



PLANNING MALAYSIA:

Journal of the Malaysian Institute of Planners

VOLUME 24 ISSUE 5 (2026), Page 65 – 80

AN EXAMINATION OF SPATIAL FACTORS AND ENVIRONMENTAL CONFIGURATION ON SOCIAL VULNERABILITY IN URBAN KAMPUNG

**Dewi Septanti¹, Dian Inayah Zahrah Pombo², Iftekhhar Ahmed³,
Tisya Surya Narida⁴, Nugraha Miftahul Bahri⁵**

^{1,2,4}*Department of Architecture,*
INSITUT TEKNOLOGI SEPULUH NOPEMBER, INDONESIA

³*School of Architecture and Built Environment,*
UNIVERSITY OF NEWCASTLE, AUSTRALIA

⁵*Department of Business Digital,*
TELKOM UNIVERSITY, INDONESIA

Abstract

An urban kampung represents a distinctive form of Indonesian urban settlement that functions as a complex socio-spatial environment. Despite its vibrancy, high density, limited public space, and infrastructural constraints contribute to latent social risks that are often underrepresented in formal crime statistics but are experienced through everyday spatial perceptions. This study examines gendered perceptions of social risk in Kampung Ketandan–Kebangsren, Surabaya, and evaluates the role of participatory mapping in capturing women’s experiential spatial knowledge. A qualitative participatory approach was employed, combining participatory mapping, semi-structured interviews, field observation, and visual documentation. Data were analysed using thematic analysis and visualized through social risk heatmaps. The findings reveal that social risk perception is gendered and intersectional. Women tend to perceive risk as interpersonal threats in spaces characterized by low visibility, inadequate lighting, and limited natural surveillance, whereas men associate risk with social conflict and conventional crime. Although only a small proportion of respondents identified high-impact, high-probability risks, these were prioritized and predominantly reported by women. This study argues that safety in urban kampung is a relational construct shaped by spatial configuration, temporal dynamics, and embodied experiences, highlighting the need for participatory and gender-sensitive planning approaches.

Keywords: Urban *Kampung*, Social Risk, Spatial Safety Perception, Gender, Participatory Mapping

¹ Corresponding author. Email: dewi_septanti@its.ac.id

INTRODUCTION

Urban kampung represents one of the most distinctive forms of urban settlement in Indonesia, shaped through long-term socio-spatial adaptation and the community's capacity to continuously negotiate spatial and resource constraints within rapidly urbanizing contexts. Unlike formally planned housing developments, urban kampung operate as complex socio-spatial systems in which residential, economic, and cultural functions are deeply interwoven into everyday life. Existing studies have emphasized their resilience and adaptive capacity in responding to urbanization pressures despite limited integration into formal planning and governance systems (Budiharjo, 1991; Anggraeni, 2010).

Kampung Ketandan–Kebangsren in Surabaya exemplifies this condition. Located within the historic Tunjungan Quadrangle, the area is characterized by extreme building density, organically formed narrow circulation networks, and a significant lack of public open space. These spatial characteristics are not the result of planned design, but rather of long-term incremental densification processes that have progressively intensified land use and spatial occupation. Consequently, the physical environment is highly constrained, producing not only environmental limitations but also shaping complex patterns of social interaction, territorial negotiation, and everyday spatial behaviour (Anggraeni, 2010). Within such densely built environments, risk cannot be reduced to a narrow interpretation of physical hazards or statistically recorded crime incidents. Contemporary risk scholarship instead conceptualizes risk as socially constructed, context-dependent, and embedded in everyday spatial practices and lived experiences (Wisner et al., 2004).

Empirical studies reinforce this shift: in informal settlements such as Kibera, Kenya, perceived insecurity shapes spatial behaviour more strongly than actual crime rates, with poor lighting, limited visual permeability, and weak natural surveillance heightening fear and avoidance (De Filippi et al., 2020). Comparable patterns emerge in Surabaya kampung, where residents may perceive high severity for risks that occur relatively infrequently (Septanti et al., 2026). Yet despite this progress, many studies still treat kampung residents as a homogeneous user group (Mohamed Saniff et al., 2026), masking differentiated vulnerabilities; gender in particular remains critically underexplored in empirical analyses of social risk in informal urban environments.

Feminist urban scholarship challenges the notion of spatial neutrality, arguing that women experience urban space through heightened vigilance that shapes their mobility, route choices, and use of time (Valentine, 1989; Koskela, 1997) pressures intensified in kampung settings by overlapping domestic, economic, and caregiving demands, and by spatial configurations that combine poor lighting with limited visual permeability (Yahya et al., 2026). Despite growing attention to participatory planning, empirical research that

systematically integrates gendered perceptions of social risk in Southeast Asian urban kampung remains scarce (Ismail et al., 2026), limiting understanding of how vulnerability is spatially produced and negotiated at the micro-scale, and how participatory methods can surface differentiated experiential knowledge (Mohamed Saniff et al., 2026).

Addressing this gap, the study positions gender not as a supplementary variable, but as a central analytical lens in understanding social risk. Specifically, this research aims to examine how women and men differently perceive social risk in Kampung Ketandan–Kebangsren, and to investigate how participatory mapping can function as a methodological instrument to surface and represent women’s experiential spatial knowledge. By doing so, the study contributes to two key scholarly advancements: first, the refinement of Community-Based Participatory Risk Analysis (CBPRA) approach through the incorporation of gendered spatial experience; and second, the development of a more nuanced, empirically grounded framework for understanding social vulnerability in dense urban kampung environments.

LITERATURE REVIEW

Urban Kampung as Living Urban Heritage

Urban kampung in Indonesia represent a distinctive form of settlement shaped through long-term socio-spatial adaptation to economic pressures, limited land availability, and dynamic urban transformation (Anggraeni et al., 2010). Rather than being formally planned, these settlements evolve incrementally, resulting in highly compact environments where residential, economic, and social functions overlap. This multifunctional character positions urban kampung not merely as residential areas, but as complex socio-spatial systems embedded within the broader urban fabric.

The notion of living urban heritage highlights that urban kampung are not static relics, but continuously evolving environments that retain their social identity through everyday practices and collective memory (Pendlebury et al., 2015). Importantly, this perspective shifts the understanding of urban kampung from marginal or informal spaces to integral components of the city. It also implies that planning interventions should not focus solely on physical upgrading, but must consider lived experiences, spatial practices, and perceived safety among residents. These dimensions are particularly relevant when addressing vulnerable groups whose spatial experiences are often overlooked in conventional planning approaches.

Social Risk in Dense Residential Environments

In dense residential environments, social risk often manifests in subtle and context-dependent ways that are not fully captured by formal crime statistics.

Rather than being defined solely by measurable incidents, risk is increasingly understood as a socially constructed and experiential phenomenon shaped by spatial, social, and individual factors (Wisner et al., 2004).

In the context of urban kampung, these conditions are especially pronounced. Narrow alleys, overlapping functions, and fluctuating activity patterns create spatial environments where perceptions of safety vary across time and users. As a result, social risk becomes highly contextual, emerging from the interaction between physical configuration and everyday social practices. Moreover, risk perception is not uniform across populations. This highlights the need for analytical approaches that move beyond generalized assumptions of safety toward a more differentiated understanding of vulnerability.

Spatial Factors and Environmental Configuration Affecting Safety

The relationship between spatial configuration and perceived safety has been extensively explored in urban design and environmental criminology. Jacobs (1961) introduced the concept of eyes on the street, emphasizing the role of active street life and natural surveillance in creating safe environments. Newman (1972) further developed this idea through the theory of defensible space, highlighting the importance of territoriality and clear spatial boundaries in reducing crime risk.

These principles were later integrated into Crime Prevention Through Environmental Design (CPTED), which identifies key design elements such as lighting, visibility, access control, and maintenance as critical factors influencing safety (Jeffery, 1971). Complementing these approaches, space syntax theory (Hillier & Hanson, 1984; Hillier, 2004) provides a quantitative framework for analyzing spatial configuration, linking integration and connectivity to movement patterns and surveillance potential. Empirical studies suggest that spaces with low visibility, weak connectivity, and limited activity tend to be perceived as less safe, particularly by women (Hillier & Sahbaz, 2009).

Building on these theoretical perspectives, this study identifies seven key spatial parameters that influence social risk and safety perception in urban kampung: integration, lighting, vitality and diversity, active frontages, visibility, territoriality, and image and maintenance. These parameters are understood as interconnected elements that support natural surveillance, sustain social activity, and reinforce informal control mechanisms (Jacobs, 1961; Newman, 1972; Kelling & Wilson, 1982). In this research, each parameter is operationalized into observable indicators to examine their relationship with social risk hotspots in Kampung Ketandan–Kebangsren.

METHODOLOGY

This study employs a mixed-methods approach with a participatory qualitative dominance, selected to capture social risk perception as a subjective, contextual

phenomenon tied to the bodily experiences of space users (Creswell & Plano Clark, 2018). This approach allows the integration of residents' experiential narratives with spatial representations of risk in the form of perception maps, as recommended in community-based participatory environmental safety studies (De Filippi et al., 2020).

This study involved a total of 128 participants purposively selected from residents of Kampung Ketandan–Kebangsren. The sample comprised 67 women and 61 men, distributed across three age categories: youth (age range 15-24, $n = 30$), adults (age range 25-59, $n = 77$), and elderly (>60 years, $n = 21$). All participants were long-term residents of the kampung (minimum 5 years of residency and holding local identity card such as KTP-KK), reflecting the study's focus on embedded, everyday spatial knowledge. Participants were recruited through purposive sampling, initiated through introductions from the local neighborhood unit (RT/RW) leadership and subsequently expanded through participant referrals to ensure adequate representation across gender and age groups. Of this total, five residents (three women, two men, spanning youth to elderly categories) took part in the participatory mapping exercise, while the remaining participants contributed through semi-structured interviews and field observation.

Data collection was conducted through several complementary techniques. Participatory mapping served as the primary method to identify locations perceived as socially risky, involving five participants, consistent with risk mapping practices in dense settlements (Chambers, 1994). This process was supplemented by semi-structured interviews to explore narratives of experience, avoidance strategies, and the meaning of safety in the daily lives of women and other groups. Additionally, observations were carried out to record actual spatial conditions such as lighting, visibility, spatial activity, and alley configurations, which have been shown to influence safety perceptions in CPTED studies (Hillier & Sahbaz, 2009; Jeffery, 1971). Visual documentation in the form of photographs was used to strengthen the linkage between subjective narratives and the physical environmental conditions.

Data analysis followed the six-phase thematic analysis procedure of Braun and Clarke (2006), moving from familiarization and initial open coding (e.g., “fear at night,” “avoidance of unlit alleys”) through candidate sub-themes (temporal risk shift, embodied physical risk, interpersonal threat, spatial ambiguity) to the three final themes reported below: gendered interpersonal threat perception, age-related embodied risk, and temporal-spatial ambiguity. Coding was conducted independently by three researchers, with discrepancies resolved through discussion to strengthen analytic reliability.

The participatory mapping results were then transformed into a social risk heatmap, serving as a visualization tool for the concentration of risk

perceptions within the kampung, as applied in participatory safety mapping studies in informal settlements (De Filippi et al., 2020). Participatory mapping was conducted in a facilitated group session using a base map of Kampung Ketandan–Kebangsren printed at scale 1 : 500. Each of the five participants was asked to mark locations they perceived as socially risky and to annotate each point with the type of risk, the time of day it was most salient, and a brief narrative justification. These annotations were digitized as point data and imported into manual overlay for spatial aggregation. Point density was calculated using overlay-count method, producing a heatmap in which color intensity corresponds to the number of participants who independently identified a given area as risky. Hotspots reported in this paper (Hotspot 1 and 2) were selected as the two locations with the highest convergence of independent risk markings, subsequently triangulated against interview narratives and field observation. Subsequently, a more inclusive reading of social risk was performed. The entire research process adhered to the principles of participatory research ethics, including informed consent, anonymity, and sensitivity to personal experiences, to avoid reproducing social vulnerabilities in the knowledge production process (Moser, 2012).

The location of this study is Kampung Ketandan–Kebangsren, administratively located in Ketabang Subdistrict, Genteng District, Surabaya City. This area was selected because it represents the typical characteristics of an urban kampung in the city center of a major Indonesian city, characterized by high building density, limited environmental infrastructure, and the presence of relatively strong and active social networks in residents' daily lives. Furthermore, Ketandan–Kebangsren is part of the Tunjungan Square heritage area, a historic district that has developed since the colonial era and to this day maintains both residential functions and local community socio-economic activities, thus holding significant historical and cultural importance within Surabaya's urban structure (Anggraeni et al., 2010). From an urban risk perspective, previous studies have identified that social problems and theft rank highest in the high-impact, high-probability category in this area, indicating the existence of real and relevant social risks for further investigation (Septanti et al., 2026).

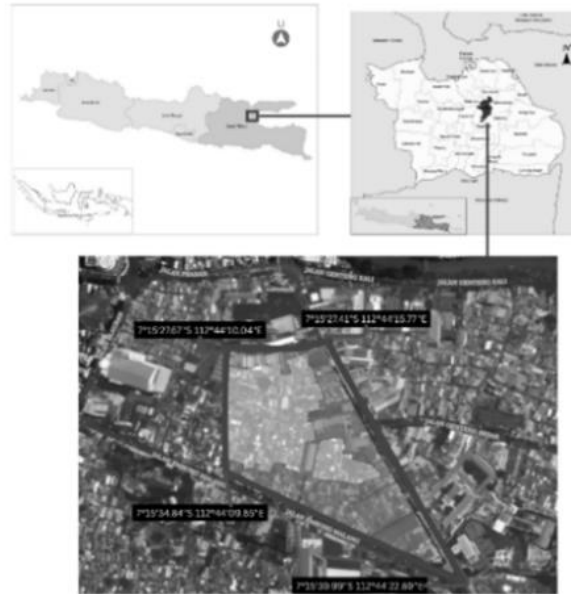


Figure 1: Research Location Map of Kampung Ketandan – Kebangsren
Source: Google Earth, 2025

ANALYSIS AND DISCUSSION

Social Risk Perception Patterns in Kampung Ketandan–Kebangsren

The results of the analysis show significant differences in how gender and age groups perceive social risk. Adult women tend to assess risk based on the potential for interpersonal threats, such as harassment or intimidation, especially in spaces with low visibility. In contrast, male participants more frequently associate risk with potential social conflict or conventional criminality. This perception is spatially translated into a heightened concern for locations where group interactions and territorial tensions are more likely to occur, such as busy intersections, informal gathering spots, street corners, and areas with a history of disputes or criminal incidents. These spaces are not necessarily characterized by low visibility, but rather by the presence of unfamiliar groups, competitive social dynamics, or weak social control. Thus, while women's risk perception is closely tied to spatial enclosure and visibility, men's perceptions are more strongly linked to the social function and interactional intensity of space. This difference is consistent with the findings of Koskela (1999) and Valentine (1989) regarding the gender construction of fear in public spaces.

The elderly group shows a different risk orientation, with their main focus on the physical aspects of the environment, such as uneven road surfaces, poor lighting, and the risk of falling. This finding indicates that social risk cannot

be separated from the bodily condition of space users, as emphasized in the embodied perception approach (Pain, 2001). Thus, social risk in urban kampung is intersectional that influenced by gender, age, and physical capacity.

These differences in perception have a direct impact on patterns of space use. Women report strategies of restricting time and routes, while the elderly tend to reduce the frequency of leaving home at certain hours. These strategies show that social risk not only affects the sense of safety but also shapes mobility patterns and access to public space, as documented in feminist urban geography studies (Kern, 2020). Risk classification followed the Community-Based Participatory Risk Analysis (CBPRA) framework used in earlier studies of Surabaya kampung (Septanti et al., 2026). Each identified hazard was scored by participants on two dimensions: potential impact and likelihood of occurrence, using a 5-point Likert scale, e.g., 1 = very low to 5 = very high]. Scores of ≥ 3 on a dimension were classified as 'high', and scores below 3 as 'low', yielding the four-category matrix (High Impact–High Probability, High Impact–Low Probability, Low Impact–High Probability, Low Impact–Low Probability) presented in Table 1.

Table 1: Results of Social Risk Perception Assessment

Hazards	High Impact High Probability	High Impact Low Probability	Low Impact High Probability	Low Impact Low Probability	SUM
Social Problems	16	9	17	86	128
Men	6	8	6	41	61
Youth	3	3	3	5	14
Adult	3	3	3	29	38
Elderly	0	2	0	7	9
Women	10	1	11	45	67
Youth	3	0	7	6	16
Adult	5	0	4	30	39
Elderly	2	1	0	9	12

The analysis of social risk perception shows that although quantitatively only 12.5% of respondents (16 out of 128 people) placed social problems in the high impact–high probability category, this category ranked highest compared to other types of hazards, thus relatively becoming the main risk priority in residents' perception. This finding confirms that social risks including theft, social disturbances, and feelings of insecurity are perceived as the most relevant threats in the daily life of the urban kampung (Septanti et al., 2026).

When examined by respondent characteristics, it is evident that women contribute significantly to the assessment of social risk as high impact–high probability; approximately 69% of this category came from women, whether

young, adult, or elderly. This indicates that the perception of social risk is not gender-neutral but is more strongly felt and expressed by women.

This finding shows that women have higher spatial sensitivity to micro-environmental conditions, especially in transitional spaces such as connecting alleys, areas behind houses, and paths leading to public facilities. This result aligns with the research of Pain (2001), which states that women tend to map risk more broadly because their daily mobility experiences are layered and repetitive. Furthermore, the results of this study show that perceived social risk does not always correlate with physically isolated spaces. Some locations with relatively high pedestrian traffic are still perceived as risky due to low natural surveillance and the absence of a sense of spatial ownership (territoriality), as explained in the theory of defensible space (Newman, 1972).

Local Analysis of Spatial Security in Kampung Ketandan–Kebangsren

To move beyond a purely descriptive juxtaposition of spatial and narrative data, the two hotspots discussed below were identified through a triangulation process: locations first emerged as high-density points on the participatory heatmap, were then cross-referenced against the thematic codes generated from interview data (particularly codes relating to temporal risk shift and spatial ambiguity), and were finally verified through direct field observation of the seven spatial parameters. This triangulated procedure ensures that each hotspot represents convergence across quantitative spatial pattern, qualitative lived experience, and observed physical configuration, rather than reliance on any single data source.

The social risk heatmap generated from participatory mapping shows a concentration of risk hotspots in the kampung boundary area adjacent to the tourist corridor and the city's main road. Although this area has a high level of activity, the low social engagement of kampung residents and the lack of natural surveillance create a transitional space perceived as unsafe. This pattern supports Jacobs' (1961) argument that the mere presence of people is not enough; the quality of interaction and a sense of ownership of the space are key factors in security. This spatial visualization also reveals differences in the scale of risk perception between participant groups. Women's maps show a broader and more layered scope of risk, while men's maps are more focused on specific points. This finding reinforces Hillier and Sahbaz's (2009) approach that security analysis needs to consider how spatial configurations are interpreted differently by different user groups.



Figure 2: Map of Hot Spot Area Analysis Mapping Results
 Source: Researcher, 2025

HOT – SPOT 1

Location: Around Jalan Kebangsren Gang II and Gang III



Figure 3: Street view of hot-spot 1
 Source: Google Maps Street Views, 2025

The designation of Hotspot 1 as a risky area is strongly supported by participant narratives emphasizing the drastic change in the sense of safety depending on the time of day. Several adult female respondents described that during the day, this space is still considered relatively safe due to the presence of informal activities, particularly street stalls and resident foot traffic. However, this sense of safety does not continue into the night when social activity disappears and natural surveillance decreases. One adult female participant stated:

"During the day, it's still normal because there are stalls and people passing by. But at night, it feels different it becomes quiet and dark. If possible, I only pass through there in the afternoon, not at night." (P1)

This quote shows that risk is not attached to the spatial form alone, but rather to the loss of continuity in social activity. This perception reinforces the spatial analysis showing that the integration of secondary paths is not sufficient to guarantee a sense of safety without the continuity of activity across time (Jacobs, 1961). Another participant also highlighted the role of inadequate lighting in reinforcing the impression of vulnerability.

"The lights exist, but they are dim. At night, it feels like an unmonitored alley that is very vulnerable, even though it's close to the main road." (P2)

This narrative clarifies that Hotspot 1 is constructed as an ambiguous space: structurally connected and active during the day but experientially felt as unsafe at night. Thus, Hotspot 1 is designated not because of extreme physical isolation, but because of the asynchrony between spatial configuration and the temporal social rhythm. The analysis of each hotspot is further elaborated based on seven spatial safety parameters, namely integration, lighting, vitality and diversity, active frontages, visibility, territoriality, and image and maintenance. Each parameter is used to read the relationship between the physical conditions of space, the dynamics of social activity, and the risk perceptions expressed by participants.

HOT – SPOT 2

Location: Inside Small Alleys around Jalan Ketandan Tengah



Figure 4: Street view of hot-spot 2

Source: Field Photo by Researcher, 2025

Unlike Hotspot 1, the designation of Hotspot 2 as a risky area is based on narratives consistently describing the absence of a sense of safety throughout

the day, not only at certain times. Participants described this narrow alley as a space that is rarely traversed, has minimal activity, and serves no social function other than residential access.

An elderly female respondent stated:

"In that alley, people very rarely pass by. Even during the day it's quiet, especially at night. The path is also uneven, and the lights often go out."
(P3)

Table 2: Comparative Analysis of Seven Spatial Safety Parameters

Parameter	Hotspot 1 (Jl. Kebangsren Gg. II–III)	Hotspot 2 (alleys off Jl. Ketandan Tengah)
Integration	Moderately integrated secondary path; busy by day but loses social function and surveillance at night (Hillier, 2004; Brantingham & Brantingham, 1991).	Very low integration; residential-access-only alley with no compensating social control, highly vulnerable to opportunistic acts (Hillier, 2004).
Lighting	Minimal, uneven lighting weakens perceived social presence during the day-to-night transition (UN-Habitat, 2007; Cho, 2017).	Streetlights often broken; alley nearly dark at night, reinforcing a sense of a hidden, unmonitored space (UN-Habitat, 2011).
Vitality & diversity	Daytime stalls create temporary vitality that vanishes at night, an asynchrony between activity rhythm and spatial structure (Jacobs, 1961; Hillier & Sahbaz, 2008).	No non-residential activity at any time; near-zero vitality removes potential “eyes on the street” (Brantingham & Brantingham, 1991).
Active facades	The façade faces a public space, yet the openings are covered by security grilles that are oriented towards the public but remain visually passive. (Newman, 1972).	Facades closed with small, inward-oriented openings that prioritize privacy over street life (Jacobs, 1961).
Visibility	Narrow alley width and building density create fragmented sightlines, correlating with elevated micro-scale risk (Hillier & Sahbaz, 2008).	Same condition as Hotspot 1: narrow width and density fragment sightlines and correlate with elevated risk (Hillier & Sahbaz, 2008).
Territoriality	Alley gates mark private claims but narrow shared space — individually defensive rather than collective (Newman, 1972).	No clear territorial markers; semi-private space without control mechanisms is the most vulnerable typology (Newman, 1972).
Image & maintenance	Ambiguous image — some houses unkempt, signalling weak collective social control (Kelling & Cole, 1997).	Poor maintenance, uneven surfaces, and dim lighting jointly reinforce signals of neglect (Kelling & Cole, 1997).

DISCUSSION

1. Perception of social risk as a spatial and gender construction

The research findings show that perceived social risk in Kampung Ketandan–Kebangsren is not neutral but constructed through the interaction of spatial configuration, social practices, and users' embodied experience. Women tend to interpret risk as interpersonal threat harassment or intimidation, especially in low-visibility, weakly surveilled spaces, confirming Valentine (1989) and Koskela's (1999) argument that women's fear in public space is shaped by bodily vulnerability and internalized power relations.

2. Age dimension and the embodied perception approach

Unlike the adult group, the elderly interpret social risk primarily through the physical conditions of the environment, such as uneven road surfaces, poor lighting, and the potential for falling. This finding reinforces the embodied perception approach, which positions the body as the primary mediator in the experience of space and risk (Pain, 2001). Thus, social risk in urban *kampung* is intersectional, influenced by a combination of gender, age, and physical capacity, and cannot be understood through only one spatial or social dimension.

3. Relevance of social risk in the daily life of urban *kampung*

This reaffirms the earlier finding that although only 12.5% of respondents classified social risk as high impact–high probability, it remained the top-ranked hazard category, with women accounting for 69% of this classification underscoring that insecurity in the *kampung* is fundamentally gendered (Pain, 2001; Kern, 2020; Septanti et al., 2025).

4. The role of lighting, visibility, and maintenance as mediators of safety

Lighting, visibility, and image and maintenance emerged as key parameters mediating the relationship between physical form and the sense of safety. Inadequate lighting and unkempt buildings reduce environmental legibility and send signals of weak social control, as explained by Nasar and Jones (1997) and Kelling and Cole (1997). This confirms that the safety of urban *kampung* depends not only on spatial morphology but also on the quality of maintenance and the social meaning attached to the space.

CONCLUSION

This study concludes that spatial safety in urban *kampung* is a relational quality produced through the interaction between space, time, and user experience. The perception of social risk in Kampung Ketandan–Kebangsren is proven to be significantly influenced by gender and age factors, where women and the elderly show higher sensitivity to micro-spatial conditions such as visibility, lighting, and

spatial legibility. These findings reinforce the critique of feminist urban studies against the assumption of neutral urban space and affirm the importance of the embodied perception approach in understanding social risk in dense settlements (Valentine, 1989; Pain, 2001; Kern, 2020).

Furthermore, this study shows that women's sense of safety can be positioned as a sensitive indicator of the environmental safety quality of urban *kampung*. Therefore, the planning and improvement of urban *kampung* quality need to adopt a participatory and gender-based approach, focusing on micro-interventions based on the seven-parameter spatial analysis of Hotspot 1 and 2, four concrete, site-specific interventions are recommended. First, lighting improvement should prioritize the two identified hotspots with the illuminance level of the urban pedestrian corridor was evaluated based on SNI 7391:2008, supplemented by motion-activated fixtures at the narrowest, least-trafficked segments (Hotspot 2) where continuous lighting may not be economically justified. Second, facade permeability should be improved incrementally by encouraging residents to replace solid security grilles with semi-transparent alternatives (e.g., perforated metal screens or raised window openings) at ground-floor frontages facing the alley, restoring partial visual connection between dwellings and public space without compromising residents' privacy or security concerns. Third, alley maintenance should be organized through a community-based rotating maintenance scheme, addressing uneven surfaces and signs of neglect identified in Hotspot 2, paired with small-scale infrastructure repair funded through kampung improvement program / CSR / local government budget. Fourth, a gender-sensitive safety audit should be institutionalized as a recurring practice, following the women's safety audit method (Whitzman, 2009): periodic (e.g., biannual) walkabouts led by women residents across age groups, using a structured checklist covering the seven spatial parameters identified in this study (integration, lighting, vitality, active frontages, visibility, territoriality, maintenance), with findings reported to the local neighborhood unit (RT/RW) and relevant city agencies to inform incremental kampung improvement planning

While grounded in a case study in Surabaya, these findings have broader applicability to other Indonesian cities where dense kampung settlements exhibit similar spatial characteristics, social structures, and informality. The relational nature of perceived safety identified in this study suggests that comparable patterns may also emerge in other Global South urban contexts characterized by high density, mixed-use environments, and strong community-based spatial practices. Thus, the insights from this research contribute not only to local urban discourse but also to wider discussions on inclusive and gender-responsive urban design in comparable settings beyond Indonesia. Future research is advised to develop comparative studies across urban *kampung* using

an intersectional approach and integrating spatial-quantitative data, to enrich the understanding of urban safety in the context of dense settlements in Indonesia.

ACKNOWLEDGEMENT

The authors would like to acknowledge that this research is supported by the Strategic Research Grant (SRG) funded by Institut Teknologi Sepuluh Nopember (ITS), Indonesia, in 2026. The financial support provided has been instrumental in facilitating the data collection and research activities undertaken in this study.

REFERENCES

- Anggraeni, R. W. D. I., Kurniawan, E. B., & Usman, F. (2010). Penataan permukiman di kawasan Segiempat Tunjungan Kota Surabaya. *Jurnal Tata Kota dan Daerah*, 2(2), 1–8.
- Brantingham, P. J., & Brantingham, P. L. (1991). *Environmental criminology*. Waveland Press.
- Cozens, P., & Love, T. (2015). A review and current status of crime prevention through environmental design (CPTED). *Journal of Planning Literature*, 30(4), 393–412.
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.
- De Filippi, F., Cocina, G. G., & Martinuzzi, C. (2020). Integrating different data sources to address urban security in informal areas. The case study of Kibera, Nairobi. *Sustainability*, 12(6), 2437.
- Hille, K. (1999). ‘Gendered exclusions’: Women’s fear of violence and changing relations to space. *Geografiska Annaler: Series B, Human Geography*, 81(2), 111–124.
- Hillier, B. (2004). *Space is the machine: A configurational theory of architecture*. Cambridge University Press.
- Ismail, M. K., Zailani, M. N., Zailani, S. H. M., Fadullah, M. F. A., & Alias, N. A. (2026). Evaluating and enhancing sustainable livelihoods among urban poor communities in Kuala Lumpur. *Planning Malaysia*, 24.
- Jacobs, J. (1961). *The death and life of great American cities*. Random House.
- Kelling, G. L., & Cole, C. M. (1997). *Fixing broken windows: Restoring order and reducing crime in our communities*. Free Press.
- Kern, L. (2020). *Feminist city: Claiming space in a man-made world*. Verso.
- Mohamed Saniff, S., Mohd Mokhtar, M. S., Ahmad Shukor, A. S. A., & Ibrahim, A. (2026). Planning for urban poverty transformation: Livelihood typologies and community resilience in Malaysia. *Planning Malaysia*, 24(41). <https://doi.org/10.21837/pm.v24i41.1992>
- Nasar, J. L., & Jones, K. M. (1997). Landscapes of fear and stress. *Environment and Behavior*, 29(3), 291–323.
- Newman, O. (1972). *Defensible space: Crime prevention through urban design*. Macmillan.
- Pain, R. (2001). Gender, race, age and fear in the city. *Urban Studies*, 38(5–6), 899–913.
- Ray, J. C. (1977). *Crime prevention through environmental design* (Rev. ed.). SAGE Publications.

- Septanti, D., Ahmed, I., Setyawan, W., Cahyadi, S., & Narida, T. S. (2026). Community-based risk analysis: Assessing multi-hazard vulnerabilities in urban kampungs in Surabaya, Indonesia. *Architecture*, 6(1), 26.
- UN-Habitat. (2011). *Building urban safety through slum upgrading*. United Nations Human Settlements Programme.
- Valentine, G. (1989). The geography of women's fear. *Area*, 21(4), 385–390.
- Whitzman, C. (2009). The effectiveness of women's safety audits. *Security Journal*, 22(3), 205–218.
- Yahya, A. S., Abdul Latip, N. S., Sharkawi, N., Abdul Kudos, A., & Ismail, A. I. (2026). Decoding spatial patterns in low income urban housing through vernacular references. *Planning Malaysia*, 24(41). <https://doi.org/10.21837/pm.v24i41.2001>

Received: 15th May 2026. Accepted: 6th June 2026