Texila International Journal of Public Health
ISSN: 2520-3134
DOI: 10.21522/TIJPH.2013.12.04.Art087

Participatory Action Research to Realize Disaster Health Crisis Preparedness in the Community

Sunarto[1*], Heru Santoso Wahito Nugroho[1], Suparji[1], Teta Puji Rahayu[1], Tinuk Esti Handayani[1], Setya Haksana[2]

[1]*Department of Midwifery, Health Polytechnic of the Ministry of Health Surabaya, Surabaya, Indonesia*

[2]*Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia*

Abstract

Many Disaster Resilient Villages in Indonesia still face obstacles in realizing preparedness for health crises due to disasters. This study aimed to facilitate the Disaster Resilient Village Forum in realizing an early warning system that is easily responded to by the community and mobilization of health resources in the disaster health crisis preparedness phase. This study was conducted using the Participatory Action Research approach involving 150 participants from 4 Disaster Resilient Villages. The research objects include: 1) preparation of a participatory health crisis contingency plan document; 2) facilitating the socialization of early warning systems to vulnerable groups; 3) facilitation of disaster health crisis emergency response simulation; and 4) measuring the level of village resilience. The approach was carried out in several cycles consisting of 4 steps, namely planning, acting, observing and reflecting. The results of the study showed that the forum and the community implemented the four research objectives well by the objectives in one cycle. It is further concluded that the Participatory Action Research approach can be used well to facilitate the Disaster Resilient Village Forum in realizing an early warning system that is easily responded to by the community and the mobilization of health resources in the disaster health crisis preparedness phase.

Keywords: *Action Research, Community, Disaster, Health Crisis, Preparedness.*

Introduction

There are 5 main aspects of disaster preparedness parameters, namely: 1) knowledge and attitude, 2) policy, 3) emergency response plan, 4) early warning system (EWS), and 5) resource mobilization. Based on prior research, it was found that the EWS and resource mobilization are the two main priorities that must be realized by Disaster Resilient Villages. In more detail, there are main priorities that must be immediately realized by Disaster Resilient Villages, namely: preparation of EWS procedures, involvement of vulnerable groups in early warning socialization, preparation of health contingency plan documents, determination of command structures in handling health crises, and preparation of disaster event scenarios for disaster health crisis emergency response simulations. Facilitation is needed in realizing these elements with an active participation approach from the forum in realizing them [1].

In East Java Province, in the period 2020 to 2024, there were 1,598 disasters, and 176 of them resulted in health crises. The average disaster occurrence is 319 times per year, the most being floods, followed by tornadoes, landslides, and earthquakes [2]. Meanwhile, in Magetan Regency, there were 33 disasters, and 5 of them resulted in health crises, with the

Received: 21.10.2024 ***Accepted: 20.11.2024*** ***Published on: 27.12.2024***

****Corresponding Author: sunartoyahyamuqaffi@gmail.com***

types of disasters that have the potential to cause health crises being floods, tornadoes, and landslides [3].

Poor emergency response to health crisis conditions due to disasters can have serious impacts on the community, especially increasing mortality and morbidity. When the health system is not ready or is slow to respond, disaster victims who need immediate medical attention, such as serious injuries or declining health conditions, do not receive timely treatment [4]. In addition, damage to health infrastructure and lack of medical supplies can worsen the situation, making it difficult for health workers to provide adequate services. As a result, there has been an increase in the incidence of infectious diseases such as diarrhoea, respiratory infections, and skin diseases, especially in crowded refugee camps with minimal sanitation facilities [5, 6].

The long-term impacts of poor health emergency response are also associated with slower recovery for communities. The inability to mobilize health resources quickly slows the recovery of medical facilities and public health services [7]. This can worsen the socio-economic and mental health conditions of affected communities, especially for vulnerable groups such as children, the elderly, and people with disabilities. Ultimately, this situation can put additional pressure on local health systems, prolonging a health crisis that could have been resolved more quickly with a more effective response [8].

The concept of disaster health crisis management aims to reduce negative impacts and ensure a rapid and effective response in dealing with crises. One theory that is often used is the cycle-based disaster management theory which includes the pre-crisis phase (prevention, mitigation, and preparedness), the crisis phase (emergency response), and the post-crisis phase (recovery) [9]. In the preparedness phase, preventive measures such as developing contingency plans, training of health reserve personnel including emergency medical teams (EMTs), and preparing health logistics. Mitigation involves reducing risks through improving health infrastructure and educating the public about preventive measures when a disaster occurs. Emergency response emphasizes the rapid mobilization of health resources, both health reserve personnel, medical personnel, and equipment, while the recovery phase focuses on rehabilitating the health system and restoring health services for affected communities [10].

To avoid serious impacts, this concept emphasizes strong coordination between institutions, including the government, non-governmental organizations, and civil society (Disaster Resilient Village Forum). A strong information system is also key in managing victim data, distributing logistics, and evaluating the effectiveness of disaster response. By applying holistic and responsive management theory, negative impacts on public health can be minimized and recovery can proceed more quickly.

The solutions offered to overcome the problem of low preparedness for health crises due to disasters in Magetan Regency include several strategic steps. First, intensive training and socialization regarding EWS for the community is needed, involving vulnerable groups to ensure that information can be accessed by all levels of society. Second, the development of clear and detailed health contingency plan documents must be a priority, so that they are more responsive and effective in emergencies. Third, it is important to conduct emergency response simulations involving the entire community, so that the community has adequate understanding and skills in dealing with health crises. Through this participatory and collaborative approach, it is hoped that it can increase community resilience in dealing with the threat of disasters and health crises in the future.

The novelty of this research lies in the integration of the Participatory Action Research that empowers communities in disaster health

crisis preparedness, which is rarely explored in current literature. This research emphasizes the use of Quadrant of Difficulty-Usefulness (QoDU) analysis to determine the priority of preparedness elements, as well as to develop effective EWS and health resource mobilization procedures [11]. By focusing on the specific geographic context of Magetan Regency, this research makes a significant contribution to the local understanding of disaster health management. Evaluation of the effectiveness of emergency response in disaster situations is also a major focus, resulting in recommendations that can improve community resilience in the future. These innovations make this research relevant and valuable for the development of better disaster management policies.

The purpose of this study is to facilitate the Disaster Resilient Village Forum to realize an EWS and mobilization of health resources in the disaster health crisis preparedness phase using the Participatory Action Research approach.

Materials and Methods

This research was conducted in 2024 in 4 villages in Magetan Regency, namely Randugede, Alastuwo, Ngelang, and Jajar Villages. The approach used was Participatory Action Research [12], with several cycles, and each cycle consisted of 4 steps, namely planning, acting, observing, and reflecting [13]. This study involved 150 participants from the Disaster Resilient Village Forum, who were selected using a purposive sampling technique.

The focus of the research was on the ability of the Disaster Resilient Village Forum to realize two disaster preparedness parameters, namely the EWS and resource mobilization. The focus of the activities was to facilitate the socialization of the EWS for vulnerable groups and to prepare contingency plan documents, health crisis emergency response simulations, and village resilience measurements. Planning and acting were carried out with participants while observing and reflecting were carried out by enumerators. If the results of reflecting were not satisfactory, the second cycle was continued, and so on until satisfactory results were obtained. The planning stage included determining the schedule, agreeing on objectives and topics, preparing observation and reflection sheets, and preparing a rubric for measuring participant activities. The acting stage follows a predetermined schedule (4 days or 32 hours of training), where participants complete the modules prepared by the researcher. The observing stage focuses on measuring participation, process, and results of activities, through interviews, observations, and document studies. The reflecting stage is to evaluate the achievement of results.

The research obtained ethical approval from the Health Research Ethics Commission of Poltekkes Kemenkes Surabaya, Number: EA/2198/KEPK-Poltekkes_Sby/V/2024.

Results

Preparation of a Participatory Health Crisis Contingency Plan Document

Planning: At this stage, problems were identified, namely: 1) lack of awareness and understanding of the importance of a health crisis contingency plan; 2) there is no formal document ready to use in an emergency. The causes of the problem are lack of training, limited resources, and lack of coordination. Furthermore, the proposed solution is the preparation of a contingency document involving the active participation of the Disaster Resilient Village Forum, volunteers, the community, and stakeholders, through training.

Acting: All planned activities were carried out in 10 x 60 minutes.

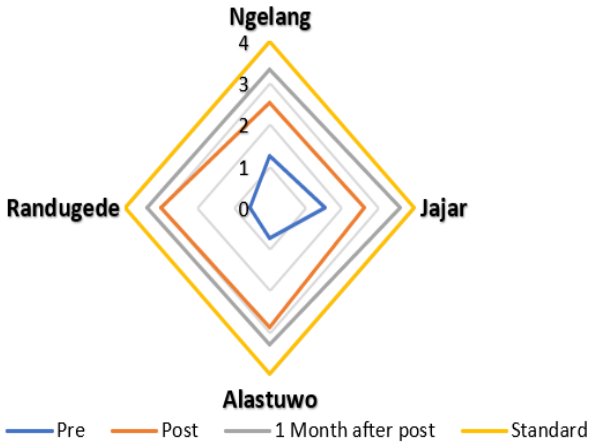

Figure 1. Level of Participant Knowledge about the Contents of the Disaster Health Crisis Contingency Plan Document

Observing: The measurement results showed an increase in the level of participant knowledge regarding the contents of the contingency plan document (Figure 1). The health crisis contingency plan document was successfully established by the village head through a decree. The contingency plan document was prepared through the use of secondary data, brainstorming, and FGDs and filling out worksheets. The preparation of this document shows the active role of participants in identifying threats, vulnerabilities, and capacities, determining disaster risk maps, and formulating health crisis response plans and action plans to prevent threats, reduce vulnerabilities, and increase capacities collaboratively.

Reflecting: Referring to the observing results, the health crisis contingency plan document can be completed in cycle I, so cycle II is not necessary.

Facilitating the Socialization of Early Warning Systems to Vulnerable Groups

Planning: At this stage, the identified problem was the lack of access to information and early warning procedures for vulnerable groups such as the elderly, pregnant women, people with chronic diseases, children, and people with disabilities. The causes of this problem are limited communication infrastructure, low involvement of vulnerable groups, and lack of special training. The proposed solution is the preparation of early warning procedure documents for vulnerable groups, through training and socialization of EWS that are easily accessible and understood by them.

Acting: Mentoring and socialization of the EWS were carried out according to plan in 6 x 60 minutes.

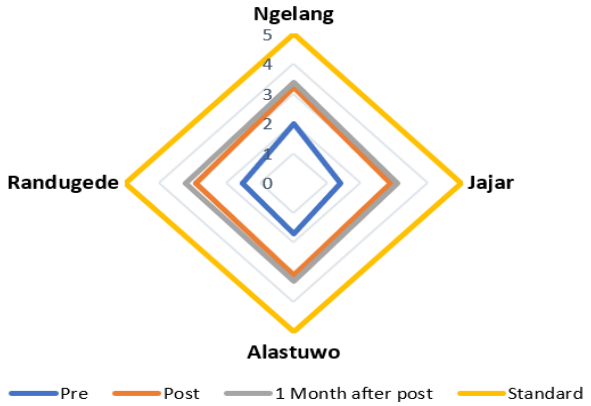

Figure 2. Level of Participant Understanding of the Contents of the Early Warning System Procedures

Observing: The Standard Operating Procedure (SOP) for the EWS was successfully prepared and well understood by the participants. The preparation of the SOP involved active participation from the Disaster Resilient Village Forum, volunteers, the community, and stakeholders, with a focus on inclusivity and ease of access to information. The success of the preparation of the SOP was measured through a review of the document by a team of experts and approved by the authorities, accompanied by a comprehensive evaluation of the contents of the procedure by the participants. The measurement results showed that the participants understood the SOP well, which was above 75% (Figure 2.). Participants were also able to conduct socialization with vulnerable groups and people with disabilities, using simple and easy-to-understand materials. The observation results showed that in the socialization, information was conveyed clearly and was considered useful in increasing their preparedness.

Reflecting: The preparation and socialization activities of the EWS for vulnerable groups can be completed in cycle I, so cycle II is not needed.

Facilitation of Disaster Health Crisis Emergency Response Simulation

Planning: At this stage, the problem was identified as the lack of community preparedness to face a health crisis, as evidenced by the low understanding of emergency actions that must be taken. The cause of this problem is the lack of training and information about emergencies, as well as minimal community involvement in preparedness programs. The proposed solution is emergency response training and simulation involving all elements of society, including health institutions, to build understanding and practical skills.

Acting: All emergency response training and simulation activities were completed according to plan in 10 x 60 minutes.

Observing: The health crisis emergency response simulation was achieved significantly, both in rapid assessment, evacuation and rescue, triage, first aid, and health services in the field hospital. During the simulation, participants successfully carried out rapid assessments and evacuations efficiently. Triage was carried out well so that victims could be grouped based on severity, making management easier in the field hospital. Coordination in command also appeared effective, each team was able to carry out their respective tasks well.

Reflecting: The disaster health crisis emergency response simulation facilitation activities can be completed in cycle I, so cycle II is not required.

Measuring the Level of Village Resilience in Preparedness in Pre-disaster Health Crisis

Planning: At this stage, the problem identified is that there is no integrated measuring tool to evaluate village resilience in facing disasters. The cause of this problem is a lack of understanding of village resilience parameters, as well as the absence of a system that supports continuous data collection and analysis. The proposed solution is training on village resilience indicators, as well as the creation of a local data-based monitoring system.

Acting: Training on village resilience indicators and the creation of a local data-based monitoring system can be completed according to plan in 6 x 60 minutes.

Table 1. Categories of Village Resilience in Dealing with Disaster Health Crises

No	Disaster Resilient Village	Before Mentoring		After Mentoring		Information
		Score	Category	Score	Category	
1	Ngelang	84.95	Superior	86.94	Superior	

2	Jajar	84.06	Superior	84.95	Superior	Score≤58.33 = Primary Score 58.33-83.33 = Superior ≥83.33 = Main
3	Alastuwo	57.31	Primary	62.32	Middle	
4	Randugede	62.90	Middle	81.33	Middle	

Observing: The results of the observation show a significant increase in village resilience (Table 1), and supporting documents are also realized, such as disaster risk assessment reports, village risk maps, and structured mitigation action plans. The community is actively involved and has succeeded in creating a local data-based recording system that functions as a periodic monitoring tool. In addition, there is also better coordination between the village government and the community, as seen from the documents of the results of the coordination meeting and evidence of active participation in discussions and decision-making related to disaster mitigation.

Reflecting: The evaluation results show that the local data-based monitoring system can be completed well in cycle I, so cycle II is not needed. stage

Discussion

The Participatory Action Research approach has proven effective in various community empowerment contexts [14]. This method emphasizes collaboration and active participation of members of the Disaster Resilient Village Forum in every stage of research and action, from problem identification to solution implementation. It is very relevant, especially in preparing comprehensive and contextual disaster health crisis preparedness documents [15].

Disaster Resilient Village is a concept that integrates various aspects of prevention, mitigation, preparedness, emergency response, and disaster recovery in one community unit [16]. Integration of the Participatory Action Research approach in disaster health crisis preparedness can be an effective solution to increase community involvement through the Disaster Resilient Village Forum. Village communities and forum members are not only the objects of research, but also play a role as active participants involved in the process of identifying problems, planning actions, and evaluating. The forum can better understand the disaster risks in the village, especially those related to health crises. Their active participation in data collection and the preparation of health emergency response plans allows for the realization of solutions based on local needs [17]. The Participatory Action Research approach allows the community to jointly develop more resilient health rescue strategies, such as increasing capacity in the early detection of outbreaks and distribution of health logistics.

The active involvement of the forum in research activities will also strengthen the sustainability of the disaster health crisis emergency response simulation program. The forum can play an important role in organizing the socialization of EWS, socialization related to emergency response SOPs, utilization of evacuation routes, management of health evacuation points, technical mobilization of health resources, management of health logistics, first aid, triage systems, and provision of disaster preparedness bags. This participation ensures that the community is not only prepared to face the threat of disaster in general but is also able to respond to health crises. With direct involvement, the forum can build a network of cooperation with the local health sector, facilitate the implementation of more structured field drills, and increase community resilience to disasters with a special focus on handling health crises. The approach, which prioritizes participatory action and

reflection, encourages collective awareness and better preparedness in dealing with future health crisis emergencies [18].

Factors causing participants to have difficulty in providing preparedness documents that form EWS parameters and resource mobilization include: 1) lack of experience, 2) no budget, 3) not knowing how to compile it, 4) not understanding the contents of the document, and 5) not having activities in the preparedness sector. The role of academics, government, mass media, village-owned enterprises, non-governmental organizations, and volunteers is needed to integrate the method into prevention, mitigation, and preparedness activities [19].

Participatory mentoring methods have proven effective in realizing village resilience assessment documents. This approach involves stakeholders in the assessment process, ensuring that various local perspectives and knowledge are included in the final document. This increases ownership and commitment to the implementation and follow-up of assessment recommendations. The use of a participatory approach in assessing urban resilience to climate change has succeeded in strengthening the implementation of sustainable urban drainage systems. Participatory approaches in assessing climate resilience have also been shown to increase the adaptation and resilience of farming communities to various shocks, such as floods and droughts. Participatory mentoring methods play an important role in realizing more accurate and implementable village resilience assessment documents, by increasing the involvement and commitment of local communities [20, 21].

The participatory approach in the preparation of EWS documents, and the socialization of EWS to vulnerable groups is very effective in ensuring that the system is not only accurate but also acceptable and responsive to vulnerable groups and disabilities. Through the active participation of the forum in preparing EWS procedures, the EWS document becomes more relevant and can integrate local knowledge that is often not accessible by top-down methods. The participation of the forum in this process allows for the collection of more complete and contextual information. By involving the forum community in each village that is the research locus, the form of early warning, socialization methods, and socialization targets are truly appropriate. This statement is proven by the presence of vulnerable groups, especially the elderly, to receive socialization of the importance of early warning [22].

Collaboration between Non-Governmental Organizations (NGOs) and local communities in developing EWS can overcome the barriers caused by fragile socio-political conditions and territorial violence. This approach ensures that early warning systems are built not only with technical but also social aspects [23, 24]. The principles of EWS must consider warning recipient groups such as vulnerable groups and disabilities. EWS procedures must be simple, and acceptable to these vulnerable groups. Direct involvement of vulnerable groups in the planning and implementation of EWS strengthens their ownership and commitment to the system. Research shows that community-driven systems are more likely to be sustainable and effective in reducing disaster risk [25].

The participatory approach has proven effective in facilitating the forum to prepare disaster health crisis contingency plan documents. This approach not only empowers the community but also ensures that the contingency plan documents prepared are truly relevant and can be implemented in the field. The results of the study showed that community participation in the contingency planning process allows for the collection of more accurate and contextual information. By involving local communities, the documents prepared can be more responsive to the specific needs and conditions of each village. A community-based approach to disaster risk management has resulted in more effective and

operational planning documents at the local level [26].

Disaster health crisis contingency plan documents are crucial elements in strengthening community resilience and resilience in dealing with emergencies. This plan provides a systematic framework for anticipating and responding to various health risks that arise during a disaster, such as the spread of infectious diseases, limited access to medical services, provision of minimum health services in evacuation sites and disaster areas, access to health logistics, and disruption to health infrastructure. Studies show that the existence of a comprehensive contingency plan can increase the effectiveness of health crisis responses by reducing reaction time and minimizing negative impacts on affected populations. The forum, as a local actor playing a role in disaster management, has the responsibility to ensure that communities are prepared for health crises through the development of plans that involve active community participation and collaboration with health clusters. Without a structured contingency plan, responses to health crises tend to be uncoordinated, resulting in reduced community capacity to mitigate and adapt during a disaster.

The active participation of the forum in the preparation of the emergency response simulation exercise plan document for health crises helps ensure that the emergency response simulations conducted are by following the reality on the ground. Thus, the exercises held become more relevant and effective in preparing communities for real emergencies. In several countries, this approach has been applied to integrate EWS into people's daily lives, improving preparedness and response to handling health crises due to disasters. Participatory action research methods strengthen coordination between various stakeholders, including local governments, NGOs, disaster clusters, and communities. This good coordination is important to ensure that all parties are involved and contribute to the preparation and implementation of contingency plans. Programs that adopt participatory methods have shown success in sustaining long-term disaster risk reduction activities [27].

Participatory approaches through action assessment methods have shown significant results in increasing community resilience to disasters in Indonesia. Experience from various case studies shows that active community involvement in the planning and implementation of disaster risk reduction programs is very effective. The experience of disaster management in Aceh, and the application of participatory methods after the 2004 tsunami showed that community involvement in the reconstruction and rehabilitation process increased their sense of ownership and responsibility for the programs implemented, including the development of early warning systems and mapping of areas at risk [28].

Implementation of participatory action research in the disaster-resilient village program shows that communities are better prepared for emergencies. Communities not only participate in the preparation of contingency plan documents but also emergency response simulation exercises. Participatory approaches increase community resilience in earthquake-resistant house reconstruction. Overall, evidence from various regions in Indonesia shows that participatory approaches in disaster risk management not only increase the effectiveness and relevance of programs but also strengthen community capacity and resilience in dealing with various disaster threats. Communities that have direct experience with disasters or who have high-risk perceptions tend to be more aware and active in participating in disaster mitigation and preparedness activities.

The results of participatory action research in handling disaster health crises in villages show that active community involvement can significantly increase the effectiveness of

preparedness and response to emergencies [29]. It was found that by involving the community in risk identification, action planning, and evaluation, villages were able to create solutions that were more relevant and appropriate to the local context [30]. The approach allows communities to share experiences, resulting in a deeper understanding of the health threats they may face, as well as more effective mitigation strategies. Community participation not only increases a sense of ownership of the emergency response plan but also strengthens the social networks needed for a rapid and effective response when a disaster occurs.

The use of the approach in disaster health preparedness training has a positive impact on the ability of individuals and communities to respond to health crises [31]. Their findings show that villages that implement the approach in emergency response simulation training experience significant improvements in respondent skills in dealing with health issues, such as infectious disease control and health resource management. This approach also strengthens collaboration between various stakeholders, including local governments and health organizations, thereby creating a more robust support system. By actively involving communities, villages can develop better capacities to deal with and mitigate health crises, ultimately increasing community resilience to disasters.

Villages that involve communities in risk identification and development of emergency response strategies experience significant increases in awareness and understanding of health risks associated with disasters [32]. Active community participation in preparedness training can reduce response times to health crises, thereby reducing negative impacts on community health [33]. By implementing the approach, communities can build stronger social support networks, which contribute to collective resilience in the face of emergencies [34].

Previous research shows that many previous approaches tend to use top-down methods, which often ignore community voices and experiences. For example, preparedness programs that do not involve active community participation are less effective in dealing with health crises [35]. The low community involvement in planning leads to a lack of preparedness that can result in major losses when a disaster occurs [36]. Ignoring participatory approaches in preparedness training negatively impacts collaboration between stakeholders. The approach is not only more innovative but also more sustainable and effective in building community resilience in dealing with health crises [37].

Conclusion

Based on the results, it is concluded that the Participatory Action Research approach can be used well to facilitate the Disaster Resilient Village Forum in realizing an early warning system that is easily responded to by the community and the mobilization of health resources in the disaster health crisis preparedness phase.

Conflict of Interest

There is no conflict of interest with anyone in writing this article.

Acknowledgements

Thanks are conveyed to the Director of Poltekkes Kemenkes Surabaya for providing the author with the opportunity to research community-based disaster health crisis preparedness.

References

[1]. Sunarto, S., Nugroho, H. S. W., Suparji, S, Santosa, B. J., 2024, Quadrant of difficulty and usefulness for prioritizing community-based disaster preparedness parameter elements. *Rawal Medical Journal*, 49(1), 172-175. doi: 10.5455/rmj.20230918043333.

[2]. Djalante, R., Garschagen, M., 2017, A review of disaster trend and disaster risk governance in Indonesia: 1900–2015, In: Djalante, R., Garschagen, M., Thomalla, F., Shaw, R. (eds) Disaster Risk Reduction in Indonesia. Disaster Risk Reduction. *Springer*, Cham. doi: 10.1007/978-3-319-54466-3_2.

[3]. Paripurno, E. T., Putra, W., Triadi, W. S., 2023, Disaster risk assessment Magetan Regency, East Java. *AIP Conf. Proc.*, 2598(1), 070009. doi: 10.1063/5.0135163.

[4]. Ramadorai, A, Ravi, P, Narayanan,V., 2019, Rhinocerebral Mucormycosis: A prospective analysis of an effective treatment protocol, *Ann. Maxillofac. Surg.* 9 192–196. https://doi.org/10.4103/ams.ams_231_18.

[5]. Filip, R., Gheorghita, P. R., Anchidin-Norocel, L., Dimian, M., Savage, W. K., 2022, Global challenges to public health care systems during the COVID-19 pandemic: A review of pandemic measures and problems. *J Pers Med*,12(8),1295. doi:10.3390/jpm12081295.

[6]. Al-Worafi, Y. M., 2024, Healthcare facilities in developing countries: infrastructure. In: Al-Worafi, Y.M. (eds) handbook of medical and health sciences in developing countries. *Springer*, Cham.

[7]. Knifton, L., Inglis, G., 2020, Poverty and mental health: policy, practice and research implications. *BJPsych Bull*, 44(5),193-196. doi:10.1192/bjb.2020.78.

[8]. Grasser, L. R., 2022, Addressing mental health concerns in refugees and displaced populations: is enough being done. *Risk Manag Healthc Policy*, 6(15), 909-922.

[9]. Tyubee, B. T., 2020, Disaster preparedness: approaches and frameworks. In: Leal Filho, W., Azul, A., Brandli, L., Lange Salvia, A., Özuyar, P., Wall, T. (eds) No Poverty. *Springer*, Cham.

[10]. Fischer, R. J., Halibozek, E. P., Walters, D. C., 2019, Contingency planning emergency response and safety. *Introduction to Security*, 249–68.

[11]. Nugroho, H. S. W., Suparji, S., Sunarto, S., Handoyo, H., Yessimbekov, Z., Burhanuddin, N., Selasa, P., 2020, Quadrant of difficulty-usefulness (QoDU) as new method in preparing for improvement of e-learning in health college. *Risk Manag Health Policy*, 13, 1625-1632. doi: 10.2147/RMHP.S268814.

[12]. Brydon-Miller, M., Kral, M., Ortiz Aragón, A., 2020, Participatory action research: international perspectives and practices. *International review of qualitative research*, 13(2), 103-111.

[13]. Kemmis, S., Taggart, R.M., Nixon, R., 2014, The action research: doing critical participatory action research. Singapore: Springer Publishing Company.

[14]. White, G. W., Suchowierska, M., Campbell, M., 2004, Developing and systematically implementing participatory action research. *Arch Phys Med Rehabil*. 85(4 Suppl 2), S3-12. doi: 10.1016/j.apmr.2003.08.109.

[15]. Lassa, J. A., Boli, Y., Nakmofa, Y., Fanggidae, S., Ofong, A., Leonis, H., 2018, Twenty years of community-based disaster risk reduction experience from a dryland village in Indonesia. *Jamba*, 10(1), 502.

[16]. Arifin, S., Wicaksono, S. S., Sumarto, S., Martitah, M., Sulistianingsih, D., 2021, Disaster resilient village-based approach to disaster risk reduction policy in Indonesia: A regulatory analysis. *Jamba*, 13(1), 1021.

[17]. Khan, Y., O'Sullivan, T., Brown, A., Tracey, S., Gibson, J., Généreux, M., Henry, B., Schwartz, B., 2018, Public health emergency preparedness: a framework to promote resilience. *BMC Public Health*, 18(1), 1344.

[18]. Canlas, I. P., Karpudewan, M., 2020, Blending the principles of participatory action research approach and elements of grounded theory in a disaster risk reduction eucation case study. *International Journal of Qualitative Methods*, 19. doi:10.1177/1609406920958964.

[19]. Bullock, J. A., Haddow, G. D., Coppola, D. P., 2013, Mitigation, prevention, and preparedness. introduction to homeland security. *Report,* 435-494.
[20]. Choptiany, J. M. H., Graeub, B. E., Hatik, S., Conversa, D., & Ledermann, S. T., 2019, Participatory assessment and adaptation for resilience to climate change. *Consilience*, 21, 17–31.
[21]. Carmen, E., Fazey, I., Ross, H. *et al.*, 2022, Building community resilience in a context of climate change: The role of social capital. *Ambio*, 1371–1387.
[22]. Sunarto, S., Nugroho, H. S. W., Surtinah, N., Diah, O. P. V., Hanifah, S. S., 2024, Collaboration with the disaster resilient village forum in disaster emergency response simulation in Ngelang Kartoharjo Village Magetan. *Front Community Serv Empower*, 3(2), 1–6.
[23]. Biermann, O., Eckhardt, M., Carlfjord, S., Falk, M., Forsberg, B. C., 2016, Collaboration between non-governmental organizations and public services in health–a qualitative case study from rural Ecuador. *Global Health Action*, 9(1).
[24]. Sajadi, H. S., Ghadirian, L., Rajabi, F., Sayarifard, A., Rostamigooran, N., Majdzadeh, R., 2022, Interventions to increase participation of NGOs in preventive care: A scoping review. *Health Sci Rep*, 5(5), e770.
[25]. Sufri, S., Dwirahmadi, F., Phung, D., 2020, Enhancing community engagement in disaster early warning system in Aceh, Indonesia: Opportunities and challenges. *Nat Hazards*, 2691–2709.
[26]. Chirenje, L. I., Giliba, R. A., Musamba, E. B., 2013, Local communities participation in decision-making processes through planning and budgeting in African countries. *Chinese Journal of Population Resources and Environment*, 11 (1), 10–16. doi:10.1080/10042857.2013.777198.
[27]. Siddique, R , Nivedhitha, M.S. , Jacob,B., 2019, Quantitative analysis for detection of toxic elements in various irrigants, their combination (precipitate), and para-chloroaniline: An inductively coupled plasma mass spectrometry study, *J. Conserv. Dent.* 22 344–350. https://doi.org/10.4103/JCD.JCD_95_19.
[28]. Syamsidik, Oktari, R. S., Nugroho, A., Fahmi, M., Suppasri, A., Munadi, K., 2021, Fifteen years of the 2004 Indian Ocean tsunami in Aceh-Indonesia: Mitigation, preparedness and challenges for a long-term disaster recovery process. *Int J Disaster Risk Reduct,* 54, 102052.
[29]. Laverack, G., Manandhar, D., 2019, Participatory action research for health promotion: a review of the literature. *Health Promotion International*, 34(2), 124-133.
[30]. Van Niekerk, D., Nemakonde, L. D., Kruger, L., Forbes-Genade, K., 2018, Community-based disaster risk management. In: Rodríguez, H., Donner, W., Trainor, J. (eds) Handbook of disaster research. Handbooks of sociology and social research. *Springer*, Cham. doi:10.1007/978-3-319-63254-4_20.
[31]. Morrow, B., Smith, E., 2020, The impact of participatory approaches on health crisis preparedness in rural communities: findings from a case study. *International Journal of Health Services*, 50(3),310-325.
[32]. Duran, A., Rojas, C., 2021, The impact of community participation in disaster risk management: A case study. *Disaster Management Journal*, 35(2),123-135.
[33]. Kieny, M.P., Bekedam, H., Dolea, C., et al., 2020, Strengthening health systems for crisis response: Lessons learned from recent health emergencies. *Global Health Action*, 13(1),1807340.
[34]. Gupta, A., Luthra, S., 2022, Building community resilience through participatory approaches: evidence from disaster management practices. *International Journal of Disaster Risk Reduction*, 62,102379.
[35]. Lillie, T., Hsu, A., Edwards, D., 2019, The role of community engagement in emergency preparedness: a systematic review. *Disaster Medicine and Public Health Preparedness*, 13(4), 687-696.
[36]. Donnelly, L., Allen, T., Khalid, H., 2020, Understanding the barriers to effective disaster response: a qualitative study. *International Journal of Emergency Management*, 16(1), 58-70.

[37]. Paton, D., Jackson, D., Chan, C., 2021, Collaborative learning for community resilience in emergency management: evidence from participatory research. *Journal of Risk Research*, 24(3), 301-315.