

Strengthening Response Time to Disaster Risk Reduction Through Community-Based Early Warning Systems

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Abstract — Community-based early warning system is a key component of disaster risk reduction because it empowers local people to respond to hazards before they escalate into disasters. Without an effective community-based early warning system, people are left unaware of approaching hazards, giving them little or no time to prepare or evacuate. This study examined the extent of awareness and participation of the community in relation to the response time on disaster risk reduction of Sitio Dukog-dukog, Barangay Rizal, San Carlos City, Negros Occidental for Calendar Year 2025-2026. The study collected data through surveys and used a quantitative research design. Assessments were carried out among community residents and barangay implementers in the most vulnerable areas. The profile of the Community Residents respondents showed that majority belonged to age bracket 20-29 years old with; females with a maximum of 2 disaster-related trainings. On the contrary, majority of Barangay Implementers belonged to age bracket 30-39 years old, graduate in college with maximum of 9 years in public service, trained with 2 disaster-related trainings. The extent of awareness and participation of the community was described as Agree. Identical with the response time on disaster risk reduction which was also described as

Agree. The test of correlation shows significant relationship hence, was Rejected. It is therefore concluded that a functional community-based early warning system must be customized to fit the community's specific traits and local circumstances. Based on the findings, it is therefore recommended that a strengthened barangay disaster risk preparedness and emergency plan must be developed.

Keywords: CBEWS, Extent of Awareness and Participation of the Community, Response Time on Disaster Risk Reduction, Descriptive-Evaluative, Sitio Dukog-dukog, Barangay Rizal, San Carlos City, Negros Occidental, Philippines

I. INTRODUCTION

The extent of awareness and participation of the community on response time on barangay disaster risk reduction and emergency in Sitio Dukog-dukog, Barangay Rizal, San Carlos City, Negros Occidental during Calendar Year 2025-2026, as basis for the strengthened barangay disaster risk preparedness and emergency response plan. It will also include comprehensive overview of literature and concepts in understanding the factors that influencing disaster response competency integrating a strengthened barangay disaster risk preparedness and emergency response plan.

Disasters pose significant threats to human lives, infrastructure and socio-economic stability, especially in vulnerable communities. The Philippines, due to its unique geographical location along the pacific ring of fire and its exposure to typhoon, floods, landslides and other hazards, it is considered as one of the most disaster-prone countries in the world. As a result, communities must develop effective disaster risk reduction and management (DRRM) strategies and disaster preparedness to safeguard lives, structures and socio-economic assets. According to the Community Risk Assessment Tool, in Barangay Rizal there are top 3 identified hazards; flood, landslide, and fire. Rockslide or landslide is one that pose a significant threat and that most likely

will endanger the lives of the residents living in the affected area, 6 sitios are known to be in alert (Medina, Tul-ang, Katiclan, Naba-taan, Calarion, Dukog-dukog) comprising 2,111 individuals that are at risk of this hazard. The total population of Brgy. Rizal, San Carlos City, Negros Occidental is 16,775 (PSA, 2020) and 6 sitios with a population of 2,111 is 12.58% of said barangay.

In the risk categories matrix from the Public Safety and Resilience Office – San Carlos City Disaster Risk Reduction and Management Office’s (SCCDRRMO) hazard monitoring team, the total number of population that is at risk in Sitio Dukog-dukog is 340 individuals and the elements at risk are the infants ages 0-11 months with a population of 9 or 2.6%; children ages 17 years old and below with a population of 72 or 21.6%; elderlies ages 60 years old and above with a population of 32 or 9.4%; and those with comorbidity with a population of 38 individuals or 11.1% of the total population of Sitio Dukog-dukog. For the inventory of response manpower, a total of 24 barangay implementers is trained with Standard First Aid (SFA) and Basic Life Support (BLS) in Barangay Rizal with a standby emergency vehicle for immediate response.

Community – Based Early Warning System (CBEWS) is one strategy that empowers local residents to monitor, prepare for, and respond to any hazard/disaster (UNDRR, 2015). This system involves the active participation of community members in hazard detection, information dissemination, risk assessment and emergency response (Kovalevski, 2020). It is particularly vital in vulnerable areas such as Barangay Rizal, San Carlos City Negros Occidental, which is one of the barangays in San Carlos City that holds the most recorded and reported hazards/incidents. By strengthening Early Warning capacities at the community level, EWS can significantly contribute in minimizing casualties and damages (IFRC, 2019).

Literature Review

This research provided a systematic literature review of studies analyzing the extent of awareness and participation of the community on response time on barangay disaster risk reduction and emergency in Sitio Dukog-dukog, Barangay Rizal, San Carlos City, Negros Occidental during

Calendar Year 2025-2026. It validated the views of the barangay implementers and the role of other stakeholders.

In both natural and man-made disasters, minimizing the loss of life and property depends on effective disaster response. Research on how early warning systems (EWS) can improve preparedness and response to disasters has grown over time. Among these, Community-Based Early Warning Systems (CBEWS) have become an essential tool, particularly in areas with limited resources and vulnerability. The structure and operation of CBEWS, prior research and academic perspectives on disaster response mechanisms, and their documented effects on response time and community resilience are all examined in this review of the literature. This section attempted to lay the groundwork for understanding how localized warning systems and community engagement can greatly increase the effectiveness of disaster response by looking at both global and local case studies.

Community-Based Early Warning System (CBEWS) are defined as systems where **local communities actively participate** in the design, monitoring, and management of early warning mechanisms, rather than being passive recipients of alerts. This bottom-up, people-centered approach contrasts with traditional top-down models and aims to bridge the “first-mile” (community engagement) and “last-mile” (technical dissemination) in early warning systems. EWS are considered important component providing effective information combining scientific and local knowledge, to provide accuracy with reliable monitoring and predictions useful to the community at risk (Tarchiani et al., 2020).

Three contextual factors—trust in the crowd, the digital divide, and cultural sensitivity—are highlighted in Bridging Community Engagement and Technological Innovation for Creating Smart and Resilient Cities (Kangana et al., 2024) as being crucial for carrying out smart community-based disaster management (CBDM) successfully. This study also emphasizes how important smart technologies are for enhancing urban resilience, including real-time data-sharing platforms, artificial intelligence (AI), and machine learning (ML). Cities can create more thorough and effective disaster management programs by integrating these factors into technological advancements, leading to safer and more intelligent urban environments. Early warning as a

critical element of a systematized community-based disaster risk management CBDRM, devising strategies to empower the communities, the concept of an affiliated crowdsourcing as a form of participation and an evolutionary method of SMS escalation in delivering effective early warning in a community is redefining community-based disaster risk management (CBDRM) through Enhanced Early Warning Processes (Pineda, 2015). A systematized prototype of a CBDRM to include early warning tools that permit alerting and reporting incidents or emergencies related to flooding and fire must be entailed.

Accurate and timely information about the disaster's status, the environment, and the impacted population is essential to the success of any disaster relief and response effort. First responders on the scene are the main source of this information, and firsthand accounts shared in real time on social media can supplement it (Nazer et al., 2017). Through the extraction, analysis, and visualization of actionable information from social media, numerous tools and techniques have been developed to automate disaster relief. These techniques, however, are not effectively incorporated into the relief and response procedures, and further development of the relationship between the two is necessary.

As demonstrated by numerous cases where communities were caught off guard by insufficient or poorly disseminated alerts, the Philippines' lack of effective early warning systems can worsen the impact of disasters. This results in more casualties, more damage, and longer recovery times. Even though the nation has made progress in creating plans for disaster risk reduction and management, there are still issues with making sure that early warnings are received by all communities and that the information is comprehended and used appropriately. CBEWS are systems where communities actively participate in design, monitoring, and decision-making, unlike top-down models where communities are end-users only. These systems are most effective when integrated with formal forecasting and impact-based services (Tarchiani et al., 2020). Early Warning Systems (EWS) are a pillar of Disaster Risk Reduction (DRR) being an integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events (UNDRR, 2015).

II. METHODOLOGY

Research Design

This study sought to examine the extent of awareness and participation of the community and response time on disaster risk reduction in Sitio Dukog-dukog, Barangay Rizal, San Carlos City, Negros Occidental, as basis for the strengthened barangay disaster risk preparedness and emergency response plan.

This study employed a descriptive-evaluative research design, which is appropriate for assessing both the extent of awareness and participation of the community and their relationship to the response time on disaster risk reduction in Barangay Rizal, San Carlos City, Negros Occidental. The descriptive aspect of the design will be utilized to document the profile of both barangay implementers and community residents, as well as to determine the extent of awareness and participation of the community such as in the number of drills participated, seminars and workshops on risk reduction and emergencies, and knowledge in the existing early warning systems in Barangay Rizal. The evaluative component is being employed to assess the response time on disaster risk reduction as to timeliness and dissemination of warning; time from alert to evacuation, time to mobilize emergency response teams.

The design is ideal for this study because it enabled the researchers to collect quantitative information from respondents' perceptions, identify trends, and examine potential relationships between early warning system awareness, participation, and effectiveness without changing any variables. Using community-based early warning systems in Barangay Rizal, this method also makes it easier to identify opportunities, obstacles, and gaps for raising community awareness and involvement in disaster preparedness.

Predominantly, this study determined the profile of the respondent groups as to: For the Barangay Implementers' is to age, sex, residential location, highest educational attainment, number of years in service: and number of relevant trainings/seminars attended; for Community Residents' is as to age, sex, residential location, highest educational attainment, and number of relevant trainings/ seminars attended; extent of awareness and participation of the

community as to the number of drill participated, seminars and workshops attended, and knowledge in existing early warning; level of the effectiveness of early warning system in disaster response time as to the following: time from alert to evacuation, time to mobilize emergency teams, timeliness and dissemination of warning, and training and preparedness.

Accordingly, in order to determine whether there is a significant relationship between community awareness and participation and the effectiveness of early warning systems in disaster response times, as well as to evaluate the internal reliability and consistency of the framed instrument, the statistical tool that will be used in data processing is the Pearson r test. The normality test will be used to determine whether samples were drawn from a population that is normally dispersed in order to choose the appropriate statistical tools for inferential statistics and descriptive statistics that will be used for the frequency spreading of the sample.

Sample of the Study

The sample refers to the number of barangay implementers and community residents that were utilized in this study. Because it directly affected the reliability and generalizability of the findings to a larger population, the sample size, which is defined as the number of objects, people, or data points selected to statistically represent a larger population is an important determinant in research. In this study, the population size (N) will be 56 for barangay implementers and 340 for community residents.

The respondents of the study were chosen using purposive sampling for barangay implementers due to the small number of population size. Purposive sampling involves selecting individuals who are especially knowledgeable about or experienced with the topic under investigation. The goal is not to generalize to a larger population, but rather to gain in-depth understanding of particular phenomena (Palinkas et al., 2015).

Simple random sampling of 150 community residents from the 340 total population of Sitio Dukog-dukog, a subset of a population chosen at random is known as a simple random sample. Every member of the population has an exact equal chance of being chosen using this sampling

technique. Because it only requires one random selection and minimal prior population knowledge, this approach is the simplest of all probability sampling techniques. Any study conducted on this sample have high internal and external validity and less susceptible to research biases like sampling bias and selection bias because it employed randomization.

The research will be conducted in Barangay Rizal, one of the most hazard-prone areas in San Carlos City, Negros Occidental, which has a history of fire, rockslide, and flooding particularly in So. Dukog-dukog.

Table 1 presented the distribution of the respondent groups.

TABLE 1
DISTRIBUTION OF THE RESPONDENT GROUPS

Respondents	f	%
Barangay Implementers	56	27.18
Community Residents	150	72.82
Total	206	100.00

As shown in Table 1, the study's respondents composed of 150 (72.82%) community residents and 56 (27.18%) barangay implementers from Barangay Rizal, San Carlos City, Negros Occidental. The survey questionnaires were sent to 206 respondents in total. Because they belong to the same community, they were selected as responders.

Measures

Data gathered for the study used a structured questionnaire. The researcher administered the survey both in-person and online using a straightforward random and purposive sampling technique.

The survey questionnaire titled “Strengthening Response Time to Disaster Risk Reduction through Community-Based Early Warning Systems” is designed to gather relevant data from

barangay implementers in Barangay Rizal. Its purpose assessed the effectiveness of current disaster risk reduction strategies and the role of community-based early warning systems (CBEWS) in enhancing response time and preparedness at the community level.

The questionnaire is divided into three comprehensive sections that address various key variables of the study.

Section I: Demographic Profile of Barangay Implementers collects background information including age, sex, residential location, educational attainment, years in service, and the number of disaster-related trainings or seminars attended. These variables serve as control variables in the study, helping to contextualize the respondents' knowledge, awareness, and engagement in disaster risk reduction activities. Understanding the demographics also provides insights into potential gaps in training or preparedness across different employee profiles.

Section II: Awareness and Participation in Community-Based Disaster Risk Reduction evaluates the respondents' personal experience with disaster drills, seminars, and knowledge of early warning systems. This section uses a 5-point Likert scale to measure the level of agreement with specific statements. The variables here focus on awareness, involvement in preparedness activities, and familiarity with community alert mechanisms, which are crucial for assessing how well-informed and engaged the barangay implementers are regarding disaster readiness initiatives.

Section III: Response Time on Disaster Reduction measures the response time in different emergency scenarios (evacuation, team mobilization, and warning dissemination), This section also uses a Likert scale to assess respondents' perceptions of timeliness and operational effectiveness, which directly ties into the primary variable of the study—response time in disaster risk reduction.

The questionnaire is well-structured and aligns with the core variables of the study: response time, effectiveness of community-based early warning systems, implementers' preparedness, and engagement in disaster risk reduction initiatives. A quantitative (Likert-scale) method, the instrument ensures a balanced approach to data collection that can inform evidence-based recommendations for policy enhancement and training improvement.

Procedures

In order to report the established research questions and produce the proper result based on the current study's findings, the data-gathering process for this study entailed the following steps.

Before the start of data collection, the researcher secured the necessary approval to ensure that the study complied with institutional and ethical standards. A formal request to conduct the research was forwarded to the Punong Barangay of Barangay Rizal and City Mayor of San Carlos City, Negros Occidental. Subsequently, coordination was made with the community leaders and barangay implementers of Sitio Dukog-dukog and arranged schedules accommodated both the administration of research instruments without disrupting regular personal and office work hours.

The data collection process carried out in several systematic phases to ensure accuracy, reliability, and adherence to ethical research protocols: **Pre-Data Collection Orientation** – The researcher conducted an orientation session with the participating barangay implementers through face to face or virtual, whichever is viable as well as community residents' respondents. The session outlined the objectives of the study, the significance of their participation, the procedures followed, and the measures taken to ensure confidentiality and anonymity. **Distribution of Barangay Implementers' and Residents Questionnaires** – respondents provided with a structured questionnaire designed to gather demographic profiles and perceptions regarding the extent of awareness and participations of the community and the effectiveness of the early warning systems in disaster response. These questionnaires were distributed in person, accompanied by clear instructions on how to complete them. Barangay Implementers allotted an agreed-upon period to accomplish the forms to allow flexibility and to avoid interference with their work hours.

To preserve a professional atmosphere, the survey was conducted during regular working hours. Guaranteed a smooth implementation, the researcher facilitated the process with the help of community leaders and officials. All residents have had an equal opportunity to finish the tasks, and instructions were given in a clear and consistent manner. **Data Collection and Verification:** Following the collection of survey questionnaire responses, the researcher thoroughly examined the data to ensure that all entries are accurate and complete. Unclear or partial responses were promptly clarified with the appropriate respondents to prevent data gaps. **Organization and Data**

Encoding: Verified data was systematically encoded into a secure database for statistical processing. Coding systems were used to protect respondent privacy and make it easier to arrange the data based on the variables being studied.

Therefore, the researchers concluded from the results and recommended research and interventions to address the issue on the extent of awareness and participation of the community in relation to the response time on disaster risk reduction in Sitio Dukog-dukog, Barangay Rizal, San Carlos City, Negros Occidental, as basis for the strengthened barangay disaster risk preparedness and emergency response plan.

Data Processing

The gathered data from the survey questionnaires were tabulated and organized. Descriptive statistics such as **frequency counts, percentages, means, and standard deviations** were used to summarize the profile variables and the extent of awareness and participations of the community. The **weighted mean** determined the overall level of response time on disaster risk reduction. To test the significant relationship between the extent of awareness and participations of the community and the level of response time on disaster risk reduction, the **Pearson Product-Moment Correlation Coefficient** was employed. The significance level is set at **0.05**. Qualitative responses on challenges were subjected to **thematic analysis**, allowing patterns and recurring issues to emerge. The information obtained served as the basis on understanding the relationship between the extent of awareness and participation of the community in relation to the level of response time on disaster risk reduction among community residents in Sitio Dukog-dukog, Barangay Rizal, San Carlos City, Negros Occidental.

Ethical Considerations

Research involving people has played a vital role in helping us understand and improve treatments whether it's new medicines, medical devices, or ways to support mental and

physical health. But with this progress comes a deep responsibility: making sure that the people who take part in these studies are treated with care, respect, and fairness. Ethics in research aren't just rules they're essential for protecting participants and ensuring that the results we rely on are trustworthy and meaningful.

Ethical considerations in research are the guiding principles that help researchers make responsible and respectful choices in how they design and carry out their work. It's essential that scientists follow a strict code of conduct—whether they're collecting data, testing new treatments, or studying how people think and behave. These ethical guidelines not only protect the rights and well-being of the individuals who take part in research, but also ensure that the results are honest, reliable, and held to the highest standards of integrity. Once participants have read the information sheet and understand what the project is about, they're given a consent form to sign. This form is a way for them to officially say they're willing to take part in the study. It confirms that they've been informed about the research and agree to participate voluntarily. The questionnaire will be designed to avoid sensitive or intrusive questions, and no personal identifiers will be collected to maintain anonymity and confidentiality.

Finally, the researcher ensured that the study was conducted with the highest level of professionalism, honesty, and care. This means followed all ethical guidelines, respecting participants' privacy in line with the Data Privacy Act of 2012 and university's policies, and making sure that any data collected is handled responsibly—including securely disposing of raw data once it's no longer needed.

III. RESULTS AND DISCUSSION

In this section, the data gathered from participants' questionnaires are presented, evaluated, and interpreted. Accompanied by appropriate statistical analyses, the findings are shown in tables and graphs. The discussion focuses on the extent of awareness and participation of the community in relation to the Barangay Rizal's response time in disaster risk reduction.

Summary of Findings. A brief overview of the findings derived from the survey questionnaires is presented in this section in connection to the extent of awareness and participation of the community and the response time on disaster risk reduction. This section summarized the key findings and insights, highlighting notable trends and patterns identified in the data.

1. Demographic Profile of the Respondent Groups. The demographic profile of both community residents and barangay implementers highlights important considerations for strengthening community-based early warning systems (CBEWS) and broader disaster risk reduction and management (DRRM) initiatives. Among community residents, the age distribution is dominated by young adults aged 20–29, who comprise nearly half of all respondents. This youthful population is complemented by a significant segment of older adults, reflecting a balanced mix of physically active individuals and more experienced residents who can provide guidance in disaster preparedness efforts. The slight predominance of females further suggests that women play a critical role in household preparedness, caregiving, and community mobilization, making them essential partners in disaster-related programs. Most residents come from upland areas, where exposure to rainfall-induced hazards such as landslides, flash floods, and erosion is more pronounced. This geographic distribution underscores the need for localized early warning mechanisms capable of functioning despite distance from urban centers and potential communication challenges. Educationally, the majority of residents have at least a high school education, with a considerable proportion having completed college. This literacy level is advantageous for disseminating and comprehending warning messages, participating in drills, and engaging in community planning. However, formal disaster-related training remains limited for most residents, indicating the need to broaden participation in capacity-building activities. Barangay implementers, meanwhile, are largely in their early to mid-career stages, with most aged 30–39. Their generally high educational attainment—dominated by college graduates—positions them well to understand and implement technical DRRM guidelines. Although most are relatively new in service, their fresh perspectives can support innovation in CBEWS implementation, provided that structured mentoring and institutional continuity are ensured. While training exposure among implementers is higher than that of residents, continued and expanded capacity-building remains essential to strengthen their ability to lead early warning initiatives effectively.

2. Extent of awareness and participation of the community. The findings presented the extent of awareness and participation of the community was described as Agreed. Through the number of drills participated, seminars and workshops on risk reduction and emergencies and knowledge in early warning systems, our respondent groups agreed that the involvement of the community must be adhered for it is the core of the success of the early warning systems of a community. Community awareness and participation are critical elements that determine how effective a community-based early warning system (CBEWS) is in reducing disaster risks. Communities can contribute important local knowledge (e.g., flood-prone areas, evacuation routes) that improves the accuracy and usefulness of early warning systems.

3. Response time on disaster risk reduction. The finding revealed that the Sitio Dukog-dukog, Barangay Rizal's response time was described as Agreed as to disaster risk reduction by the respondent groups to be effective and prompt. The timeliness and dissemination of warning, diligent time from alert to evacuation, and the time to mobilize emergency teams when disasters arise in Barangay Rizal was sought to be conscientious. In any community facing natural hazards, the speed at which people react after receiving a warning can make the difference between safety and disaster. When response time is fast, families can evacuate early, move to safer areas, and take simple protective actions that prevent injuries and save lives. A quick response also allows households to secure their property, shutting off power, moving valuables, or reinforcing structures, and reducing the amount of damage a disaster can cause. A community that consistently responds quickly becomes more resilient over time. People learn from experience, trust warning systems, and understand what to do when a threat appears. This readiness not only minimizes damage during the event but also speeds up recovery afterward.

4. Test of significant relationship between profile of community residents and the extent of awareness and participation of the community.

The correlation analysis indicates a statistically significant positive relationship between the identified community residents and the extent of awareness and participation of the community. The effectiveness of a community-based early warning system depends not only on

the technologies or protocols in place, but also on the people who receive, interpret, and act on the warnings. The profile of residents such as their age, gender, education, occupation, socioeconomic status, length of residence, access to information, and previous experience with hazards plays a crucial role in shaping their level of awareness and degree of participation in early warning initiatives.

5. Test of significant relationship on the profile of barangay implementers and the extent of awareness and participation of the community.

The results of the correlation analysis indicate that some profile of barangay implementers have a statistically significant positive correlation with the extent of awareness and participation of the community in Sitio Dukog-dukog, Barangay Rizal. The success of community-based early warning systems in any barangay relies heavily on the capacity and characteristics of the implementers who lead disaster preparedness and response efforts. The profile of barangay implementers including their age, educational attainment, training background, experience in disaster risk reduction, length of service, and roles in the local government structure significantly influences how effectively they can raise awareness and encourage active participation among residents. Barangay officials and volunteers who possess relevant training in disaster management are typically more confident and capable of communicating accurate hazard information and mobilizing the community during emergencies. Their experience in past disaster events also equips them with practical judgment on how to coordinate warnings, manage risks, and engage community members.

6. Test of significant relationship on the profile of barangay implementers and the response time on disaster risk reduction.

The results of the correlation analysis indicate that some profile of barangay implementers have a statistically significant positive correlation with the response time on disaster risk reduction in Sitio Dukog-dukog, Barangay Rizal. Experience is a crucial factor, barangay officials and volunteers who have dealt with previous disasters often develop situational awareness and quick decision-making skills, allowing them to anticipate challenges and execute established procedures with confidence. In contrast, implementers with limited experience may take more time to verify

information or hesitate in initiating emergency measures, which can slow down overall response time. Moreover, the length of service and familiarity with the community enable implementers to identify high-risk areas, vulnerable households, and the most effective communication channels, ensuring that warnings reach the right people as fast as possible. Leadership qualities and interpersonal skills also influence response time. Implementers who are trusted by the community can mobilize residents rapidly, reducing delays in evacuation or hazard-mitigation actions. Their ability to coordinate with local agencies, emergency responders, and community volunteers strengthens operational efficiency, especially during critical moments when every second counts. When implementers are skilled, experienced, and well-prepared, the community's response time is significantly improved, contributing to a safer and more resilient barangay.

7. Test of significant relationship on the extent of awareness and participation of the community and the response time on disaster risk reduction.

The correlation analysis shows an association between the extent of awareness and participation of the community and the response time on disaster risk reduction in Sitio Dukog-dukog, Barangay Rizal. The same result is likewise supported by the non-parametric Fisher's Exact Probability Test. The Community-Based Early Warning System (CBEWS) is a tool to capacitate a community that will ultimately reduce the risks or impacts of a hazard when exposed or when vulnerable to disasters. CBEWS strengthened the response time in disaster risk reduction, as whole-of-society approach with active community participation.

IV. CONCLUSIONS

Based on the findings, this study concludes that the profile of the respondent groups is connected to the extent of awareness and participation of the community and response on disaster risk reduction as functional community-based early warning system must be customized to fit the community's specific traits and local circumstances. In community-based early warning systems, higher community awareness and participation lead to faster, more organized disaster responses. Engagement in drills, monitoring, and preparedness activities builds skills, trust, and coordination,

demonstrating a significant link between awareness, participation, and response time, highlighting the need for continuous education and inclusive strategies.

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