

STUDY PROTOCOL

Cross-Sectional Study Protocol on Community Disaster Resilience in Selangor Flood-Prone Communities During Covid-19 Pandemic

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ABSTRACT

Introduction: Future floods are expected to increase in frequency and intensity. Communities must arm themselves with information and skills to overcome these disasters and limit their impact. Moreover, the Coronavirus-19 infection doubled as the transmission was thought to occur when evacuation facilities were overrun and crowded. Despite government and agency assistance, the aftermath of a flood disaster leaves victims susceptible to the impacts. Resilience is essential when battling flooding or a pandemic. Thus, this study aims to determine the community disaster resilience score and its associated factors in Selangor flood-prone communities during the COVID-19 Pandemic. **Methods:** A cross-sectional quantitative survey will be conducted with a sample size of 574 residents living in flood-prone areas. A validated self-administered questionnaire will be distributed in liaison with community leaders using paper and online. The questionnaire includes respondents' demographic, flood disaster preparedness, general disaster preparedness belief, and community disaster resilience. The associations and predictors between the independent and dependent variables will be examined using bivariate analysis and multiple linear regression with a < 0.05 significance level. **Discussion:** Insights from this research will help communities better prepare for and recover from disasters. A more robust resilience approach requires focusing on predictors and recruiting those factors to assist health authorities in promoting flood disaster preparedness and resilience practices in the community. Researchers may comprehend the health behaviour of a community to build disaster preparedness and resilience as well as a health intervention.

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INTRODUCTION

In Malaysia, flooding has been the most significant hazard. Due to climate change, a growing population, deforestation, a deficient drainage system, and the absence of water retention zones, its frequency and intensity are anticipated to increase. The frequency of flooding in Selangor has risen from 111 in 2019 to 264 in 2021 (1). It destroys infrastructures and properties and causes loss of lives. An estimated 29,799 km² of Malaysia's land is flooded yearly, affecting 4.9 million people, and causing physical damages totalling RM 1 billion (2). The recent flood in December 2021 displaced more than 120,000 people, and 54 people were killed (3). Selangor was the heaviest damaged state

with residential, factory, car, and commercial property losses totalling RM1.0 billion (4).

It also accelerates the spread of infectious diseases via contaminated food, water, and exposed wounds. It endangers vulnerable groups such as young children, women, the aged, the disabled, the impoverished, and those who are marginalised (5). The Ministry of Health issued a public health alert after the recent flood in December 2021 identified Coronavirus Disease (COVID-19) positive cases jumped twice from 181 to 361 and 1 cluster (6). Transmission may occur when flood victims gather in evacuation centres. Another example is Leptospirosis cases doubled in the post-flood period of Kelantan's 2014 major flooding event (7). As multiple hazards may coincide, new approaches are required to reduce, prevent, and build community resilience.

Nonetheless, disaster mitigation requires the collaboration of all parties. The government has recently

adopted the Hyogo Framework for Action 2005–2015 and the Sendai Framework for Disaster Risk Reduction 2015–2030, emphasising a proactive disaster risk reduction in communities (8). Instead of top-down management, the framework acknowledges local populations' active role. The community is the initial responder to a disaster within 72 hours (9). However, Malaysia's community preparedness and resilience towards flood disasters remain inadequate and require improvement (9). A community must act and be accountable for arming itself with the knowledge and skills necessary to overcome these inevitable events. Enhanced preparedness and a resilient community can mitigate the negative impact.

Community resilience promotes preparedness actions and rapid recovery in the aftermath. Numerous studies have highlighted the importance of community-based disaster mitigation in building resilience (10,11). However, Malaysians rarely addressed this topic and focused more on the response stage of disaster relief (12–14). Respondents with a moderate level of community resilience show that they are nonetheless vulnerable and unprepared for flood disasters across all dimensions of resilience: maintenance, recovery, and adaptation (12).

A study in Kampung Asahan Selangor revealed moderate community disaster resilience (62%, 90 out of 145) (15). It was discovered that the community possessed flood response knowledge but lacked flood preparedness training and skills due to the absence of government or community-planned activities on all-hazard resilience. Moreover, Kajang and Ampang Jaya's case studies revealed average resilience (16). Aspects of health and community preparedness were also moderate in both cities.

In addition, a flood disaster preparedness intervention in six districts of Selangor found at the baseline measurement that 62.7% (178 out of 284) of respondents had past disaster experiences. Still, 62.3% (177 out of 284) did not know about disaster preparedness (17). Despite facing previous disasters, the Selangor community lacked sufficient knowledge and preparedness. It may make them susceptible to disastrous effects. Furthermore, there were significant differences between-group for intervention on knowledge ($p < 0.001$), skills ($p < 0.001$), and preparedness ($p < 0.001$) of flood disasters (17). The intervention demonstrated efficacy in enhancing community preparedness for flood disasters, promoting community disaster risk reduction and resilience. Thus, individuals must participate in community preparedness activities, as prepared individuals contribute to more resilient communities that are better able to withstand, manage, and recover from disasters (18).

Despite government and agency assistance, the aftermath of a flood disaster leaves victims susceptible to infections, psychological stress, economic loss,

infrastructure damage, and prolonged recovery time. Thus, this research aims to determine the disaster resilience of communities residing in flood-prone areas of Selangor during the COVID-19 pandemic. Evaluating the factors contributing to community resilience will benefit the government, policymakers, and disaster management. Future collaboration between community members and public leaders will be more effective in resolving flood disaster issues.

Additionally, this study provides an overview of local communities' knowledge, skills, and strengths for preparation and recovery from disasters. Future disaster preparedness training programmes can apply this study's findings in various ways to inform and encourage the public to seek information and broaden their knowledge about flood disasters.

This study will adopt the Communities Advancing Resilience Toolkit (CART) developed by (19) to objectively measure individuals' perception of their community resilience towards a disaster and what factors influence it. The CART toolkit developed by the Terrorism and Disaster Center (TDC) of the National Child Traumatic Stress Network has been recognised as an "important" community tool designed to assist communities in enhancing resilience (20). This tool can be used in a number of ways, including (a) independently to provide information to organisations and communities interested in gauging their community's resilience to disasters, (b) in conjunction with other tools as part of a more thorough community assessment, or (c) as part of additional efforts to increase community resilience (19,21).

Many studies have been conducted in an effort to develop reliable methods for measuring community resilience. Studies summarised frameworks for assessing community resilience listed were Community Disaster Resilience Index (CDRI), Community Disaster Resilience Framework for Iran, Community Resilience Score Card, Conjoint Community Resiliency Assessment Measure (CCRAM), Communities Advancing Resilience Toolkit (CART), Community Disaster Resilience Indicators (CDRI), and more (22,23). Communities in different areas face different hazards and have other capabilities, making it difficult to find a single resilience framework. Social, physical, economic, and infrastructural aspects have long been studied to determine community resilience (22).

CART promotes community participation, self-awareness, critical reflection, and skill development, and it encourages communication, analysis, and action on the part of its participants. It encourages public problem-solving and using local assets to support the community's needs. In addition, it does not compare or rate the communities but rather strengthens and empowers them. (19). Table I presents

Table 1: CART toolkit domains, descriptions, and questions (24).

Domains	Descriptions	Questions
Connection and Caring	Individuals in this community have a sense of belonging. Individuals in this community are committed to the community's well-being.	1. People in my community feel like they belong to the community. 2. People in my community are committed to the well-being of the community. 3. People in my community have hope about the future. 4. People in my community help each other. 5. My community treats people fairly no matter what their background is.
Resources	This community has the resources it requires to address community issues (resources include money, information, technology, tools, raw materials, and services). People in this locality can access the services they require.	6. My community supports programs for children and families. 7. My community has resources it needs to take care of community problems (resources include, for example, money, information, technology, tools, raw materials, and services). 8. My community has effective leaders. 9. People in my community are able to get the services they need. 10. People in my community know where to go to get things done.
Transformative Potential	People in this community collaborate to make the community better. This society learns new abilities and seeks resources to solve challenges and achieve its objectives.	11. My community works with organisations and agencies outside the community to get things done. 12. People in my community communicate with leaders who can help improve the community. 13. People in my community work together to improve the community. 14. My community looks at its successes and failures so it can learn from the past. 15. My community develops skills and finds resources to solve its problems and reach its goals. 16. My community has priorities and sets goals for the future
Disaster Management	This community is actively preparing for future disasters. During a calamity, this community will be able to provide emergency services.	17. My community tries to prevent disasters. 18. My community actively prepares for future disasters. 19. My community can provide emergency services during a disaster. 20. My community has services and programs to help people after a disaster.
Information and Communication	This community has systems that regularly provide citizens with updated information on local issues. In times of need or catastrophe, this town has a person or people who can be relied on to provide reliable information to its members.	21. My community keeps people informed (for example, via television, radio, newspaper, Internet, phone, neighbours) about issues that are relevant to them. 22. If a disaster occurs, my community provides information about what to do. 23. I get information/communication through my community to help with my home and work life. 24. People in my community trust public officials.

the five overlapping and interrelated domains that CART addresses. These domains characterise and influence community resilience.

Preparedness that is done well decreases vulnerability, boosts mitigation levels, enables a timely and effective response to a disaster event, reduces the amount of time needed to recover from a disaster, and increases the community's resilience. Human behaviours are the primary focus of emergency and disaster preparedness efforts. It contributes to the capacity of a community to attain disaster resilience (25). It is influenced by a variety of factors, such as how people perceive risk, the lessons they have learned from both direct and indirect prior disasters and crises, and how people interact with their environment. These elements have an impact on the type and degree of individual preparation for emergencies and disasters (25–27).

Numerous efforts have investigated the potential of behavioural theories to improve disaster and emergency preparedness, including the Health Belief Model theory, Ecological theory, Social Cognitive Theory, Knowledge, Attitude and Preparedness theory, and Precaution Adoption Process Model theory (26). One of the earliest and most commonly used theory-adapted

models is the Health Belief Model (HBM). It was initially developed to simulate the adoption of preventative health behaviours in the United States. Nevertheless, it has been successfully adapted to fit numerous cultural and topical contexts (26). These theories help scholars comprehend people's behaviour to promote health and find knowledge needed to create an effective strategy.

There is a lack of knowledge about the application of behavioural theories and models to emergencies and disasters in Asia, despite the fact that the yearly number of disasters and victims in Asia exceeds that of other continents (25). It identified a need for additional research on the application of theories of behavioural change in Asian countries that bore the brunt of disasters and their consequences. Future research could investigate whether these theories have been utilised in response and recovery contexts in Asia and other regions (25).

Thus, this study will adopt the General Disaster Preparedness Belief (GDPB) based on the Health Belief Model (HBM) theory. The HBM is comprised of a set of six constructs that affect people's decision to engage in a healthful behaviour: 1) Perceived susceptibility: a person's subjective assessment of the likelihood of facing a disaster, 2) Perceived severity: an individual's

presumption of the seriousness of disaster condition; 3) Perceived benefits: a person’s assessment of the efficiency of various actions available to reduce the impact of disaster, 4) Perceived barriers: a person’s presumption of the potential negative consequences of engaging in specific health action, 5) cue to action: internal or external cues that indicate a person’s readiness for action and initiate the decision-making process, and 6) self-efficacy: an individuals’ belief in their ability to deal with a disaster/emergency (17,26,28). Incorporating HBM into information and education can assist in disaster preparedness and community health resilience interventions, resulting in a disaster resilience society.

Figure 1 shows the study’s conceptual framework relationship between flood disaster preparedness and community disaster resilience (CDR) among communities in Selangor during COVID-19 Pandemic. The independent variables are respondent demographics, flood disaster preparedness, and General Disaster Preparedness Belief (GDPB) based on the Health Belief Model (HBM), while the dependent variable is CDR.

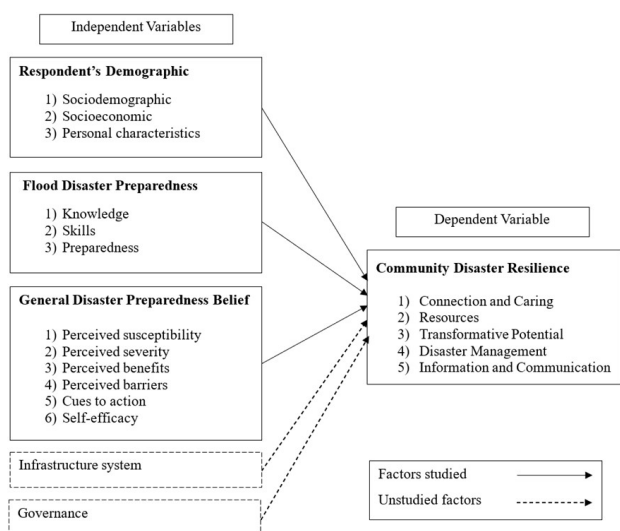


Figure 1: Conceptual Framework of Independent Variables and its Relationship with CDR

METHODS

Study Design, Population, and Sampling

The study will be a cross-sectional study and a quantitative study. It will be carried out in flood-prone areas in Selangor, Malaysia, and conducted for four months, from June 2022 to September 2022. The most populated state in Malaysia, Selangor, was estimated to have suffered a total loss of RM 3.1 billion in 2022 due to devastation caused by floods.

The communities residing in flood-prone areas of Selangor that satisfied both the inclusion and the exclusion criteria make up the study population. The inclusion criteria are citizenship and adulthood over the age of 18. The criteria for exclusion are illiteracy and

physical or mental disability.

This study will be a single-stage cluster sampling. The cluster comprised the latest list of flood-prone areas obtained from Selangor’s Department of Irrigation and Drainage. An individual from each household within the selected clusters will be invited. Simple random sampling will be used to select clusters within each community using Microsoft Excel’s random number generator. Simple random sampling is the most suitable technique because it is impartial in choosing the sample from a large population. The finding can be easily generalised with the minimum error and the simplest method.

This study determines community disaster resilience within a 95% confidence level. The sample size was estimated by two formulae described by (29). Based on a formula comparing two means, the estimated sample size was 478. Estimating a response rate of 80%, an additional 20% of respondents make the final sample size of 574.

Tools and Variables

It is a self-administered questionnaire written in English and Malay. With the liaison of community leaders, the respondent may choose to answer either paper or online Google Form based on their convenience. Those in home quarantine or COVID-19-positive may participate through an online questionnaire where the link will be sent through their respective community leaders. The participants will be given one week to complete the survey before being collected.

The questionnaire used for this study will be based on several validated tools. The final questionnaire has 109 items included in eight sections: Section A: Sociodemographic characteristics, Section B: Socioeconomic characteristics, Section C: Personal Characteristics, Section D: Knowledge, Section E: Skills, Section F: Preparedness, Section G: General Disaster Preparedness Belief, and Section H: Community Disaster Resilience.

Dependent Variables

Community Disaster Resilience

It refers to individual perception of their community disaster resilience measured through five domains with 24 items: Connection and Caring, Resources, Transformative Potential, Disaster Management, and Information and Communication. A participant’s score will be calculated by summing the scores of the items composing that domain. The total community resilience score will be calculated by summing the scores from the five domains. On a five-point Likert scale, each item will be scored from 1 (strongly disagree) to 5 (strongly agree). The primary community resilience strength and community resilience challenge will be identified using

a high and low percentage of agreement scores for the 24 community resilience items (24).

Independent Variables

Sociodemographic

5 sociodemographic factors: age, gender, level of education, ethnicity, and marital status (17,30).

Socioeconomic

5 socioeconomic statuses: tenure, employment status, social class, monthly household income, and car ownership (17,30).

Personal Characteristics

2 items in personal characteristics: past disaster experience and knowledge about disaster preparedness. Only "Yes" or "No" answers for both questions (17,30).

Flood Disaster Preparedness

Flood disaster preparedness includes knowledge, skills, and preparedness on flood disaster preparedness. Knowledge consists of the information, comprehension, and abilities acquired through education or experience. The total mark on the knowledge section will be calculated by summing the results of nine questions. If the answer is "yes," a score of 1 is awarded, and there is no deduction for "no". 9 is the maximum possible result on the knowledge section. The term "skills" refers to a person's positive or negative response to flood disaster preparedness. Each respondent will be asked ten questions about their disaster preparedness capabilities. The maximum score attainable in the skills section is 10. As part of the preparedness section, each respondent will be asked if they have taken any specific actions to enhance disaster preparedness. There be no negative marks given, and scores will be assigned accordingly. 9 is the maximum possible total (17,30).

General Disaster Preparedness Belief (GDPB)

The GDPB score measures respondents' perceptions and beliefs of disaster preparedness. It is calculated by adding the six subscales containing 45 items (Perceived susceptibility + Perceived severity + Perceived low barrier (items were reverse scaled) + Perceived benefits + Cues to action + Self Efficacy). On a five-point Likert scale, each item will be scored from 1 (strongly disagree) to 5 (strongly agree). The scores on the reverse-scored items were negatively worded statements (4,6,8,9,17-30,31,35,37,38,42,44), so a higher score represented a more positive disaster preparedness belief. Total score for each item for susceptibility (30), severity (20), benefits (30), barriers (70), self-efficacy (40), and cues to action (50). Responses will be scored and categorised as high (75th quartile), moderate (75–25th quartiles), and low (25th quartile) (17,30).

Validity of Questionnaire

The questionnaire will be pre-tested to ensure its reliability

before the final version is used. The questionnaire will be adopted from (17,24,30). Except for community disaster resilience, all questionnaire has been validated in Malaysia. This part will be validated using both content and face validation. Content Validation will be done with an expert panel of two public health medicine specialists. Meanwhile, face validation will be performed with thirty people from other flood-prone areas in Selangor. As the questionnaire is available in both English and Malay versions, the forward (English to Malay) and backward (Malay to English) translation will be done by two experts who understand both languages to ensure the similarity of the questions. Post-validation changes will be made to the questionnaire before data collection.

Ethical Consideration

The participation in this research is completely voluntary; consequently, no incentives or financial remuneration will be offered to any of the participants. In order to receive the participants' informed consent, it is necessary to first notify them of the objectives and procedures of the research. Study involving human subjects was approved by the University Putra Malaysia Ethics Committee (JKEUPM) (approval number UPM/TNCPI/RMC/1.4.18.2) (JKEUPM).

Statistical Analysis

The Statistical Package for Social Sciences Software (IBM SPSS; Version 28) will be used to analyse the data by descriptive and inferential analysis. The significance level will be set at a level of 0.05. The data will be analysed using descriptive statistics, non-parametric tests, T-tests, and linear regression with binary and multivariate analyses. P level \leq 0.05 is considered significant (24).

DISCUSSION

The expected outcomes of this study can be divided into three categories: community and local organisations, future researchers, and policymakers. First, the community, local Village Community Management Council (MPKK), non-governmental organisations (NGOs) such as the Malaysian Red Crescent Society, the Malaysian Medical Relief Society (MERCY), and many other voluntaries bodies may collaborate with community leaders in assessing and understanding their community's disaster preparedness, perceptions and resilience through health intervention programmes on an annual basis, utilising methods from this study as they are feasible to implement. It provides baseline data and annual statistics where local authorities may monitor the progress of the community in disaster risk reduction (DRR).

For future researchers, the data may also be used as a guide to compare future findings to those of earlier investigations. It is suggested that CDR surveys be carried

out and contrasted in various flood-prone locations of Selangor. It is also helpful to adopt a qualitative methodology. The survey can be expanded with specific questions about the severity and frequency of the flood, the sorts of rural and urban communities, and many other demographic and economic characteristics that may influence community resilience. Future researchers may recognise the current issue and health behaviour of the community.

This research can benefit policymakers such as the Municipal council, the National Disaster Management Agency (NADMA), and the Ministry of Health Malaysia (MOH) in identifying communities that lack resilience and preparedness to take the necessary measures. Understanding the perception of the community and increasing its capacity will influence the adaptation process. This approach will help bridge the divide between spatial planning and disaster-resilient building design, particularly for future DRR initiatives.

This study hopes to add to the body of empirical knowledge that may utilise to design post-disaster interventions that efficiently distribute vital resources and services to strengthen the resilience of communities. When planning and carrying out interventions to increase a community's resilience, it is necessary to consider several factors, including knowledge of and attitude toward emergency preparedness.

Enhanced resilience enables greater foresight and better preparation to mitigate disaster losses instead of waiting for an event and paying for it. Increasing disaster resilience is an objective that demands the nation's and communities' collective resolve. Even though disasters will continue to occur, efforts that shift the country from a reactive to a proactive position, communities actively strengthen resilience would alleviate many of the wide-ranging social and economic costs that disasters may impose.

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