The Impact of Community Involvement on the Effectiveness of Disaster Risk Reduction Initiatives in Indonesian Villages

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Positionality

Coming from the global North as a white, middle-class female student, I was aware that my background might influence how I viewed the data and findings. To address this, I tried to remain aware of my position throughout the research. I focused on allowing community members and stakeholders to speak for themselves and guide the study's findings. I did this by making sure to listen carefully and understand the local context without allowing my own ideas to influence the findings.

Abstract

This paper examines the impact of community involvement on the effectiveness of disaster risk reduction (DRR) initiatives in Indonesian villages. Given Indonesia's high vulnerability to climate-related disasters, effective disaster management is critical. Community-based disaster risk reduction (CBDRR) emphasizes the empowerment of local communities to take an active role in disaster preparedness, response, and recovery. Through in-depth interviews with experts and questionnaires with community members, this study examines whether community involvement leads to more effective DRR outcomes. Findings indicate that community involvement is critical to successful DRR initiatives by enhancing local knowledge, ensuring efficient resource use, and building resilience. However, challenges such as a lack of public knowledge, distrust in the government, stakeholder coordination problems, and resource constraints still remain. The aim of this study is to fill in the knowledge gaps regarding the practical implementation and long-term efficacy of CBDRR. This study has contributed to the DRR research area by pointing out the importance of community empowerment and preparedness. Finally, the current study provides valuable practical implications for policymakers, organizations, and practitioners.

Keywords: community-based disaster risk reduction, disaster management, community involvement, resilience building

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1. Introduction

Indonesia is one of the world's most disaster-prone countries, ranking sixth in terms of flood risk (Isa et al., 2018; Nuryana et al., 2023). In 2020, there were 2925 disasters reported to the National Disaster Management Agency (Purba et al., 2022). Many potential climate-related disasters affect the country, especially along its extensive coastline. This is mainly due to its climate and geographical location. Located in the Pacific Ring of Fire, Indonesia is home to 147 volcanoes, 76 of which are active (Nuryana et al., 2023).

As the potential for disasters increases due to rapid climate change, the importance of community involvement in disaster risk reduction (DRR) cannot be overstated. The need to address DRR is underscored by the global context. More than one-third of the world's population is currently at risk of climate-related disasters, with coastal regions disproportionately affected by storms and floods. Rising sea levels, subsidence, and tidal flooding increase the vulnerability of coastal areas in Indonesia, the world's largest archipelago, and call for strong DRR measures (Putiamini et al., 2022).

Community-based disaster risk reduction (CBDRR) is the foundation for building community resilience and engaging communities in disaster risk reduction (Lassa et al., 2018). However, research by Deelstra and Bristow (2023) suggests that despite the implementation of DRR efforts, the effectiveness of these efforts may vary depending on the level of community involvement. For DRR initiatives to be successful, community involvement and stakeholder collaboration are essential (Deelstra & Bristow, 2023; Naik and Murari, 2023; Isa et al., 2019). In particular, the involvement of communities can ensure the effective use of financial resources,

promote sustainable development, and give local people a voice in development decisions (Draçi & Laska, 2023).

There has been a lot of research on the role of community involvement in the tourism sector, but this has not been the case for long-term and real-world DRR initiatives (Lassa et al., 2018). In the current study, I aim to investigate whether community involvement leads to effective DRR initiatives and to identify barriers and opportunities for CBDRR. However, it is critical to define "effective" in the context of DRR activities. Effectiveness refers to the ability of community-based DRR projects to significantly reduce the vulnerability of communities to various hazards and increase their resilience to disasters. In other words, effective DRR innovations lead to progress in disaster preparedness, response, and recovery at the community level. This study aims to contribute to future projects and organizations to identify and develop the best strategy for DRR implementation in Indonesia and possibly other parts of the world.

The main research question of the thesis paper is the following: "*How does community involvement impact the effectiveness of disaster risk reduction initiatives in Indonesian villages?*" In order to provide a complete answer, the sub-question: *"What are some barriers and opportunities for community involvement?"*, which will provide more in-depth information on factors that hinder and support CBDRR.

2. Literature Review

An overview of the historical background is provided before delving into the current study. For a better understanding of community involvement in disaster risk reduction initiatives, further background information and important literature are provided. This serves as the theoretical framework on which the study is built.

2.1 Historical Context of Indonesia

Throughout the history of disaster risk management in Indonesia, there has been a remarkable evolution in raising awareness and responding to disasters. International initiatives have highlighted the need for improved disaster education and preparedness in developing countries, such as the United Nations' 1994 Yokohama Strategy (Kadir & Nurdin, 2022). Yet, many people living in disaster-prone areas are unaware of the high risks and significant losses associated with disasters (Purworini et al., 2020).

According to Purworini and colleagues (2020), people may be more willing to take such risks if they are connected to the local culture, customs, and environment. Despite Indonesia's history of neglecting disaster preparedness, significant events such as the 2004 Aceh earthquake, with a magnitude of 9.1-9.3, have encouraged the democratic government to take action and highlighted the importance of effectively reducing disaster risk (Kadir & Nurdin, 2022). Indonesia has made progress in establishing a comprehensive disaster management system. Examples include the establishment of the National Disaster Management Agency and the application of community-based disaster risk management (Efendi et al., 2019).

2.2 Community-based Disaster Risk Reduction

There are several names for community-based disaster risk reduction strategies. An example is community-managed disaster risk reduction (CMDRR), in which the community is in control of disaster risk reduction processes (Lassa et al., 2018). In the current study, the term community-based disaster risk reduction (CBDRR) is used. CBDRR is the empowerment of local communities to take an active part in disaster risk reduction (Rizki et al., 2023). The concept of CBDRR emerged as an alternative to the traditional top-down approach to disaster

risk management, which focused on proactive rather than reactive measures, often coming from institutions or organizations (Nkombi & Wentink, 2022). Instead, CBDRR is often the result of bottom-up strategies in which local people become active participants and initiators of DRR programs (Naik & Murari, 2023).

Expanding on these concepts, the Indonesian government's Natural Disaster Law states that "disasters" are not just isolated events. They are disruptive forces, often caused by hazards, that affect lives, livelihoods, the environment, and even mental well-being. Disasters are a complex mix of natural phenomena and human actions, often driving them further (Efendi et al., 2019). In addition, the definition of "risk" includes the assessment of the probability of occurrence and the severity of the consequences associated with the hazard activity (Isa et al., 2018). For example, the disaster risk of a hazard may be the potential estimate of the number of deaths, injuries, and property damage that could result from an earthquake in a community (World Health Organization et al., 2015). Typically, risk management involves some combination of mitigation (Isa et al., 2018).

Processes of community-based disaster risk reduction frameworks are discussed below. First, communities that are vulnerable to disasters must be selected, understood, and assessed. Next comes planning and implementation, followed by adoption scenarios and options. Finally, monitoring and evaluation are important steps in creating an exit strategy to ensure long-term sustainability (Lassa et al., 2018; Isa et al., 2019). Implementing these processes is critical to the planning of future mitigation strategies (Aksa & Afrian, 2022).

In DRR, community involvement is essential to building resilience. "Community involvement" refers to a variety of efforts aimed at actively involving local communities throughout the DRR process. This involvement can include participation in decision-making

processes, including the identification and prioritization of risks, the design of mitigation plans, and the allocation of resources. In addition, community involvement can include active participation in the implementation of DRR projects, such as mobilizing community resources, knowledge, and skills to mitigate identified risks. It also involves promoting cooperation and partnerships among community members, local governments, non-governmental organizations (NGOs), and other stakeholders to ensure the inclusiveness and sustainability of DRR activities. Often praised as the foundation of disaster risk reduction, CBDRR eliminates the biases found in top-down risk identification while empowering communities at risk. The involvement of vulnerable communities can also address problems in advance and promote inclusiveness in DRR initiatives (Lassa et al., 2018).

2.3 Barriers to Community Involvement

Involving communities in DRR initiatives pose several challenges that hinder the effectiveness of CBDRR. The first barrier that hinders effective CBDRR is coordination problems and conflicting stakeholder interests. This may be due to the complex structure of Indonesia's regional systems, which are made up of multiple levels of government, each with their own set of rules and priorities. (Deelstra & Bristow, 2023). Furthermore, these coordination difficulties are frequently exacerbated by resource constraints, such as lack of time and financial resources, which prevents CBDRR projects from being successfully implemented. For example, the last two processes, evaluation and monitoring, are not always completed due to lack of resources (Lassa et al., 2018).

In addition, disaster management initiatives in Indonesia are affected by governance issues characterized by centralized decision-making and delayed, ineffective, and disorganized

government interventions that fail to engage local community knowledge networks (Efendi et al., 2019; Nuryana et al., 2023). There is a frequent "gap" between what the government is willing to do during and after a disaster, and what victims expect (Nuryana et al., 2023).

At the same time, one of the main barriers to effective CBDRR is public distrust of government agencies. According to Efendi and colleagues (2019), many people trust traditional authorities such as local leaders more than official government organizations. This mistrust makes it difficult to implement CBDRR programs and prevents the community from participating in disaster preparedness activities.

Furthermore, culture is critical to DRR because it can have a major impact on how people perceive and understand events. Ignoring cultural aspects can make communities more vulnerable and potentially hinder the process of DRR. Evacuation habits are also greatly influenced by belief systems and the level of public awareness. These beliefs have a significant impact on community members' decision-making processes (Purworini et al., 2020).

According to Nuryana and colleagues (2023), there is still a lack of public knowledge about disaster preparedness in Indonesia. People are unable to protect themselves and their property, resulting in loss of life, damage to infrastructure, and loss of property. One reason for this may be that DRR education has not yet been effectively implemented in Indonesia (Kadir & Nurdin, 2022). On top of that, studies indicate that there is a knowledge gap between the sexes, with men having greater knowledge and involvement in disaster preparedness than women, which leaves women more vulnerable in times of disaster (Purba et al., 2022).

Additional factors that influence decision-making behavior may include community roles, conventions, language, leadership, guidelines, occupations, habits, views, family involvement, and other actions exhibited by people in the community. For example, ancestral

mythologies and cultural beliefs have led some villagers near Mount Merapi to disobey evacuation orders even though the volcano was predicted to explode (Purworini et al., 2020).

Similarly, the tragic landslide in Banaran village in 2017 highlighted the critical need for timely evacuations. As locals went about their daily lives, the sudden landslide buried 26 people and left others missing despite intensive search efforts. Despite repeated warnings from authorities, many villagers were reluctant to evacuate for a variety of reasons. These included a belief that disasters were a test of Allah rather than a harmful threat, a belief in traditional protective rituals, and strong family ties that prioritized staying together despite warnings about the risks. Additionally, the community's reliance on others for disaster information and limited use of communication tools hindered effective communication of warnings. The lack of incentives to evacuate also created a dilemma for the village leader. If the community members leave, they will not have a source of income anymore and most likely do not have a place to stay. This is why the village leader is often not able to force others to evacuate without compensation (Purworini et al., 2020).

2.4 Opportunities for Enhancing Community Involvement

Community-based disaster risk reduction initiatives offer many opportunities to build resilience and promote long-term disaster preparedness. The core principle of CBDRR is community ownership, which promotes greater trust and empowers local stakeholders, especially community members, to take the initiative. This helps ensure that the initiatives address both the short-term and long-term needs of the community (World Health Organization, 2015).

In addition, communities have invaluable traditional knowledge and traditions for dealing with natural hazards. Indigenous wisdom has proven to be one of the most effective ways for

local people to deal with natural disasters in many regions of the world (Syahputra, 2019; Indrawati et al., 2022). Some examples are the "*smong system*", a traditional tsunami warning system on Simeulue Island, or the elevated houses built through communal labor called *"gotong royong"* (Syahputra, 2019; Aksa and Afrian, 2022). Comprehensive DRR methods must incorporate both established global knowledge systems and indigenous wisdom. Nevertheless, indigenous knowledge should complement rather than undermine the current global knowledge system (Syahputra, 2019). When done successfully, community involvement will support the success of the initiative, project, or program of DRR (Isa et al., 2019).

Furthermore, CBDRR initiatives prioritize the inclusion of vulnerable groups and promote equality in preparing for and responding to disasters (Lassa et al., 2018; Isa et al., 2019; Draçi & Laska, 2023). For instance, by including men and women, the gender disparity in DRR knowledge can be reduced.

2.5 Engaging Stakeholders

One way to overcome a CBDRR barrier is to actively coordinate and avoid conflicting stakeholder interests. This can be achieved through balanced stakeholder engagement. A "stakeholder" is a person, group, or organization that is affected by a policy or action in which one party is not always fairly represented. When local communities work together with other stakeholders, initiatives can be implemented in a more time-efficient, equitable, and sustainable manner (Isa et al., 2019). Actors who can potentially be involved in CBDRR include local, regional and government organizations, NGOs, international organizations, local policymakers, religious leaders, community members, and the private sector (World Health Organization, 2015). However, it is important to acknowledge that different stakeholders have different

objectives in participating in CBDRR. This is why effective communication is essential (Isa et al., 2019).

2.6 Research Gap and Opportunities

Finally, there are still significant gaps in disaster research, particularly in understanding the long-term effectiveness and practical implementation of CBDRR strategies globally (Lassa et al., 2018). While the existing literature sheds light on many of the barriers to community participation in disaster management, there is still uncertainty about the specific problems and opportunities faced in different circumstances. Specifically in Indonesia, most research on mitigating flood risk still focuses on structural measures, with little effort devoted to assessing community adaptation strategies (Aksa & Afrian, 2022). This underscores the importance of better understanding community dynamics and how they affect disaster resilience. Additionally, there are still gaps in the research on the sociocultural aspects of vulnerability and resilience, particularly the influence of cultural values. Therefore, more research should be done on community involvement to develop successful DRR initiatives (Purworini et al., 2020).

In this context, this study seeks to fill current research gaps by delving deeper into the complexities of CBDRR projects, with a particular focus on understanding the role of community participation and cultural dynamics in DRR. Working with organizations such as the YAKKUM Emergency Unit (YEU), which is known for its community-based approach to DRR, provides a unique opportunity to examine the practical implications of such projects.

YAKKUM Emergency Unit (YEU) is one of the units of YAKKUM, a Christian Foundation for Public Health, and was established in 2001. Its main mission is to provide an inclusive emergency response that encourages community participation in assessing needs and

distributing supplies. Through community-led DRR efforts and climate change adaptation, YEU works to formulate initiatives to build community resilience. As of 2017, YEU has been assisting more than 250 villages and has partnerships with more than 350 community organizations across Indonesia (YAKKUM Emergency Unit, 2024).

In collaboration with YEU, and other stakeholders, this research aims not only to contribute to the academic field, but also to provide actionable insights for organizations working closely with communities. The goal of this research is to identify the opportunities and barriers of working with the community on DRR and, hopefully, to improve the efforts of these community-based initiatives.

3. Methodology

Qualitative research has been chosen to conduct this research because it allows for an in-depth exploration of the experiences and perspectives of stakeholders involved in DRR initiatives and individuals living in Indonesian communities. This is followed by secondary data (i.e., questionnaire study conducted by YAKKUM Emergency Unit), which is also under analysis.

3.1 Primary Data Collection

3.1.1 Participants

In-depth interviews were conducted with stakeholders that have experience with CBDRR to explore barriers and opportunities for community involvement. The goal was to engage with a wide range of stakeholders to gain broad insights and potentially identify recurring themes or

trends. The participants were selected based on whether they had prior knowledge and experience in involving communities in DRR projects or innovations. Out of the five interviewees, three identified themselves as male and two as female. All the participants had been working in Indonesia for an extended period of time. They worked in a variety of professions and organizations, all of which were related to disaster risk management and had experience with community involvement

3.1.2 Materials

A tailored interview guide was created for each interviewee based on whether they worked for an organization or as a freelancer, and whether they worked on multiple projects or fewer. The interviews were semi-structured with the intention of leaving room for the conversation to flow in different directions. Although the researcher guided the interviews with asking certain questions, the participants were given the freedom to answer what they felt was relevant. This participant-centered approach was chosen because it is essential for in-depth interviews, improving data quality by prioritizing individual experiences and perspectives, resulting in more detailed and nuanced narratives. This method empowers participants, making them feel more involved and valued in the data collection process, which increases their engagement and builds trust (Saunders, 2021). The general interview guide with interview questions can be found in Appendix A.

3.1.3 Procedure and ethics

Potential participants received an email asking them to participate or to extend the invitation to others who might be interested. To address ethical concerns and to protect their

rights as participants, all individuals who participated in the in-depth interviews were required to sign a consent form before participation. In this form, more information and their rights were being stated. The interviews were all conducted online with Google Meet due to the distance. The interviews were highly interactive, with many participants taking longer than the estimated 45 minutes to share their personal stories and lessons learned from engaging with communities in DRR initiatives. The average calculated length of the interviews was 53 minutes.

The interviews were safely documented and analyzed through storage in a secure access folder. All interviews were audio-recorded for precise transcription and later analysis, with participant consent. An online transcription tool was used to transcribe the recordings, and then manual editing was carried out. All information was removed from the tool because of ethical considerations. Next, there was an initial analysis, in which the relevant sentences were highlighted for emphasis. A coding and color highlighting strategy was used for the interviews. This strategy allows for visual identification and tracking of recurring themes and patterns in the stakeholder interviews. This was followed by a thematic analysis. Six different thematic areas were identified, which are also the subheadings of the results section for the primary data.

3.2 Secondary Data Collection

3.2.1 Participants

As previously mentioned, this qualitative research was conducted in collaboration with the YAKKUM Emergency Unit (YEU). YEU offered the researcher to use secondary data derived from a questionnaire study that they conducted in 15 communities with at least 5 individuals per community. Most of the communities were located in the city of Yogyakarta and

surrounding areas such as Bantul, Sleman, and Kulon Progo. The total number of respondents was 77. The majority of respondents (64%) identified as female and 35% identified as male, with one respondent choosing not to answer their gender. Furthermore, 14% of respondents reported having a disability. In terms of age demographics, the participants varied widely in age. The majority (61%) of the participants were between 18-59 years old. Three participants were over the age of 80, ten participants were between the ages of 70-79, and fourteen participants were between the ages of 60-69. There were three participants under the age of 13, all of whom reported having a disability. This shows that the questionnaire included vulnerable people, especially the elderly and people with disabilities.

3.2.2 Materials and Procedure

The questionnaire included items that assessed community involvement in the design, input, development, and implementation of local programs or projects, hereafter referred to as "innovations". Examples of innovations are inclusive disaster preparedness education centers, mobile public kitchens to support flood relief, and inclusive disaster education theater. Other innovations focus on health monitoring during pandemics or on agricultural land management adaptations to address drought and climate change impacts. The questionnaire captured community members' perceptions of these innovations and their effectiveness in addressing disaster risks such as earthquakes, storms, droughts, (flash) floods, landslides, pandemics, fires, tsunamis, environmental pollution, and volcanic eruptions.

Each community received a personalized questionnaire tailored to its specific innovation(s) and disaster risk context. Most of the questions were quantitative, requiring participants to select an option indicating their level of agreement, ranging from *"not at all"* to

other levels of agreement. Participants were asked to explain the reasoning behind their answers after each question, adding qualitative insight to the data collection process. Additionally, two open-ended questions were included to further enrich the qualitative side of the data. The translated full questionnaire used for data collection is included in Appendix B. After consultation with YEU, the translated dataset from these questionnaires was provided. This secondary data was then coded and analyzed to identify trends and patterns.

4. Results

This section presents an analysis of primary and secondary data sources related to community engagement in disaster risk reduction efforts. First, findings are discussed from the interviews conducted with individuals who are actively involved in DRR projects and have valuable experience in community engagement. These interviews, conducted with participants labeled as P1, P2, P3, P4, and P5, were analyzed across six thematic areas to identify different perspectives. The thematic topics include community perceptions, barriers, opportunities, effectiveness of DRR initiatives, stakeholder perspectives, and future directions.

This is followed by findings from the secondary data source that reflect the perspectives and experiences of community members themselves. By clearly distinguishing primary and secondary data, the aim is to provide a comprehensive and nuanced understanding of the multifaceted landscape of CBDRR.

4.1 Primary data

4.1.1 Community Perceptions and Knowledge of Disaster Risk

Foremost, all interviewees emphasized the importance of community awareness and involvement in DRR efforts. For instance, one highlighted the need for increased community engagement to improve disaster resilience, particularly in Indonesia, where many villages face significant risks [P3]. This sentiment was echoed by Participant 5, who emphasized the centrality of community participation and sustainability in building resilience. Participants emphasized the need to value community voices and perspectives in decision-making processes and the need to put communities at the center of DRR activities [P3; P4; P5]. This is consistent with Participant 4's focus on involving communities early in the DRR process and seeing them as key actors.

In addition, some emphasized that communities are essential sources of local knowledge. They have a long history of personal experience with their environment. Two participants emphasized this, pointing out that community members possess unique perspectives on the environment and landscape [P1; P2]. One of them stated, *"communities, they have experience on how to deal with their environment problem",* highlighting the ingrained ability of these communities to identify and respond to local risks [P2].

Participants generally agreed that a bottom-up strategy is preferable to a top-down strategy. One participant emphasized the need to put community awareness first and to foster a sense of responsibility for addressing issues collectively [P2]. Other participants echoed this sentiment, arguing that peer learning and knowledge sharing are useful tools for community awareness building [P1; P2; P5].

4.1.2 Barriers and Solutions to Community Involvement in DRR

Several barriers were identified by the participants as preventing communities from getting involved in DRR projects. A key observation by one participant highlighted several barriers to community engagement, including the perception that some programs are only looked at as opportunities for personal gain for locals, cultural and religious constraints, and challenges in fostering trust and transparency [P4].

Another important obstacle identified was communication breakdowns within and between community groups [P2]. Participants described instances where miscommunication led to negative community evaluations of DRR programs [P2; P4]. In addition, limited incentives for community members to participate and a lack of direct benefits were identified as additional barriers [P2; P4]. Another participant also highlighted the difficulties associated with establishing trust and transparency, especially in diverse communities with different backgrounds and cultural norms [P5]. Furthermore, according to one participant, *"the communities do not really participate meaningfully"*, implying that current CBDRR initiatives and the organizations working on them are not focused enough on community involvement [P3].

Moreover, there are often limited resources such as time and money available for CBDRR [P1; P4]. For instance, institutional constraints such as bureaucratic procedures and inflexible reporting requirements were identified as barriers to community engagement [P1]. One participant discussed the difficulty of aligning project timelines with community needs, as short implementation times often hinder the efficient execution of CBDRR initiatives [P1]. The barrier of staff turnover was also mentioned by Participant 4. This made it difficult to build good relationships with people working on DRR projects because, for example, there would be a new person working on the project every year [P4]. Similarly, one participant emphasized the need

for regulatory support and law enforcement to ensure compliance with DRR activities, citing difficulties such as insufficient law enforcement capacity [P2].

Participants also recognized effective stakeholder communication challenging for DRR projects. According to them, especially in Indonesia, there is a "communication gap" between stakeholders [P1; P4]. The reason for this is that technical communication remains problematic at different levels, such as local, provincial, and ministerial [P1]. Addressing this gap is critical to fostering collaboration and increasing the effectiveness of CBDRR efforts. Therefore, Participant 2 emphasized the value of structured meetings, such as steering and technical committee meetings, in facilitating communication and decision-making among partners. Additionally, to communicate project developments and maintain stakeholder engagement, periodic reports and newsletters can be used [P4].

A variety of approaches to overcoming current barriers were presented by participants. Two participants emphasized the need to establish clear partnership contracts with communities that define mutual expectations and commitments [P1; P2]. One participant also found using contracts very helpful because together they wrote down goals and objectives to work toward during the DRR program and the community could sometimes receive incentives or rewards for meeting them. The contract could be referred to at any time during the projects and ensured to fewer misunderstandings. [P2].

Increasing community knowledge about challenges such as miscommunication and cultural barriers can address some of the barriers that stakeholders still face [P2]. According to Participant 2, the importance of regulatory support and law enforcement from the Indonesian government to ensure compliance with DRR activities is important.

In addition, someone emphasized the value of promoting open communication with communities and capacity building programs to build trust and transparency [P5]. Similarly, one participant expressed that their organization had fewer difficulties with communities they had worked with for longer because they had built trust and familiarity [P1]. In order to adapt DRR strategies appropriately, Participant 5 stressed the importance of being aware of community needs and putting intersectional assessments into practice. Strategies such as training on accountability and improving communication channels were also suggested to reduce barriers and promote successful community participation [P4; P5].

4.1.3 Opportunities for Enhancing Community Involvement in DRR

While all participants felt that community-based DRR projects were a positive experience, there are several opportunities to strengthen community participation in DRR activities. Two participants highlighted the effectiveness of initiatives that come directly from the community itself [P1; P2]. Communities give organizations and practitioners *"their local knowledge, their insight, their opinion"*, which is very valuable [P5]. By actively involving community members in the design and implementation of DRR initiatives, practitioners can ensure that interventions are aligned with local needs and goals. This collaborative approach not only improves the relevance and effectiveness of DRR activities, but also increases community members' sense of ownership and empowerment [P2]. Community empowerment emerged from several interviews as an important way to strengthen the community involvement in DRR. Participants emphasized the importance of empowering communities to take ownership of the DRR initiatives, thereby fostering resilience from within [P1; P2; P3].

Addressing the needs of vulnerable groups emerged as another important way to increase community participation in DRR activities. Participants emphasized the need to prioritize vulnerable populations in DRR activities, including those with disabilities, the elderly, pregnant women, children, and indigenous groups [P1; P3; P5]. Practitioners can improve community resilience and promote effective disaster preparedness and response by ensuring that CBDRR programs are inclusive and accessible to all community members [P3; P4; P5]. Thus, baseline assessments are important to identify vulnerable groups within the community, especially at the beginning of the project [P4; P5]. Baseline assessments involve the collection and analysis of data to better understand the community's situation and specific needs, laying the groundwork for personalized and effective interventions.

Furthermore, collaborative approaches involving local leaders, elders, and indigenous groups were identified as effective strategies for empowering communities in disaster preparedness [P1, P3]. These leaders possess invaluable traditional knowledge and deep insights into community dynamics, which enable the development of culturally appropriate and context-specific resilience strategies.

4.1.4 Effectiveness of Current DRR Initiatives

While recognizing the progress made, participants identified persistent gaps in reaching marginalized and vulnerable groups and translating community involvement into actionable measures. As noted above, this ensures that DRR programs are relevant to the local context and specifically address community problems. For instance, frequent assessments and monitoring processes to evaluate the performance of CBDRR initiatives and identify areas for improvement were emphasized by all the participants. These evaluations are conducted by two-way

communication with the community through regular meetings, asking for feedback, and/or conducting surveys and questionnaires. By asking stakeholders and community members for their input, practitioners can learn a great deal about the strengths and weaknesses of CBDRR programs and make the necessary changes to increase their effectiveness over time. Each participant said they would use these insightful evaluations to improve their future strategies.

Additionally, many interviewees mentioned that ensuring communities are able to stand on their own and continue resilience-building programs after a project ends is a critical component of improving the effectiveness and sustainability of DRR initiatives [P1; P2; P4]. For instance, Participant 4 emphasized the need for community resilience and disaster preparedness because *"we will not be there forever, right? And the community will be there."* They explain that organizations and practitioners are only in the community for certain periods of time and then leave because the project is over and the funding is gone. The participant suggests having an "exit strategy" to make sure that when the practitioners leave the village and the project, the community has established certain teams that understand the entire process and can move their community forward without help from outside [P4]. Therefore, practitioners can support long-term sustainability and resilience by providing communities with the tools and resources they need to build their capacity to prepare for, respond to, and recover from disasters [P1; P4].

Furthermore, Participant 1 argued for the need to change perspectives, and implement more sustainable strategies that prioritize local knowledge and perspectives. According to this participant, *"the donor systems or the funding system is fairly global North approach".* The participant mentions that the power should be given to the communities and the humanitarian aid should be decolonized [P1]. By using local wisdom and regional resources, practitioners can promote innovative and sustainable solutions to problems of DRR that are deeply rooted in

communities. This is highlighted by Participant 1 who stated: *"I think this is the start of the approach that many of the organizations need to take, to shift the paradigm and to, to let the communities be more expressive and innovative with what they are doing."* [P1]. These findings underscore the need to remain critical and rethink conventional aid strategies.

4.1.5 Stakeholder Perspectives and Roles

Stakeholder collaboration emerged as another important theme during the interviews, with participants emphasizing the importance of engaging different stakeholders at different levels. One participant emphasized collaboration with local government organizations, such as the example of the Local Data Management Agency and the Ministry of Marine Affairs and Fisheries, demonstrating the value of collaboration at both the provincial and national levels [P1]. Likewise, another participant highlighted the importance of involving multiple stakeholders, including global partners, national government ministries, provincial agencies, and local governments, to successfully implement DRR projects [P2].

In addition, one participant underlined the significance of community-based action teams, which include village governments, community leaders, regional representatives, and elders, and their participation throughout the project stages [P4]. Participant 5 also emphasized the need for resilience activities and stakeholder mapping to identify possible partners and gain support for community initiatives.

4.1.6 Future of Disaster Risk Management and Sustainability

Participants emphasized the importance of evaluating the long-term impact and sustainability of CBDRR projects to fill research gaps and determine future directions in disaster

resilience [P1; P3; P5]. To properly assess effectiveness and promote sustainable behaviors, one

participant emphasized the need for improved measurement techniques [P1]. Furthermore, as

noted by another participant, the integration of environmental concerns and climate change

adaptation into DRR frameworks emerged as a critical part of developing holistic DRR

initiatives [P3]. Participant 3 also mentioned that the system has to change into a long-term

visioned one, especially since climate change is increasing.

As mentioned before, Participant 1 argues for a change of paradigm because the local

communities need to get the power back and the humanitarian aid should be decolonized. While

there are already existing policies on DRR in Indonesia, participants emphasized the need for

their review and enhancement to increase their effectiveness [P3; P5]. In particular, they

advocated the integration of additional ecosystem management, restoration, and climate change

adaptation approaches into these policies [P3]. Finally, Participant 5 emphasized the need for

long-term learning and commitment in resilience-building initiatives, stressing that these

activities require commitment and continuous learning.

4.2 Secondary data

This section is an examination of the secondary data and provides insightful information

on how innovations can improve disaster preparedness and response in Indonesian communities.

The innovations seek to address disasters such as earthquakes, windstorms, droughts, (flash)

floods, volcanic eruptions, and many more. Examples of innovations include disaster

preparedness education centers, mobile public kitchens to support flood relief efforts, and

disaster education theaters. Responses from 77 people in 15 local communities surveyed by the

YAKKUM Emergency Unit (YEU) reveal a positive view of the impact of the innovations on community resilience.

4.2.1 Enhanced Disaster Preparedness

The majority of respondents (90%) said they are prepared to manage potential risks and feel better equipped to deal with disasters after the implementation of the innovation. According to 77% of respondents, this preparedness is due to increased knowledge and skills in disaster preparedness and response. One respondent commented, *"My child, who initially didn't know anything, now knows and understands disasters. Children also often talk about disaster material at school, one of which is knowing what actions to take when a disaster occurs"*. Overall, community members feel safer and more confident as a result of the innovation. For example, one community member explained their answer with the following: *"I feel the risk is decreasing. We can move more quickly if there is a disaster"*. With the innovation, over 91% of respondents said they felt safer and more confident in the face of disasters. The consensus of the communities is that they feel more prepared and feel confident. Remarkably, 92% of respondents believe that innovations implemented in their community can improve the effectiveness of disaster preparedness and response.

4.2.2 Incorporating Community Perspectives

In addition to improving preparedness and responsiveness, these innovations implemented by YEU contribute significantly to the inclusion of community perspectives in disaster management procedures. The vast majority of respondents (77%) believe that community input is important and has so far been taken into account in the development of new

ideas. The participatory strategy of YEU promotes inclusion and a sense of ownership in the efforts to reduce disaster risk, and this has been confirmed by the majority of the communities.

4.2.3 Inclusion of Vulnerable Groups

Finally, the innovations overcome barriers for people with disabilities and other at-risk groups in actively participating. One respondent stated that, in their opinion, disaster preparedness is more efficient, better, and smoother for them *"because it will make it easier for me as a person with a disability."* Other respondents also mentioned similar experiences. According to the survey results, most of the innovations installed are even inspiring and encouraging persons with disabilities and other vulnerable groups to participate in the coordination and policy making processes of the CBDRR initiatives.

5. Discussion

The main research question of this study is to find out how community involvement affects the effectiveness of disaster risk reduction programs in Indonesian villages. In the context of disaster resilience, this question explores the complexities of cultural influences and community dynamics. Furthermore, the sub-question on barriers and opportunities provides a comprehensive analysis that examines the factors that hinder and facilitate community involvement.

The theoretical framework for this study emphasizes the development of initiatives and policies aimed at reducing the impact of disasters, drawing on the historical background of disaster risk management in Indonesia. Furthermore, the framework combines the concepts of CBDRR, emphasizing the value of community ownership, empowerment, and inclusiveness in

building resilience. This discussion draws on interviews, surveys from secondary data, and the

literature review to answer the main research questions.

5.1 Public Awareness and Preparedness for DRR in Indonesia

Indonesia is vulnerable to a variety of climate-related disasters (Nuryana et al., 2023).

Despite international initiatives, there remains a notable gap in public awareness of the profound

risks and losses posed by disasters (Purworini et al., 2020; Kadir & Nurdin, 2022; Nuryana et al.,

2023). The results of the current study revealed that the general Indonesian resident has a notable

knowledge gap on DRR. This finding is consistent with the literature review, as Nuryana and

colleagues (2023) state that there is a lack of understanding of disaster preparedness in

Indonesia. This lack of understanding frequently results in significant losses as people are unable

to protect themselves and their property.

The questionnaires from the secondary data further illustrate this issue, revealing a

significant lack of knowledge among community members about the disasters they face. Many

respondents were previously unaware of the risks in their environment. This is in line with the

research conducted by Kadir and Nurdin (2022), which indicates that DRR has not been properly

integrated into the Indonesian education sector, contributing to this knowledge gap.

However, with the new innovations implemented in their villages, the vast majority of

respondents now feel prepared to manage potential dangers and are more equipped to deal with

disasters. One reason may be that they have a better understanding of potential disasters.

According to the questionnaires, the majority of respondents indicated that their improved

understanding and ability to prepare for and respond to disasters was the primary reason for their

increased level of preparedness. Examples of the initiatives include disaster preparedness

education centers, mobile public kitchens to support flood relief efforts, and disaster education theaters. The general outcome of the survey was that the vast majority of community members felt safer and more confident as a result of these innovations.

Nonetheless, challenges remain. According to Purba and colleagues (2022), there is still a gender imbalance in DRR knowledge in Indonesia, with men often more knowledgeable about disaster preparedness than women. This is consistent with the findings of the current study, which showed that one participant worked primarily with grassroots women's groups to address the gender gap, highlighting the importance of women's empowerment. This gender gap underscores the need for more inclusive education strategies that ensure that all community members, regardless of gender, are included.

In response to the lack of public knowledge on disaster preparedness, the Indonesian government implemented robust legal frameworks and established dedicated institutions for disaster management. Notable examples include the establishment of the National Disaster Management Agency and the implementation of community-based disaster risk management strategies (Efendi et al., 2019). These efforts reflect a growing recognition of the need for proactive measures to mitigate vulnerability and strengthen resilience in Indonesia. This is consistent with the findings of the current study, which highlights the need for greater community involvement.

5.2 Community-Based Disaster Risk Reduction

The CBDRR approach is the cornerstone of community resilience and active engagement in DRR (Rizki et al., 2023). The success of CBDRR initiatives depends on effective community involvement throughout the DRR process and collaborative efforts among stakeholders (Deelstra

& Bristow, 2023; Naik and Murari, 2023; Isa et al., 2019; Lassa et al., 2018). The primary data

supports these theoretical concepts, with the importance of community awareness and

participation in DRR initiatives emphasized by all interviewees. In Indonesia, where many

villages are at high risk of disaster, greater community involvement is needed to promote disaster

resilience.

Moreover, the literature review highlights that CBDRR frameworks include a variety of

processes and tools, such as community assessment, planning, implementation, and monitoring.

These frameworks provide an organized way to involve communities in DRR efforts and build

long-term resilience (Lassa et al., 2018; Isa et al., 2019). Additionally, CBDRR methods not only

ensure optimal use of financial resources, but also promote sustainable development by giving

local communities a voice in setting development agendas (Draçi & Laska, 2023). Some

interview participants agree with this and emphasize the importance of the community being at

the center of these CBDRR method. This means that communities should be involved in the

initiatives from the start of the project, seeing them as the most important stakeholders. This

approach is crucial for the success of CBDRR initiatives, as it ensures that the needs and

perspectives of the community are fully taken into account in the DRR efforts.

Secondary data supports this, with a vast majority of respondents believing that

innovations used in their community can increase the effectiveness of disaster preparedness and

response. This key finding underscores the importance of community involvement in DRR

projects and demonstrates how community-driven projects can improve preparedness and

resilience.

5.3 Barriers and Solutions to Community-Based Disaster Risk Reduction

During this research, several barriers were analyzed and identified. These are divided into

three different sections: cultural and societal factors, governance issues and public mistrust, and

coordination and interest issues among stakeholders. As the secondary data findings were mostly

related to positive outcomes of CBDRR initiatives, the literature review and primary data

findings are mostly discussed in the following section.

5.3.1 Cultural and Societal Factors

Interview participants emphasized the significant role that cultural norms, customs,

religious constraints, and societal expectations play in shaping community perceptions and

responses to DRR initiatives, which was also supported by literature (Purworini et al., 2020).

These constraints have been found to influence the community's views on external interventions

and initiatives, often influencing individuals' willingness to participate in risk reduction

activities.

One participant highlighted the challenge of building trust and transparency in DRR

programs in culturally diverse areas. Additionally, participants highlighted the difficulties of

overcoming communication barriers and resolving misunderstandings caused by cultural

differences. These barriers do not only hinder the transfer of information but can also weaken

community trust in the validity and effectiveness of DRR activities. This aligns with the

literature, which suggests that managing cultural differences is critical to creating inclusivity and

ensuring that CBDRR programs are accepted by local communities. Without community

participation, CBDRR would not be possible.

5.3.2 Governance Issues and Public Mistrust

The effectiveness of disaster management activities in Indonesia is limited by governance challenges such as centralized decision-making and delayed, ineffective, and unorganized government responses (Efendi et al., 2019; Nuryana et al., 2023). These challenges result in a significant gap between government activities during and after disasters, and the expectations of affected communities (Nuryana et al., 2023). This was also highlighted in the current study, as one interviewee emphasized the importance of regulatory support and law enforcement by the Indonesian government to ensure compliance with DRR initiatives.

In addition, community distrust of government agencies is a significant barrier to effective CBDRR programs. Efendi and colleagues (2019) found that many residents have more trust in traditional authorities, such as local leaders, than in formal government agencies. This is in line with results of this research as interview suggestions included working with village governments, community leaders, regional representatives and the elderly to gain community trust and support. Another participant recommended stakeholder mapping as essential for gaining community support. These findings highlight the importance of improved governance structures and mechanisms in DRR projects that promote openness, accountability, and community involvement.

5.3.3 Coordination and Interest Problems among Stakeholders

A common barrier to the successful implementation of CBDRR projects is the lack of coordination and conflicting interests among stakeholders. According to Deelstra and Bristow (2023), this is mainly due to the complexity of Indonesia's regional systems. Interviewees observed notable barriers to communication between certain stakeholders, which is consistent

with theoretical concerns about coordination issues. More specifically, a communication gap was highlighted between ministerial and provincial stakeholders. This gap affects the flow of information and decision-making, impacting the overall coordination of CBDRR efforts.

To address these communication problems, interview participants described many feasible solutions. These include organized meetings such as steering and technical committee meetings that help stakeholders communicate and make decisions more effectively. Additionally, regular newsletters and reports were recommended to keep stakeholders informed and involved throughout the project lifecycle. These tactics are consistent with the literature review's emphasis on the need for good communication to balance stakeholder interests and ensure the achievement of CBDRR projects (Isa et al., 2019).

Moreover, resource constraints, such as insufficient time and funding, exacerbate the challenge of coordination and interest issues among stakeholders. These constraints arise from a variety of factors, including tight deadlines, inflexible funding cycles, and competing priorities. Limited resources often prevent the full implementation of processes and tools designed to effectively involve communities (Purworini et al., 2020). Interviewees highlighted the challenges posed by limited resources, including time and money, which hinder the efficient implementation of CBDRR initiatives. Community involvement is further complicated by bureaucratic procedures and strict reporting requirements that create organizational constraints that impede progress. Additionally, aligning project timelines with community needs is challenging, as short implementation periods frequently do not allow for the thorough implementation required for effective CBDRR. Staff turnover was also identified as an obstacle, making it difficult to build and maintain relationships with individuals involved in CBDRR projects, as new staff regularly replace existing staff. Inadequate regulatory support and law enforcement capacity complicate the sustainability of DRR activities, highlighting the need for increased resources and support to ensure the sustainability and success of CBDRR efforts.

Furthermore, participants noted that organizations and practitioners often only stay in the community for the duration of the project and then leave when the funding ends. To address this issue, one participant advocated creating an "exit strategy" to ensure that when the practitioners leave, the communities have developed teams that are knowledgeable about the entire process and can move forward independently. By providing communities with the appropriate tools and resources, practitioners can improve long-term sustainability and resilience, enabling communities to prepare for, respond to and recover from disasters on their own.

One potential strategy for reducing misunderstandings during projects is to establish partnership contracts with communities. These formal agreements, which outline all expectations and commitments, can serve as a clear reference throughout the life of the project. Such contracts are likely to improve communication and accountability. They can document specific goals and objectives for the community, and potentially provide positive incentives for achieving these goals. This approach could significantly improve project outcomes by fostering more structured and transparent collaboration.

5.4 Opportunities for Enhancing Community Involvement in DRR

After identifying the barriers that exist and hinder effective CBDRR initiatives, opportunities to enhance community involvement in DRR were also identified. As previously stated, the greater the community's involvement in DRR initiatives, the greater their efficacy. The opportunities are classified into four segments: community ownership and empowerment, incorporation of indigenous and traditional knowledge, inclusion of vulnerable groups, and effective stakeholder engagement.

5.4.1 Community Ownership and Empowerment

First, the literature review highlighted that by community members playing an active part in DRR initiatives, they gain more trust and get empowered (World Health Organization, 2015; Rizki et al., 2023). This also came back in the interviews because by actively involving community members in the design and implementation of DRR initiatives, practitioners can ensure that interventions are aligned with local needs and goals. According to a participant, the community members' sense of ownership and empowerment increases when they are involved. This empowerment was also found to be beneficial for the community involvement because villages become more resilient from within. Another finding from the primary data was that participants believed that by increasing ownership, independence, and resilience, the effectiveness and sustainability of DRR initiatives increased significantly. As mentioned in the section where barriers were identified, it is important to ensure that villages remain resilient after practitioners leave and projects end. In addition, the secondary data questionnaire showed that most respondents agreed that community perspectives and input are essential and are taken into account in the implementation of DRR initiatives.

5.4.2 Incorporating Indigenous and Traditional Knowledge

There are significant opportunities to improve resilience by incorporating indigenous wisdom and traditional knowledge into CBDRR projects. In many parts of the world, the use of traditional wisdom to deal with natural hazards is one of the most successful strategies for local people (Syahputra, 2019; Indrawati et al., 2022). Most of the interviewees were in line with this and emphasized the inclusion of local knowledge. A unique knowledge of how to identify disasters and traditions of how to respond to them has been acquired by the local people, who

have lived in their area for the longest time. When taking the local indigenous knowledge into account, the DRR initiatives become more culturally relevant and context-sensitive. Therefore, participants propose collaborative DRR methods where local leaders, elderly, and indigenous groups are incorporated.

Furthermore, a participant emphasized the necessity of a paradigm shift. According to them, the current system, especially the funding system, is a global North approach. This interviewee suggests the possibility of empowering communities, as well as decolonizing humanitarian aid. The term "decolonizing" refers to the unequal distribution of power and the possibility of re-balancing it (Aloudat & Khan, 2022). In this case, there is a global North-South power imbalance, probably because global North perspectives are often used when working on DRR programs. Additionally, funding is frequently dependent on actors from or influenced by the global North (Aloudat & Khan, 2022). As a result, communities will be more expressive and innovative in DRR projects, complementing existing knowledge systems. This is in line with the literature review, where Syahputra (2019) emphasizes that indigenous knowledge should build upon rather than contradict the existing global knowledge structure.

5.4.3 Inclusivity of Vulnerable Groups

Vulnerable groups, such as people with disabilities, elderly, pregnant women, and children, should also be incorporated into the DRR projects. This has been agreed on from all sources, the literature review, primary, and secondary data. CBDRR projects generally prioritize the inclusion of disadvantaged populations and the promotion of equity in the preparation for and during disasters (Lassa et al., 2018; Isa et al., 2019; Draçi & Laska, 2023). By ensuring that CBDRR programs are inclusive and accessible to all community members, practitioners create

successful disaster preparedness and response, and increase community resilience. These findings are in line with the findings of the questionnaire with the communities, where it has been proven that certain innovations installed overcome barriers for people with disabilities and other at-risk groups in actively participating. Respondents shared that because of this, the disaster preparedness strategy for vulnerable people was more efficient, better, and smoother than ever before. On top of that, some respondents who belong to vulnerable groups even felt inspired and encouraged to participate in coordination and policy making processes of the CBDRR initiatives. However, some interview participants noted that there are still persistent gaps in outreach to marginalized and vulnerable groups. Although efforts have been made, such as installation of more inclusive DRR innovations, more involvement of vulnerable groups is needed to ensure effective CBDRR initiatives.

5.4.4 Effective Stakeholder Involvement

The literature review suggests a balanced approach to stakeholder involvement to effectively coordinate and prevent competing stakeholder interests. Initiatives can be implemented in a more equitable, sustainable, and timely manner when local communities collaborate closely with other stakeholders (Isa et al., 2019). Interview participants state that stakeholders from all levels should be included, which is also supported by previous research (World Health Organization, 2015). One participant explained the need for proper stakeholder mapping in order to identify all actors and reach out to possible support for the CBDRR initiatives.

The recognition that many stakeholders will have different goals and objectives during CBDRR is crucial. For this reason, it is important to communicate effectively (Isa et al., 2019).

Effective stakeholder communication was also a common theme found in the results of the primary data, since it is essential but can be difficult to do. Particularly in the case of Indonesia, a communication gap has been identified between stakeholders. More specifically, there are still problems with technical communication at all societal levels. As a result, one participant emphasized the need for structured meetings for communication and decision-making among partners, such as steering and technical committee meetings. Furthermore, regular reports and newsletters can also be used to keep stakeholders informed and encourage them to keep them updated and involved.

5.5 Practical Implications and Future Research

To extend these findings and improve the effectiveness and sustainability of DRR programs, a number of important practice implications are identified. First, thorough and frequent assessments are necessary to ensure continuous improvement of CBDRR projects. Practitioners are encouraged to integrate input from surveys, questionnaires, and meetings, and to conduct regular assessments through two-way interaction with community members. By identifying strengths and weaknesses, these assessments will enable the necessary changes to improve program effectiveness over time.

Second, future work must focus on developing inclusive education plans that address gender disparities and knowledge about disaster preparedness. Ensuring equal access to DRR education for all community members, regardless of gender, age, or disability, would cultivate a more knowledgeable and resilient population. This includes creating targeted initiatives that empower women and other marginalized groups, and ensure their active involvement in DRR projects. In addition, all relevant stakeholders should also be involved. Collaboration across

governmental, non-governmental, commercial and academic sectors should be encouraged. Collaborative efforts have the potential to add a range of resources and experience to CBDRR initiatives, thereby strengthening and expanding them.

Moreover, although DRR policies are in place in Indonesia, they need to be evaluated and improved to maximize their effectiveness. Approaches to climate change adaptation, restoration, and ecosystem management should be incorporated into policies. The Indonesian government needs to support bottom-up CBDRR activities, while at the same time enforcing existing laws. By moving towards a long-term, environmentally integrated vision, Indonesian communities will be better prepared to deal with disasters in the future.

In addition, longer-term planning and implementation of DRR projects should be made possible through the use of more adaptable and stable financing methods. Activities that promote resilience need to be sustained over time and need to be adapted to the changing environment, in particular due to the changing climate.

Lastly, future research should focus on assessing the lasting impact and viability of CBDRR initiatives. This includes examining how CBDRR techniques make use of indigenous and traditional knowledge, as well as the cultural influences on community involvement. Studies could also examine how public trust and governance frameworks affect the success of DRR initiatives. In general, more longitudinal studies and comparative assessments of CBDRR across sites and contexts are needed to develop inclusive, sustainable, and successful disaster resilience solutions in Indonesian communities and elsewhere.

5.6 Limitations

There were some challenges and limitations to the methodology of this research. First, there are only five interviewees, mostly due to distance. A larger number of participants might have strengthened the results of this study and made them more applicable to other locations. In addition, the decision to focus on professionals with experience of working on DRR projects with community involvement could have led to biased results because other stakeholders were not investigated. The data now focuses mainly on specific projects and initiatives, while the research could have been more valid if other perspectives from other stakeholders had been included.

In addition, the secondary data from YAKKUM Emergency Unit may be subject to bias due to differences in the way the survey was conducted in different communities. Not all communities have the same initiatives in place or are subject to the same potential disasters, which could have an impact on the applicability of the data. On top of that, there is no complete transparency about how, when, and exactly where the questionnaires were conducted. This lack of openness raises concerns about the consistency and reliability of the data obtained. Moreover, the questionnaire study may not fully represent all regions of Indonesia due to its geographical scope and limited number of villages. In addition, both the questionnaire itself and the participants' responses were translated from Bahasa Indonesia to English, which could have resulted in loss of nuance or accuracy, potentially impacting the interpretation of the data. These methodological challenges underscore the importance of examining the results with caution and of conducting further research that takes these limitations into account.

6. Conclusion

This study investigated the impact of community involvement on the effectiveness of DRR initiatives in Indonesian communities. The goal of the current paper is to provide a comprehensive understanding of the barriers and opportunities of community involvement of CBDRR projects. This study helps to fill a critical gap in the existing literature, particularly in studies looking into the barriers and opportunities. Furthermore, this paper's emphasis on cultural dynamics within CBDRR deepens our understanding of effective resilience-building interventions.

The most important finding is that when community members are actively involved in CBDRR efforts, there is a significant increase in disaster preparedness and resilience. This study adds to the theoretical knowledge of CBDRR by highlighting the importance of community empowerment and ownership. It examines the barriers, such as public trust issues, resource constraints, and lack of coordination. Opportunities are then highlighted, including empowering communities, increasing inclusiveness, and effective stakeholder involvement. Lastly, the paper offers practical implications for policymakers and practitioners on how to improve the effectiveness of DRR programs through inclusive and ongoing community involvement.

However, this study has several methodological limitations. The small sample size and focus on DRR professionals may bias the results, while translation issues and survey methodology lack transparency. Future studies are needed and should focus on examining the integration of indigenous knowledge, addressing governance issues, and assessing the sustainability and long-term impact of CBDRR projects.

In conclusion, strengthening community participation in DRR initiatives is critical for the development of resilient communities in Indonesia. CBDRR initiatives can improve disaster preparedness and resilience, enhance community empowerment, promote inclusiveness, and ultimately save lives and livelihoods.

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Appendix A. Interview Guide

Before the interview

- Informal chat to break the ice: How are you doing?
- Introduction to the study: "The Impact of Community Involvement on the Effectiveness of Disaster Risk Reduction Initiatives in Indonesian Villages"
  - Purpose of the study
- Introduction to the semi-structured interview
  - More of a conversation than a formal interview
  - Time commitment
- Emphasize participants' rights (confidentiality, ability to stop at any time, ability to choose not to answer questions, audio recording)

Introduction

1. Could you please briefly introduce yourself?
2. What is your current occupation?
   a. At what organization do you work?
   b. What are your responsibilities at this institution?
3. What role does [your organization] play in helping Indonesian communities prepare for disasters?
4. How would you define community involvement in disaster risk management?
5. Do you have personal experience with involving local communities in disaster risk initiatives? Can you elaborate?

Core questions

Their experience

6. What was the process of involving local communities? How did you get in contact with them, etc.?
   a. Are there specific strategies or methodologies that you use?
7. How does the process of setting up a disaster risk reduction initiative work?

8. Would you describe this as a positive or negative experience?

9. Particularly in the Indonesian context, do you believe community involvement contributes to the overall effectiveness of disaster risk reduction projects?

    a. Could you share any successful examples where community involvement has significantly improved the effectiveness of disaster risk reduction initiatives in Indonesian villages?

    b. In your opinion, what are some positive outcomes of involving communities in the process?

    c. In your opinion, are there any negative outcomes?

10. In your experience, did you encounter any barriers to involving communities in the process?

    a. Do you think there are common barriers or challenges when organizations engage with communities?

    b. How is [your organization] or how are you addressing these challenges?

Evaluation

11. How does [your organization] evaluate the level of community involvement in its projects or initiatives? Are there specific metrics or indicators used for evaluating the effectiveness?

12. Does [your organization] ask for feedback from the community members?

13. Does [your organization] adapt its strategies based on the findings of the evaluations?

Stakeholders

Introduction: It is often the case that there are many different parties and partners involved in DRR initiatives. In my research, I call these partners "stakeholders".

14. What role do local partnerships and collaborations play in facilitating community involvement and increasing the effectiveness of efforts to reduce disaster risk?

    a. Do you have any examples?

15. How do you make sure that the different stakeholders coordinate and communicate with each other?

Vulnerable people

16. How does [your organization] ensure that vulnerable or excluded groups within communities are effectively involved and empowered in disaster risk reduction activities?
    a. Do you have any examples?

Lessons learned

17. What do you think could be improved for next time (even if everything went well)?
18. Can you share any lessons learned or best practices that [your organization] has identified over the years in promoting community-based disaster risk reduction?

Concluding questions

19. Looking forward, what are your priorities or goals for future community-based innovation projects in the field of disaster management and risk reduction?
20. What do you see as the future of community engagement in disaster risk reduction initiatives, especially in the context of Indonesia's changing climate and evolving disaster landscape?
    a. Does your organization have a long-term vision for this?
21. Is there anything you would like to highlight? Do you have any questions?
22. Do you have any recommendations for other organizations or stakeholders, so I can ask their perspectives on community involvement for disaster risk reduction initiatives?

Appendix B. Translated Questionnaire

Date:

Demographics:

- What is your sex (female, male, prefer not to say)
- Location/village
- What is your age (in years)
- Washington Group Questions

What are the three disaster risks/threats that exist in your area?

<u>Engagement in innovation:</u>

How do you feel have you engaged with the innovation program and the ideas (innovations) it is helping to develop? [select all that apply]

- ☐ I have not heard of the program or their innovations
- ☐ I have heard about the program but was NEVER asked for my views
- ☐ I was OCCASIONALLY asked for my views on the program and their innovations
- ☐ I had multiple opportunities to input into the innovations
- ☐ Direct feedback was provided on how my input has been used by the program
- ☐ I was directly involved in all key activities and decisions by the program
- ☐ I was empowered to make the final decision on the innovation design

<u>Resilience to Crises:</u>

With the innovation, are you ready to face such kind of issues? [Please mention if the innovation is related to a certain issue such as flood, drought, etc.]? [pick one]

- ☐ Not at all
- ☐ Not really
- ☐ Moderate
- ☐ Yes, a little

☐ Yes, totally

☐ No idea

Please write down the respondent's narrative; why the narrative answers the discourse.

Do you think ___ [mention the innovative activity]____ which has been conducted can solve your issues to actively participate, especially, in disaster preparedness? [such as flood, drought, or other area based disasters] [pick one]

☐ Not at all

☐ Not really

☐ Moderate

☐ Yes, a little

☐ Yes, totally

☐ No idea

Please write down the respondent's narrative; why the narrative answers the discourse.

Do you think the given activity has further helped your disaster preparedness or response? [Pick one]

☐ Not at all

☐ Not really

☐ Moderate

☐ Yes, a little

☐ Yes, totally

☐ No idea

Please write down the respondent's narrative; why the narrative answers the discourse.

Based on your perception, does the given activity help the implementation of disaster preparedness to be more efficient, better, and smoother? [Pick one]

☐ Not at all

☐ Not really

☐ Moderate

☐ Yes, a little

☐ Yes, totally

☐ No idea

Please write down the respondent's narrative; why the narrative answers the discourse.

Do you think the voice of the locals are welcomed and considered during the implementation of the innovative ideas? [Pick one]

☐ Not at all

☐ Not really

☐ Moderate

☐ Yes, a little

☐ Yes, totally

☐ No idea

Please write down the respondent's narrative; why the narrative answers the discourse.

Does the involvement give (positive/negative) effects for the locals? To what extent? [Pick one]

☐ Strong negative effect

☐ Slight negative effect

☐ Slight positive effect

☐ Strong positive effect

☐ No idea

Please write down the respondent's narrative; why the narrative answers the discourse.

In your opinion, is the idea suitable and applicable? [Pick one]

- ☐ Not at all
- ☐ Not really
- ☐ Moderate
- ☐ Yes, a little
- ☐ Yes, totally
- ☐ No idea

Please write down the respondent's narrative; why the narrative answers the discourse.

Does the innovative action elevate your confidence and sense of self-security for the implemented disaster preparedness? [Pick one]

- ☐ Not at all
- ☐ Not really
- ☐ Moderate
- ☐ Yes, a little
- ☐ Yes, totally
- ☐ No idea

Please write down the respondent's narrative; why the narrative answers the discourse.

How do you define "climate change"? [Open-ended response]

What are the effects that you feel from climate change? [Open-ended response]

Do you think the ideas which are being developed can help to reduce or limit the effects of climate change? [Pick one]

☐ Not at all

☐ Not really

☐ Moderate

☐ Yes, a little

☐ Yes, totally

☐ No idea

Please write down the respondent's narrative; why the narrative answers the discourse.