EREM 81/3
Journal of Environmental Research, Engineering and Management
Vol. 81 / No. 3 / 2025
pp. 63–72
10.5755/j01.erem.81.3.39073

Resilient Communities: Adapting to Flood Disasters in Kemaman, Terengganu, Malaysia and Padang City, Indonesia

Received 2024/12 | Accepted after revisions 2025/07

https://doi.org/10.5755/j01.erem.81.3.39073

Resilient Communities: Adapting to Flood Disasters in Kemaman, Terengganu, Malaysia and Padang City, Indonesia

Ernawati[1]*, Arie Yulfa[1], Lailatur Rahmi[1], Mohd Hairy Ibrahim[2]

[1] Department of Geography, Faculty of Social Science, Universitas Negeri Padang, Indonesia

[2] Department of Geography, Faculty of Human Sciences, Universitas Pendidikan Sultan Idris, Malaysia

***Corresponding author:** ernawati@fis.unp.ac.id

Community resilience in facing floods is largely determined by people's ability to adapt to the flood itself. Normally, people do not live in disaster-prone areas; however, in Kemaman, Terengganu, Malaysia and Padang City, West Sumatra, Indonesia, people continue to live in flood-prone areas. This paper aims to discuss the community's response to flood disasters and analyse the level of resilience, the relationship between education level and community resilience and adaptation to floods in Kemaman and Padang. This study uses a quantitative method with a survey study design. The research sample was determined using the Krejcie and Morgan table with a random sampling technique. Data collection tools included questionnaires and data collection techniques such as field observations and interviews, and data were analysed using simple linear regression. The findings of the study indicate that the community responds quickly and with great initiative in dealing with floods. The level of community resilience is relatively high, while the relationship between resilience and education level is not significant. Adaptation strategies carried out include raising the foundations of the house, making an attic in the house, making a floating raft house and strengthening cooperation in maintaining the cleanliness of the river and drainage. This study has implications for the formulation of community-based disaster mitigation policies and the planning of settlements that are more resilient to disasters. Further research can explore other socioeconomic factors that contribute to community resilience in dealing with floods.

Keywords: resilience, social, adaptation, flood, community.

Introduction

Floods are very destructive in all aspects of life and can cause loss of life, damage property and impact public healt (Wahyudin et al., 2024). In Malaysia and Indonesia, floods are a frequent occurrence. High rainfall can cause rivers to overflow and trigger flooding (Poff, 2002). The impacts include material losses, impacts on public health and disruption of basic needs (Nakoe and Lalu, 2022; Rosmadi et al., 2023).

The floods that hit Kemaman caused property damage and losses to the community. Several areas in Kemaman were cut off from clean water supplies and basic necessities due to flooding that closed the main route to the city. Based on data from the Secretariat of the Terengganu State Disaster Management Authority, in 2022, 30,316 people were affected, and in 2023, 1880 people (APM Kemaman, 2024). Padang is also a flood-prone area; in 2022, around 1,000 victims were recorded. In 2023, the number of victims was around 600. Floods hit almost all areas in Padang (Nurpasari and Febriamansyah, 2020). Several buildings were submerged in floodwaters to a depth of 1–1.5 m (Sandrina et al. 2023). In several other areas in Padang, such as Lubuk Begalung, Padang Utara, Padang Selatan, Padang Timur, Koto Tangah and Nanggalo (Hendra and Muhammad, 2024) floods reached a depth of 60 cm. When prolonged heavy rainfall is accompanied by high tides, natural and artificial drainage systems are unable to accommodate or drain large amounts of water quickly, resulting in waterlogging or even flooding in residential areas, roads and other areas (Prawati et al., 2022).

To reduce the risk of flooding, it is necessary to increase knowledge about preparedness (Hildayanto, 2020). Preparedness is one of the disaster management processes and increasing preparedness is an important element in proactive disaster risk reduction activities implemented before a disaster occurs (Ferianto and Hidayati, 2019). Understanding preparedness is needed for people living in disaster areas to reduce various impacts, both material and non-material (Sandrina et al., 2023). Many factors influence preparedness, one of which is community resilience (Carmen et al., 2022). Resilience is the ability of a community to build, maintain or regain the level of community capacity that faces difficulties and challenges when a disaster occurs (Lwin et al., 2020; Satria and Sari, 2017). Resilience produces and maintains a positive attitude to developing a community preparedness approach. Individuals can derive meaning from life and use their previous knowledge and experiences to prepare themselves for adversity such as disasters, appropriately (Kamh and Khalifa, 2016). The use of positive and appropriate strategies can address problems, handle emotional stress and overcome difficulties well, thereby increasing community resilience to flooding (Chen et al., 2024). Empirical evidence shows that people tend to stay in disaster areas even though environmental conditions are unfavourable, so an understanding of preparedness and resilience is needed for the community (Bott and Braun, 2019). Therefore, disaster preparedness can be influenced by community resilience (Guo and Sim, 2020). Resilient communities can change the environment through deliberate collective action, and thus require communities to cope with and learn from difficulties effectively (Chen et al., 2024).

Research (Nguimalet, 2018) revealed that a person's resilience and experience of disasters determine what actions will be taken when a disaster occurs based on previous knowledge or experience. According to other research (Curtis et al., 2024), communities that have resilience and have experienced disasters can help the community conduct disaster preparedness simulations. Thus, it can be seen that victims of natural disasters who have resilience can reduce psychological problems and ensure positive mental health for themselves (Irasanti et al., 2023; Md. Akhir et al., 2021). Realising that this flood disaster is not something to be taken lightly, public awareness is needed so that people can focus on steps to reduce the dangers of flooding. In addition, the condition of the community that does not have strong resilience because it cannot adapt to the existing flood conditions renders them unable to help themselves when a disaster occurs. Therefore, it is necessary to conduct research that aims to analyse the community's response to flood disasters, the level of community resilience, the relationship between education levels and the level of community resilience in dealing with flood disasters and community strategies for adapting to flood disasters. Focusing on aspects of social resilience and adaptation, this study is expected to identify community strategies for dealing with floods, so that it can be a future reference and consideration for the government or policymakers and communities experiencing similar disasters.

Methods

Research design and procedures

This study uses quantitative descriptive and inferential methods. Research objectives 1, 2 and 4 are descriptive quantitative research. Research objective number 3 seeks the effect of variable X on variable Y using the inferential method and is analysed with simple linear regression. Variable X is education and variable Y is the level of resilience. Data were collected using questionnaires, observations and interviews.

Population and sampling

The population of this study was the entire community affected by the flood in Kemaman as many as 226,400 people, and in Padang as many as 942,938 people. The sample was taken using the probability sampling technique with the simple random sampling method, based on the Krejcie and Morgan table. With a confidence level of 95% and a margin of error of 5%, 384 respondents were recruited from each city, giving a total sample size of 768 people.

The Krejcie and Morgan table (Krejcie and Morgan, 1970) was used to determine a representative sample size based on the population size. This table is used in quantitative research with large populations and probability sampling techniques. The main criteria used in this table are as follows:

Table 1. *Sample size (Krejcie and Morgan, 1970)*

Population (*N*)	Sample (*S*)
100	80
200	132
500	217
1000	278
5000	358
10,000	370
100,000	384

The inclusion criteria in the sampling were: (1) Communities that have experienced the impact of flooding in the last five years, (2) A minimum age of 18 years and (3) Willingness to provide information voluntarily. The exclusion criteria were: (1) Individuals who experienced cognitive disorders that prevented them from completing the questionnaire and (2) Individuals who had moved away from the affected area before the data were collected.

Research instruments

The research instrument is a structured questionnaire developed based on the theory of community resilience. Each item in the questionnaire was measured using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Validity and reliability of the research instruments.

The validity of this research instrument was tested using the Pearson product-moment correlation analysis, with valid criteria if the calculated r-value> r table a degree of freedom (df) = n – 2, with a probability level of error of 0.05. The validity test was conducted on 100 respondents. Thus, r table:

$$df = (N - 2) = 100 - 2 = 98 \quad (1)$$

With a probability of 5%, the r table obtained is 0.197. With a probability of 5%, the r table obtained is 0.197.

1 Validity test

Table 2. *Validity test*

Item No.	r count	r table	information
1.	0.575	0.197	Valid
2.	0.439	0.197	Valid
3.	0.684	0.197	Valid
4.	0.547	0.197	Valid
5.	0.611	0.197	Valid

Based on the results of the test of the validity of the calculation of the question items, all the question items for the education variable were declared valid and suitable for use.

2 Reliability test

Table 3. *Reliability test*

Frequentist Scale Reliability Statistics				
			95% CI	
Coefficient	Estimate	Std. Error	Lower	Upper
Coefficient α	0.715	0.049	0.619	0.811

Based on the calculation of the reliability test, the question items meet the high-reliability criteria with a score of 0.715. The reliability test was conducted using Cronbach's Alpha method, with the reliability value considered high if $\alpha > 0.70$.

Data analysis

Research objectives 1, 2 and 4 were analysed using quantitative descriptive statistics. Objective number 3 was analysed using simple linear regression.

Results and Discussion

Based on the sociodemographic data, the participants in this study in Padang City were mostly aged 31–35 years and in Kemaman the age range was 36–45 years. These data show that residents living in flood-prone areas are mostly younger age groups who still have the strong physical abilities needed to survive living in flood-prone areas (Bukvic et al., 2018).

Community response to flooding

Based on the analysis of the flood data that hit Kemaman and Padang, it can be seen that the community's response to the flood was fast and showed great initiative. The community's response to the flood included several important steps that were carried out independently before any outside assistance, either from the government or the private sector. These steps included moving goods and electronic equipment and evacuating children and older adults to a safer place (attic). These actions reflect both independence and togetherness in facing disasters. In addition, good coordination with local community leaders and active participation in routine meetings indicate that the community has a strong internal support system and is ready to deal with emergencies efficiently. Coordination by community leaders and village heads in the evacuation process and community participation in routine meetings in the village also strengthened the flood support system. Community participation and communication in routine activities such as neighbourhood or village meetings had a direct impact on community preparedness and response to disasters. Community responses in dealing with floods can be seen from:

a *The level of community participation in regular meetings*

The following community participation in regular meetings in Padang and Kemaman.

The results of data processing on the level of participation in routine community meetings showed that the highest score in Padang was 253, which indicates a moderate level of participation in the meeting, and the lowest score was 20, which is included in the low participation category. Meanwhile, in Kemaman, the highest score was 157, which indicates a high level of participation in the meeting, and the lowest score was 5, which is also included in the low participation category. The high vulnerability in Kemaman was due to a lack of coordination between stakeholders. This was the main obstacle that caused delays in the evacuation process and distribution of aid to the affected areas. This was also driven by low community attendance at routine meetings in the area to address flooding problems, a lack of coordination between RT and RW, no collective efforts in cleaning drainage and community passivity in disaster preparedness, especially in preparing food and medicine for emergencies.

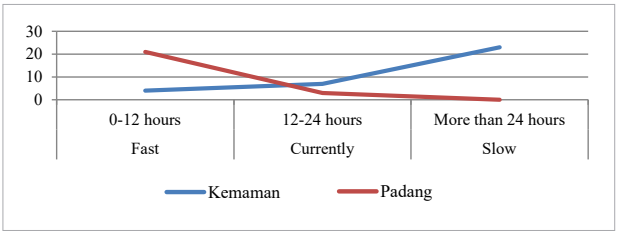
Table 4. *Level of community participation in regular meetings*

Variables	Padang		Kemaman	
	Frequency	Percentage	Frequency	Percentage
High participation	62	16.1	157	40.89
Moderate participation	253	65.9	67	17.45
Low participation	20	5.2	5	1.30
No participation	49	12.8	155	41.67

b *Time taken for water to recede*

During the flood disaster in Padang and Kemaman, the water took a relatively long time to recede, with an average of 12–24 hours. The data can be seen from the following data processing results:

Fig 1. *Length of the low tide time*



The time required for floodwaters to recede can vary significantly depending on factors such as rainfall intensity, drainage capacity and topography. Floodwaters

start to recede within 12 to 24 hours for Padang and Kemaman. In some areas with inadequate drainage systems and flatter topography, floodwaters take longer and sometimes take several days to fully recede. In Padang, flooding usually occurs in Parak Jambu and Lubuk Buaya, while in Kemaman it occurs in Chukai, Air Putih, Kijal and Kemasik.

In addition, during a flood, the average water level in Padang reaches an adult's knees, while in Kemaman the water level reaches an adult's waist. Such floodwater levels can cause extensive damage, including damage to buildings, loss of property and danger to life (Maranzoni and D'Oria, 2023).

Resilience level in Padang and Kemaman

The level of community resilience in Padang and Kemaman is seen from several aspects such as health and social unity and disaster preparedness.

Fig 2. *Health*

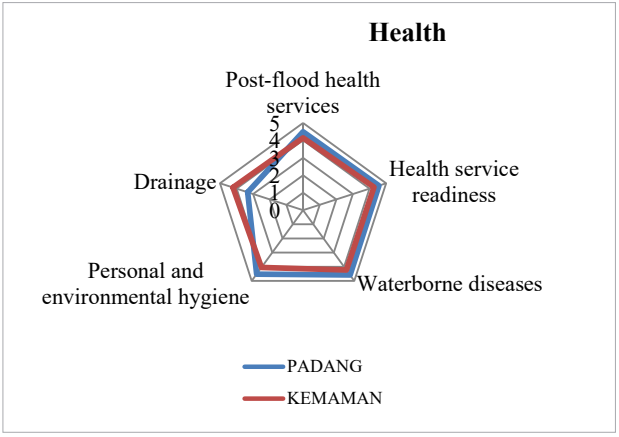
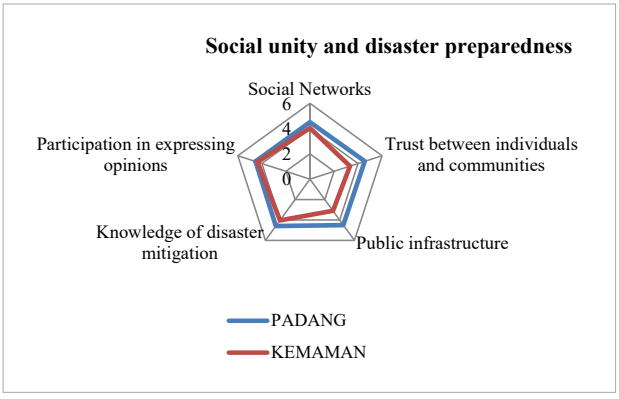


Fig 3. *Social unity and disaster preparedness*



Health is a variable that is categorised as very high in Padang and Kemaman. Many people are affected by diseases due to flooding. This condition is caused by poor environmental hygiene and a lack of drainage. Several variables that are categorised as moderate are access to the nearest health facilities, the ability of the health service system to handle floods and the functioning of health facilities during disasters. These variables require efforts such as improving the accessibility of health facilities and the readiness of medical personnel to increase community resilience in dealing with floods.

Social cohesion and disaster preparedness are two keywords in building community resilience (Plough et al., 2013). Social cohesion refers to the level of solidarity and connectedness between community members, while disaster preparedness is an effort to minimise risk through planning and preventive actions. When communities have a strong sense of kinship and mutual trust, they tend to share information and act collectively in the face of disasters (Drury, 2012). These variables require increased efforts, such as providing material and non-material assistance to disaster-affected communities and village governments to facilitate the need for evacuation sites in the form of existing permanent government buildings that meet the criteria for evacuation sites.

Relationship between education level and community resilience level in facing flood disasters

Based on data analysis using simple linear regression, no influence was found between education level and flood disaster resilience in Padang City and Kemaman City. The absence of this influence can be seen from its significance of >0.05, which is 0.257 with the magnitude of the influence between resilience and education of (0.021). This shows that several flood disasters in Padang City and Kemaman City were not accompanied by community resilience derived from various levels of education. The data also prove that community education in cities does not affect flood resilience.

Research conducted in Padang and Kemaman shows no significant influence between education levels and flood resilience levels. This result is based on the data analysis of the influence coefficient between the two variables. In Padang, an influence coefficient of 0.021 was obtained with a significance value of 0.257. This

shows that the influence between education level and resilience level is very weak and not statistically significant. Education level does not have a significant influence on the ability of individuals or communities to deal with post-flood recovery. In Kemaman, an influence coefficient of –0.020 was found with a significance value of 0.150. This means that education is also not the main determining factor in flood resilience in Kemaman. The results of this study indicate that other factors have a greater influence on flood resilience than education. These factors include participation in a community, social capital, health, social unity and disaster preparedness. For more details, see *Tables 5* and *6*.

Table 5. *The effect of education level on the resilience level in Padang City*

Model		Sum of the squares	df	Mean square	F	Sig.
1	Regression	0.123	1	0.123	1.288	0.257(*a*)
	Residual	36.234	378	0.096		
	Total	36.357	379			

Table 6. *Coefficients(a)*

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	*Std. error*	*Beta*	*B*	*Std. error*
1	(Constant)	4.369	0.081		54.228	0.000
	Pendidikan	0.021	0.018	0.058	1,135	0.257

Table 7. *The influence of education level on the resilience level in Kemaman city*

Model		Sum of the squares	df	Mean square	F	Sig.
1	Regression	0.099	1	0.099	2.083	0.150(*a*)
	Residual	17.955	376	0.048		
	Total	18.054	377			

Table 8. *Coefficients(a)*

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	*Std. error*	*Beta*	*B*	*Std. error*
1	(Constant)	3.845	0.064		60.498	0.000
	Pendidikan	–0.020	0.014	–0.074	–1.443	0.150

Community adaptation to floods

Adaptation may initially be a spontaneous community response to an event (Wilson and Gilbert, 2008). This response can be scaled up over time depending on the duration and size of the event. According to modern disaster risk reduction measures to address hazards, some recommended steps to adapt to extreme climate events and build resilience include measures for protection (preparedness, mitigation, prediction and early warning) and for recovery (impact assessment, response, recovery and reconstruction) (Handayani and Kurniadi, 2022). Adaptation to floods requires strategies to survive and adjust to recurring disaster risks (Wilby and Keenan, 2012). Based on various indicators that have been analysed between Padang and Kemaman, communities in the two areas show different responses to flood risk. Efforts made by communities in physical adaptation are mostly carried out at

the household level, specifically for Kemaman and Padang. Some people choose to raise the foundation of their houses by a few cm to 1 metre from the ground surface. One of the purposes of raising the foundation of a house is to prevent water from entering the house, so it is effective if the surface of the floodwater is lower than the front of the house (Dewa and Makoka, 2023).

The form of adaptive actions taken by the community in the research location is largely determined by economic considerations (Marfai and Sekaranom, 2015). The cost of raising houses and building embankments is considered relatively cheap by the community in Kemaman; therefore, this action is the most common choice taken by the community in dealing with flood conditions in their area. In contrast, building additional floors in the house is considered more expensive because it entails a very large cost. This also encourages people to build houses that are mostly made of wood (Mabrouk and Haoying, 2023). The community in a community is the first to respond to a disaster, so it is necessary to build resilience and prepare and empower the community through the implementation of flood risk reduction during and after the flood (Chen et al., 2024). Furthermore, communities need to strengthen their disaster resilience through better communication, cross-community cooperation and protection in the event of a disaster (Sardi and Razak, 2019).

In addition to physical adaptation, several forms of non-physical adaptation were identified through in-depth interviews. Some local communities have developed a collective work system called 'gotong royong', which involves cleaning the rivers and drainage channels around settlements (Mussadun et al., 2019). This is one of the main actions at the community level to prevent or minimise flooding. Non-physical adaptation measures were also identified in terms of post-disaster recovery (Shah et al., 2023). These measures include reusing undamaged materials, especially wood and plastic, as building materials and repairing materials that are still useful, especially household appliances. To finance repairs, some people obtained loans or borrowed money from relatives. With additional funds, they were able to buy new materials and hire workers, which allowed reconstruction to be carried out and completed more quickly. Community skills in adapting and solving problems will develop and their confidence in flood disaster mitigation and ability to face flood disasters will increase (Akhir et al., 2021).

Fig 4. *Floating raft house in the Kemaman district*

The driving factor in building community resilience after a disaster is gratitude, because the community and government provide a great deal of assistance and direct concern to disaster victims, starting by providing life insurance assistance and other logistical assistance. According to Hakim et al., (2023), social support is the presence of certain people who personally advise, encourage, direct and show a way out when someone encounters problems and obstacles in carrying out an activity. Social support is very important to understand because it becomes very valuable when someone is experiencing problems, so people need someone close to them who can be trusted to help them overcome these problems (Jacinto et al., 2023).

Implications of the study

The implications of the results of this study can be used by the government in formulating more effective policies to reduce disaster risk, including increasing

community involvement in safer spatial planning. In addition, communities and non-governmental organisations can also use the results of this study to strengthen flood awareness and preparedness through community-based training and adaptation strategies. From a policy perspective, this study emphasises the importance of integrating digital technology into disaster mitigation, especially in early warning systems and disaster education.

In the context of digital technology use, this study highlights how social media and digital systems play a role in increasing social resilience to floods. Social media platforms such as Facebook and WhatsApp are used to disseminate emergency information, accelerate aid coordination and increase public awareness of flood preparedness. Therefore, policies that support the use of digital technology in disaster education, early warning systems and post-disaster health services need to be developed continuously so that communities can be more resilient in facing future disaster threats.

Limitations and Recommendations

This study has several limitations. First, the study was limited to Kemaman, Terengganu and Padang City, so the results cannot be generalised to other areas with different geographical and social conditions. Second, the data collection methods used, such as questionnaires and interviews, may have limitations in terms of respondent subjectivity and potential bias in answering questions.

Based on these limitations, there are several recommendations for further research. First, comparative studies need to be conducted in various regions with different social and geographical characteristics to understand broader and more diverse community adaptation patterns. Second, it is suggested that the use of mixed-methods research that combines quantitative and qualitative data can provide a more comprehensive picture of the factors that influence social resilience to flood disasters. In addition, future research should explore in more depth the role of digital technology in disseminating disaster information, coordinating assistance and monitoring post-disaster public health.

Conclusion

Based on the research, it can be concluded that the people in both cities have a fast response and exhibit great initiative in dealing with floods. The level of resilience is at a high level, there is no significant influence between resilience and education level and the form of adaptation carried out is to raise the front of the house from the ground level and develop a cooperation system to clean rivers and drainage around the settlement. The resilience of the community in Padang City is better than that in Kemaman. This is driven by a sense of unity and a high level of cooperation among the people affected by the flood.

The implications of this study can be used by the government as a reference in determining policies related to flood resilience to increase community involvement in better and safer spatial planning. In addition, this study can also be used by the community and non-governmental organizations (NGOs) to strengthen awareness and preparedness for floods through community-based training and adaptation strategies, this study also emphasizes the importance of integrating digital technology in disaster mitigation, especially in early warning systems and disaster education. This study examines how social media and digital systems play a role in increasing social resilience to floods. Such as Facebook, and WhatsApp, which are used to disseminate emergency information, accelerate aid coordination, and increase public awareness of flood preparedness.

References

Akhir N. M., Noremy., Aun N. S. M., Selamat M. N., Amin A. S. (2021) Exploring Factors Influencing Resilience Among Flood Victims in Malaysia. International Journal of Academic Research in Business and Social Sciences 11(6): 969-981. Available at: http://dx.doi.org/10.6007/IJARBSS/v11-i6/10227

APM Kemaman (2024) A report book (hard copy: Kemaman Civil Defense District Office Profile 2023/2024. Available at: https://www.bizmalay.com/en/kemaman-civil-defense-district-office-09-859-5233

Bott L.M., and Braun B. (2019) How Do Households Respond to Coastal Hazards? A Framework for Accommodating Strategies Using the Example of Semarang Bay, Indonesia. International Journal of Disaster Risk Reduction 37:101177. Available at: https://doi.org/10.1016/j.ijdrr.2019.101177

Bukvic A., Gohlke J., Borate A., Suggs J. (2018) Aging in Flood-Prone Coastal Areas: Discerning the Health and Well-Being Risk for Older Residents. International Journal of Environmental Research and Public Health 15(12):2900. Available at: https://doi.org/10.3390/ijerph15122900

Carmen E., Fazey I., Ross H., Bedinger., Smith F. M., Prager k., McClymont K., Morrison D. (2022) Building Community Resilience in a Context of Climate Change: The Role of Social Capital. Ambio 51(6):1371–87. Available at: https://doi.org/10.1007/s13280-021-01678-9

Curtis A. G., Allred S. B., Murphy R. C., Roberts B. A. (2024) Exploring the Role of Social Capital in Community Flood Resiliency in Binghamton, NY. International Journal of Disaster Risk Reduction 104:104322. Available at: https://doi.org/10.1016/j.ijdrr.2024.104322

Dewa O., Makoka D., Ayo-Yusuf O. A. (2023) Measuring Community Flood Resilience and Associated Factors in Rural Malawi. Journal of Flood Risk Management 16(1):12874. Available at: https://doi.org/10.1111/jfr3.12874

Drury J. (2012) Collective Resilience in Mass Emergencies and Disasters: A Social Identity Model. The social cure 195–215. Available at: https://www.taylorfrancis.com/chapters/edit/10.4324/9780203813195-14/collective-resilience-mass-emergencies-disasters-john-drury

Ferianto K., and Hidayati U. N. (2019) Efektifitas Pelatihan Penanggulangan Bencana dengan Metode Simulasi terhadap Perilaku Kesiapsiagaan Bencana Banjir pada Siswa SMAN 2 Tuban [The Effectiveness of Disaster Management Training Using Simulation Methods on Flood Disaster Preparedness Behavior of Students of SMAN 2 Tuban]. Journal of Mesencephalon Health 5(2):88-94 *(in Indonesian)*.

Guo C., Sim Timothy S., Ho H. C. (2020) Impact of Information Seeking, Disaster Preparedness and Typhoon Emergency Response on Perceived Community Resilience in Hong Kong. International Journal of Disaster Risk Reduction 50:101744. Available at: https://doi.org/10.1016/j.ijdrr.2020.101744

Hakim L., Setiawan B., Hawing H., Lestari I. (2023) Resiliensi Masyarakat dan Penyuluhan Pasca Banjir di Kecamatan Masamba Kabupaten Luwu Utara [Community Resilience and Post-Flood Counseling in Masamba District, North Luwu Regency]. Journal of Community Counseling 19(02):220–31. Available at: https://doi.org/10.25015/19202346001 *(in Indonesian)*.

Handayani D. A., Kurniadi A., Bahar F. (2022) Strategi pengurangan risiko bencana berbasis pemberdayaan masyarakat desa penyangga kawasan konservasi Taman Nasional Gunung Merapi [Disaster Risk Reduction Strategy Based on Empowerment of Village Communities in the Mount Merapi National Park Conservation Area]. Sukowati Research and Development Journal: Research and Development Media 6(1):84–97. Available at: http://journal.sragenkab.go.id; Permalink/DOI: 10.32630/sukowati.v6i1.328 *(in Indonesian)*.

Hendra, M. N. (2024, June 21). Padang dilanda banjir, ketinggian air mencapai 60 cm [Padang Hit by Flood, Water Level Reaches 60 Cm]. Available at: https://sumatra.bisnis.com/read/20240621/533/1775788/padang-dilanda-banjir-ketinggian-air-]mencapai-60-cm

Hildayanto A. (2020) Community Knowledge and Attitudes of Preparedness for Flood Disasters. Higeian Journal Of Public Health Research and Development 4(4):577–86. Available at: https://doi.org/10.15294 /higeia/v4i4/38362

Irasanti S. N., Respati T., Januarita R., Yuniarti Y., Jun Chen H. W., Marzo R. R. (2023) Domain and Perception on Community Resilience: Comparison between Two Countries. Frontiers in Public Health 11:1157837. Available at: https://doi/10.3389/fpubh.2023.1157837

Jacinto R., Sebastian F., Reis E., Ferrao J. (2023) SoResilere—a Social Resilience Index Applied to Portuguese Flood Disaster-Affected Municipalities. Sustainability 15(4):3309. Available at: https://doi.org/10.3390/su15043309

Jun Chen H. W., Marzo R. R., Htay M. N. N., Abdalqader M. A., Baobaid M. F., Naidu J. R., Anuar H., Sithamparanathan Y., Thein K. H. H., Muslimin I., Jafar D. U. A., Jamaludin N. A., Attalla S. M. (2024) Towards Sustainable Community: Social Responsibility and Community Resilience in Flood Disaster Management. Malaysian Journal of Public Health Medicine 24(1):131-141. Available at: http://www.mjphm.org/index.php/mjphm/article/view/2462

Kamh Y. Z., Khalifa M. A., El-Bahrawy A. N. (2016) Comparative Study of Community Resilience in Mega Coastal Cities Threatened by Sea Level Rise: The Case of Alexandria and Jakarta. Procedia-Social and Behavioral Sciences 216:503–17. Available at: https://doi.org/10.1016/j.sbspro.2015.12.007

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. Educational and Psychological Measurement, 30(3), 607–610. https://doi.org/10.1177/001316447003000308

Lwin K. K., Pal I., Shrestha s., Warnitchai P. (2020) Assessing Social Resilience of Flood-Vulnerable Communities in Ayeyarwady Delta, Myanmar. International Journal of Disaster Risk Reduction 51:101745. Available at: https://doi.org/10.1016/j.ijdrr.2020.101745

Mabrouk M., Haoying H. (2023) Urban Resilience Assessment: A Multicriteria Approach for Identifying Urban Flood-Exposed Risky Districts Using Multiple-Criteria Decision-Making Tools (MCDM). International Journal of Disaster Risk Reduction 91:103684. Available at: https://doi.org/10.1016/j.ijdrr.2023.103684

Maranzoni A., D'Oria M., Rizzo C. (2023) Quantitative Flood Hazard Assessment Methods: A Review. Journal of Flood Risk Management 16(1):e12855. Available at: https://doi.org/10.1111/jfr3.12855

Marfai M. A., Sekaranom A. B., Ward P. (2015) Community Responses and Adaptation Strategies toward Flood Hazard in Jakarta, Indonesia. Natural Hazards 75(2):1127–44. Available at: https://link.springer.com/article/10.1007/s11069-014-1365-3

Mussadun M., Kurniawati W., Nugraha M. F. (2019) Adaptasi Masyarakat Pesisir Gang Banjar Kampung Melayu Semarang terhadap Banjir Rob [Adaptation of the Coastal Community of Gang Banjar Kampung Melayu Semarang to Tidal Flooding]. Journal of Urban Development 7(2):111–19. Available at: https://doi/10.14710/jpk.7.2.111-119 *(in Indonesian)*.

Nakoe R., Nur A. L. (2022). Disaster Management Tulungagung. UD Duta Sablon.

Nguimalet., C.A. (2018) Comparison of Community-Based Adaptation Strategies for Droughts and Floods in Kenya and the Central African Republic. Water International 43(2):183–204. Available at: https://doi.org/10.1080/02508060.2017.1393713

Nurpasari F., Febriamansyah R. (2020) Study of the Public Perspectives on the Problems of Batang Kuranji River Basin Management in Padang City, West Sumatra, Indonesia. IOP Conference Series: Earth and Environmental Science 583: 012036. Available at: https://doi.org/10.1088/1755-1315/583/1/012036

Plough A., Fielding J. E., Chandra A., Williams M., Eisenman D., Wells K. B., Law G. y., Fogleman S., Magana A. (2013) Building Community Disaster Resilience: Perspectives from a Large Urban County Department of Public Health. American Journal of Public Health 103(7):1190–97. Available at: https://doi.org/10.2105/AJPH.2013.301268

Poff N. L. (2002) Ecological Response to and Management of Increased Flooding Caused by Climate Change. Philosophical Transactions of the Royal Society of London. Series A: Mathematical, Physical and Engineering Sciences 15;360(1796):1497–1510. Available at: https://doi.org/10.1098/rsta.2002.1012

Prawati E., Eva R., Faldan A. (2022) Analisis Sistem Drainase terhadap Penanggulangan Banjir dan Genangan di Kecamatan Metro Timur Kota Metro Lampung [Drainage System Analysis for Flood and Inundation Management in Metro Timur District, Metro City, Lampung]. Tapak (Construction Application Technology): Journal of the Civil Engineering Study Program 12(1):60–70. Available at: http://dx.doi.org/10.24127/tp.v12i1.2323

Rosmadi H. S., Ahmed M. F, Mokhtar M. B., Lim C. K. (2023) Reviewing Challenges of Flood Risk Management in Malaysia. Water 15(13):2390. Available at: https://doi.org/10.3390/w15132390

Sandrina S. L., Adi G. S., Susilo C. (2023) Keterkaitan Resiliensi dengan Kesiapsiagaan Masyarakat dalam Menghadapi Bencana Banjir [The Relationship between Resilience and Community Preparedness in Facing Flood Disasters]. Health & Medical Sciences 1(1):8–8. Available at: https://doi.org/10.47134/phms.v1i1.30 *(in Indonesian)*

Sardi, M. F., Razak K. A., Bakri Z. (2019) Assessinga Disaster Risk and Resilience: A Case Study in Urban Flood Vulnerable Community in Kampung Asam, Kuala Selangor. The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences XLII-4/W16:603–10. Available at: https://doi/10.5194/isprs-archives-XLII-4-W16-603-2019

Satria, B., and Sari M. (2017) Tingkat Resiliensi Masyarakat di Area Rawan bencana [Community Resilience Level in Disaster-Prone Areas]. Idea Nursing Journal, 8 (2): 30–34. Available at: http://download.garuda.kemdikbud.go.id/article.php?article=1564886&val=3933&title=TINGKAT%20RESILIENSI%20MASYARAKAT%20DI%20AREA%20RAWAN%20BENCANA *(in Indonesian)*.

Shah A. A., Ullah A., Khan N. A., Shah M. H., Ahmed R., Hassan S. T., Tariq M. A. U. R., Xu C. (2023) Identifying Obstacles Encountered at Different Stages of the Disaster Management Cycle (DMC) and Its Implications for Rural Flooding in Pakistan. Frontiers in Environmental Science 11:1088126. Available at: https://doi/10.3389/fenvs.2023.1088126

Wahyudin D., Ede A.R.L., Sanjaya W., Ida I., Yulianti M. (2024) Pengaruh sikap dan resiliensi terhadap kesiapsiagaan remaja dalam mengahadapi bencana gempa bumi [The influence of attitudes and resilience on adolescent preparedness for facing earthquake disasters]. Bhakti Husada Health Sciences Journal: Health Science Journal 15(2). Available at: https://doi.org/10.34305/jikbh.v15i02.1310 *(in Indonesian)*.

Wilby R. L., and Keenan R. (2012) Adapting to Flood Risk under Climate Change. Progress in Physical Geography 36(3):348–78. Available at: https://doi.org/10.1177/0309133312438908

Wilson T. D., and Gilbert D. T. (2008) Explaining Away: A Model of Affective Adaptation. Perspectives on Psychological Science 3(5):370–86. Available at: https://doi.org/10.1111/j.1745-6924.2008.00085.x