

Brief

Empowerment Disaster-Resilient Village Forums for Health Crisis Preparedness: A Participatory Action Research Approach

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ABSTRACT

This study aims to enhance the Disaster Resilient Village (Destana) forum's preparedness for disaster-related health crises. The key challenges identified are low community response to early warning systems and slow mobilization of health resources, both contributing to high victim numbers and exacerbating health crises. The study focuses on creating an accessible early warning system and accelerating health resource mobilization, prioritizing these elements based on an analysis of disaster preparedness parameters. Using Action Research with a Participatory Action Research (PAR) design, the research was conducted in Magetan Regency, East Java, involving 150 Destana forum administrators. The study explores the development of early warning procedures, health contingency plans, emergency response structures, and simulation plans. The findings reveal that the Destana forum successfully developed tailored health contingency plans for each village, including an inclusive early warning system Standard Operating Procedure (SOP) for vulnerable groups. Additionally, an integrated health command structure was formed, enhancing emergency response coordination. Emergency response simulations with 90 participants demonstrated improved readiness and community engagement in handling health crises. The study highlights the importance of a participatory, sustainable approach to building resilience, showing that active community involvement fosters collective responsibility for managing health crises during disasters.

Keywords: Preparedness; crisis; health; disaster; action research

1. INTRODUCTION

Disaster preparedness includes five main parameters, namely: 1) Knowledge and attitude, 2) Policy, 3) Emergency response plan, 4) Early warning system, and 5) Resource mobilization. This study uses the Quadrant of Difficulty-Usefulness (QoDU) method to determine the priority of disaster health crisis preparedness parameters. Based on this analysis, early warning system and resource mobilization are the two main priorities that need to be realized by Disaster Resilient Villages (Destana).⁽¹⁾ Over the past five years, Magetan Regency has experienced various disasters that have impacted public health and infrastructure. Based on data from the Magetan BPBD and the regional health profile, in 2020 alone there were 242 disasters, consisting of 74 natural disasters and 168 non-natural disasters, such as floods, strong winds, and landslides. Floods, for example, occurred in Ngelang Village and Jajar Village, Kartoharjo District,

which had an impact on health such as increasing cases of diarrhea, itching, and non-communicable diseases. Landslides that hit Magetan, Plaosan, Poncol, Parang, and Ngariboyo Districts damaged buildings and basic infrastructure, although there were no fatalities.⁽²⁾ Strong winds also hampered road access in Magetan and Plaosan Districts but did not cause serious damage. Meanwhile, the Community Service Center (PSC) 119 and the Health Office noted an increase in emergency services such as evacuation and post-disaster health care, especially for vulnerable groups such as the elderly and children.

Lack of emergency response to health crises caused by disasters can lead to increased mortality and morbidity in affected communities. If health systems are unprepared or slow to respond, disaster victims who need immediate care, including those with serious injuries or deteriorating health conditions, will not receive timely care.⁽³⁾ Damaged health infrastructure and limited medical supplies also exacerbate the situation, making it difficult for health workers to provide adequate care. As a result, infectious diseases such as diarrhea, respiratory infections, and skin diseases are likely to increase, especially in crowded evacuation centers with limited sanitation facilities.⁽⁴⁾

In disaster management, there are four main phases: mitigation, preparedness, response, and recovery. The emphasis on mitigation and prevention aims to reduce the risk and impact of disasters. Mitigation includes structural efforts such as building disaster-resistant infrastructure, as well as non-structural efforts such as developing policies based on risk analysis. Meanwhile, prevention includes specific steps to minimize the impact of disasters, including public education and preparedness training designed to increase community resilience.^(5,6)

In Magetan Regency, mitigation and prevention efforts are carried out through various programs at the village level, one of which is Destana which actively involves the community in disaster preparedness planning and training. This approach is in line with community-based mitigation which emphasizes the importance of community participation in identifying and reducing risks. According to current theory, community-based mitigation is effective in strengthening local capacity, because local communities have a deep understanding of their environmental conditions. This approach also supports WHO recommendations that prioritize coordination between

government, NGOs, and communities in developing early warning systems and emergency response plans.

Participatory Action Research (PAR) actively involves communities in every phase, from problem identification through focus groups and in-depth interviews to planning, implementation, data collection, and evaluation.⁽⁷⁾ In implementing the action, researchers and communities work together to ensure the success of the intervention, and data is collected through surveys, interviews, and observations. The final step of reflection and evaluation is carried out to identify successes and challenges, and to generate insights for the next research cycle. The results of this research are disseminated to the community and stakeholders, ensuring that the knowledge generated is used well. This collaborative approach of PAR not only produces relevant data but also empowers communities to make decisions that matter to their lives.⁽⁸⁾

This study selected Ngelang Village and Jajar Village which are prone to flooding almost every year, as well as Alastuwo Village and Randugede Village which face the risk of landslides and land fires. Ngelang Village and Jajar Village become the context to explore the development of community capacity in dealing with recurring floods. This study also examines the effectiveness of Destana interventions in increasing community participation in disaster mitigation and response. Meanwhile, the selection of Alastuwo Village and Randugede Village allows this study to explore mitigation strategies tailored to local risks, such as landslides and land fires. The focus on diverse local dynamics provides deeper insights into disaster risk management, as well as policy recommendations to improve community resilience in Magetan Regency. This approach also by following the principles of disaster management which emphasize the importance of community involvement throughout the disaster cycle.⁽⁹⁾ Weak disaster health crisis preparedness can slow the recovery of affected communities in the long term. The inability to quickly mobilize health resources slows the recovery of medical facilities and public health services, which worsens the socio-economic and mental health conditions of communities, especially vulnerable groups such as children, the elderly, and people with disabilities.^(10,11)

Solutions to improve disaster health crisis preparedness in Magetan Regency include intensive training, socialization of early warning systems for vulnerable groups, and development of clear health

contingency plan documents. Emergency response simulations involving the entire community are also important to ensure community understanding and skills in dealing with health crises. This study combines a PAR approach to empower communities and QoDU analysis to prioritize preparedness elements. This study contributes to local understanding of disaster health management and provides recommendations to improve community resilience, as well as support the development of better disaster management policies.

2. METHODS

This research employed action research with a Participatory Action Research (PAR) design. The research process followed four stages outlined by Kemmis and McTaggart: planning, acting, observing, and reflecting. The research was conducted in the Disaster Resilient Villages (Destana) of Randugede, Alastuwo, Ngelang, and Jajar in Magetan Regency, East Java, Indonesia. The locations were selected using purposive sampling based on disaster frequency, types of disasters, village resilience categories, and the level of activity of the Destana forum. The study took place from February to October 2024 and involved 150 participants from the Destana forum.

The focus of the research was on enhancing the forum's capacity to implement two disaster preparedness parameters: the early warning system and resource mobilization. These parameters were prioritized based on the Quadrant of Difficulty and Usefulness (QoDU) model. PAR activities aimed to facilitate the development of standard operating procedures for early warning systems, raise awareness about the importance of responding to early warnings for vulnerable groups and individuals with disabilities, and prepare health contingency plans, followed by simulations of health crisis emergency responses. The planning and implementation processes were conducted collaboratively with the participants, while observations were made by enumerators. If the results of observations and reflections were unsatisfactory, the research cycle was repeated until the desired outcomes were achieved. The research procedure began with planning, which involved scheduling, agreeing on objectives and topics, preparing observation and reflection sheets, and developing a rubric to measure participant activity. Activities were implemented according to the schedule, with 4 days (32 hours) of

training, during which participants completed modules prepared by the researcher. Observations were made to evaluate participation, processes, and outcomes. Finally, reflections were conducted to assess the results.

Data were collected through interviews, observations, and secondary sources, using observation sheets as instruments. Data analysis was qualitative and descriptive, involving data reduction, verification, and presentation of information. All research activities were approved by the Health Research Ethics Commission of the Surabaya Ministry of Health Polytechnic (approval number: EA / 2198 / KEPK-Poltekkes_Sby / V / 2024).

3. RESULTS

The Table 1 below summarizes the main results of each PAR stage, including activity focus, activity implementers, activity results, participation levels, and reflections.

1. *Destana Forum Assistance in Preparing Health Crisis Contingency Plan Documents*

The results of the study using the Participatory Action Research (PAR) approach in Magetan Regency showed a significant impact in realizing health contingency plan documents, which were different from previous conditions. Before this study, many villages in Magetan did not have structured health contingency plans to deal with health crises due to disasters, even though disaster threats such as floods, landslides, and land fires often occurred. This resulted in the community being unprepared to respond to disasters, as well as limitations in coordinating health care. Previous studies have shown that many communities still rely on assistance from the central or regional government without having a clear plan and active involvement in disaster management.

By implementing the PAR method, communities in villages such as Ngelang, Jajar, Alastuwo, and Randugede were directly involved in developing the document. As a result, the community not only prepared a contingency plan but also developed standard operating procedures (SOPs) for an inclusive early warning system. Comparison with previous studies indicates that active community involvement in the decision-making process increases a sense of ownership and responsibility for the plans made. Other studies emphasize that

Table 1. Research results show the elements of early warning system parameters and resource mobilization for disaster preparedness

| No. | Parameter | Element | Before | After | Executor | Observation | Reflection |
|-----|-----------------------|--|--|---|--|--|--|
| 1 | Early Warning System | 1) Standard Operating Procedure for Early Warning System 2) Socialization of the importance of responding to early warnings 3) Early warning team | There isn't any yet Never been done 1 person | Available It is already done 3 people | Destana forum accompanied by facilitator | Based on the observation results, participants were very active, and their level of knowledge increased significantly. | Based on the results of the reflection, the activity can be completed in 1 cycle. |
| 2 | Resource Mobilization | Resource Mobilization 1) Threat Map 2) Vulnerability Map 3) Capacity Map 4) Area Risk Map 5) Response Map 6) Health Crisis Emergency Response Command Structure 7) Infrastructure Needs Plan 8) Command and Control System 9) Communication and Information Systems Disaster Health Crisis Emergency Response Simulation 1) Developing Disaster Event Scenarios 2) Developing Disaster Impact Scenarios 3) Performing Table Top Exercise (TTX) 4) Developing a Rehearsal Operation Plan 5) Arranging roles and actors 6) Conducting Post Command Exercises (Space Rehearsal) 7) Conducting Field Training Exercises | Not available Not available Not available Not available Not available Not available Not available Not available Not available Never compiled Never compiled Never done it Never done it Never done it Never done it Never done it | Available Available Available Available Available Available Available Available Available Already compiled Already compiled Already done Already done Already done Already done Already done | Destana forum accompanied by facilitator Destana forum community, and accompanied by facilitators | Based on the observation results, participants were very active, and their level of knowledge increased significantly. Based on the observation results, participants were very active, their level of knowledge increased significantly, and the simulation was carried out according to the operational plan for 120 minutes. | Based on the results of the reflection, the activity can be completed in 1 cycle. Based on the results of the reflection, the activity can be completed in 1 cycle. |

community participation in disaster planning increases local resilience and accelerates response in emergencies. Thus, this research not only creates useful documents but also empowers communities in preparing themselves for potential future health crises, creating sustainable changes in the culture of disaster preparedness in Magetan Regency.

This research has successfully facilitated the development of a health crisis contingency plan document that was previously unavailable in the villages where the research was conducted (Table 1). This document covers disaster scenarios that impact public health, such as the impact on sick and injured residents, disease outbreaks, damage to health facilities due to natural disasters, affected health workers, and disruption of access to health services. The development process involved the active participation of the Destana forum, the community, health workers, and village officials through brainstorming, brainwriting, focus group discussions, and practice. With this document, the village now has clear guidelines for responding to various possible health crises.

This contingency plan is also equipped with special procedures for evacuation and first aid for critically injured victims, non-critically injured, moderately injured, and lightly injured, including a triage system, and treatment of victims in field hospitals in emergency conditions. Each step is explained in detail, including treatment for vulnerable groups such as the elderly, pregnant women, children, and people with disabilities. In addition, the document includes the division of roles between village health workers, health cadres, and volunteers in managing crises. This comprehensive preparation ensures that all elements of society understand their respective responsibilities in responding to a health crisis.

The existence of this contingency plan document is a step forward in village preparedness to face a health crisis because previously the handling was done spontaneously and uncoordinated. With this document, the village can anticipate the impact of disasters on health in a more structured and efficient manner. This plan also serves as a reference for local governments in supporting village preparedness and integrating health crisis mitigation measures at a broader level.

2. Destana Forum Assistance in the Preparation and Socialization of Early Warning System Procedures for Vulnerable Groups

The results of the study using the Participatory Action Research (PAR) approach in the Magetan Regency showed a significant impact on the development of Standard Operating Procedure (SOP) documents for the early warning system and socialization of vulnerable groups and disabilities. Previously, the condition of the early warning system in many villages was still reactive and unstructured, with information that did not reach all levels of society. Other published studies have noted that the lack of clear SOPs results in delays in disaster response, especially for vulnerable groups who are often not integrated into the planning and response process.

Through the PAR approach, the communities in the villages involved not only developed SOPs but also participated in the socialization of information to vulnerable groups, including disabilities. This is different from previous studies that have been published, where the participation of vulnerable groups in the early warning system was very minimal, resulting in their lack of understanding of the risks and procedures that must be taken. By involving this group in the SOP preparation process, this study ensures that the early warning system that is built is more inclusive and responsive to their needs. The findings show that communities are better prepared to face disasters, as well as creating better communication networks between the community and health service providers. Thus, the results of this study show positive changes in the culture of disaster preparedness in Magetan, which focuses on strengthening community capacity in dealing with health risks due to disasters.

The study also produced early warning system procedures that focus on protecting vulnerable groups such as the elderly, pregnant women, children, and individuals with disabilities. These procedures were designed with the specific needs of these groups in mind, especially in terms of speed and access to information when a disaster or health crisis occurs. The early warning system uses local communication devices such as loudspeakers in mosques, community radio, and short messages via mobile phones to reach all levels of society.

In addition to the preparation of procedures, this study also carried out intensive socialization activities for vulnerable groups and their families (Table 1). Socialization activities were carried out through meetings at the neighborhood association (RT) and community association (RW) levels, as well as simple independent evacuation techniques that directly involved vulnerable groups in the threat of priority disasters in each village. With this socialization, village communities who are categorized as vulnerable can understand what steps to take when a disaster occurs, including knowing evacuation routes, where the nearest evacuation point is, and who they can contact in an emergency.

Increasing the understanding of vulnerable groups about the early warning system is essential to ensure that no one is left behind when a crisis occurs. Intensive socialization also strengthens social cohesion at the village level, where communities support and help each other with those who are vulnerable. These results confirm that with an inclusive approach, early warning systems can function effectively, especially for those who have limited access to information.

3. Destana Forum Assistance in Health Crisis Emergency Response Simulation

The results of the study that applied the Participatory Action Research (PAR) approach in Magetan Regency showed a significant impact in organizing emergency response simulations for health crises. Previously, emergency response simulations in villages were often sporadic and did not involve broad community participation. Research has reported that many villages do not have structured training, resulting in unpreparedness when facing health disasters. In this context, the simulations held were not optimal because they did not involve all elements of society, including vulnerable groups.

In this study, emergency response simulations were carried out by actively involving local communities, which is one of the advantages of the PAR approach. In the villages involved, such as Ngelang and Alastuwo, this simulation was attended by 90 participants consisting of forum members and the community, who directly practiced the previously prepared SOPs. As a result,

this simulation not only increased the knowledge and skills of participants but also created a sense of mutual trust and coordination between community members in responding to emergencies. Research in several countries has emphasized that involving communities in simulations can strengthen local capacity and accelerate disaster response, reducing the time needed to adapt when a disaster occurs.

Thus, the results of this study indicate a significant change in the culture of disaster preparedness in Magetan, making emergency response simulations an important tool for building community resilience. An approach that prioritizes active community participation in every stage of disaster preparation produces a more sustainable impact, compared to previous efforts that were more top-down and less effective in reaching all levels of society.

The disaster-resilient villages involved in this study successfully conducted a simulation of a health crisis emergency response based on a scenario that had been prepared in a contingency plan document. This simulation involved all levels of society, especially in high-risk areas, including health workers, village officials, volunteers, and vulnerable groups. The main focus of the simulation was handling a health crisis due to a disaster, conducting a Rapid Health Assessment, triaging victims at the disaster site, handling injured victims, victim evacuation techniques, distributing medicines, recording victim data, and providing temporary health services at evacuation sites.

This simulation provides a clear picture of community preparedness in dealing with emergency health crises. During the simulation, several shortcomings in emergency response procedures were identified, such as limited medical facilities and medicines, slow mobilization of reserve health workers to the disaster location, inconsistencies in victim data, inappropriate evacuation techniques, and delays in evacuating vulnerable groups. Through this simulation, volunteers, communities, and village officials can re-evaluate the procedures that have been implemented, make adjustments, and correct any shortcomings found, so that they are better prepared to face a real health crisis.

The simulation results showed an increase in awareness of volunteers and the community about

the importance of a well-coordinated emergency response to a health crisis (Table 1). In addition, this simulation strengthened the synergy between the village government, health workers, the disaster emergency response command team, and volunteers in responding to disasters. Through continuous training and repetition of simulations, it is hoped that community preparedness will become more mature, and they will be able to face future health crises more resiliently.

4. DISCUSSION

The study using Participatory Action Research (PAR) demonstrated the effectiveness of community empowerment in health crisis preparedness in Magetan Regency. Active community involvement in programs like the Disaster Resilient Village (Destana) has successfully built local capacity to develop contingency plans and early warning system Standard Operating Procedures (SOPs). This aligns with global frameworks like the Sendai Framework for Disaster Risk Reduction, which emphasizes community participation in disaster risk management.⁽¹²⁾

Health crisis contingency planning is crucial for disaster-prone villages. Preparedness documents serve as essential guides for managing health crises during disasters, with studies showing that structured contingency plans lead to faster, more effective responses.^(13,14) Magetan's context, prone to floods and landslides, requires a systematic health risk management approach. Insights from Japan and Brazil, where community involvement and public health integration have proven effective, are valuable in developing inclusive strategies.^(15,16)

The synergy between government policies and community participation is vital, as seen in the national framework by the National Disaster Management Agency (BNPB).⁽¹⁷⁾ Additionally, models from the Philippines, Singapore, and Germany highlight the importance of community-based preparedness, which strengthens resilience.⁽¹⁸⁻²⁰⁾

The emergency response simulation in Magetan revealed gaps in evacuation and data consistency, consistent with findings by Jones et al. showing that simulations identify operational weaknesses.⁽²¹⁾ These exercises enhance community preparedness and improve coordination during real crises. Regular

evaluations, as suggested by Mitroff et al., ensure continuous improvement.⁽²²⁾

The PAR approach significantly improved health crisis preparedness in Magetan, with community involvement in document preparation, early warning procedures, and simulations strengthening resilience.⁽²³⁾ This study contributes valuable insights to disaster preparedness literature, particularly in public health, and provides a model for other villages.⁽²⁴⁾

The study faced challenges such as potential bias in data collection, participant variability, and limited geographic scope. Future research should explore the long-term impact of contingency plans, incorporate technology for communication and training, and compare preparedness models across regions. A holistic, interdisciplinary approach is needed to address the evolving nature of health crises influenced by climate change and socio-economic factors, involving all relevant stakeholders.

5. CONCLUSION

This study highlights the effectiveness of community empowerment in enhancing health crisis preparedness through the Participatory Action Research (PAR) approach. Involving communities in developing health contingency plans and early warning system SOPs has strengthened resilience in Magetan Regency. Active participation in emergency simulations further underscores the need for continuous education and training to improve preparedness, especially given the region's vulnerability to natural disasters like floods and landslides. The policy implications are significant. There is a need for more integrated, community-based policies to encourage local participation in health preparedness planning. Local governments should allocate more resources to community education and training, fostering collaboration with NGOs and the private sector. A community-based approach will enhance the effectiveness of health preparedness, improving local capacity to respond to and recover from health crises. This study calls for proactive policy-making focused on risk mitigation and strengthening community resilience.

Recommendation

Following are some specific policy recommendations for action to scale up interventions to

Destana and other areas, and integrate research findings into local and national disaster management strategies:

1. Enhance collaboration between government, NGOs, the private sector, and local communities in disaster health crisis preparedness. Establish a network to share resources and create joint action plans.
2. Incorporate research findings into national and regional disaster management policies like the RPJMD and RAD, with clear guidelines for health contingency plans and early warning SOPs.
3. Invest in disaster-resilient health facilities and ensure all health centers have access to early warning systems and can function as emergency response hubs.
4. Use ICT to disseminate health crisis information, such as mobile apps for real-time alerts, online training, and resource updates.
5. Provide special funds for local governments to support Destana activities, including mitigation, preparedness, training, and equipment procurement.
6. Expand training for Destana members and the public on disaster crisis management, including SOPs and emergency simulations, especially for vulnerable groups.
7. Facilitate collaboration between villages to exchange best practices and resources for disaster preparedness.
8. Encourage collaboration between Destana, NGOs, and the private sector in community-based disaster risk reduction (CBDRM) programs to enhance resource availability and outreach.
9. Launch campaigns to educate the public on disaster risks, preparedness, and preventive actions, targeting schools, communities, and vulnerable groups.
10. Establish a system for monitoring and evaluating disaster preparedness programs, incorporating community feedback for ongoing improvements.

By implementing these recommendations, it is hoped that Destana and the community in Magetan Regency and other areas can be better prepared and resilient in dealing with health crises that arise due to disasters. These steps will also ensure that regional and national disaster management strategies become more inclusive and responsive to local needs.

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Conflict of Interest

Although there is funding support from the Magetan Regency Disaster Risk Reduction Forum, East Java, Indonesia, there is no conflict of interest between the author and the forum. The research results can be used by the forum to assist other disaster-resilient villages.

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