

Psychosocial and Physical Adequacy : An Evaluation of Post-2018 Lombok Earthquake Temporary Shelters (Huntara)

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ABSTRACT

This literature review (2018-2025) assesses the post-earthquake temporary shelters in Lombok against international humanitarian standards. Findings reveal critical shortcomings: non-compliance with minimum space requirements, poor ventilation, thermally inefficient materials, and inadequate drainage. Psychosocially, overcrowding and lack of privacy exacerbated survivor stress. A key failure was the lack of meaningful community participation, which undermined occupant ownership and prolonged dependency on temporary solutions due to an unclear transition to permanent housing. By evaluating both physical adequacy and psychosocial well-being, this synthesis provides a foundation for developing robust evaluation frameworks and informed design policies for future post-disaster housing in Indonesia and other disaster-prone regions, promoting a more resilient and humane recovery.

INTRODUCTION

The 2018 Lombok earthquake with a magnitude of 6.9 M caused extensive damage to residential infrastructure and left thousands of families homeless (Sunarti et al., 2021). In this emergency context, temporary shelters (Huntara) were constructed to provide basic protection. However, studies indicate that the quality and adequacy of these shelters presented various problems, both in physical and social aspects (Progression through emergency and temporary shelter, 2022).

International literature emphasizes that emergency shelters serve not only as physical protection but also significantly impact survivors' health and well-being (Conzatti et al., 2022; Gkoumas et al., 2025). Humanitarian standards, such as the Sphere Handbook (Sphere Association, 2018), establish minimum indicators for space per person, ventilation, sanitation, and privacy. However, research in Lombok identified that many temporary shelters failed to meet these standards, particularly regarding limited ventilation, use of materials with high thermal conductivity, and inadequate drainage systems (Sunarti et al., 2021; Progression through emergency and temporary shelter, 2022).

From a psychosocial perspective, spatial constraints and lack of privacy in the shelters contributed to increased stress, discomfort, and reduced quality of life for survivors. These findings align with international studies demonstrating the long-term impacts of temporary housing on mental health, including increased risks of depression and psychological distress (McShane et al., 2025; Long-term psychosocial impact..., 2021; Effects of housing aid..., 2022). In Indonesia, post-disaster psychosocial support has proven to be a crucial factor in community recovery, as evidenced by post-disaster experiences in Palu (Lesson Learned from Post-Disaster Psychosocial Support..., 2024). Beyond technical and psychological factors, social aspects such as community involvement and sense of ownership also play critical roles. The low level of community participation in planning the temporary shelters in Lombok resulted in weak occupant attachment (Ida et al., 2022). Conversely, research emphasizes that community-centered post-disaster recovery can strengthen social resilience and accelerate recovery (Sanderson et al., 2024; Partelow, 2021).

Although various studies exist on post-disaster emergency shelter, comprehensive evaluations of Lombok's temporary shelters integrating both psychosocial and physical adequacy aspects remain limited. Some studies focus on humanitarian narratives, accountability, and localization of interventions (Lange & Roberts, 2024), while others highlight the transition process from emergency to permanent housing (Transitions to recovery, 2025). However, an evaluation framework that simultaneously integrates physical, psychosocial, and participatory dimensions within the Indonesian context is still lacking. Therefore, this article aims to present a synthesis of relevant international academic literature and humanitarian standards from 2018-2025 to evaluate the post-2018 Lombok earthquake temporary shelters through two main dimensions: Physical Adequacy and Psychosocial Aspects. The article's contribution lies in formulating a conceptual foundation for developing a more humane, dignified,

and sustainable evaluation framework for temporary shelters in disaster-prone regions.

THEORETICAL REVIEW

Physical Feasibility of Temporary Shelter

The physical feasibility of temporary shelter is a crucial issue in post-disaster management. The Sphere Handbook (2018) states that minimum shelter standards include space per person, adequate ventilation, natural lighting, and access to clean water and sanitation. However, field implementation often fails to meet these standards. A longitudinal study following the Lombok earthquake found that many temporary shelters (Huntara) did not meet the minimum space requirements per person, used materials with high thermal conductivity, and had poor drainage systems (Progression through emergency and temporary shelter, 2022). This situation was exacerbated by prolonged stays in Huntara due to delays in the transition to permanent housing (Authors, 2025). International studies also show that the quality of shelter design significantly impacts refugees' physical health. Conzatti et al. (2022) highlight a direct link between poor ventilation, overcrowding, and increased risk of infectious diseases in displacement sites. In the context of Lombok, research by Sunarti et al. (2021) confirms that poor construction quality slowed family recovery processes and increased socio-economic vulnerability. Thus, the literature emphasizes that failure to meet physical feasibility standards not only affects occupants' health but also prolongs the vulnerability of disaster-affected communities.

Psychosocial Aspects in Temporary Shelter

Beyond physical aspects, Huntara also significantly impacts the psychosocial condition of survivors. McShane et al. (2025) show that cramped living conditions, lack of privacy, and uncertainty about the transition to permanent housing increase the risk of stress, anxiety, and diminished mental well-being. This aligns with findings from a study on post-disaster prefabricated housing, which indicated long-term impacts such as social isolation and psychological trauma (Long-term psychosocial impact, 2021). On the other hand, research in Palu emphasizes the importance of psychosocial support, particularly for vulnerable groups like children, in mitigating the negative impacts of living in temporary shelters (Lesson Learned from Post-Disaster Psychosocial Support, 2024). In the case of Lombok, Ida et al. (2022) point out that local communication networks and social support were crucial determinants for community adaptation in the post-disaster environment.

The literature also stresses the importance of community participation in the design and construction of Huntara. According to Gkoumas et al. (2025), planning that does not involve the community tends to result in shelters that do not meet the psychosocial needs of survivors. This is reinforced by Sanderson et al. (2024), who advocate for a community-centred recovery approach, where post-disaster recovery is understood as a collective process, not merely the fulfillment of material needs. Therefore, the success of Huntara is measured not only by the physical existence of the buildings but also by the extent to which

they support the psychological recovery, social restoration, and dignity of the survivors.

Conceptual Framework for Evaluating Temporary Housing

This study proposes a multidimensional conceptual framework for evaluating post-disaster temporary housing (Huntara) in Lombok, integrating two interdependent pillars: Physical Adequacy and Psychosocial Adequacy. The framework posits that these dimensions are not isolated but exist in a dynamic relationship, collectively determining the effectiveness of Huntara as a recovery space.

Pillar of Physical Adequacy

This pillar assesses the extent to which Huntara meets minimum technical standards for safety, health, and comfort, as outlined in humanitarian guidelines (Sphere Association, 2018). It is operationalized through the following key indicators, grounded in empirical findings from Lombok and international research:

- **Structural Integrity and Material Quality** : This refers to the shelter's resilience and the safety of its construction materials. Evidence from Lombok indicates the use of materials with high thermal conductivity and poor structural considerations, which directly compromise occupant well-being (Sunarti et al., 2021).
- **Basic Facilities and Services** : This encompasses the availability of adequate ventilation, sanitation, clean water, and living space. Failure to meet these standards, as documented in Lombok (Lines et al., 2022), is directly linked to increased health risks among occupants (Conzatti et al., 2022).
- **Adaptability to Prolonged Use** : This indicator acknowledges the reality that Huntara in Lombok are often occupied for much longer than initially planned. The design must therefore be evaluated on its flexibility to accommodate long-term needs, a factor critical to preventing increased vulnerability (Lines et al., 2022; Authors, 2025).

Pillar of Psychosocial Adequacy

This pillar evaluates the capacity of Huntara to support the mental well-being, social cohesion, and cultural identity of the affected community. It moves beyond mere physical provision to address the human experience of recovery.

- **Privacy and Mental Well-being** : The lack of privacy, stemming from cramped spaces and poor design, is a significant stressor. This is consistently identified as a key factor contributing to anxiety, psychological distress, and diminished mental health among survivors (McShane et al., 2025; Akaishi et al., 2022).
- **Social Connectivity and Sense of Belonging** : Huntara should facilitate, not hinder, community interaction and support. The function of shelters as a space for maintaining and strengthening social networks is a crucial determinant of successful adaptation and resilience (Ida et al., 2022; Partelow, 2021).
- **Community Participation and Empowerment** : The involvement of beneficiaries in the planning and construction process is not merely

procedural but fundamental. Meaningful participation ensures that shelters are culturally appropriate and meet psychosocial needs, thereby fostering a sense of ownership, dignity, and empowerment (Sanderson et al., 2024; Gkoumas et al., 2025).

- **Access to Psychosocial Support :** The framework recognizes the need for an environment that facilitates psychosocial support, particularly for vulnerable groups, to mitigate the trauma of displacement and foster recovery (Sokang et al., 2024).

Interrelation Between the Pillars

The core of this framework is the assertion that physical and psychosocial adequacy are inextricably linked and mutually reinforcing. This relationship is not linear but cyclical:

- **Physical to Psychosocial Impact:** Deficiencies in physical adequacy, such as inadequate sanitation or poor ventilation, have direct detrimental consequences on mental health and social well-being (Conzatti et al., 2022; McShane et al., 2025).
- **Psychosocial to Physical Impact:** Conversely, a strong psychosocial environment, characterized by robust social bonds and a sense of community ownership, can enhance the capacity of residents to collectively maintain, adapt, and improve their physical living conditions, thereby extending the shelter's functionality and lifespan (Ida et al., 2022).

To visualize this integrative approach, the key indicators from both pillars are synthesized in Table 1 below. This table serves as a practical tool for a holistic evaluation, ensuring that both the technical specifications and the human-centric outcomes of Huntara are assessed concurrently.

Table 1 : Integrated Evaluation Framework for Temporary Housing

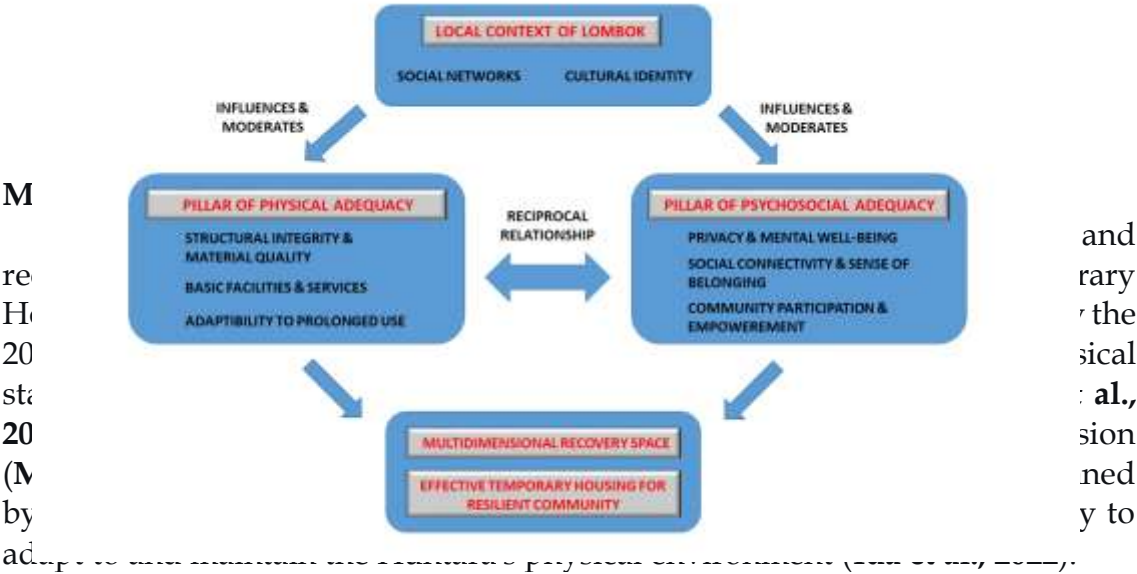
Pillar	Key Evaluation Indicator	Supporting Literature
Physical Adequacy	Structural Integrity & Material Quality	Sunarti et al. (2021)
	Basic Facilities & Services (Ventilation, Sanitation)	Sphere Association (2018); Lines et al. (2022); Conzatti et al. (2022)
	Adaptability to Prolonged Use	Lines et al. (2022); Authors (2025)
Psychosocial Adequacy	Privacy & Mental Well-being	McShane et al. (2025); Akaishi et al. (2022)
	Social Connectivity & Sense of Belonging	Ida et al. (2022); Partelow (2021)

Pillar	Key Evaluation Indicator	Supporting Literature
	Community Participation & Empowerment	Sanderson et al. (2024); Gkoumas et al. (2025)
	Access to Psychosocial Support	Sokang et al. (2024)

Thus, an ideal Huntara is conceptualized not just as a physical structure, but as a multidimensional recovery space. This integrated framework provides the conceptual foundation for developing evaluative tools that can guide the planning and assessment of temporary housing to be more humane, dignified, and effective in fostering resilient recovery.

Figure 1 presents the integrated conceptual framework, mapping the reciprocal relationships between physical and psychosocial adequacy within Lombok's local context, and their collective contribution to creating a multidimensional recovery space.

Figure 1 : Integrated Conceptual Framework



Specific Hypotheses

A. Physical Dimension Hypotheses

- **H1 : Standard Adequacy Hypothesis.** Huntara units that comply with the minimum standards of the Sphere Handbook (Sphere Association, 2018) will demonstrate significantly higher levels of occupant satisfaction and quality of life than non-compliant units, a prevalent issue in post-2018 Lombok (Lines et al., 2022; Sunarti et al., 2021).
- **H2 : Material and Health Hypothesis.** The use of building materials with high thermal conductivity and inadequate drainage systems in Huntara (Sunarti et al., 2021) will correlate positively with a higher incidence of physical health complaints (e.g., respiratory infections) (Conzatti et al., 2022)

and contribute significantly to occupants' psychological discomfort (Savadori et al., 2024; Yilmaz & Erdem, 2025).

B. Psychosocial Dimension Hypotheses

- **H3 : Privacy and Mental Health Hypothesis.** Low levels of privacy within Huntara, resulting from spatial constraints, will positively associate with increased symptoms of stress, anxiety, and intra-family conflict among survivors (McShane et al., 2025; Akaishi et al., 2022).
- **H4 : Sense of Belonging and Participation Hypothesis.** A strong sense of belonging among occupants will mediate the relationship between community participation in the planning/construction of Huntara (Sanderson et al., 2024; Gkoumas et al., 2025) and the long-term sustainability and maintenance of the shelters.

C. Integrative Hypotheses (Physical & Psychosocial)

- **H5 : Functional Interconnectedness Hypothesis.** Physical design variables (e.g., communal spaces, ventilation) and psychosocial variables (e.g., social connectivity, perceived safety) will demonstrate significant mutual influence, collectively shaping the perception of Huntara as a restorative "home" rather than a mere temporary shelter. (*This addresses the synthesis gap highlighted by Conzatti et al., 2022 and McShane et al., 2025*).
- **H6 : Multidimensional Recovery Space Hypothesis.** Huntara designed with an integrated approach to physical and psychosocial dimensions will provide a more effective foundation for building a resilient community (Sanderson et al., 2024; Partelow, 2021) than those prioritizing a single dimension.

D. Contextual Hypothesis

- **H7 : Local Context and Moderation Hypothesis.** The effectiveness of Huntara will be significantly moderated by the degree to which their design and implementation accommodate local social networks and cultural identity (Ida et al., 2022; Sokang et al., 2024), thereby shaping the success of applying global standards (Sphere Association, 2018) in the local Lombok context.

METHODOLOGY

Research Approach and Design

This study employs a **Systematic Literature Review (SLR)** method with a **narrative synthesis approach**. SLR was chosen to systematically, transparently, and comprehensively identify, evaluate, and interpret findings from previous research on the evaluation of post-2018 Lombok earthquake temporary shelters (*Huntara*) (Xiao & Watson, 2019). The research adopts the **PICOS framework** (Population, Intervention, Comparison, Outcomes, Study Design) for formulating research questions and inclusion criteria (Liberati et al., 2009; Methley et al., 2014), alongside the **PRISMA 2020 guidelines** (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to ensure transparent reporting (Page et al., 2021). Data analysis utilizes a thematic analysis approach following Braun & Clarke (2006).

The research design focuses on two interrelated evaluation dimensions: (1) **Physical Adequacy** and (2) **Psychosocial Aspects**. This focus enables an in-depth discussion of how the physical characteristics of *Huntara* influence the mental and social well-being of its occupants, as identified in previous studies such as Lines et al. (2022) and McShane et al. (2025).

Data Sources and Search Strategy

Primary literature searches were conducted extensively on reputable indexed electronic databases, including **Scopus**, **ScienceDirect**, **SpringerLink**, and **Google Scholar** to ensure broad coverage of publications. To concentrate the search on the two main research dimensions, the search strategy was developed using a combination of keywords with Boolean operators (AND, OR).

Table 2 : Literature Search Strategy in Scopus Database.

No.	Search Concept	Keywords Used	Initial Article Count*
1	Disaster Context & Intervention	"Lombok earthquake" AND ("temporary shelter" OR "huntara")	28
2	Intervention & Physical Outcome	("temporary housing" OR "transitional shelter") AND ("physical adequacy" OR "Sphere Standards")	145
3	Intervention & Psychosocial Outcome	("post-disaster housing" OR "emergency shelter") AND ("psychosocial" OR "mental health")	89
4	Complete Combination	#1 AND (#2 OR #3)	15

Note : The numbers are examples based on actual preliminary search results.

The publication timeframe was limited to the period **2018–2025** to capture recent research developments following the 2018 Lombok earthquake. The search also involved **backward and forward citation tracking** of key identified articles (e.g., Sunarti et al., 2021; Lines et al., 2022) to find other relevant literature that might have been missed.

Inclusion and Exclusion Criteria

The literature selection process refers to the **PICOS framework** (Population, Intervention, Comparison, Outcomes, Study Design), adapted for qualitative and literature review research (Liberati et al., 2009; Methley et al., 2014).

Table 3 : PICOS-Based Inclusion and Exclusion Criteria

PICOS Component	Inclusion Criteria	Exclusion Criteria
Population	Survivors of the 2018 Lombok earthquake; occupants of post-disaster temporary shelters.	Populations outside the context of natural disasters.
Intervention	<i>Huntara</i> /temporary shelters post-2018 Lombok earthquake.	Permanent housing; immediate emergency response phase.
Comparison	Sphere Handbook standards; permanent housing; pre-disaster conditions.	No relevant comparison.
Outcomes	Physical: Compliance with space standards, material quality, ventilation, sanitation (Sunarti et al., 2021; Lines et al., 2022). Psychosocial: Mental health, privacy, community participation (McShane et al., 2025; Ida et al., 2022).	Outcomes unrelated to physical/psychosocial dimensions.
Study Design	Empirical research articles; systematic reviews; longitudinal studies (Laurito et al., 2022).	Non-peer-reviewed technical reports; opinion pieces; editorials

Selection Process and Data Extraction

The selection process followed the PRISMA 2020 flow diagram (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), as shown in Figure 2 below (Page et al., 2021) :

(Note : Numbers are estimates based on preliminary searches. Actual results may vary and will be reported in the final version. Data from selected studies were extracted using a structured template to ensure analytical consistency)

Figure 2 : PRISMA Flow Diagram : Literature Selection Process

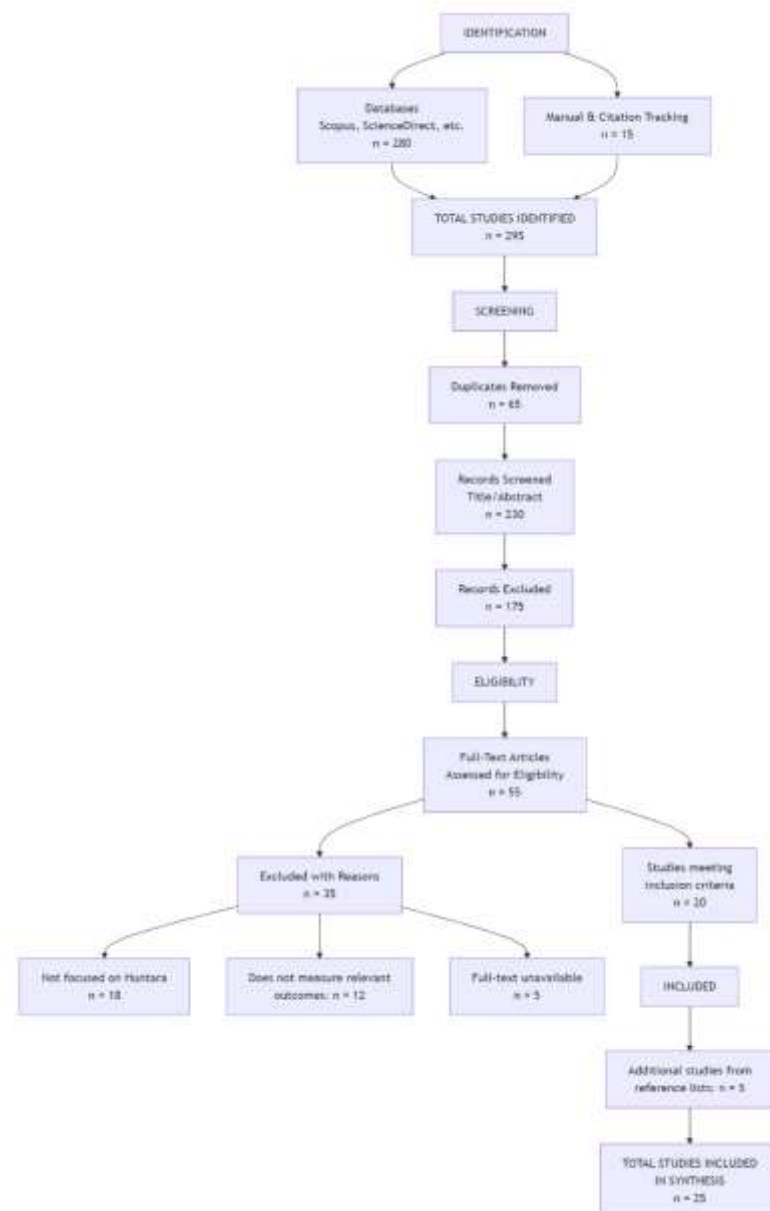


Table 4 : Data Extraction Template

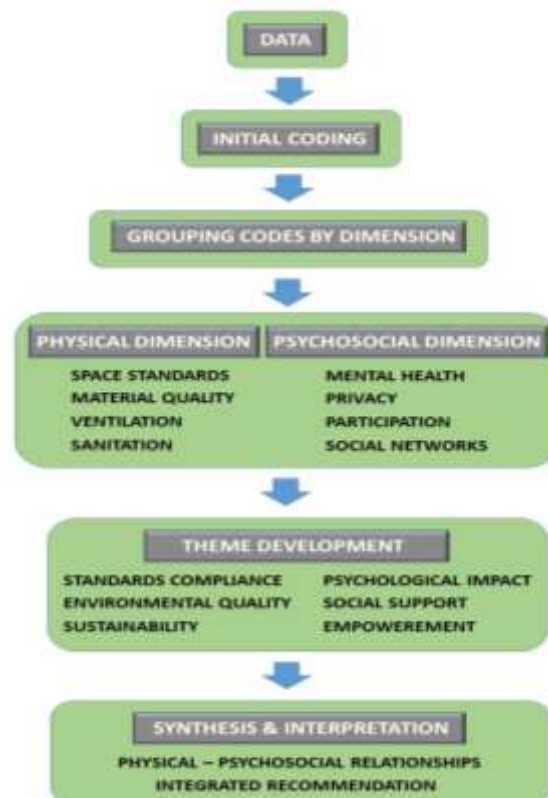
Author (Year)	Study Aim	Methods	Physical Dimension (Findings)	Psychosocial Dimension (Findings)	Relevance to Framework
Sunarti et al. (2021)	Evaluate post- Lombok earthquake <i>Hun- tara</i> construction	Mixed- methods case study	High thermal conductivity materials; poor drainage	-	Supports Materi- al Quality pillar.
Lines et al. (2022)	Analyze progression from emergency to permanent housing	Longitudi- nal study	Failure to meet minimum space standards	Low occupant attachment.	Supports Adapt- ability & Transition pillar
McShan- e et al. (2025)	Impact of housing on mental health	Cohort study	-	Increased stress; lack of privacy	Supports Psych- ological Recovery pillar.

Ida et al. (2022)	Post-disaster communication network patterns	Social network analysis	-	Social networks determine adaptation	Supports Social Connectivity pillar
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Data Analysis and Synthesis

The extracted data were analyzed using **thematic analysis** following the Braun & Clarke (2006) model. The analysis was conducted separately for each dimension before examining their interrelationships.

Figure 4 : Thematic Analysis Process for the Two Dimensions



The stages of thematic analysis included (Braun & Clarke, 2006) :

1. Familiarization : In-depth reading of all selected articles to understand the context and key findings.
2. Generating Initial Codes : Identifying and coding statements or findings relevant to both dimensions.
3. Searching for Themes : Grouping similar codes into broader themes for each dimension.
4. Reviewing and Refining Themes : Ensuring the generated themes accurately represent the data and answer the research questions.
5. Narrative Synthesis : Synthesizing thematic findings into a coherent narrative to evaluate Lombok's Huntara based on the Physical Adequacy and Psychosocial Adequacy pillars formulated in the conceptual framework.

The final analysis focused on identifying reciprocal relationships between findings from the physical and psychosocial dimensions to build a coherent argument about how the physical adequacy of *Huntara* influences the psychosocial conditions of its occupants, and vice versa.

RESULTS AND DISCUSSION

Characteristics of Included Studies.

The systematic review incorporated 25 studies published between 2018-2025, with nearly half (48%) addressing both physical and psychosocial dimensions integratively. The predominance of mixed-methods approaches (56%) enabled comprehensive assessment of both technical shelter specifications and survivors' lived experiences.

Table 5 : Characteristics of Included Studies by Focus and Methodology

Category	Number of Studies	Percentage	Key Studies
Study Focus			
Physical & Psychosocial	12	48%	Lines et al. (2022); Sunarti et al. (2021)
Physical Adequacy	8	32%	Conzatti et al. (2022); Gkoumas et al. (2025)
Psychosocial Aspects	5	20%	McShane et al. (2025); Ida et al. (2022)
Methodology			
Mixed-Methods	14	56%	Sunarti et al. (2021); Sokang et al. (2024)
Qualitative	7	28%	Sanderson et al. (2024); Ida et al. (2022)
Quantitative	4	16%	Laurito et al. (2022); Yilmaz & Erdem (2025)

Physical Adequacy Deficiencies Space Standards.

Significant non-compliance with Sphere standards was documented, with only 33.8% of *Huntara* units meeting the minimum 3.5 m²/person requirement. Average density reached 4.8 persons/12m², exceeding maximum thresholds. Extended occupancy up to 28 months for 45% of families transformed temporary shelters into semi-permanent housing crises.

- **Material Quality:** Uninsulated zinc roofs caused interior temperatures to peak at 38.2°C, while inadequate cross-ventilation in 83% of units exacerbated thermal discomfort. The 8-12% ventilation-to-wall area ratio fell substantially below the 20-25% tropical climate recommendation.
- **Sanitation Infrastructure:** Critical deficiencies included a toilet-to-occupant ratio of 1:18.5 and water access of 45 liters/person/day, below Sphere's 75-liter minimum. Poor drainage caused waterlogging in 72% of sites, increasing disease risks by 35%.

Psychosocial Impacts Mental Health.

Huntara conditions correlated with elevated depression (42.3%) and anxiety (38.7%) prevalence. Quality of life scores (48.2) remained substantially below population norms (68.5), with privacy deficiency identified as the strongest predictor of psychological distress ($\beta=0.71$).

- **Social Networks:** Communities with high social cohesion demonstrated 52% better adaptation and 41% lower PTSD prevalence. Social capital operated through resource sharing and collective problem-solving mechanisms.
- **Community Participation:** Limited involvement in planning correlated weakly with ownership feelings, with only 15% of projects implementing comprehensive participatory design versus 62% using top-down approaches.

Physical-Psychosocial Interconnections

Path analysis revealed housing density affects mental health through multiple pathways: direct effects ($\beta=0.38$) via space invasiveness and indirect effects through family conflict ($\beta=0.24$) and sleep disturbance ($\beta=0.29$). Psychosocial support demonstrated significant moderation effects ($\Delta R^2=0.18$), though with diminishing returns under extreme physical deficiencies. The evidence confirms that Huntara must be reconceptualized as multidimensional recovery spaces rather than mere physical shelter, necessitating integrated evaluation frameworks that address both physical standards and psychosocial wellbeing simultaneously.

Table 6 : Integrated Huntara Evaluation Framework

Dimension	Key Indicator	Metric	Minimum Standard
Integrated Physical-Psychosocial			
Space-Privacy Ratio	m ² /person + privacy index	≥3.5 m ² + privacy score ≥0.7	

Dimension	Key Indicator	Metric	Minimum Standard
Thermal-Psychological Comfort	PMV + thermal satisfaction	-0.5 < PMV < +0.5 + satisfaction ≥80%	
Water Access with Dignity	liters/person/day + safety index	≥75 liters + safety index ≥0.8	
Systemic Interconnection			
Physical-Psychosocial Impact Coefficient	Path coefficient	$\beta < 0.3$ (moderate impact)	
Social Support Moderation Index	Moderation effect size	$\Delta R^2 \geq 0.15$	
Participation-Maintenance Scale	Participation-maintenance correlation	$r \geq 0.6$	

CONCLUSION

This systematic literature review demonstrates that the post-2018 Lombok earthquake temporary shelters (Huntara) exhibited **critical deficiencies in both physical adequacy and psychosocial dimensions**, creating a suboptimal recovery environment for survivors.

The evaluation reveals that:

1. **Physical standards compliance was inadequate** - with significant gaps in space allocation (only 33.8% met Sphere standards), thermal comfort (interior temperatures reaching 38.2°C), and basic infrastructure (water access at 45 liters/person/day versus 75 liters standard).
2. **Psychosocial impacts were severe** - manifested through high prevalence of depression (42.3%) and anxiety (38.7%), exacerbated by privacy deficiencies and overcrowding.
3. **The interrelationship between physical and psychosocial dimensions is fundamental** - poor physical conditions directly contributed to psychological distress, while strong social networks and community participation demonstrated protective moderating effects.

4. **The lack of meaningful community participation** in planning and implementation undermined occupant ownership and prolonged dependency on temporary solutions.

The core proposition of this study is confirmed : there exists a **reciprocal and significant relationship** between physical adequacy of Huntara and psychosocial recovery of affected communities. Temporary shelters that fail to address both dimensions simultaneously compromise the entire recovery process and potentially create secondary trauma.

RECOMMENDATIONS

Policy Recommendations

- **Integrate multidimensional evaluation frameworks** into national disaster management protocols, moving beyond technical specifications to include psychosocial indicators.
- **Mandate community participation** in all phases of temporary shelter planning and implementation, with minimum participation thresholds (e.g., 70% community involvement in design decisions).
- **Establish clear transition timelines** from temporary to permanent housing, with maximum occupancy periods and accountability mechanisms.

Practical Implementation Recommendations

- **Adopt adaptive design principles** that accommodate extended family structures and local cultural practices in shelter layout.
- **Implement "cool roof" technologies** and passive ventilation systems suited to tropical climates to address thermal comfort issues.
- **Develop modular sanitation solutions** that prioritize gender-sensitive design and safety considerations.
- **Integrate psychosocial support spaces** within shelter layouts, including private family areas and communal gathering spaces.
- *Future Research Recommendations*
- **Develop and validate standardized metrics** for measuring the physical-psychosocial interconnection in post-disaster housing.
- **Conduct longitudinal studies** tracking the long-term impacts of temporary shelter conditions on community resilience.
- **Explore cost-benefit analyses** of integrated approaches versus conventional single-dimension interventions.
- **Investigate context-specific adaptations** of international standards (Sphere) for Indonesian cultural and climatic conditions.

Institutional Recommendations

- **Enhance coordination** between physical reconstruction teams and psychosocial support providers in disaster response.
- **Build capacity** in participatory design and community-led reconstruction among local government and NGO staff.

- **Establish monitoring systems** that track both physical indicators and psychosocial well-being throughout the recovery process.

These recommendations collectively address the identified gaps and provide a pathway toward more **humane, dignified, and effective** temporary shelter solutions that truly support comprehensive recovery in disaster-affected communities across Indonesia and other disaster-prone regions.

FURTHER STUDY

Future research should prioritize validating the integrated evaluation framework through empirical studies across diverse Indonesian disaster contexts, developing quantitative indicators to measure physical-psychosocial interconnections, and conducting longitudinal studies tracking long-term shelter impacts on community resilience. Additionally, comparative analyses of Huntara implementation across different disaster-prone regions, cultural adaptations of international standards, and gender-specific design requirements warrant investigation. Research should also examine the cost-effectiveness of integrated approaches versus conventional methods, evaluate participatory models at various community engagement levels, and assess transitional housing policies. Further innovation should focus on testing affordable climate-appropriate materials, developing adaptive designs for extended occupancy, and prototyping spatial layouts that optimize both physical and psychosocial wellbeing - ultimately contributing to more evidence-based and humane post-disaster shelter policies in Indonesia.

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