



Research Article

Mosques as Islamic Social Infrastructure for Community Resilience in Tsunami-Prone Padang, Indonesia

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Abstract

This article examines the potential of mosques to function as Islamic social infrastructure for strengthening community resilience in tsunami-prone coastal Padang, Indonesia. Existing disaster risk reduction strategies in Padang have largely emphasized technical mitigation, early warning systems, evacuation routes, and purpose-built vertical evacuation shelters. However, formal shelters remain limited and unevenly distributed in densely populated coastal areas exposed to short tsunami arrival times. Using a qualitative evidence synthesis approach, this article draws on secondary spatial data, disaster risk studies, mosque distribution data, and literature on social trust, place attachment, Islamic perspectives on disaster, and community resilience. The findings highlight four strategic qualities of mosques: spatial proximity to exposed communities, everyday familiarity, moral legitimacy, and institutional capacity for collective coordination. When technically assessed and formally integrated into disaster planning, mosques can become community-based nodes of preparedness, evacuation, communication, and post-disaster support. The article contributes to disaster risk reduction and Islamic social studies by developing mosque-based Islamic social infrastructure as a culturally grounded framework for resilience in Muslim coastal communities.

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INTRODUCTION

Coastal cities in Indonesia face a persistent tension between high disaster exposure and uneven access to safe evacuation infrastructure. Padang, the capital of West Sumatra Province, represents one of the most critical cases because of its location along the western coast of Sumatra, close to the Mentawai-Siberut segment of the Sunda megathrust. The region has long been identified as a major source of earthquake and tsunami hazard due to the convergence of the Indo-Australian and Eurasian plates (Sieh, 2007). Studies on the locked patch of the Sumatra megathrust and subsequent seismic stress accumulation have continued to underline the possibility of future large-magnitude earthquakes affecting the western coast of Sumatra (Jihad et al., 2023; Konca et al., 2008). For Padang, this risk is especially urgent because potential tsunami arrival times may be less than 25-30 minutes after a major earthquake, while possible run-up heights along the coastal zone could reach approximately 10-15 m (Ramli et al., 2022).

Disaster mitigation policies in Padang have therefore emphasized early warning systems, evacuation routes, public education, and the construction of vertical evacuation shelters. Yet previous studies have shown that purpose-built vertical evacuation shelters remain insufficient in both number and spatial distribution. Ashar et al. (2014) found that existing vertical shelters in Padang could accommodate only a small proportion of the at-risk population. More recent assessments have similarly indicated that many residents in exposed coastal neighborhoods may be unable to reach formal shelters within the available evacuation window, especially under conditions of traffic congestion, panic, and limited road capacity (Adji et al., 2025; Shabrina & Ahmad, 2023). In this context, the problem is not merely the absence of buildings but the limited integration between formal evacuation infrastructure and the everyday spatial practices of coastal communities.

This article argues that disaster preparedness in Muslim coastal communities requires more than technically designated evacuation buildings. It also requires socially meaningful spaces that people already know, trust, and use in everyday life. In Padang, mosques occupy precisely this position. They are not peripheral buildings that operate only during religious rituals; rather, they function as centers of

worship, learning, neighborhood interaction, moral communication, charity, and community coordination. Their spatial distribution within residential areas and their symbolic authority in everyday Muslim life make them potentially significant institutions for disaster risk reduction.

The role of mosques in disaster contexts has been observed in other Indonesian cases. In Banda Aceh, for example, post-tsunami research showed that mosques were often perceived not only as places of worship but also as preferred evacuation destinations because of their accessibility, familiarity, and emotional meaning for residents (Vivita et al., [2023](#)). Studies on evacuation behavior further demonstrate that people do not always make evacuation decisions based on technical safety calculations alone. Under conditions of uncertainty and time pressure, people tend to move toward spaces that feel familiar, socially legitimate, and psychologically secure (Makinoshima et al., [2020](#); McCaughey et al., [2017](#)). This behavioral insight is crucial for understanding why formal shelters may remain underused if they are socially unfamiliar, while everyday religious buildings may attract spontaneous collective movement.

Despite this potential, disaster risk reduction studies have often treated religious buildings as post-disaster relief spaces, cultural symbols, or informal gathering points, rather than as integral components of preparedness and evacuation systems. Conversely, studies of mosques in Islamic social life rarely place them within the practical agenda of disaster governance and urban resilience. This creates a conceptual gap between disaster planning and Islamic social infrastructure. The mosque is socially central, yet its role in formal disaster preparedness remains under-theorized. Disaster governance increasingly recognizes the importance of whole-of-society approaches, social capital, and community-based preparedness, but practical models for integrating religious institutions into evacuation systems remain limited (Aldrich & Meyer, [2015](#); Paton, [2013](#); UNDRR, [2015](#)).

This article addresses that gap by proposing the concept of mosques as Islamic social infrastructure for community resilience. Islamic social infrastructure refers to religiously grounded physical and organizational spaces that structure everyday interaction, produce social trust, and enable collective action in Muslim communities. In this sense, mosques are not only sacred buildings but also social institutions through which knowledge, authority, solidarity, and collective discipline can be mobilized during crises. This framing builds on broader discussions of social infrastructure as the physical and organizational conditions that shape social interaction and collective life (Klinenberg, [2018](#)), while situating the concept within the Islamic cultural context of coastal Padang.

The article asks three main questions. First, how can mosques in tsunami-prone Padang be understood as Islamic social infrastructure rather than merely religious buildings? Second, how do social trust, familiarity, place attachment, and spatial proximity make mosques relevant to tsunami preparedness? Third, how can mosque-based preparedness be integrated into community resilience frameworks without reducing the mosque's religious function? By answering these questions, this article contributes to both disaster risk reduction studies and Islamic social-cultural studies. It shows that religious infrastructure can be understood as a culturally embedded resilience asset when it is connected to spatial risk, community trust, and institutional preparedness.

CONCEPTUAL FRAMEWORK

Social infrastructure and disaster resilience

The concept of social infrastructure emphasizes that community life depends not only on formal institutions or abstract social values but also on physical places where people meet, interact, build trust, and organize collective life. Klinenberg ([2018](#)) uses the term social infrastructure to refer to the spaces and organizations that shape social interaction and support civic life. In disaster contexts, this concept is important because resilience is produced not only by engineering systems, warning technologies, or emergency regulations, but also by social relationships, trusted gathering places, and the capacity of communities to act collectively under pressure.

Social capital literature similarly shows that networks, trust, and norms of reciprocity influence disaster preparedness, response, and recovery. Aldrich and Meyer ([2015](#)) argue that social capital is a

critical resource in disaster survival and recovery because it enables information circulation, mutual aid, and collective mobilization. Paton (2013) highlights that disaster-resilient communities are formed through preparedness, participation, collective efficacy, and institutional trust. These insights shift disaster risk reduction away from a narrow focus on hazard exposure and physical vulnerability toward a more integrated understanding of how communities respond, adapt, and recover.

In tsunami-prone areas, social infrastructure matters because evacuation decisions must often be made rapidly. A warning message, evacuation map, or technically safe building may not be sufficient if residents do not trust the source, recognize the destination, or feel socially motivated to move. Makinoshima et al. (2020) show that tsunami evacuation processes are shaped by risk perception, time pressure, social influence, and familiarity. McCaughey et al. (2017), in their study of tsunami vertical evacuation buildings in Banda Aceh, further demonstrate that trust and distrust influence whether people are willing to use designated evacuation buildings. Effective evacuation planning must therefore connect formal safety design with the social psychology of place.

Mosques as physical, social, and moral infrastructure

In Muslim societies, mosques are among the most important forms of everyday social infrastructure. Their meaning extends beyond ritual prayer. Mosques support religious learning, charity, deliberation, neighborhood communication, youth activities, and social assistance. They also produce moral authority because their messages are mediated through religious legitimacy, community recognition, and routine interaction. In cities such as Padang, where Islam shapes many dimensions of social and cultural life, mosques are deeply embedded in neighborhood identity and everyday rhythms.

The analytical core of this article is that mosques operate through three interrelated dimensions. First, mosques are physical infrastructure: they occupy specific locations, have built forms, and may serve practical functions during emergencies. Second, mosques are social infrastructure: they connect residents, religious leaders, mosque committees, youth groups, volunteers, and neighborhood organizations. Third, mosques are moral infrastructure: they communicate values of responsibility, mutual assistance, discipline, and protection of life. These three dimensions make mosques distinct from ordinary public buildings and explain why their potential role in preparedness cannot be assessed only through engineering or spatial criteria.

This framing is particularly relevant because Islamic perspectives on disaster need not produce fatalism. Aksa (2020) argues that Islamic disaster risk reduction can be grounded in the principles of *al-‘ilm*, or knowledge; *ikhtiar*, or effort; and *tawakkul*, or trust in God. These principles challenge passive fatalism by emphasizing that religious belief should be accompanied by knowledge, preparedness, and responsible action. In this sense, mosque-based preparedness can translate Islamic ethical principles into practical community behavior. Evacuation drills, risk education, emergency communication, and shelter management can be framed not as secular activities external to religious life, but as forms of collective responsibility and protection of human life.

Place attachment, trust, and evacuation behavior

Place attachment refers to the emotional, social, and symbolic bonds between people and places. In disaster contexts, these bonds can influence whether people avoid, approach, trust, or resist particular evacuation destinations. Vivita et al. (2023) found that in Banda Aceh, mosques could become preferred tsunami evacuation buildings because communities had strong attachment to them. This attachment was shaped by everyday use, religious meaning, accessibility, and collective memory. Such findings show that evacuation behavior is not determined by hazard maps alone. It is also shaped by how people interpret space.

For Muslim communities, the mosque is often perceived as a familiar and morally meaningful place. During a crisis, this perception may reduce hesitation and strengthen collective movement. People may be more likely to follow instructions delivered through mosque loudspeakers, religious leaders, or mosque-based volunteers because these actors and infrastructures already possess legitimacy. This does not mean that mosques are automatically safe as evacuation shelters. Structural

safety, capacity, access, and management remain essential. However, it does mean that mosques possess a social advantage that formal shelters may lack: they are already woven into community life.

Community-based disaster preparedness

Community-based disaster preparedness emphasizes that disaster risk reduction should not be imposed only from above but embedded within local institutions and everyday practices. The Sendai Framework for Disaster Risk Reduction 2015-2030 calls for strengthened disaster risk governance, investment in resilience, and enhanced preparedness for effective response and recovery (UNDRR, [2015](#)). A whole-of-society approach requires the participation of local communities, civil society, and socially trusted institutions.

Mosque-based preparedness aligns with this approach because mosques can connect formal disaster management agencies with neighborhood-level social structures. Mosque committees can maintain preparedness facilities, religious leaders can communicate risk messages, volunteer teams can organize drills, and residents can participate through routine mosque-based activities. The mosque therefore becomes a bridge between formal disaster governance and everyday community life.

METHOD

Research design

This article uses a qualitative evidence synthesis design to develop a conceptual framework for mosque-based Islamic social infrastructure in tsunami-prone Padang. The study does not present new primary field survey data. Instead, it synthesizes existing spatial, social, behavioral, architectural, and disaster risk evidence to reinterpret the potential role of mosques in community resilience. This approach is suitable because the article aims to reposition existing data and literature into a new analytical framework rather than test a single intervention.

The evidence synthesis was guided by three analytical concerns. The first concerns spatial risk: how mosque locations relate to tsunami-prone coastal areas and shelter deficits. The second concerns social behavior: how trust, familiarity, and place attachment influence evacuation choices. The third concerns Islamic social infrastructure: how mosques can mediate preparedness through religious legitimacy, social networks, and community coordination.

Study area

The study focuses on the coastal areas of Padang City, West Sumatra, Indonesia. Padang is a highly relevant case because it combines high tsunami exposure, dense coastal settlements, limited formal vertical evacuation shelters, and a strong Islamic social landscape. The city is located close to the Mentawai-Siberut megathrust and faces the possibility of short tsunami arrival times after a major earthquake. This creates a practical need for rapidly accessible evacuation spaces near residential clusters.

Padang is also socially significant because mosques are widely distributed across neighborhoods and are deeply integrated into everyday community life. The majority Muslim population strengthens the social relevance of mosque-based communication and coordination. This makes Padang an appropriate case for examining how Islamic social infrastructure can contribute to community-based tsunami preparedness.

Data sources and evidence selection

The article draws on four categories of secondary data. First, tsunami risk evidence was derived from published studies on the Sumatra megathrust, tsunami hazard in Padang, and evacuation constraints (Adji et al., [2025](#); Jihad et al., [2023](#); Konca et al., [2008](#); Ramli et al., [2022](#); Sieh, [2007](#)). Second, spatial and shelter evidence was drawn from previous assessments of vertical evacuation shelter capacity, road

network accessibility, and mosque distribution in Padang (Algamar, 2022; Ashar et al., 2014; Shabrina & Ahmad, 2023). Third, behavioral evidence was synthesized from studies on tsunami evacuation behavior, social trust, and place attachment (Makinoshima et al., 2020; McCaughey et al., 2017; Vivita et al., 2023). Fourth, conceptual evidence was drawn from literature on social infrastructure, social capital, Islamic disaster perspectives, and community resilience (Aksa, 2020; Aldrich & Meyer, 2015; Klinenberg, 2018; Paton, 2013; UNDRR, 2015).

The literature was selected purposively according to four criteria: direct relevance to tsunami risk or evacuation in Padang and comparable Indonesian contexts; explicit discussion of social trust, place attachment, mosque functions, or community resilience; publication in peer-reviewed journals, academic books, or recognized institutional reports; and usefulness for linking disaster risk reduction with Islamic social life. Studies that only addressed disaster response in general terms without clear relevance to evacuation behavior, community institutions, or religious infrastructure were not prioritized. When several sources addressed similar issues, priority was given to recent empirical studies and works that directly informed the analytical dimensions of this article.

Analytical procedure

The analysis was conducted through thematic synthesis. Relevant findings from the literature and spatial data were coded into five analytical themes: tsunami exposure and shelter deficit, mosque spatial embeddedness, social trust and familiarity, Islamic moral legitimacy, and community-based preparedness. These themes were then interpreted in relation to one another to develop the concept of mosque-based Islamic social infrastructure.

The article does not claim that all mosques are technically ready to function as vertical evacuation shelters. Instead, it identifies the social and spatial conditions under which selected mosques may become strategic preparedness nodes. Structural assessment, engineering feasibility, capacity modelling, evacuation simulations, and community perception surveys remain necessary before any mosque is formally designated as a safe evacuation facility.

Analytical dimensions

Table 1. Analytical dimensions of mosque-based Islamic social infrastructure

Analytical dimension	Main concern	Relevance to tsunami preparedness
Spatial proximity	Location of mosques in relation to coastal settlements and hazard zones	Determines whether residents can reach potential evacuation points within short tsunami arrival times
Everyday familiarity	Routine use of mosques for worship and social interaction	Reduces hesitation and increases intuitive recognition during emergency movement
Social trust	Community confidence in mosque leaders, committees, and religious spaces	Supports compliance with warnings, drills, and evacuation instructions
Islamic moral legitimacy	Religious values of knowledge, effort, protection of life, and mutual aid	Frames preparedness as a collective religious and ethical responsibility
Organizational capacity	Mosque committees, volunteers, youth groups, and local residents	Enables maintenance, training, drills, communication, and long-term community ownership

RESULT

Tsunami risk and the limits of formal evacuation infrastructure in Padang

Padang's tsunami risk is shaped by its proximity to the Mentawai-Siberut megathrust and the concentration of population in low-lying coastal areas. The estimated tsunami arrival time of less than 25-30 minutes creates a severe constraint for horizontal evacuation. In such conditions, residents cannot rely only on movement toward distant high ground. They require nearby vertical evacuation options that can be reached quickly on foot.

Previous studies have shown that the number and distribution of purpose-built shelters in Padang remain inadequate. Ashar et al. (2014) identified significant capacity limitations in existing vertical evacuation shelters. Algamar (2022) reported a continuing shortfall of vertical evacuation shelters in key exposed districts such as Padang Utara and Koto Tengah. Network-based analysis by Shabrina and Ahmad (2023) further showed that in several coastal neighborhoods, the walking distance and travel time to formal shelters may exceed realistic evacuation windows.

These findings reveal a fundamental problem in formal evacuation planning: technical designation does not automatically produce practical accessibility. A shelter may be structurally safe but socially or spatially ineffective if residents cannot reach it in time or do not perceive it as a familiar destination. This mismatch becomes more serious when evacuation must occur under panic, uncertainty, damaged roads, traffic congestion, and limited time. Therefore, tsunami preparedness in Padang requires a broader understanding of evacuation infrastructure - one that includes not only purpose-built shelters but also existing community buildings with high accessibility and social legitimacy.

Spatial embeddedness of mosques in coastal communities

Mosques in Padang are spatially embedded in residential areas. Secondary spatial analysis has identified approximately 190 mosques across the city, with around 58 located in high tsunami-risk zones, particularly in areas below 10 m above sea level. Among these mosques, approximately 23 buildings have reinforced concrete structures and two or more floors, making them potentially relevant for further assessment as vertical evacuation sites. In Padang Utara and Padang Barat, more than 70% of mosques are reportedly reachable by nearby residents within approximately 10 minutes on foot.

These figures are important not because they prove that all mosques are ready to serve as shelters, but because they show that mosques are located where evacuation demand is high. Their spatial proximity to residential clusters gives them practical value in situations where every minute matters. Unlike formal shelters that may be located farther from daily residential movement, mosques are part of the neighborhood's ordinary spatial routines. Residents know where they are, how to reach them, and who manages them.

The distinction between merely close buildings and socially meaningful buildings is crucial. A nearby building may still fail as an evacuation destination if residents do not recognize it, trust it, or understand its emergency function. Conversely, a familiar building that is both physically accessible and socially legitimate can become an intuitive point of collective movement. Mosques combine these two qualities: they are geographically present within neighborhoods and socially present within community life. This combination makes them distinct from many other public buildings in tsunami-prone urban areas.

Mosques as everyday spaces of trust, familiarity, and moral communication

The mosque's role in disaster preparedness cannot be understood only through its location or physical structure. Its deeper significance lies in trust. In many Muslim communities, the mosque is one of the most trusted public spaces because it is associated with worship, moral guidance, social assistance, and community leadership. This trust is reproduced through daily prayer, Friday sermons, Qur'anic learning, charity practices, and routine interaction between residents and mosque committees.

Studies on evacuation behavior show that trust strongly influences disaster response. McCaughey et al. (2017) found that trust and distrust shape residents' willingness to use tsunami vertical evacuation buildings. Makinoshima et al. (2020) also show that evacuation behavior is influenced by social cues, familiarity, and perceived safety, not only by rational calculations of hazard exposure. These findings help explain why mosques may become attractive evacuation destinations during crises. They are not anonymous buildings. They are known, named, remembered, and socially anchored.

Research in Banda Aceh provides a particularly relevant comparison. Vivita et al. (2023) found that community attachment to mosques influenced their potential function as tsunami evacuation buildings. The mosque was perceived not merely as a physical structure but as a place carrying emotional, social, and religious meaning. In an emergency, such meaning can become operationally important because it reduces uncertainty and motivates collective movement.

In Padang, where Islam is central to social life, mosque-based communication may also strengthen compliance with disaster preparedness messages. Religious leaders and mosque committees can translate disaster warnings into familiar moral language. For example, evacuation can be framed as *ikhtiar*, or responsible effort, rather than as a sign of weak faith. Preparedness can be associated with the protection of life, mutual assistance, and community responsibility. This framing is important because it can counter fatalistic interpretations of disaster while remaining culturally and religiously grounded.

Islamic principles and the ethics of preparedness

A mosque-based resilience framework must avoid two extremes. The first is reducing mosques to purely technical shelters and ignoring their religious meaning. The second is romanticizing mosques as automatically protective spaces without technical assessment. A balanced approach recognises that mosques can support disaster preparedness precisely because they combine religious meaning, social trust, and practical community organization.

Aksa (2020) provides a useful Islamic framework by identifying *al-‘ilm*, *ikhtiar*, and *tawakkul* as principles for disaster risk reduction. *Al-‘ilm* emphasizes knowledge. In disaster preparedness, this includes understanding hazard maps, evacuation routes, natural warning signs, and safe behavior during earthquakes and tsunamis. *Ikhtiar* emphasizes effort. This includes preparing evacuation plans, conducting drills, strengthening buildings, and organizing volunteers. *Tawakkul* refers to trust in God after responsible effort has been made. It does not justify passivity; rather, it gives spiritual meaning to preparedness.

Through this framework, mosque-based disaster preparedness can be understood as an ethical practice. Risk education delivered through mosques is not merely technical instruction; it becomes part of communal responsibility. Evacuation drills are not only simulations; they are exercises in discipline, care, and solidarity. Shelter maintenance is not only infrastructure management; it is stewardship over a public good. Protecting children, elderly people, people with disabilities, and other vulnerable groups can be framed as a religious and social obligation.

This ethical framing is central to the idea of Islamic social infrastructure. The mosque does not only provide space. It provides meaning, authority, and moral motivation. Disaster preparedness becomes more effective when it is not experienced as an external bureaucratic program but as a shared practice rooted in the community's own institutions and values.

Mosque-based preparedness as community coordination

The mosque's potential role in tsunami preparedness depends on its organizational capacity. A mosque-based preparedness model should involve at least three groups of actors: mosque committees, volunteer teams, and local residents. Mosque committees provide institutional continuity and legitimacy. Volunteer teams provide technical assistance, training, and operational readiness. Local residents provide participation, feedback, and collective ownership.

This model transforms the mosque from an informal refuge into a preparedness node. The mosque remains a place of worship, but it also becomes a place where risk knowledge is circulated, evacuation behavior is rehearsed, and emergency roles are clarified. Such integration can strengthen the link between formal disaster governance and community-level action.

Table 2. Proposed roles in mosque-based community preparedness

Actor	Core role	Possible activities
Mosque committee	Institutional management and legitimacy	Maintaining preparedness facilities, coordinating with local government, managing mosque-based information boards, supporting inclusive access
Religious leaders	Moral communication and behavioral guidance	Integrating preparedness messages into sermons, countering fatalism, encouraging responsible evacuation behavior
Volunteer teams	Technical facilitation and emergency support	Conducting drills, mapping vulnerable residents, managing evacuation flow, assisting elderly people, children, and people with disabilities
Residents	Participation and community ownership	Joining simulations, identifying safe routes, disseminating information, maintaining family evacuation plans
Local government and disaster agencies	Formal integration and technical support	Providing training, certification, structural assessment, early warning linkage, SOP development, and policy recognition

The mosque's existing communication infrastructure is particularly relevant. Loudspeakers, notice boards, Friday sermons, study groups, youth organizations, and charity networks can all become channels for preparedness communication. These channels are already familiar to residents and do not require the creation of entirely new social systems. This is one of the main advantages of using Islamic social infrastructure: preparedness can be embedded into existing practices rather than added as an external project.

Adaptive reuse without displacing religious function

Although this article focuses on social infrastructure, the physical adaptability of mosques remains important. Selected mosques with adequate structural quality, reinforced concrete construction, and multiple floors may be assessed for potential use as vertical evacuation sites. The adaptive reuse approach allows mosques to maintain their primary religious function while adding emergency capacity.

Possible interventions include designating upper floors or roof decks as temporary evacuation areas, providing external staircases or ramps, adding visible shelter markers, improving access for vulnerable groups, and integrating emergency supplies or communication systems. Intermediate floors may serve normal community functions during non-disaster periods, such as religious education, meetings, or youth activities, while also being available for emergency use. This multifunctionality helps avoid the common problem of underused disaster infrastructure.

However, adaptive reuse must be treated carefully. Not every mosque can become a vertical evacuation shelter. Structural integrity, load-bearing capacity, height, access, surrounding road conditions, management capacity, and community acceptance must be assessed before formal designation. The social trust attached to mosques should not be used to justify unsafe evacuation decisions. Rather, social legitimacy must be matched with technical safety through engineering review, evacuation simulation, accessibility assessment, and clear operational procedures.

DISCUSSION

Reframing mosques in disaster risk reduction

The findings suggest that mosques in tsunami-prone Padang should be understood not only as religious buildings but as Islamic social infrastructure. This reframing has important implications for disaster risk reduction. Conventional evacuation planning often begins with hazard maps, shelter capacity, road networks, and engineering standards. These elements are indispensable, but they do not fully explain whether people will evacuate quickly and where they will go. Human behavior is shaped by trust,

memory, routine, identity, and social influence. Mosques are relevant because they connect these behavioral dimensions with physical space.

This does not mean that mosques should replace formal evacuation shelters. Rather, mosques should be considered supplementary and complementary nodes within a broader evacuation network. Purpose-built shelters remain essential, especially where structural safety and capacity are required. However, mosque-based preparedness can reduce the gap between formal planning and community behavior. It can also strengthen preparedness in areas where new shelter construction is slow, costly, or spatially constrained.

The concept of Islamic social infrastructure therefore expands the meaning of resilience. Resilience is not only the ability of buildings to withstand hazards. It is also the ability of communities to recognize danger, trust information, move collectively, protect vulnerable groups, and sustain preparedness over time. Mosques can support these capacities because they are embedded in everyday community life.

From technocratic preparedness to culturally grounded preparedness

One weakness of technocratic disaster planning is that it often assumes that people will follow official instructions once information is provided. In reality, disaster behavior is more complex. People interpret warnings through social relationships, prior experiences, religious beliefs, and trust in institutions. A culturally grounded approach does not reject technical science; rather, it translates risk knowledge into social forms that communities recognize and accept.

Mosques can serve as sites of such translation. Scientific information about tsunami risk can be communicated through mosque-based education. Evacuation routes can be introduced through community gatherings. Early warning messages can be reinforced through trusted religious leaders. Family evacuation plans can be discussed through religious study groups or neighborhood meetings. In this process, disaster preparedness becomes part of everyday social and moral life.

This approach is consistent with the Sendai Framework's emphasis on strengthening disaster risk governance and enhancing preparedness through participation and resilience investment (UNDRR, 2015). It also resonates with social capital theory, which emphasizes that networks and trust are vital resources during crises (Aldrich & Meyer, 2015). What this article adds is a specifically Islamic social-cultural framing: in Muslim coastal communities, mosques can provide the institutional and moral infrastructure through which disaster preparedness becomes socially legitimate.

Mosque-based preparedness and the problem of fatalism

Disaster fatalism is often discussed in relation to religious communities, but this discussion can be misleading if it assumes that religion necessarily produces passivity. Islamic perspectives on disaster can support active preparedness when interpreted through knowledge, effort, and responsibility. Aksa's (2020) framework of *al-'ilm*, *ikhtiar*, and *tawakkul* is important because it shows that Islamic teachings can be mobilized to counter fatalism rather than reinforce it.

Mosque-based preparedness can make this shift practical. Sermons and mosque education can emphasize that understanding hazard risk is part of *al-'ilm*, preparing evacuation routes is part of *ikhtiar*, and maintaining spiritual trust after responsible action is part of *tawakkul*. This ethical sequence can help communities avoid the false opposition between faith and preparedness. It also makes disaster risk reduction culturally intelligible.

Policy implications

The article offers several implications for local disaster governance in Padang and other Muslim coastal cities. First, local governments and disaster management agencies should map mosques in tsunami-prone zones not only as religious facilities but as potential preparedness nodes. This mapping should

include elevation, distance from coastline, building height, structural quality, access routes, and community usage patterns.

Second, selected mosques should undergo technical assessment before being considered for vertical evacuation functions. Social trust alone is insufficient. Formal integration requires engineering review, safety certification, carrying capacity estimation, accessibility assessment, evacuation simulation, emergency management planning, and clear operational standards.

Third, mosque committees and religious leaders should be included in community-based disaster preparedness programs. Their role should not be limited to post-disaster charity. They can participate in preparedness communication, evacuation drills, vulnerable group mapping, and maintenance of emergency equipment.

Fourth, mosque-based preparedness should be connected to formal systems. This includes coordination with BPBD, kelurahan authorities, neighborhood organizations, schools, and local volunteer groups. Without formal linkage, mosque-based preparedness may remain ad hoc. With formal integration, mosques can become part of a distributed evacuation and communication network.

Fifth, preparedness messages should be culturally and religiously grounded. Technical language should be translated into accessible narratives of responsibility, protection of life, mutual aid, and collective care. This can increase community acceptance and reduce the gap between disaster knowledge and actual behavior.

Limitations and future research

This article is conceptual and based on secondary evidence synthesis. It does not provide new household survey data, direct interviews with mosque committees, or engineering assessments of individual mosque buildings in Padang. Therefore, the argument should be understood as a framework for further empirical research and policy experimentation, not as a final designation of specific mosques as safe shelters.

Future research should pursue four directions. First, detailed GIS-based accessibility analysis should be conducted to identify mosque catchment areas in tsunami-prone neighborhoods. Second, engineering assessments should evaluate structural safety, height, capacity, vertical access, and retrofitting needs. Third, community surveys and interviews should examine whether residents would actually use selected mosques during tsunami evacuation and what factors influence their trust. Fourth, pilot programs should test mosque-based drills, evacuation signage, volunteer coordination, and early warning communication.

Comparative studies may also examine whether mosque-based preparedness frameworks can be adapted to other Muslim coastal cities in Indonesia or Southeast Asia. Such research would help clarify which elements are locally specific to Padang and which are transferable to broader contexts.

CONCLUSION

This article has repositioned mosques in tsunami-prone coastal Padang as Islamic social infrastructure for community resilience. Rather than viewing mosques merely as religious buildings, cultural symbols, or informal refuge spaces, it argues that mosques can function as socially trusted, spatially embedded, and morally legitimate institutions for disaster preparedness.

The analysis shows that mosques possess several qualities relevant to tsunami risk reduction: proximity to residential communities, routine use in everyday life, public trust, and existing organizational structures. These qualities make selected mosques potential nodes for risk communication, evacuation training, community coordination, and, where technically feasible, vertical evacuation.

The article also shows that Islamic perspectives can support active preparedness rather than fatalism. Through the principles of knowledge, effort, and trust in God, disaster preparedness can be

framed as an ethical and communal responsibility. Mosque-based preparedness therefore offers a culturally grounded pathway for linking disaster science with Islamic social life.

The concept of Islamic social infrastructure contributes to disaster risk reduction studies by highlighting the role of religious institutions in resilience-building. It also contributes to Islamic social-cultural studies by showing that mosques can mediate not only worship and community identity but also practical responses to environmental risk. For Padang and other tsunami-prone Muslim coastal cities, integrating mosques into community-based preparedness systems may help close the gap between formal disaster planning and the lived realities of vulnerable communities.

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REFERENCES

- Adji, B. M., Istijono, B., Rahendra, M., Koting, S., Hakam, A., Ophiandri, T., Masrilayanti, M., & Yunanda, R. (2025). Failure risk in post-earthquake evacuation and logistics in Padang City. *Jambá: Journal of Disaster Risk Studies*, 17(1), Article a1773. <https://doi.org/10.4102/jamba.v17i1.1773>
- Aksa, F. I. (2020). Islamic perspectives in disaster: An alternative to changing fatalistic attitudes. *Jambá: Journal of Disaster Risk Studies*, 12(1), Article a942. <https://doi.org/10.4102/jamba.v12i1.942>
- Aldrich, D. P., & Meyer, M. A. (2015). Social capital and community resilience. *American Behavioral Scientist*, 59(2), 254-269. <https://doi.org/10.1177/0002764214550299>

- Algamar, A. H. (2022). Strategy to increase Padang City Government apparatus' capacity in dealing with earthquake and tsunami. *Indonesian Journal of Multidisciplinary Science*, 2(2), 1991-2004. <https://doi.org/10.55324/ijoms.v2i2.290>
- Ashar, F., Amaratunga, D., & Haigh, R. (2014). The analysis of tsunami vertical shelter in Padang City. *Procedia Economics and Finance*, 18, 916-923. [https://doi.org/10.1016/S2212-5671\(14\)01018-1](https://doi.org/10.1016/S2212-5671(14)01018-1)
- Ibrahim, Syamsidik, Azmeri, & Hasan, M. (2024). Tsunami fragility based characterisation of mosques as alternatives tsunami evacuation buildings: Reconstructing evidence from the 2004 Indian Ocean tsunami. *International Journal of Disaster Risk Reduction*, 100, Article 104149. <https://doi.org/10.1016/j.ijdrr.2023.104149>
- Jihad, A., Umar, M., Ramli, M., Syamsidik, & Banyunegoro, V. H. (2023). Analysis of change of seismic stress along the Sumatran zone to predict potential earthquake zones. *GEOMATE Journal*, 24(104), 36-43. <https://geomatejournal.com/geomate/article/view/3695>
- Klinenberg, E. (2018). *Palaces for the people: How social infrastructure can help fight inequality, polarization, and the decline of civic life*. Crown.
- Konca, A. O., Avouac, J.-P., Sladen, A., Meltzner, A. J., Sieh, K., Fang, P., Li, Z., Galetzka, J., Genrich, J., Chlieh, M., Natawidjaja, D. H., Bock, Y., Fielding, E. J., Ji, C., & Helmberger, D. V. (2008). Partial rupture of a locked patch of the Sumatra megathrust during the 2007 earthquake sequence. *Nature*, 456(7222), 631-635. <https://doi.org/10.1038/nature07572>
- Makinoshima, F., Imamura, F., & Oishi, Y. (2020). Tsunami evacuation processes based on human behaviour in past earthquakes and tsunamis: A literature review. *Progress in Disaster Science*, 7, Article 100113. <https://doi.org/10.1016/j.pdisas.2020.100113>
- McCaughey, J. W., Mundir, I., Daly, P., Mahdi, S., & Patt, A. (2017). Trust and distrust of tsunami vertical evacuation buildings: Extending protection motivation theory to examine choices under social influence. *International Journal of Disaster Risk Reduction*, 24, 462-473. <https://doi.org/10.1016/j.ijdrr.2017.06.016>
- Mizutori, M. (2019). From risk to resilience: Pathways for sustainable development. *Progress in Disaster Science*, 2, Article 100011. <https://doi.org/10.1016/j.pdisas.2019.100011>
- Mulia, F. A., & Handayani, W. (2024). Assessment and comparison of community resilience to floods and tsunamis in Padang, Indonesia. *IDRiM Journal*, 14(1). <https://doi.org/10.5595/001c.115826>
- Paton, D. (2013). Disaster resilient communities: Developing and testing an all-hazards theory. *IDRiM Journal*, 3(1). <https://doi.org/10.5595/001c.11702>
- Ramli, M. W. A., Alias, N. E. B., Yusop, Z. B., & Taib, S. M. (2022). Disaster risk management: An overview of disaster risk assessment in ASEAN countries. In M. F. M. Din, N. E. Alias, N. Hussein, & N. S. Zaidi (Eds.), *Sustainability management strategies and impact in developing countries* (pp. 15-27). Emerald Publishing Limited. <https://doi.org/10.1108/S2040-726220220000026002>
- Shabrina, N., & Ahmad, D. (2023). Analisis jalur terdekat menuju bangunan shelter evakuasi tsunami di Kota Padang menggunakan Network Analyst. *Jurnal Pendidikan Matematika*, 1(2), Article 13. <https://doi.org/10.47134/ppm.v1i2.202>
- Sieh, K. (2007). The Sunda megathrust: Past, present and future. *Journal of Earthquake and Tsunami*, 1(1), 1-19. <https://doi.org/10.1142/S179343110700002X>
- United Nations Office for Disaster Risk Reduction. (2015). *Sendai framework for disaster risk reduction 2015-2030*. United Nations. <https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030>
- Vivita, L., Husaini, Anggraini, R., & Dewi, C. (2023). Enhancement of disaster preparedness: Approaches of place attachment and behavior to “build back better” mosque as tsunami evacuation building in Banda Aceh City, Indonesia. *Progress in Disaster Science*, 19, Article 100293. <https://doi.org/10.1016/j.pdisas.2023.100293>