



Trauma-informed housing and wellbeing in resettlement: An actionable design model from refugee children's perspectives and mothers' photovoice

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ARTICLE INFO

Keywords:

Trauma-informed care
Trauma-informed design
Refugee children
Built environment
Resettlement
U.S. housing
Emotional well-being
Healing spaces
Child-centered design

ABSTRACT

Housing plays a central role in refugee integration, shaping psychological wellbeing and everyday adaptation. However, limited research has examined how refugee children experience housing environments as sources of safety or stress during resettlement. Many refugee children carry the effects of displacement, conflict, and prolonged instability, which influence how they interpret safety, predictability, and belonging in daily life. Within both home and neighborhood environments, they encounter conditions that can either support well-being or heighten vulnerability. Although trauma informed design highlights the role of built environments in reducing distress and supporting recovery, its application in refugee housing remains limited, and children's perspectives are often overlooked. This qualitative participatory study engaged nine Zomi refugee children and nine mothers resettled within the last five years across three neighborhoods in Tulsa, Oklahoma. Using creative design workshops and storytelling with children, alongside photovoice with mothers, the study explored how housing environments shape children's daily experiences. Data were analyzed using reflexive thematic analysis informed by trauma-informed care principles. Findings indicate that children associate well-being with safe, community-oriented homes and neighborhoods that support cultural identity, play, and social connection. In contrast, limited indoor space, poor maintenance, and inadequate amenities act as ongoing stressors that can intensify trauma-related distress and recall past experiences of instability. Overall, the study highlights how housing and neighborhood conditions can either mitigate or exacerbate trauma-related stress, offering practical implications for designing inclusive environments that support refugee children's well-being in resettlement.

1. Introduction

Global forced displacement continues to rise, with >122.6 million people displaced worldwide by mid-2024, nearly 40 percent of whom are children (UNHCR, 2025). For refugee children, resettlement is not only a geographic relocation but a profound psychological and social transition. While resettlement systems often prioritize rapid access to shelter, the everyday quality of housing and neighborhoods, and how these environments shape recovery and long-term well-being, remain less visible in policy and practice (McShane et al., 2025; O'Donnell et al., 2020). Evidence shows that distress often persists long after resettlement, making ordinary living environments central to rebuilding safety, stability, and belonging over time.

Housing is widely recognized as a social determinant of health and a key pathway of refugee integration. Having a home is essential to restoring *ontological security*, understood as a sense of predictability and continuity in everyday life (Fozdar and Hartley, 2014; Ziersch et al.,

2024). Research consistently links poor housing to adverse health outcomes, identifying it as a major post-migration risk factor (Gleeson et al., 2020). Yet many refugee families are placed in overcrowded, poorly maintained, unaffordable, or culturally mismatched housing (Spira et al., 2025). These conditions disrupt daily routines, intensify family stress, and can generate long-term consequences. Children are especially vulnerable because they spend substantial time in and around the home and are highly sensitive to environmental and social cues (Chen and Knöll, 2022). When homes and neighborhoods feel unsafe or isolated, everyday environments become sources of chronic stress rather than stability.

In the United States, housing is often treated as a logistical requirement of resettlement rather than a long-term foundation for child well-being. Since 1975, >2.6 million refugees have been resettled nationwide. U.S. resettlement policies frequently prioritize rapid resettlement over long-term suitability, addressing basic needs while overlooking children's developmental and spatial well-being (Sangalang et al., 2019;

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<https://doi.org/10.1016/j.wss.2026.100384>

Received 2 September 2025; Received in revised form 8 March 2026; Accepted 17 March 2026

Available online 24 March 2026

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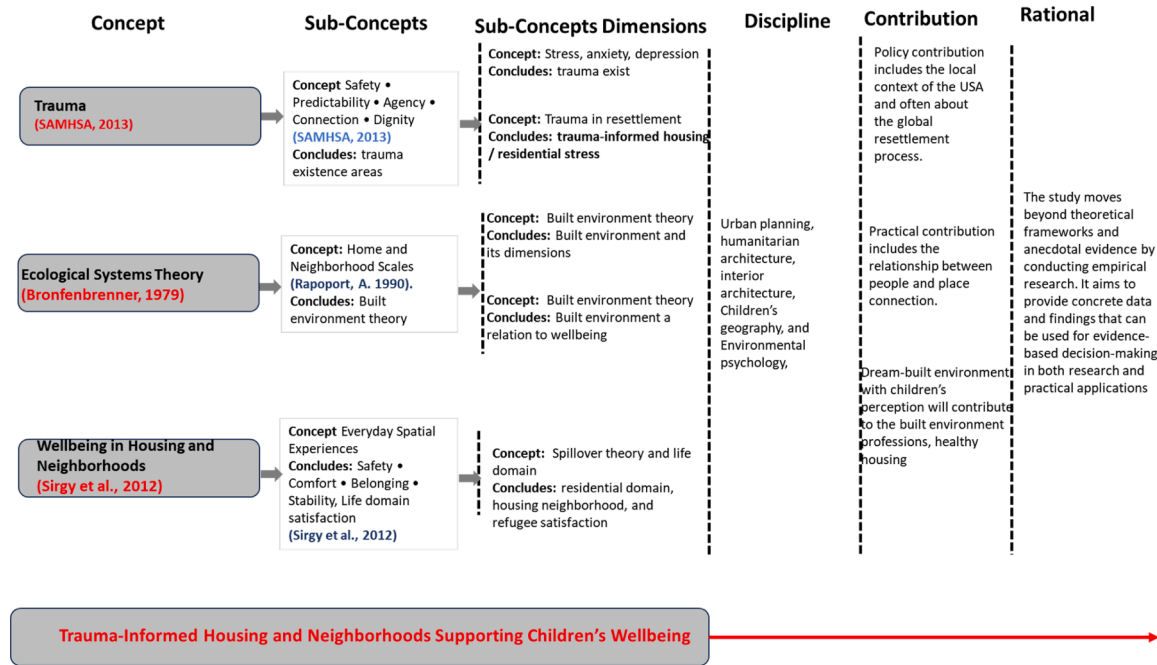


Fig. 1. Theoretical framework (Authors, 2024).

Xu, 2007). This adult-centric model often places families in overcrowded or under-resourced housing, exacerbating stress and insecurity (Bettmann et al., 2017; Shaw et al., 2021; Zucker, 1983). For instance, Myanmar refugees in Dallas report housing-related challenges (Bhattacharjee and Corbett, 2023), while Iraqi refugees express disappointment, “We came for the future of our children, but we do not have a future” (Yako and Biswas, 2014). Cultural exclusion, unaffordable rent, and placement in high-crime neighborhoods remain persistent concerns of adequate and healthy housing (Bose, 2023; Chaiwat, 2024), reinforcing the need for child-centered resettlement strategies that promote stability, integration, and healing (Xu, 2007).

Trauma-informed design (TiD) offers a useful lens for understanding why everyday housing conditions matter. Grounded in trauma-informed care (TiC), it emphasizes how environments can support safety, predictability, agency, connection, and dignity in daily life. It draws on the Substance Abuse and Mental Health Services Administration’s (SAMHSA) six core principles: safety, trust, empowerment, peer support, collaboration, and cultural responsiveness (SAMHSA, 2014). Trauma-informed design views trauma as shaped by environments rather than just individuals. It integrates spatial design with social and therapeutic support across scales (Ajeen et al., 2023; Bollo and Donofrio, 2022). At the home level, layout, lighting, and acoustics support emotional security (Connellan et al., 2013). At the neighborhood level, walkability, green space, and safety support recovery (Schroeder et al., 2021). For children, these environments can either intensify or reduce trauma (Schroeder et al., 2022). Trauma-informed design therefore ecologically grounded, supporting healing through both design and community (Brocius et al., 2022).

Despite growing applications of trauma-informed approaches in education (Wiest-Stevenson and Lee, 2016) healthcare (Bassuk et al., 2017) schools (Kopeck and Harte, 2020), residential care settings for youth resilience (Ames and Loebach, 2023), and neighborhood design (Schroeder et al., 2021), their application to refugee resettlement housing remains limited. Much of the refugee well-being literature documents trauma and service needs without translating these insights into housing or neighborhood design knowledge. Children’s perspectives are particularly underrepresented, as most studies rely on adult reports or focus primarily on adolescents (Bajo Marcos et al., 2021; Burenby Yxne et al., 2025). On the other side, in the U.S., trauma

support is often delivered through clinical or school-based services, with limited attention to housing and neighborhood conditions that shape daily routines and caregiver stress. Although some studies engage with trauma-informed approaches in refugee contexts, this area remains limited. For example, Omiyefa (2025) focuses on care with less attention to spatial design, while Im and Swan (2021) examine health services with limited consideration of the built environment. Similarly, Sheth et al. (2022) highlight mental health needs without extending these insights into design strategies. Together, these gaps point to opportunities for more integrated, child-centered housing research (Alipui and Gerke, 2018). These gaps reflect a U.S. resettlement policy tendency to prioritize adult productivity over child-centered housing stability. As a result, housing is often framed as an outcome of resettlement rather than an active setting that shapes children’s daily well-being (Alipui and Gerke, 2018).

This study addresses these gaps by examining how housing and neighborhood environments shape refugee children’s well-being in resettlement, centering children’s own accounts alongside caregiver perspectives. Guided by Bronfenbrenner’s ecological systems theory (Bronfenbrenner, 1994) research examines on Zomi refugee families from Myanmar resettled in Tulsa, Oklahoma, where an estimated 7000 to 9000 Zomi refugees have settled since the 1970s, and continue to face challenges in accessing safe and equitable housing (NOE, 2022).

Rather than privileging a single perspective, the study integrates children’s drawings and narratives with mothers’ photovoice documenting material conditions and everyday constraints. This dual lens remains uncommon in refugee housing research and represents a key contribution. The study addresses the following research questions:

1. What housing conditions do refugee children experience in resettlement?
2. How do existing housing and neighborhood features shape children’s everyday stress, recovery, and well-being?
3. How do refugee children conceptualize safety, well-being, home, and neighborhood in resettlement?
4. How can these insights inform an actionable trauma-informed design model for refugee resettlement housing?

The study follows a qualitative interpretive approach and uses

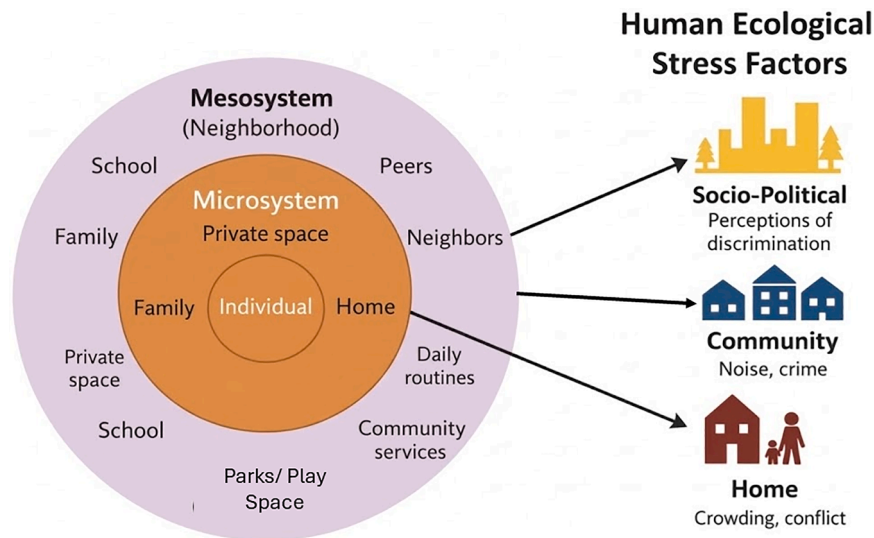


Fig. 2. Human ecological model and stress. Source: (Author Created based on Urie Bronfenbrenner's ecological theory).

participatory methods that support meaningful child involvement (Hart, 1987), guided by a culture-centered perspective (Kumar, 2021). The paper proceeds with a review of relevant literature, followed by methodology, findings discussion of design and policy implications, and concluding reflections.

2. Theoretical framework

Our literature review draws on three areas: (1) trauma-informed design, (2) ecological systems theory, and (3) research on how housing and neighborhood environments shape children's wellbeing (Fig. 1). Using a trauma-informed lens, the model illustrates how home and neighborhood environments can either reduce or reproduce stress through safety, predictability, agency, connection, and dignity across ecological scales. The framework integrates children's lived experiences and caregivers' housing knowledge to inform the actionable design model proposed in this study.

2.1. Trauma-informed design: Evolution

Trauma-Informed Design (TID) is an emerging architectural approach derived from Trauma-Informed Care (TIC), which emphasizes environments that promote safety, empathy, and emotional well-being. TIC gained prominence in the late 1990s through SAMHSA's work on addressing trauma in mental health and substance use treatment (Harris and Falot, 2001). Earlier understandings of trauma, once described through terms such as "shell shock," evolved into the formal diagnosis of PTSD following the Vietnam War. The 1998 Adverse Childhood Experiences (ACE) study reframed trauma as a public health issue, highlighting its long-term effects on health and development (Owen and Crane, 2022). This shift moved the focus from asking "What is wrong with you?" to "What happened to you?" and informed SAMHSA's six trauma-informed principles, which increasingly guide design approaches in the built environment (Ames and Loebach, 2023).

2.2. Trauma-informed design in the housing context: frameworks and principles

Despite growing momentum, TID lacks formal standards comparable to Leadership in Energy and Environmental Design (LEED) or WELL building standards. Existing frameworks translate trauma-informed principles into spatial strategies that support safety, dignity, autonomy, and well-being.

Early housing-focused work connects trauma-informed principles to design strategies such as predictable layout, noise control, daylight access, and opportunities for personalization, reflecting a biopsychosocial understanding of health (Fallot and Harris, 2008). Organizations such as Design Resources for Homelessness emphasize privacy, empowerment, and community in shelter environments (Pable and Ellis, 2020), while the Committee on Temporary Shelter promotes multisensory and biophilic approaches to reduce environmental stressors (Bollo and Donofrio, 2022).

Denver's Sanderson Apartments incorporate widened corridors and visual openness to enhance security (Brisson et al., 2020), while Los Angeles' Star Apartments provide shared spaces that support social connection and recovery (Michael Maltzan Architecture, 2014). Similarly, the Haven Shelter in Montana integrates visibility and openness in children's areas (Houghton, 2023), and POAH's Hawthorne Apartments include trauma-sensitive play areas and biophilic elements that promote dignity and well-being (POAH, 2013).

Research further highlights design elements that support trauma recovery. Layout, lighting, color, and access to nature can regulate stress and emotional responses (Yan et al., 2024). Privacy, environmental control, and culturally responsive spaces help reduce feelings of vulnerability while strengthening stability and self-worth (Pable and Ellis, 2020). Studies of permanent supportive housing also emphasize the importance of choice, autonomy, environmental comfort, and connection to nature (Brisson et al., 2025). Frameworks such as Shopworks Architecture's model sensory boundaries, nested spatial layers, and identity anchors demonstrate how trauma-responsive principles can be operationalized in housing design (Grabowska et al., 2021).

Despite these advances, TiD remains largely adult-centered. While supportive housing and shelters increasingly adopt these principles, the spatial needs of children are rarely addressed. Although the Trauma-Informed Design Society has explored trauma-informed design in child abuse intervention centers, this work remains limited to specialized facilities and does not address everyday housing or neighborhood environments, leaving a key gap for refugee children in resettlement contexts (Trauma-Informed Design Society, 2022). Yet research shows that environmental qualities such as layout, lighting, and privacy significantly influence children's sense of safety, stability, and emotional regulation (Chayadi et al., 2024; Slater, 2023). Although participatory approaches exist in humanitarian contexts (e.g., UNHCR shelter initiatives) (Citaristi, 2022), refugee housing design rarely centers on children's perspectives.

This study addresses this gap by advancing a child-centered, trauma-

informed housing model grounded in refugees' experiences during resettlement. Incorporating children's needs and cultural contexts is critical to ensuring that housing environments support recovery rather than reproduce stress and exclusion.

2.3. Understanding refugee children's trauma through an ecological lens

Trauma is not a singular event but a cumulative experience shaped by biological, psychological, social, and environmental conditions (Christopher, 2004). Refugee children often encounter trauma throughout all stages of displacement, pre-flight, flight, and resettlement through experiences of violence, separation, instability, and prolonged uncertainty. (Isaksen and Vejling, 2018). Their capacity to cope and recover depends on both internal factors (e.g., age and health) and external conditions, including social support, cultural continuity, and access to safe environments. (Cook et al., 2005).

To understand how built environments influence refugee children's well-being, this study draws on Urie Bronfenbrenner's ecological theory of human development (Bronfenbrenner, 2000). The ecological model explains development through interconnected systems operating at different spatial scales. The microsystem includes the child's immediate environment and direct relationships, such as family members, peers, and teachers. The mesosystem reflects interactions between these settings, for example, the connection between caregivers and school. The macrosystem represents broader socio-cultural and policy contexts, including cultural norms, legal frameworks, and economic structures. These layers can either buffer or intensify trauma (Kuru and Ungar, 2021; Lustig, 2010). For instance, overcrowded housing, unsafe neighborhoods, and exclusionary policies may reinforce stress and undermine stability.

Insights from environmental psychology further demonstrate that spatial qualities, such as layout, lighting, noise, and privacy, shape emotional responses, behavior, and recovery (Altman, 2012; Gifford, 2007). In this study, the ecological framework is applied specifically to the home and neighborhood scales, which form the most immediate environmental contexts of children's daily lives. Border systems such as the exosystem and chronosystem are not examined in depth in order to maintain a focused analysis of children's everyday housing experiences Fig. 2.

2.4. Housing, trauma, and the well-being of refugee children in resettlement: A global context

Well-being is a multidimensional concept shaped by sociocultural context, caregiver relationships, and subjective experiences (Ben-Arieh and Shimon, 2014). For refugee children, well-being is closely tied to both past trauma and the quality of resettlement environments. Housing plays a central role in this process, extending beyond shelter to include the physical conditions of the dwelling, neighborhood environment, and opportunities for social connection.

Substandard housing conditions, such as overcrowding, dampness, cold, and environmental hazards, can harm physical health, while a lack of privacy and autonomy undermines emotional stability and a sense of security. The World Health Organization identifies housing as a key social determinant of health, linking structural quality, emotional safety, and cultural fit to long-term well-being. These outcomes are further shaped by broader social determinants such as education, race, gender, and economic resources (Rana et al., 2025). Design-centered interventions, such as UNICEF's Makani centers in Jordan, highlight how trauma-sensitive environments can support healing and social inclusion (Fallahi and Gamini Esfahani, 2017).

Neighborhood environments also influence children's recovery and integration. Access to schools, healthcare, green spaces, and peer networks can strengthen social belonging and emotional security. However, refugee families are frequently resettled in under-resourced areas, increasing risk of isolation and stress (Omiyefa, 2025). Research links

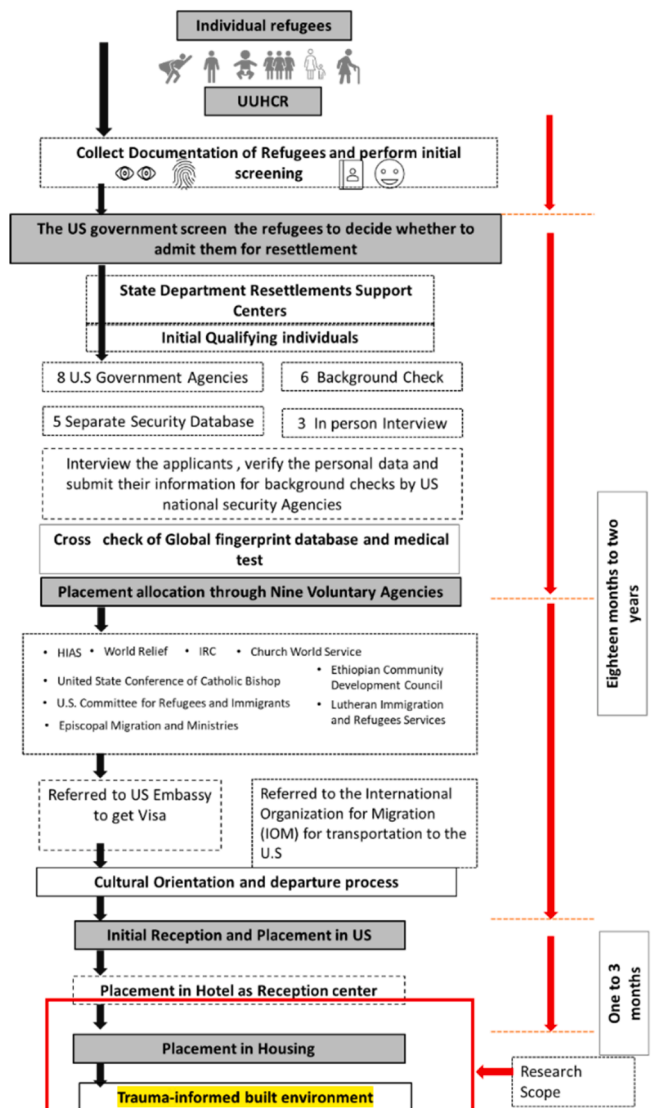


Fig. 3. Refugee Resettlement Process in the USA. Authors created based on (National Immigration Forum, 2020; UNHCR, 2022).

neighborhood deprivation to higher psychiatric distress among refugee youth (Foverskov et al., 2022), while studies from Australia (Correa-Velez et al., 2020), New Zealand (Lovelock et al., 2023), and Germany (Hennig, 2020) demonstrate that safe, cohesive, and green communities foster resilience.

Housing insecurity persists even in high-income countries with formal resettlement programs. Refugees in Canada face affordability and language barriers that limit neighborhood integration (Rabiah-Mohammed et al., 2022), while short-term support structures in Australia can leave families vulnerable (Liddell et al., 2022). Similarly, the United Kingdom's dispersal policies often place refugees in marginalized neighborhoods. Globally, only a very small proportion of refugees access formal resettlement each year, typically less than 1%, with the vast majority, including children, remaining in camps or informal settlements with limited access to adequate housing, education, and care (UNHCR, 2016). These conditions highlight the need for trauma-responsive housing systems that support refugee children's development and long-term integration (Elswick et al., 2022).

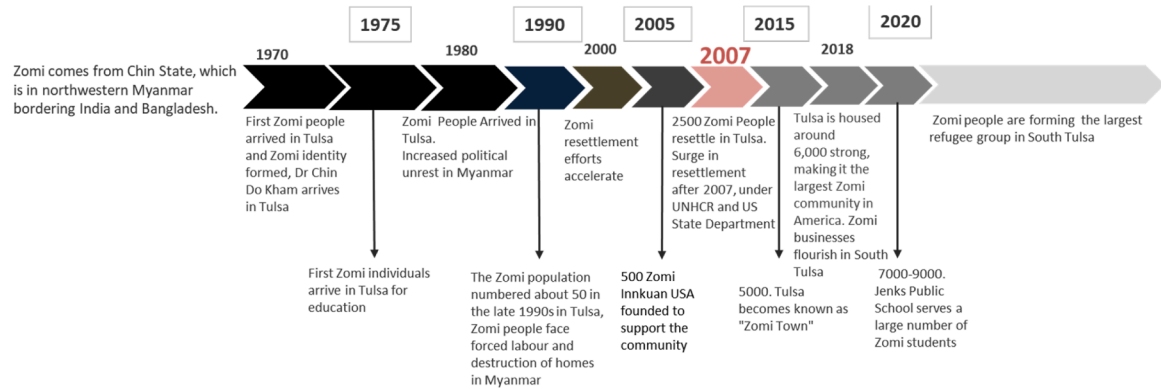


Fig. 4. Timeline of Zomi refugees in the USA. Source: Author created based on (Eaton, 2016; NOE, 2022; Bates, 2023; Zomi Town, Tulsa, n.d.).

2.5. Housing, trauma, and the well-being of refugee children in resettlement: US context

In the U.S., over 3.6 million refugees have been resettled since 1975 through a public-private partnership involving nine national voluntary agencies and their local affiliates (Capps et al., 2015; Shaw et al., 2021). Although the refugee admissions cap increased to 125,000 in 2022, systemic barriers remain. The resettlement process is lengthy, often 18 to 24 months, and largely follows a top-down approach, limiting refugees' ability to influence where they are placed (Palmgren et al., 2025). Initial assistance typically covers food, shelter, and case management for 30 to 90 days, while public benefits last up to eight months, and Office of Refugee Resettlement (ORR) support may extend up to five years (Fig. 3). However, services often prioritize rapid employment rather than long-term stability in housing, education, and community integration (Halpern, 2008). The system also remains largely adult-centered, frequently overlooking children's needs related to cultural displacement, language barriers, and developmental challenges (Bettmann et al., 2017; Shaw et al., 2021; Xu, 2007).

Upon arrival, families receive a one-time cash payment and short-term case management (Office of Refugee Resettlement, 2022). Delays in obtaining legal permanent residency can restrict access to credit, transportation, and secure housing (Evans and Fitzgerald, 2017). Although NGOs assist with housing placement, refugee families often have little input in these decisions, which can result in culturally mismatched or unsafe living conditions (Cicek-Okay et al., 2024). Rising rents and placement in under-resourced neighborhoods further increase housing instability, particularly for refugee children (Brown and Scribner, 2014).

Evidence from across the U.S. highlights persistent housing challenges for refugee families (Yako and Biswas, 2014). Karen refugees have been reported living in overcrowded apartments with inadequate heating (Kenny and Lockwood-Kenny, 2011), while Bhutanese refugees face high suicide rates linked to poor integration outcomes (Sangalang et al., 2019). Refugee housing is frequently concentrated in low-income areas where families face violence, discrimination, and deteriorating housing conditions. For example, in San Diego, nearly 30% of refugees live in overcrowded units (Hassani et al., 2023). While studies show that Somali refugees have experienced relocation due to neighborhood violence and discrimination (Gillespie et al., 2020), and Syrian refugees in St. Louis often reside in high-poverty areas with limited safety and resources (Sichling, 2023). Such residential instability contributes to elevated risks of trauma, PTSD, and mental health challenges, particularly among refugee youth (Marshall et al., 2005).

Despite these challenges, trauma-informed design remains largely absent from U.S. resettlement policy. While reforms have been proposed (Brown and Scribner, 2014), children's lived housing experiences are rarely considered in housing placement or planning decisions (Noyori-Corbett and Moxley, 2017). Furthermore, within resettlement contexts, refugee children's well-being is shaped by collective trauma, reflecting shared experiences of displacement, loss, and instability that influence both home and neighborhood environments. This study addresses this gap by advocating for participatory, trauma-informed housing strategies that prioritize refugee children's safety, stability, and well-being beginning at the point of resettlement.

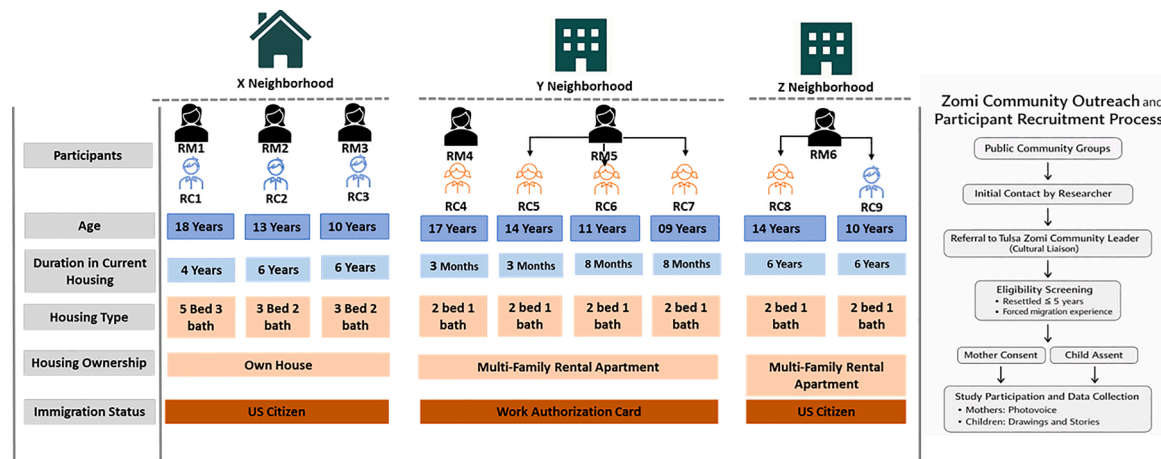


Fig. 5. Participants' Profile and Recruitment.

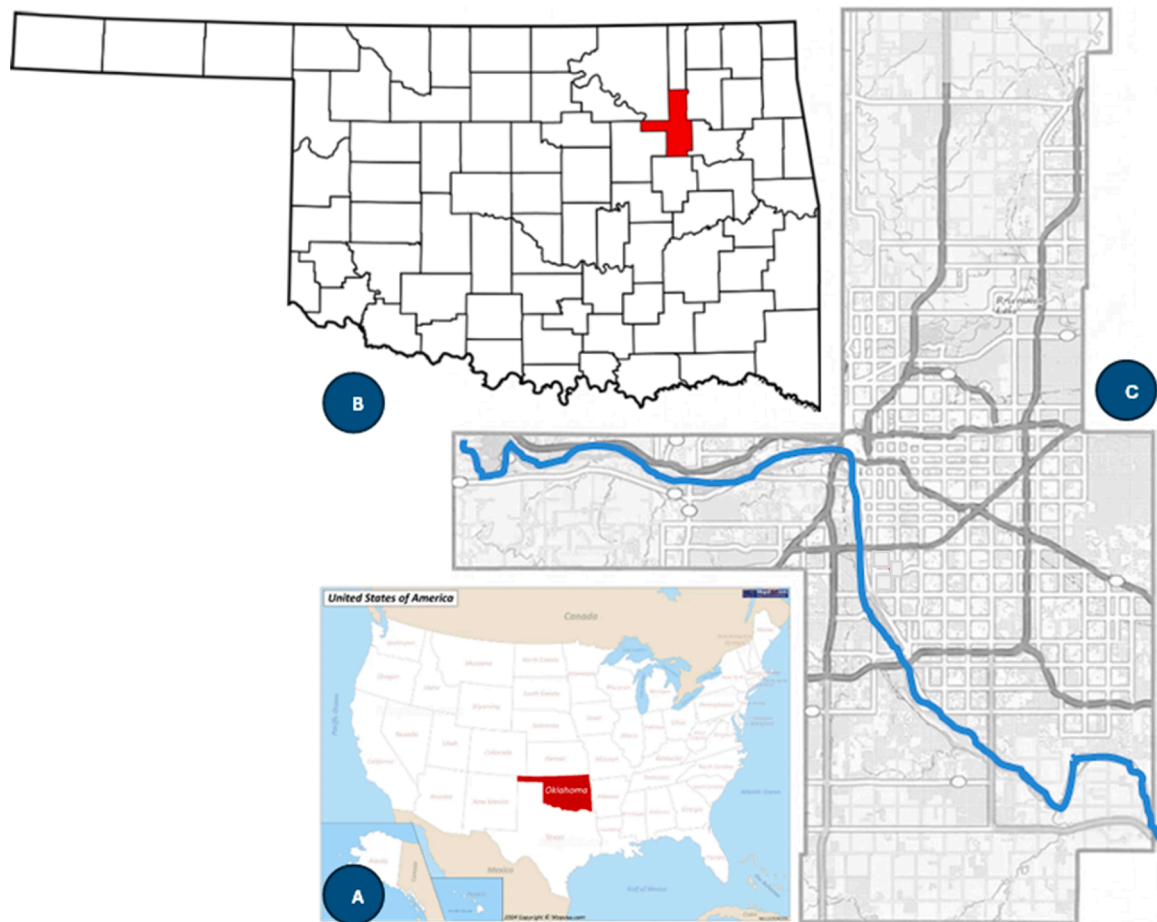


Fig. 6. A) US map; B) Oklahoma state; C) Tulsa County. Source: The author collected information from various sources.

3. Context and methods

3.1. Study context

This study was conducted in Tulsa, Oklahoma, the state's second-largest city, where housing affordability and overcrowding affect approximately 15% of residents. Tulsa is home to one of the largest Zomi refugee communities in the U.S., with an estimated 9000 residents. The Zomi, an ethnic group from Myanmar, began arriving in Tulsa in the 1970s, with the largest wave of resettlement after 2007 supported by international and federal refugee programs (Fig. 4). While Tulsa's relatively affordable cost of living attracts refugee families, many Zomi households still face challenges related to overcrowding, rising rents, and language barriers, which can affect children's well-being and housing stability.

3.2. Participants

This study included nine Zomi refugee children (RCs) aged 9 to 18 (5 girls, 4 boys) and nine refugee mothers (RMs) aged 30 to 50 from six households (Fig. 5). All participants experienced housing in at least one transitional country prior to resettlement, primarily in Malaysia following displacement from Myanmar. Three mothers participated with two children each and three with one child. Children were enrolled in Tulsa public schools and had lived in their current housing from 3 months to 5 years. Most households relied on industrial or service-sector employment, while mothers primarily served as caregivers. Many mothers reported limited formal education due to displacement and varying levels of ESL participation.

Participants were recruited from three South Tulsa neighborhoods

(Fig. 6). Housing conditions ranged from single-family homes to two-bedroom apartment units with limited amenities. Recruitment occurred through community outreach and collaboration with a Zomi community leader, who served as a cultural liaison. Participation required informed consent from mothers and assent from children, and neighborhood identifiers were omitted to protect confidentiality.

3.3. Research design

This study used a qualitative bounded case study design with an interpretive orientation to explore how resettled refugee children experience well-being through their housing and neighborhood environments. Guided by a phenomenological focus on lived experience, the study examined children's perception of home, safety, comfort, and belonging through narratives and visual materials. The case was bounded by *population, place, and time*:

Ethical considerations were paramount. The research followed five steps: tool development, IRB approval, engagement of a trained cultural liaison from the Myanmar refugee community, participant recruitment, and fieldwork (Fig. 7). Participants received \$15 (children) and \$25 (mothers) gift cards.

3.4. Data collection methods

Data were collected through four participatory methods: (1) closed and open-ended questionnaires with mothers, (2) mothers' photovoice, (3) a children's creative design workshop, and (4) field observations. Fieldwork occurred over five trips from Norman to Tulsa during January-February 2024, scheduled based on participant availability. The first visit focused on building trust with the cultural liaison, while

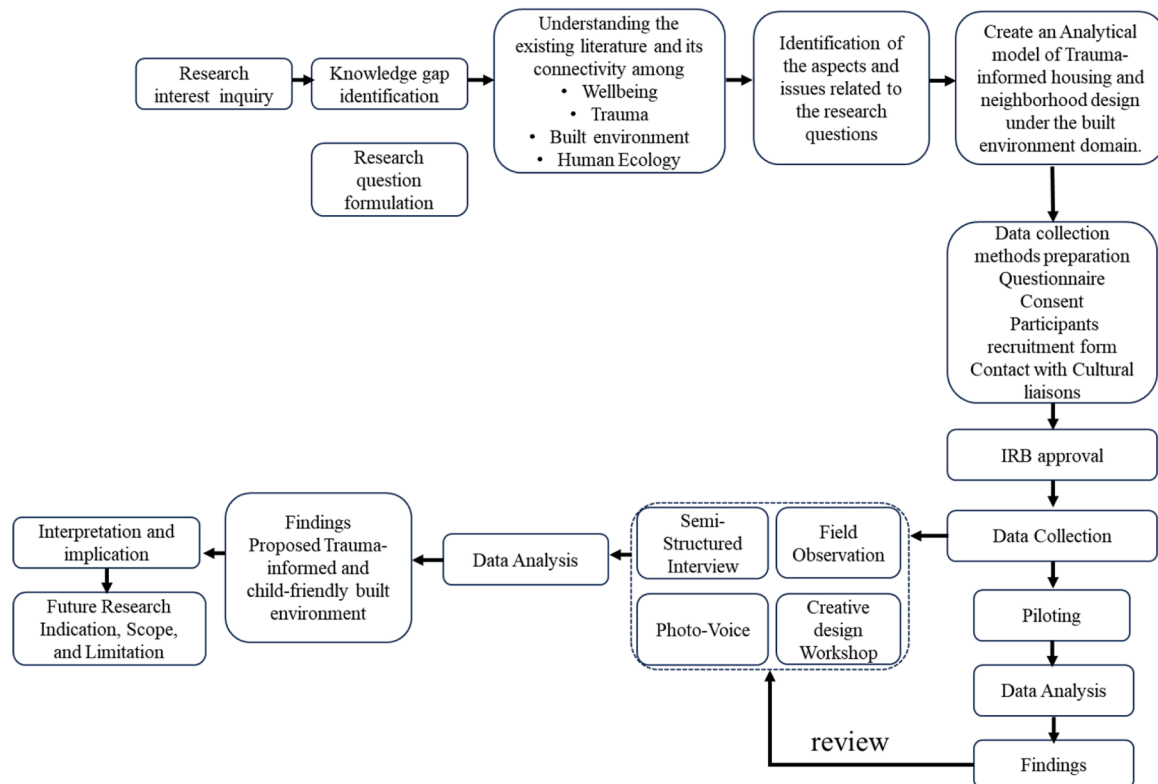


Fig. 7. Research Steps.

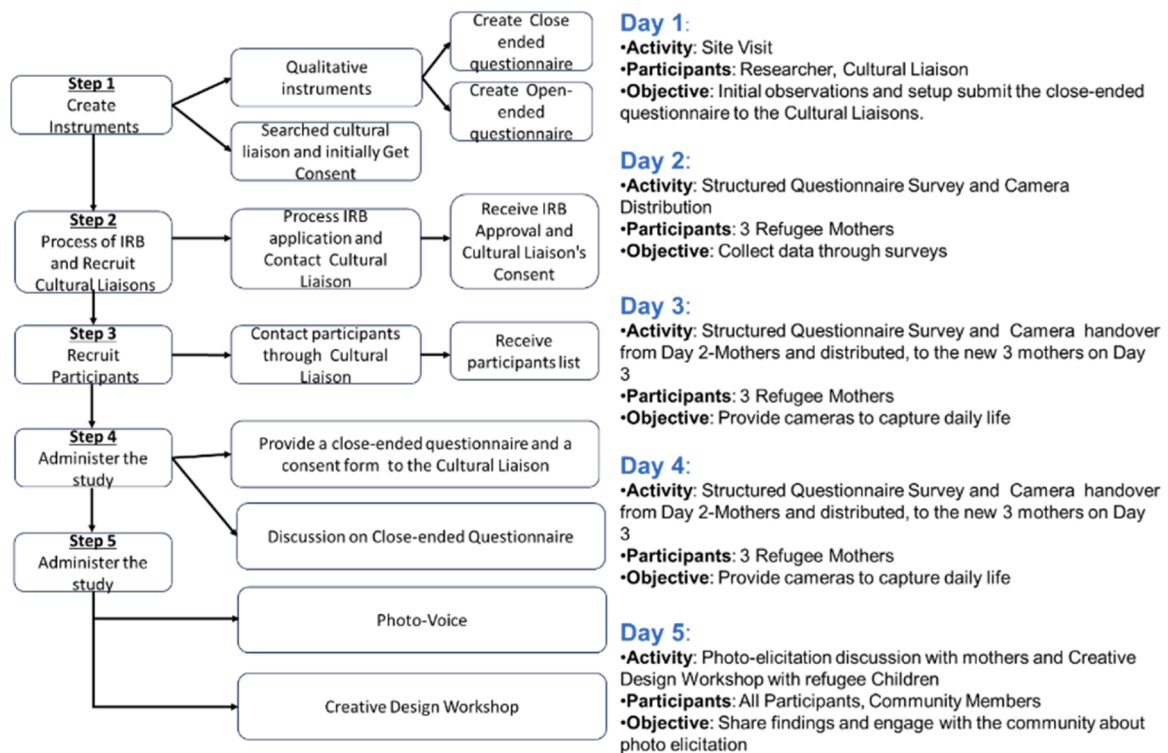


Fig. 8. Research process and Schedule of the field trip.



Fig. 9. (a) Camera and Emojis provided to the Refugee Mothers; (b) refugee mothers' annotations on the photos, and (c) cultural liaison translating the narration of refugee mothers in the photos.

subsequent visits included interviews, surveys, and photo-voice activities (Fig. 8).

3.4.1. Close-ended questionnaire survey

Nine Zomi refugee mothers completed paper-based questionnaires capturing demographics, housing conditions, and children’s daily routines. The survey examined housing quality, indoor environmental conditions (e.g. lighting, ventilation, WASH facilities), and neighborhood amenities, along with their perceived influence on children’s well-being. All materials were translated into Zomi and supported by visual prompts (for example, “A Typical Day for Your Child”) to facilitate understanding.

3.4.2. Mothers’ adapted photovoice activity

To explore how housing and neighborhood environments shape children’s routines, mothers participated in an adapted photovoice activity. Using digital cameras, they documented spaces and activities important to their children’s daily lives over the one week.

Participants then joined a 30-minute group reflection session, where they shared photographs, added brief narratives, and used simple *mood tags* to express emotional responses to different home and neighborhood spaces (Fig. 9). A cultural liaison assisted with translation.

3.4.3. Creative design workshop

A creative design workshop was conducted with refugee children to visualize their ideal homes and neighborhoods. Using drawing and mental mapping, children illustrated spaces that represented safety, belonging, and comfort. The 160-minute session included pre-design activities (30 min), design (60 min), post-design discussions (40 min), and a closing appreciation session (30 min). With consent, the session was audio- and video-recorded.

In the pre-design phase, children received brief training and drawing materials, encouraged to include culturally significant elements from Myanmar, like parks and playgrounds. In this phase, children were prompted: “Please draw the ‘dream neighborhood and home’ you love most. You can include elements from your home in Myanmar or new ideas that

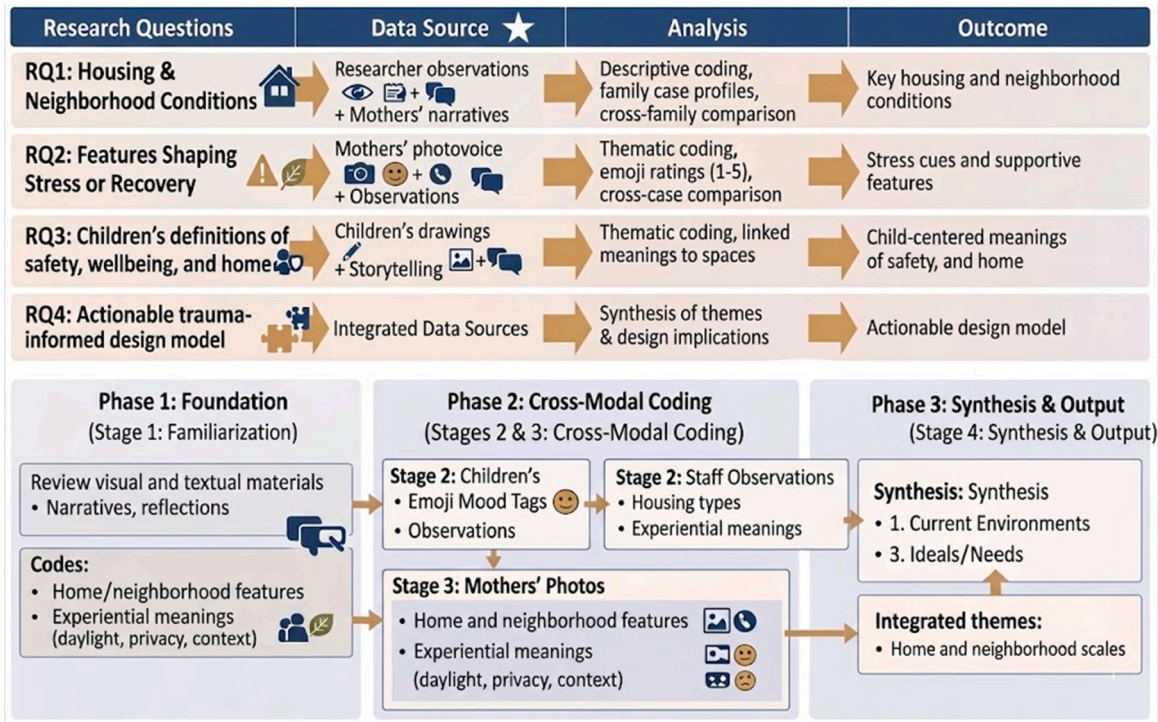


Fig. 10. A) Methodological framework and B) codes for the theme generation process.

make you feel safe and happy." In the design phase, we supported the children's creative process with encouraging prompts, such as: "Wow, that is a great design! In the post-design phase, one-on-one discussions were held where children reflected on their drawings, and questions like "Why did you include a large garage?" or "What were your living conditions like in Myanmar?" reinforced their sense of belonging. A food appreciation event was held for rapport-building with mothers and children. Photographs and videos documented the workshop, and all data were securely stored for confidentiality. The workshop was held at a familiar community location and co-facilitated with a cultural liaison to ensure cultural sensitivity and emotional safety.

3.4.4. Field observation

Researchers conducted home visits and neighborhood observations with participating families to document housing conditions, spatial layouts, and neighborhood environments, including safety, accessibility, and available amenities. Observations were recorded through field notes with support from a bilingual cultural liaison. Each visit lasted approximately one hour, totaling five hours of reflexive, in-situ observation.

3.5. Data analysis

Qualitative data were analyzed using reflexive thematic analysis guided by a phenomenological approach focused on lived experience (Braun and Clarke, 2006; Giorgi, 1999). The dataset included mothers' adapted photovoice photographs, mood tags, and reflections; children's drawings and narratives of ideal homes and neighborhoods; and researcher field observations used to contextualize environmental conditions (Fig. 10). Field observations informed interpretation but were not coded as an independent dataset.

Analysis followed four iterative stages (Fig. 10). First, all materials were reviewed repeatedly for familiarization. Second, the first author conducted coding across data types, analyzing photographs with reflections and mood tags, and children's drawings with narratives to interpret visual materials within their narrative context. Codes captured environmental features and experiential meanings such as daylight, privacy, spatial organization, play, and belonging. Third, codes were grouped into categories and refined through constant comparison across participants and data sources. Fourth, cross-case analysis examined patterns across families living in different housing and neighborhood contexts (Capous-Desyllas and Bromfield, 2018).

Themes were analyzed through trauma-informed care principles to interpret how environmental factors shaped stress and well-being and then situated within ecological systems theory to identify salient levels of influence. The first author led coding and theme development manually, while the second author reviewed and coded materials; discrepancies were resolved through discussion, and the analytic framework was refined accordingly. To aid analysis, we used Raw Graphs, an open-source visualization tool, to generate a linear dendrogram (network diagram) mapping codes and categories across home and neighborhood scales. This visualization was selected to illustrate hierarchical relationships and thematic connections, supporting interpretation by revealing interactions across ecological levels.

3.6. Rigor trustworthiness

To strengthen credibility, dependability, and confirmability, multiple strategies were employed throughout the study (Creswell and Poth, 2016). The first author conducted the initial coding and developed the codebook, while the second author coded a subset of children's drawings to refine the coding framework and establish shared interpretation through consensus coding (Miles et al., 2014). Constant comparative analysis across participants (RC1 to RC9) helped identify both convergent and divergent patterns, including the risk of thematic over-generalization (Charmaz, 2014). Member checking with the Zomi

cultural liaison and systematic documentation of coding decisions supported confirmability. Triangulation across children's drawings and narratives, mothers' adapted photovoice data, and researcher observations further enhanced credibility (Creswell and Clark, 2017).

3.7. Positionality

The researcher's reflexivity was maintained throughout the study (Creswell and Miller, 2000). The lead author's experience working with Rohingya and Bihari refugees at the shelter scale and the co-author's work in refugee resettlement with Myanmar and Afghan communities informed culturally grounded interpretations and helped build trust with participants.

4. Findings and analysis

These findings address four research questions exploring post-migration housing vulnerabilities and "dream" housing experiences of Zomi refugee children. Analysis of children's drawings and photovoice by mothers revealed key home and neighborhood-based vulnerabilities, including overcrowding, poor housing conditions, limited green and play space, and concerns related to walkability, safety, and cultural belonging.

4.1. R.Q. 1: what housing conditions do refugee children experience in resettlement?

Participating Zomi children in Tulsa lived in two housing contexts that shaped their daily environments. Three children lived in owner-occupied single-family homes in the X area (pseudonyms), typically with three to five bedrooms and greater indoor space for family activities. In contrast, six children lived in multi-family rental apartments in the Y and Z areas, where two- to three-bedroom units often accommodated larger households. Several units met common definitions of overcrowding, with six to seven individuals residing in two-bedroom apartments of approximately 870–900 sq. ft., and up to seven individuals in three-bedroom units of about 1,080 sq. ft. These conditions fall below recommended spatial standards. The U.S. Department of Housing and Urban Development defines unit square footage per person (USFPP) as a measure of crowding, with less than 165 sq. ft. per person considered overcrowded. (Blake et al., 2007). Newly resettled families were more likely to live in rental housing due to affordability and limited placement options. Survey responses and field observations also indicated fewer child-supportive amenities in these settings, including limited study space, indoor play areas, and access to nearby parks or recreation spaces. Overall, owner-occupied homes offered more space and flexibility, while rental apartments were more often characterized by crowding and fewer resources for children's daily well-being.

4.2. R.Q. 2: how do housing and neighborhood features shape children's everyday stress, recovery, and well-being?

Analysis of mothers' photovoice narratives generated 70 initial codes (30 at the home level and 31 at the neighborhood level), shown in Table Y(Appendix). Through consolidation and cross-case analysis (Table MA and MB: Appendix), these codes were organized into 15 analytic categories and synthesized into key themes (Appendix).

At the home level, three themes emerged: 1) housing safety, maintenance, and health risks; 2) spatial adequacy and crowding stress; and 3) daylight and visual comfort. At the neighborhood level, five themes were identified: 1) access to safe play and recreation; 2) pedestrian mobility and independent movement; 3) environmental quality and everyday infrastructure; 4) safety, surveillance, and social cohesion; and 5) cultural cohesion.

Although affordability and tenure insecurity were not directly depicted in photographs, they frequently appeared in participants'



Fig. 11. Photovoice from RM7 shows structural deficiencies in the rental apartment that affect children's physical well-being.

narratives and were often linked to temporary visa status. These conditions contributed to a sense of instability and reduced control over housing conditions, affecting both physical and mental well-being.

4.2.1. Home environment conditions trigger stress and trauma

4.2.1.1. Theme 1: spatial inadequacy, lack of privacy and dignity. This theme highlights issues related to room adequacy, crowding, privacy, and functional use of space. Mothers frequently reported insufficient room sizes, overcrowded kitchens, and limited bedroom space that made it difficult for children to study, rest, or engage in quiet activities. Six of the nine families lived in two-bedroom, one-bath units with four to six family members. These conditions fall below U.S. Department of Housing and Urban Development (HUD) healthy housing standards, which define overcrowding as more than two people per bedroom or <165 square feet per person (Blake et al., 2007).

Such cramped conditions increased family stress and reduced children's privacy and sense of safety. RM8 explained, "Our house is too small for our family, and this affected our children's health, but we cannot go bigger house, we do not have money...." Similarly, RM9 stated, "We have no choice but to select a house. It is better than nothing." Limited control over housing, often linked to financial constraints and visa limitations, reinforced feelings of powerlessness. Mothers also emphasize inadequate storage, lack of personal areas, and

constrained layouts that limit children's ability to control their immediate environment, undermining dignity and autonomy. Some mothers noted that these spatial conditions echoed earlier experiences during displacement, making it harder for children to feel settled and secure. In contrast, RM1, who owns her home and has citizenship, reported a more positive experience: "I am happy in this house because I have everything here."

4.2.1.2. Theme 2: indoor environmental quality. This theme includes natural light, visual and thermal comfort, and emotional attachment to space. Mothers emphasized daylight as important for children's calm, happiness, and focus, while dark interiors were associated with low mood and withdrawal. Air quality and temperature regulation were also major concerns. Many kitchens lacked exhaust fans, and bathrooms had little or no ventilation, leading to mold, moisture, and heat buildup.

RM6 and RM8 highlighted these problems in their photovoice narratives: "absence of a smoke fan in the kitchen; poor maintenance" and "broken bathroom, damaged kitchen cabinets, overcrowded kitchen" (RM7, Fig. 11). While most mothers described these deficits, RM3, who lived in an owner-occupied home, shared a contrasting experience, stating that she "likes the room with natural light," highlighting the psychological value of well-lit spaces.

Cold, dampness, and mold were among the most reported problems, reflecting both poor housing conditions and limited control over repairs.

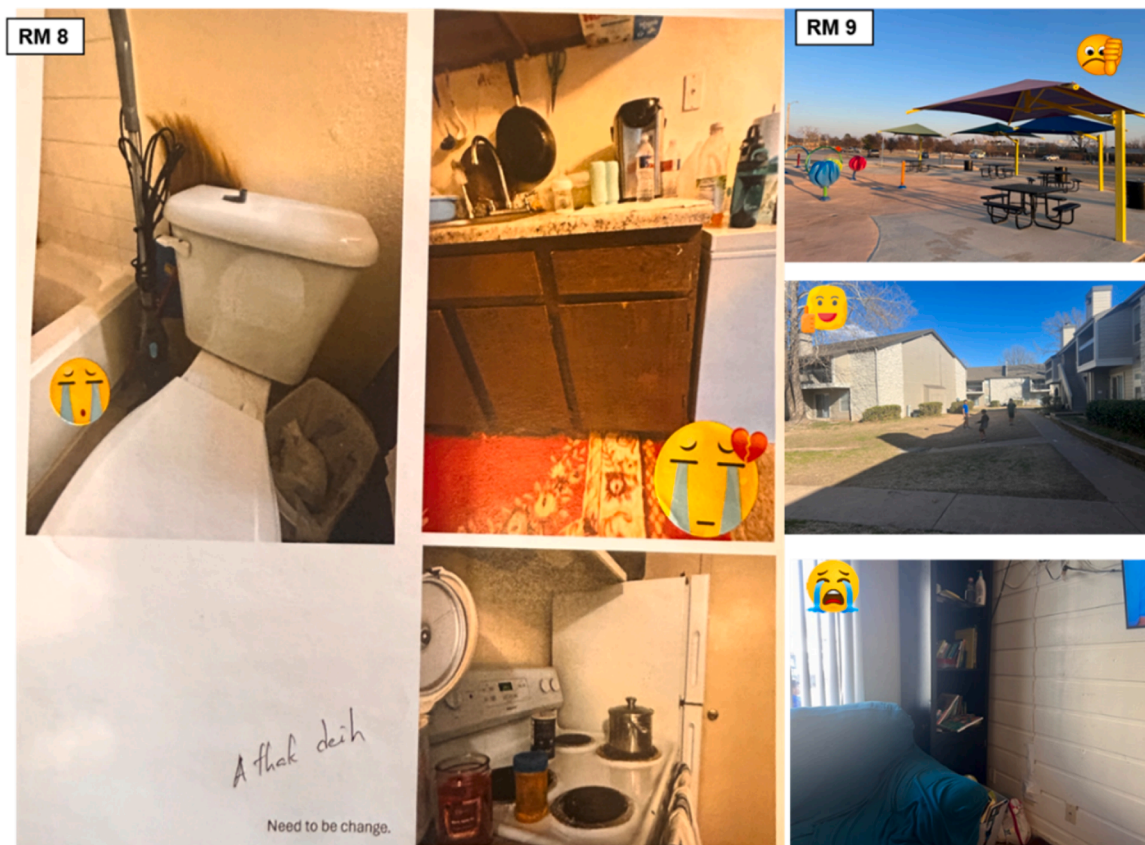


Fig. 12. RM8 and RM9 narrate about home and neighborhood conditions.

Mothers linked these issues to respiratory discomfort and chronic pain. As RM9 shared, “It is wet. It has moisture... most of the time we feel chronic pain, like the lower back on the foot and those kinds of things” (RM9, Fig. 11). Overall, light, ventilation, and spatial comfort functioned as important trauma-sensitive design elements that influence children’s well-being.

4.2.1.3. Theme 3: housing quality, maintenance, and hygiene. This theme combines concerns related to housing maintenance, indoor environmental quality, and everyday safety risks. Photovoice images frequently documented deteriorating conditions, including peeling paint, damaged cabinets, leaking ceilings, mold, pests, and broken fixtures. Mothers reported that although they contacted maintenance offices, repairs were often delayed or ineffective.

These conditions caused frustration and distress, especially for renters who had limited financial resources and little control over repairs. RM9 described: “*inadequate* room... peeling paint, damaged walls... unsafe electric socket... poor exhaust facilities in the kitchen.” Similarly, RM7’s reported “Water leaking at the base of the door... water leaks from the ceiling... lack of natural lighting.” Fig. 12). Interior materials and finishes such as carpets, vinyl flooring, and laminated counters were often poorly maintained, with ripped materials, mold, and exposed wiring observed in several units.

Bathrooms and kitchens were common problem areas, with broken fixtures and mildews posing hygiene and safety concerns. One mother noted, “A flak deih – need to be change,” indicating the need for immediate repairs. In some cases, mothers implemented improvised safety measures, such as taping exposed wires or restricting children’s movement near hazards. These constant precautions created ongoing stress and vigilance.

Overall, only two mothers expressed satisfaction with their housing conditions, while most reported concerns related to overcrowding, poor

maintenance, and safety hazards (Fig. 13). These living conditions restricted children’s ability to play, study, and feel secure, and in some cases reminded families of earlier displacement experiences. The findings highlight the importance of safe, well-maintained, and adequately sized housing environments to support refugee children’s recovery and development.

4.2.2. Neighborhood environment, facilities, and refugee children’s well-being and stress

4.2.2.1. Theme 1: lack of access to safe play and recreation. This theme highlights two connected issues: the availability of play spaces and children’s ability to use them safely. Play supported children’s daily well-being, yet it was often limited or unsafe. Seven mothers reported missing or poorly maintained playgrounds, parks, and outdoor areas, forcing children to play in parking lots, streets, or near traffic. Mothers described this as a constant concern and a reason children had less freedom to play independently. RM1’s “Need in our neighborhood” and RM6’s photo of a swing frame without swings (Fig. 14) illustrated neglected play spaces. RM1’s also wished for “a playground with rides... library... traffic lights... pedestrian safety,” reflecting a desire for safer daily routines and inclusion shaped by earlier restrictions in Malaysia (Fig. 15). Some mothers noted that children still hesitated to play outside after resettlement; one child said, “It still feels unsafe....”

A smaller number of photos showed supportive environments. For example, RM3 described private yards and quieter surroundings as supportive for children’s play and sense of stability (Fig. 15). In contrast, mothers in multifamily rental housing described narrow walkways, limited outdoor space, and heavy traffic that kept children indoors and increased screen time. Overall, traffic, limited trust in neighbors, and a lack of shared family spaces made outdoor play uncertain.

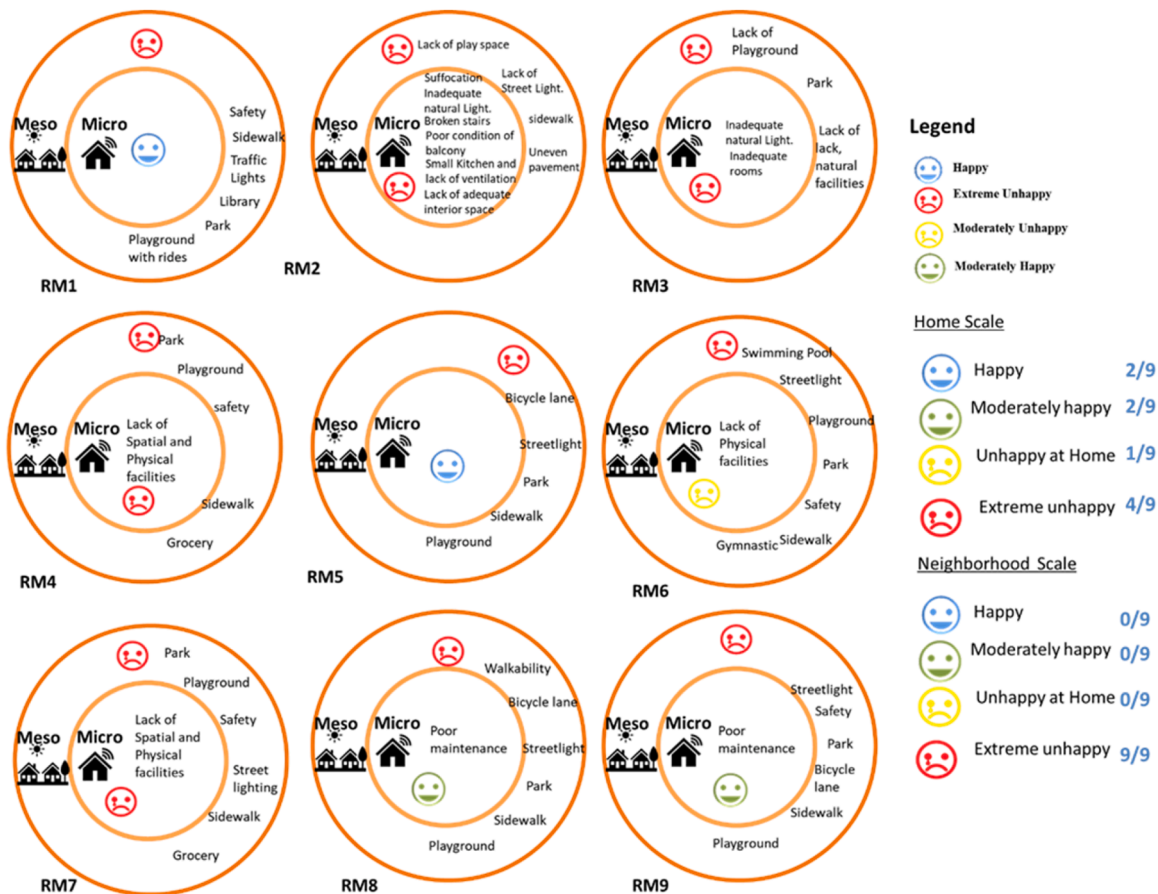


Fig. 13. Overall Refugee mothers' depiction of children's challenges in the home and neighborhood.

4.2.2.2. Theme 2: limited pedestrian mobility and independent movement.

This theme includes walkability, circulation, and children's autonomy in moving around the neighborhood. Seven mothers described barriers such as missing sidewalks, lack of bicycle paths, blocked walkways, poor lighting, and streets designed primarily for cars. Photographs frequently showed obstructed routes and unsafe street edges, including parked vehicles blocking narrow paths. RM5 explained, "I need space to walk out, but the car park blocks the way... We need a side for kids to walk and cycle," adding, "Need cycling area" (Fig. 16). RM6 similarly noted the "lack of sidewalks, streetlights, and neighborhood safety." In several cases, parked cars blocked exits or forced children to walk close to traffic. These conditions reduced children's independence and increased reliance on adults even for short distances, limiting access to parks, friends, and everyday activities.

For families with past experiences of insecurity in Malaysia, these conditions also revived earlier fears. Many mothers restricted outdoor movement due to concerns about accidents, abduction, or violence. RM8 explained, "The play space is open to the road... lack of streetlight." Mothers also noted gaps in neighborhood infrastructure, including limited green spaces and poorly connected bus stops, which further reduced safe mobility and children's participation in community life.

4.2.2.3. Theme 3: safety, surveillance. Neighborhood safety was one of the most emotionally charged concerns raised during photovoice discussions. Six mothers described worries related to lighting, surveillance, and neighborhood security. Participants pointed to missing streetlights, limited CCTV coverage, poor pedestrian infrastructure, and a lack of green spaces as factors that made neighborhoods feel unsafe, particularly in the evening.

One mother recalled witnessing *gun*-related activity near her

apartment, stating, "I was scared... I didn't let my kids out for many days." Such experiences heightened feelings of vulnerability, especially in unfamiliar communities where language and cultural barriers increased isolation. As a result, many families restricted children's outdoor activities, reducing opportunities for physical activity and social interaction. For these mothers, safety was not only physical but also linked to the need for predictability and stability in daily life after years of precarious housing conditions.

4.2.2.4. Theme 4: lack of access to community services and amenities.

Photovoice data also highlighted limited access to everyday services near participants' homes. Mothers frequently documented the absence of nearby grocery stores, libraries, laundry facilities, and child-oriented community spaces. Accessing these services often requires traveling longer distances, increasing caregiving demands for families with limited transportation.

Mothers described how these gaps disrupted daily routines and reduced opportunities for informal social interaction with other families. Several mothers noted that obtaining basic services required careful planning and constant supervision of children, contributing to emotional fatigue. As a result, neighborhoods were experienced less as supportive environments and more as places where limited services made everyday life more difficult during resettlement.

4.2.2.5. Theme 5: resourceful places and social connection. Photographs and narratives also revealed the absence of shared communal and culturally supportive spaces. Mothers reported few gathering places where families could meet, children could play safely, or trust could develop among neighbors. In one of the complexes, a small, shaded seating area near the playground existed, but mothers described it as

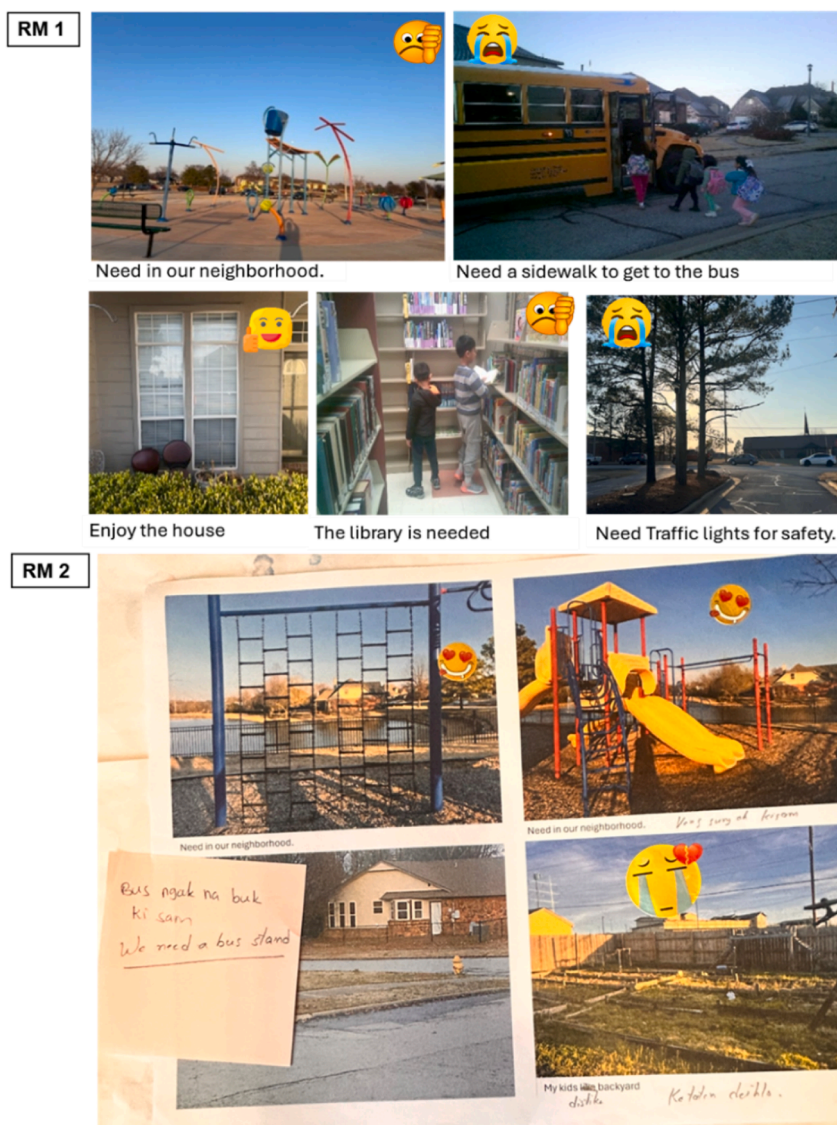


Fig. 14. RM1 and RM2 photos show their children's challenges on the neighborhood scale.

insufficient and rarely used due to the distance from homes and safety concerns.

Many mothers described neighborhood life as socially disconnected, with little cooperation among neighbors. Families in rental housing reported greater isolation and weaker informal support networks, which contributed to loneliness and emotional strain. In contrast, mothers living in owner-occupied homes reported modest social ties and greater confidence in their children's safety.

Religious spaces emerged as rare but valued sites of connection. For Zomi families, church gatherings provided opportunities for cultural continuity and social support. RM3 reflected during a church event: "In the United States, one can worship freely. There is no such thing as religious discrimination, persecution, or arrest." (Fig. 16). Mothers contrasted this with experiences in Myanmar, where religious practice could be restricted, and noted that spirituality and prayer had also helped them cope during their time in Malaysia. In the resettlement context, the church became one of the few places where families felt safe, welcomed, and connected.

4.3. RQ3: How do refugee children conceptualize safety, well-being, and "home" and neighborhood in their resettlement environments

Children's post-migration drawings and narratives generated 120 codes (65 home-related and 55 neighborhood-related), grouped into 25 categories and 20 subthemes (Table X and Figure Y - Appendix). Cross-case comparison synthesized these into five home-level themes and five neighborhood-level themes (Table Y- Appendix). Although codes recurred across cases, each instance was retained to reflect the relative prominence of spatial features across participants, consistent with qualitative cross-case analysis (Braun and Clarke, 2006; Saldaña and Omasta, 2016).

At the home scale, themes emphasized security and privacy, healing elements, stability and permanence, and cultural familiarity, with children highlighting personal space, natural light, and a stable environment that fosters belonging. At the neighborhood scale, themes focused on access to play and green spaces, mobility and accessibility, safety and community belonging, and social interaction in shared public spaces.

4.3.1. Home scale: spatial and functional facilities preferences

4.3.1.1. Theme 1: spatial adequacy, privacy, and comfort. Spatial quality

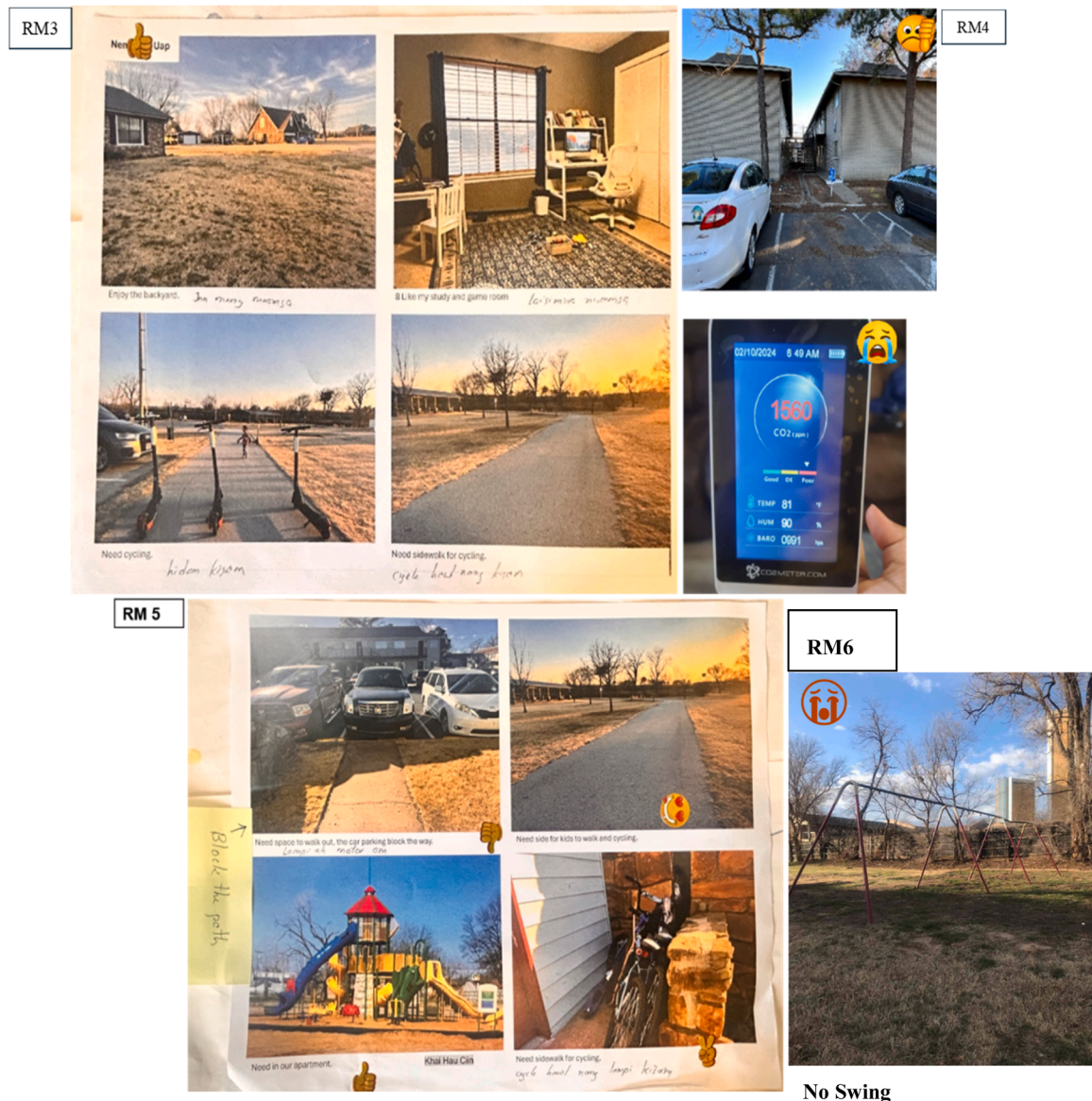


Fig. 15. RM3 – RM6 photos show their children's challenges on the neighborhood scale.

and privacy were central across children's dream housing drawings. Participants preferred single-family homes with adequate interior space, personal rooms, storage, garages, and manageable layouts. Children linked space with privacy, autonomy, and reduced stress from crowding. After years of sharing cramped rooms, having a "secret place" (RC8) or an "own room" (RC1-RC3, RC5, RC7-RC9) symbolized regained control over noise, personal boundaries, and emotional exposure. Retreating into private spaces was described not as avoidance but to relax and manage stress.

RC7 emphasized the importance of decorating her own room to express identity and comfort. RC4's request for "more electronics and knowledge space" reflected the value of learning and hobby areas for focus and positive distraction. Many drawings showed calm and orderly interiors, suggesting that predictability and organization support dignity and emotional safety. Children such as RC1-RC4 highlighted functional layouts for studying, storing belongings, and quiet time. RC3 also valued a spacious garage for organization and reduced stress.

Children also described the emotional burden of overcrowding and imagined larger homes to support everyday activities. RC8 imagined a three-story house with a balcony and garage as a symbol of stability rather than luxury. RC7 reflected on her experience:

"As a newcomer to Tulsa, I think it is fun to have a new experience. The school is completely different from what we have in Malaysia. The drawing is the kind of house I have always dreamed of. I know it's hard to find the perfect house of my dreams, due to our lack of money. But I hope that everything will come true".

4.3.1.2. Theme 2: daylight and visibility. Children's drawings also highlighted the importance of environmental quality in supporting emotional well-being. Eight children (RC1-RC8) included windows, daylight, glass rooms, or well-lit interiors in their designs. These elements were associated with comfort, safety, and emotional regulation. Large windows were especially significant, providing both daylight and a visual connection to the outdoors. One child noted, "Sunlight makes the space feel alive, and makes me feel alive." RC9's depiction of a "glass roof and windows" similarly reflected the desire for natural light and external views that promote calm and reduce stress. Access to daylight and natural elements aligns with trauma-informed design research linking environmental quality to reducing anxiety and improving well-being.



Freedom to Religion



Freedom to Religion

Fig. 16. Religious spaces within neighborhoods or in proximity contribute to mental well-being among refugee mothers and children by fostering a sense of peace, belonging, and spiritual connection.

4.3.1.3. Theme 3: housing form and cultural identity. Six children (RC1, RC2, RC3, RC5, RC7, RC9) drew familiar housing forms such as pitched roofs, detached houses, and multi-storied homes, often labeling them “my home.” These individualized houses represented independence and permanence, and were contrasted with negative views of apartments or shared housing.

Many drawings combined familiar details with U.S. housing forms, using bright colors, gardens, and decorative elements to maintain cultural continuity while adapting to a new environment. For example, RC3 included a toilet cabinet inspired by traditional Myanmar design.

Homes were drawn with clear layouts and visible entrances, including front doors, garages, and simple circulation patterns (RC1-RC3, RC5, RC7). Boundaries such as porches, balconies, stairs, garages, and fences appeared in seven cases. These elements functioned as protective transitions rather than restrictive barriers, offering safety while maintaining visibility and connection. Transitional features such as steps and entryways were often decorated with flowers or tiles, reinforcing pride and belonging. These design elements created clear transitions between private and public spaces and supported feelings of safety and control.

4.3.1.4. Theme 4: private outdoor space and retreat. Children frequently included small outdoor spaces connected to the home, such as a backyard, balconies, front yards, or gardens. Six children emphasized these domestic outdoor areas as spaces for play, relaxation, gardening, and family interaction. These spaces were viewed as safer and more controllable than public streets. Drawings often included swings, flowers, grass, and small gardens, highlighting outdoor space as a source of comfort, privacy, and sensory connection with nature. For many children, these spaces served as a protective middle zone between the home and the wider neighborhood. In this near-home environment, children could play, calm down, and connect with nature while remaining close to caregivers. As one child reflected, “I drew this because I wanted to tell people what it looks like and what the experience is from people around the world... and it’s way different.”

4.3.1.5. Theme 5: hygiene and maintenance. Safety and cleanliness also emerged as important themes. RC4 illustrated a single-family home labeled “New Housing,” with a backyard playground and flowers at the

- * Small and quiet neighbour hood
- * Neighbourhood Walmart near house
- * Nearbr houses for friends and family.
- * Playground in middle
- * Circular neighbourhood to make it easier to reach houses
- * I want two garages

Fig. 17. Information written by RC2 alongside their drawing.

entrance, symbolizing safety, nature, and organized play. The child wrote, “I don’t like the apartment because there are mice and ants,” expressing discomfort with current housing conditions and a desire for a clean, pest-free environment. The drawing also included “water pool,” reflecting a desire for joyful communal spaces. This drawing reveals the child’s clear sensitivity to environmental stressors and aspiration for a healthier, safer home.

4.3.2. Dream neighborhood facilities for wellbeing

4.3.2.1. Theme 1: play and recreation. The most frequently represented theme was the need for safe, accessible play areas. All nine children (9/9) included playgrounds, parks, or green spaces in their drawings. These spaces supported creativity, social interaction, and emotional recovery in unfamiliar environments. Participants described soccer fields, basketball courts, swimming pools, and backyard play areas as essential for health, peer bonding, and a sense of community.

RC5 emphasized backyard and pet-friendly environments linked to family life and emotional stability. RC3’s drawing of a “playground with surrounding road” illustrated how open spaces encouraged movement and reduced stress (Fig. 17). Many children also recalled limited or unsafe outdoor play during their time in Malaysia, describing play areas in their new neighborhood as symbols of freedom and connection. As RC3 explained: “I want a soccer field because I like playing soccer. I want a swimming pool because it’s hot in the summer. I want a



Fig. 18. RC1-RC5 perceptions towards their trauma-informed housing and neighborhood.

playground because I can play tag or hide-and-seek. The reason why I want a big house is that I have lots of rooms to go in and explore whenever I'm bored"

4.3.2.2. Theme 2: social connectivity and cultural continuity. Children's dream neighborhoods reflected a strong desire for belonging and trust. Nearly all children (8/9) emphasized living near family members, friends, or culturally familiar communities. Several children described

feeling disconnected in unfamiliar neighborhoods and imagined close-knit environments where neighbors shared language, religion, or background.

Drawings frequently depicted clustered homes, shared outdoor spaces, and gathering areas labeled "close to family and friends". These layouts suggested that belonging was experienced spatially through neighborhood design that supports interaction and familiarity. RC1 emphasized: "I drew my dream neighborhood like this because I want

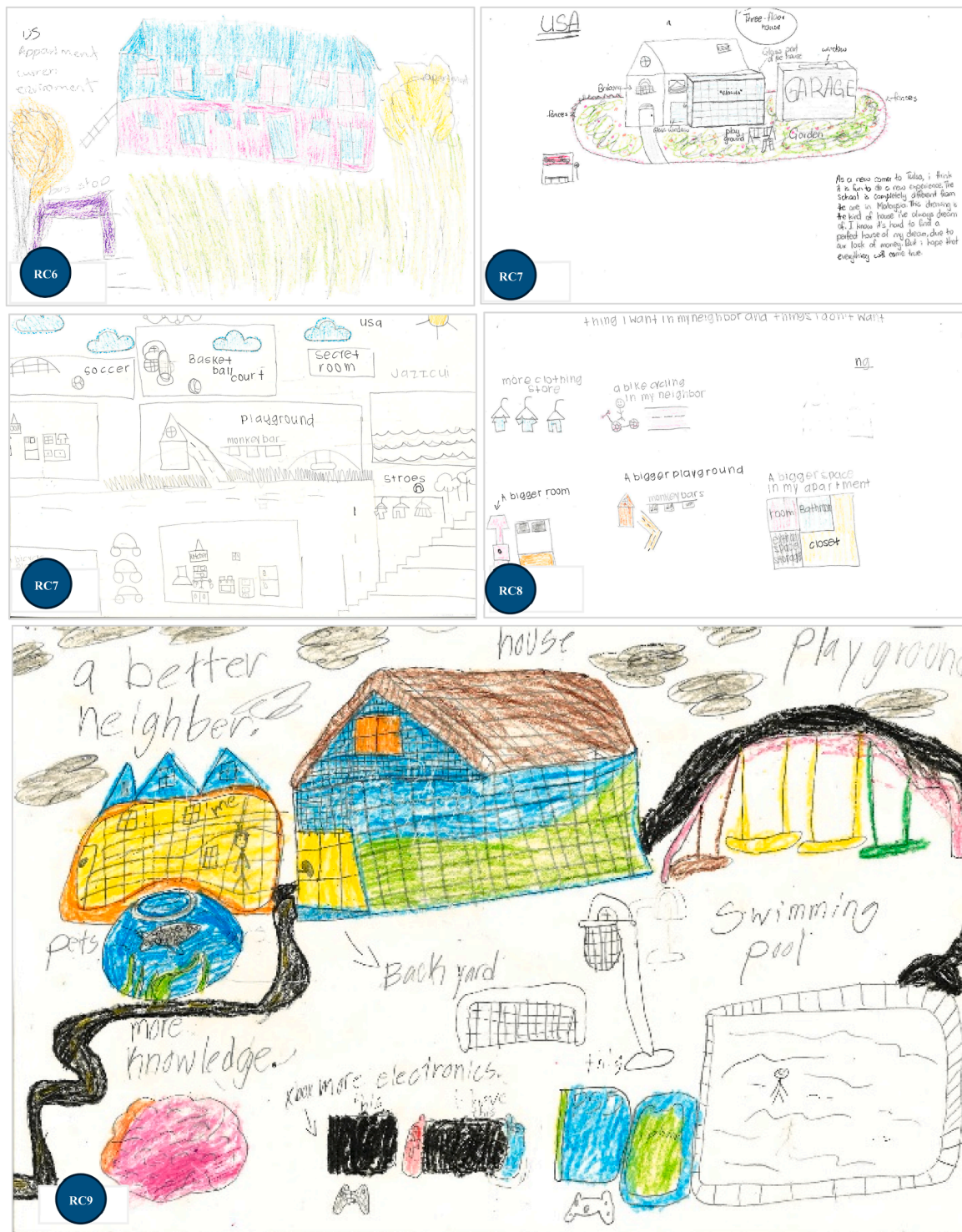


Fig. 19. RC6-RC9 illustrates their ideal home and neighborhood, where play areas, a spacious house with a garage, and green space are considered the most important.

my family and community to stay close by... I think being close to the people you love is important."

4.3.2.3. Theme 3: mobility, walkability, and layout. Six children emphasized walkability and neighborhood organization. Their drawings included sidewalks, bike paths, and clearly connected roads linking homes to schools, shops, and play areas. Grid-like (RC1) or circular (RC2) layouts were often used to create predictable routes and manageable distances (Fig. 18).

Safety remained central to these designs. Children included fences, lighting, and nearby trusted neighbors (RC7, RC8) to enhance security. Clear sightlines and accessible paths were viewed as important for reducing anxiety and supporting independent movement.

4.3.2.4. Theme 4: proximity to services. Children also emphasized the importance of living close to everyday services. Six of nine children included grocery stores, bus stops, shops, and community spaces within walking distance of home. Proximity reduced travel barriers, simplified

Table 1
Drivers of Trauma, Anxiety, and Depression.

Drivers of Trauma	Aspects/issues	Dimensions	Stress Identifiers		Stress Survivors	Overall Aspect-wise Stress areas	Overall Aspect-wise Stress Level High (12–18 (≥ 67%) Moderate (6–11 (34%– 66%) Low (1–5 (≤ 33%)
			Children (ID)	Mother's (ID)			
Home	Space & Layout	Inadequate bedrooms, a small kitchen, and a lack of family space. Big house, three-floor house, large house,	RC1, RC2, RC3, RC8, RC9	RM3, RM7, RM9, RM1, RM5	Children + Family	Physical and Psychological Stress	High
	Clean & Functional Interiors	Mice, ants, mold, trash, Water leaks (ceilings, doors), broken kitchen/toilet cabinets, poor maintenance. Kitchen, garage, broken bathroom/kitchen, damaged walls/cabinets, peeling paint, Absence of a smoke fan in the kitchen, and door leaks.	RC3, RC7, RC8, RC9	RM5, RM7, RM8, RM9, RM3, RM1	Children + Family	Physical Stress	High
	Privacy and Safety	Room separation, secret/private zones	RC7, RC8, RC9	RM4, RM9, RM7, RM6	Children + Family	Physical and Psychological Stress	Moderate
	Light & ventilation	Adequate windows, natural light, windows with blue views, lack of natural lighting, and poor lighting	RC1, RC2, RC3, RC8, RC9	RM3, RM7, RM9, RM1, RM5	Children + Family	Physical and Psychological Stress	High
	Safety & Health Risks	Unsafe electric sockets, broken stairs, poor balcony conditions, and broken doors	No	RM7, RM9	Children + Family	Physical and Psychological Stress	Low
	Household Facilities & Utilities	Absence of laundry space, poor kitchen exhaust system	No	RM6	Family	Physical Stress	Low
	Family & Social Connection	House for extended families	RC1, RC3, RC6	RM1, RM2	Children + Family	Psychological Stress	Moderate
Neighborhood	Play & Recreation Spaces	Playground, swing, soccer field, basketball court, monkey bars, absence of playground/parks	All	All	Children + Family	Physical and Psychological Stress	High
	Nature & Green Space	Trees, green space, garden, plants, backyard, lack of trees/green space	RC1, RC2, RC3, RC4, RC5, RC7	RM5, RM6, RM7, RM8, RM9	Children + Family	Physical and Psychological Stress	High
	Community & Social Space	Outdoor Learning Space, Community Park, picnic/gathering areas, stores, family gathering spaces	RC1, RC2, RC3, RC4, RC9	RM1, RM3, RM5	Children + Family	Psychological Stress	Moderate
	Accessibility and Mobility	Clear roads, sidewalks, fences, bicycle place/road, blocked paths	RC2, RC3, RC6, RC8	RM3, RM5, RM6, RM7, RM8, RM9	Children + Family	Physical Stress	High
	Safety and Security	Street lighting needed, lack of CCTV, open play space exposed to the roads, traffic light for safety, Sightline, Visibility	RC1, RC3, RC9	RM1, RM2, RM3, RM6, RM7, RM8, RM9	Children + Family	Physical and Psychological Stress	High
	Sensory	Noise	RC3	None	Children	Physical and Psychological Stress	Low
	Public Amenities	Swimming pool, Jacuzzi, bus stop, laundry space, library, grocery shops	RC1, RC2, RC4, RC5, RC6, RC9	RM1, RM2, RM6, RM8	Children + Family	Physical and Psychological Stress	High
	Cultural & Social Belonging	Proximity to friends/family, lack of cultural cooperation	RC2, RC3	RM3, RM6, RM9	Children + Family	Psychological Stress	Moderate

daily routines, and helped families access essential resources. RC2's "My Dream Neighborhood" drawing showed a circular layout with a central green space and nearby amenities, reflecting a vision of efficient and supportive neighborhood design. RC2 explained: "When we came here, we did not have a car. We had to walk a lot to go shopping. I want Walmart near my home, so my mom does not get tired. "This statement illustrates children's awareness of family challenges and their desire for spatial arrangements that support everyday care and accessibility.

4.3.2.5. Theme 5: biophilia and greenery. Greenery appeared in nearly all drawings (8 of 9 children). Trees, bushes, flowers, and bushes were often placed around homes and along streets to create calm, welcoming environments. Instead of hard barriers, children used vegetation as soft boundaries that offered both privacy and visibility. These natural

elements supported sensory comfort and predictability while maintaining social connection. RC1 described wanting large trees and bushes around each house, while RC6 imagined a garden that would create protection and pride. RC9 explained: "I drew this because I wanted to tell people what it looks like and what the experience is from people around the world." (Fig. 19)

Across drawings, greenery functioned as a biophilic design element that enhanced safety, comfort, and emotional regulation in children's imagined neighborhoods.

4.4. RQ4: How insights from children's drawings and caregiver photovoice inform trauma-informed housing and neighborhood design

Integrating children's drawings and narratives with mothers'

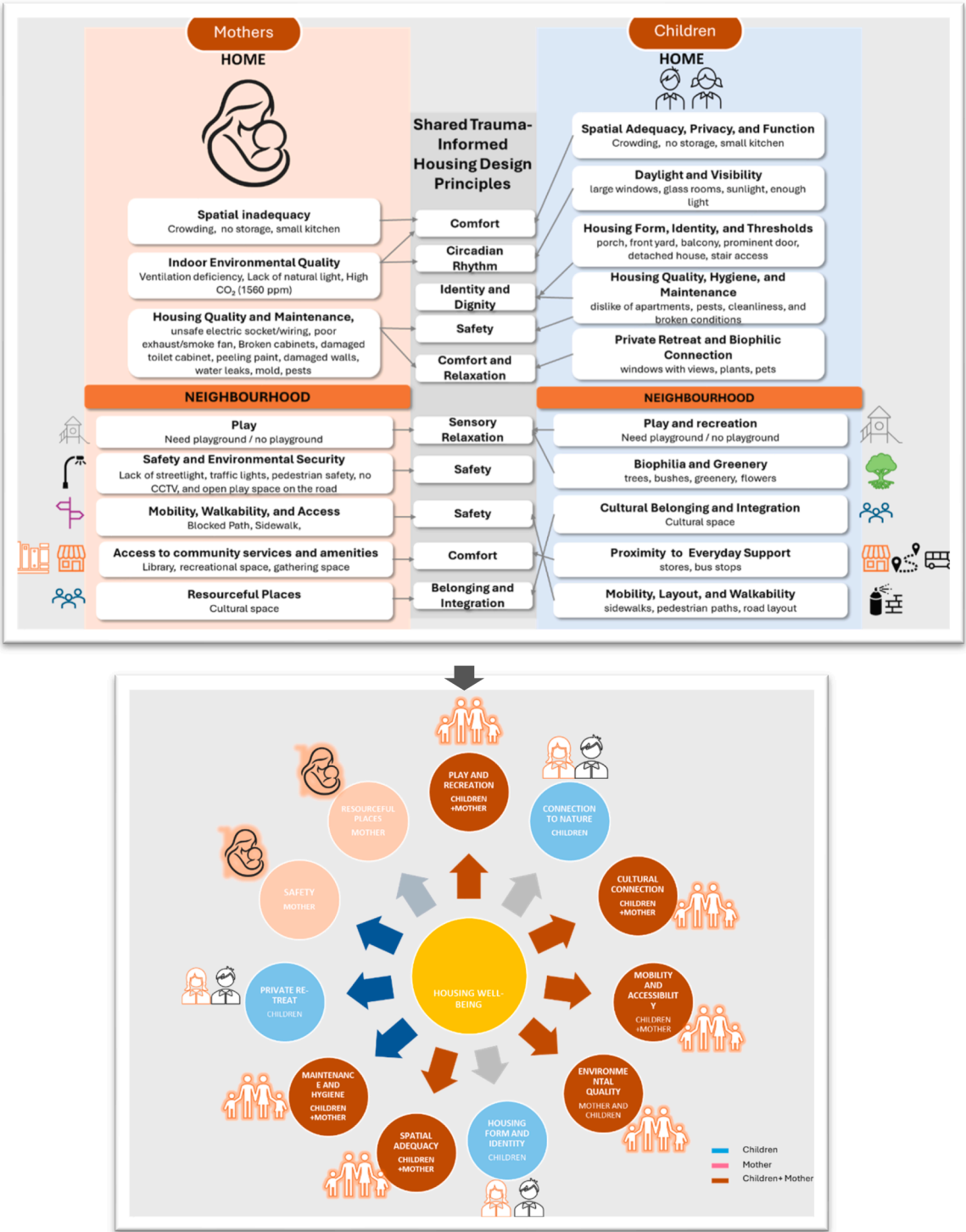


Fig. 20. Children's Perception towards an informed home and neighborhood.

photovoice shows that refugee children’s well-being is shaped by both past displacement experiences and current housing neighborhood conditions in Tulsa (Appendix 3 and Appendix 4). Together, the datasets illustrate how everyday environments can either sustain or reduce trauma at both home and neighborhood scales.

At the home level, major stressors included overcrowding, deteriorated interiors, lack of privacy, and unsafe structures, which were rated as high to very high stress by both children (RC) and mothers (RM). Children consistently envision spacious, well-lit homes with open layouts, reflecting SAMHSA’s trauma-informed principles of

empowerment, voice, and choice. Poor indoor conditions, such as mold, pests, broken fixtures, and unsafe wiring, were linked to high stress, shame, and discomfort, reinforcing findings from POAH’s TID framework that environmental neglect can hinder recovery. In contrast, well-maintained homes with access to gardens or natural elements were associated with lower stress and supported SAMHSA’s principles of safety, comfort, and dignity. Privacy, particularly having a personal room, was also important. For example, RC7 described how private space supported emotional grounding, ownership, and trust. Mothers also emphasized the burden of unsafe housing conditions and missing

household infrastructure, such as laundry areas and kitchen ventilation. Cultural belonging and proximity to extended family were also important, with supportive social networks contributing to resilience.

At the neighborhood level, major stressors included the absence of safe play areas, limited green space, poor walkability, unsafe streets, weak neighborhood infrastructure, and a lack of shared community spaces. Children emphasized the need for playgrounds, trees, and safe outdoor environments for play, while mothers highlighted blocked sidewalks, traffic exposure, and limited public amenities. Restricted access to everyday services and culturally familiar spaces further increased stress, particularly for families relying on collective social support. These conditions undermined SAMHSA's trauma-informed principles, such as trust, connection, collaboration, and identity (Brisson et al., 2025), Table 1.

Overall, integrating children's and mother's perspectives shows that trauma-informed housing and neighborhood design must address both material safety and everyday lived experience. Children emphasized private retreat, housing identity, and access to nature, while mothers stressed safety and access to supportive community spaces. Both groups highlighted shared priorities including spatial adequacy, maintenance and hygiene, environmental quality, mobility and accessibility, cultural belonging, and safe play environments. Together, these findings demonstrate that TID must support dignity, emotional stability, and healthy development across both home and neighborhood environments (Fig. 20).

5. Discussion

This study examined the social context elements that support the well-being of children from refugee families through a participatory approach. The findings align with UNICEF's framing of child well-being by linking children's lived experiences to the broader structural conditions shaping daily life, consistent with socioecological perspectives. Across the dataset, neighborhood conditions most strongly shaped day-to-day well-being through play, social connection, safety, and access to nature, while housing conditions most strongly supported pride, dignity, comfort, and emotional security. Building on these results, we propose a modified ecological model that translates these insights into trauma-informed design guidance for refugee housing and neighborhood contexts, drawing on the concept of nested spaces to emphasize how interconnected home and neighborhood environments collectively shape children's everyday experiences of safety and well-being.

5.1. Theoretical implications

Using Bronfenbrenner's ecological systems theory (Bronfenbrenner, 1986), the findings show that refugee children's stress and well-being are shaped most strongly within the microsystem, particularly the home, and are amplified or buffered by neighborhood conditions through mesosystem connections. Children identified family ties, nature, religious practice, and community networks as key sources of resilience, while mothers emphasized housing disrepair, hazards, and fear of injury. Together, these perspectives reveal how everyday pressures operate across scales. Participants frequently contrasted these experiences with life in Malaysia, where limited access to natural spaces and threats to identity heightened vulnerability. Displacement, therefore, reshapes survival strategies as families adapt cultural and spiritual resources while negotiating identity and belonging in new environments.

At the home scale, safety and privacy emerged as central mechanisms shaping daily stress. Overcrowding combined with limited control over space reduces children's ability to rest, concentrate, and regulate emotions. Mother's described constant vigilance due to hazards such as exposed wiring, unsafe stairs, leaks, pests, and unresolved maintenance issues. Children expressed a strong desire for personal rooms, quiet corners, and "secret spaces," reflecting needs for privacy, dignity, and

emotional regulation rather than luxury. These findings align with trauma-informed design principles emphasizing safety, empowerment, and predictability, suggesting that hazard reduction, maintenance, and usable privacy are fundamental requirements for refugee well-being.

At the mesosystem level, the relationship between home and neighborhood was critical. When neighborhoods lack safe *play spaces, parks, and recreational spaces*, these functions shift into the home, creating role overlap and tension in already crowded units. This spillover effect increased stress for both children and mothers. Conversely, access to safe play areas and green spaces supported emotional regulation, peer interaction, and daily routines also highlighted in the past study (Trauma-Informed Design Society, 2022). This spillover effect increased stress for both children and mothers. Conversely, access to safe play areas and green spaces supported emotional regulation, peer interaction, and daily routines. These findings contrast with participants' experiences in Malaysia, where restricted access to outdoor spaces intensified feelings of confinement. Natural environments also supported cultural continuity, as families connected green spaces with memories and traditional practices.

Belonging and cultural identity emerged at the intersection of the microsystem and mesosystem. Children consistently framed well-being through proximity to family members, trusted adults, and friends. Close kinship networks provide emotional security, practical support, and a sense of belonging, particularly after displacement disrupted family connections in Malaysia. Rebuilding those networks in the U.S. helped restore predictability and social regulation (Silove et al., 1997). Children's drawings also reflected elements of social cohesion, including social relationships, connectedness, and confidence that neighborhoods support everyday life (Schiefer and Van der Noll, 2017). Previous studies similarly show that cohesive neighborhoods improve life satisfaction and buffer mental health risk among children facing material hardship (McDonnell and Sianko, 2021; Cheng et al., 2024).

Community networks also played a critical role in resettlement. In the U.S., refugee organizations, cultural associations, and supportive neighbors helped reduce isolation and facilitate integration. In contrast, legal restrictions and discrimination in Malaysia often weakened community ties. Zomi families in Tulsa still face overcrowding, marginalization, and housing instability similar to those in refugee communities in Canada and Germany. As Ager and Strang (2008) argue, integration depends not only on refugees' efforts but also on the inclusivity of host communities. Religious institutions also functioned as important community anchors, supporting emotional resilience and social connection. Refugees frequently described faith practices as helping relieve stress and rebuild dignity during resettlement (Bokore et al., 2023).

Predictability refers mobility, neighborhood organization, and access to everyday services, which further shaped well-being by supporting predictability and autonomy. Continuous sidewalks, clear routes, and organized street layouts reduced perceived risk and mental strain, while poor lighting, broken sidewalks, and confusing circulation limited participation in daily life align with (Skiendzielewski et al., 2022). Trauma-informed perspectives define safety not only as the absence of harm but also as the presence of environments that feel understandable and manageable (Lynch et al., 2025).

Community anchors such as libraries, community centers, and places of worship supported routine, learning, and social connection, also highlighted in past research (Ives and Sinha, 2010). Evidence shows that resource-rich neighborhoods strengthen stability and protect children's well-being during resettlement (Burenby Yxne et al., 2025). These findings demonstrate that trauma is not only psychological but also spatially embedded, and that housing and neighborhood design can actively support recovery.

Finally, children's narratives highlight the importance of material resources and socioeconomic conditions. Prior research shows that poverty and inequality negatively affect children's health, well-being, and development (Whittaker, 2025; Beltramo et al., 2023). Participants also described challenges navigating unfamiliar systems and

Trauma-Informed Housing Design Model for Refugee Children

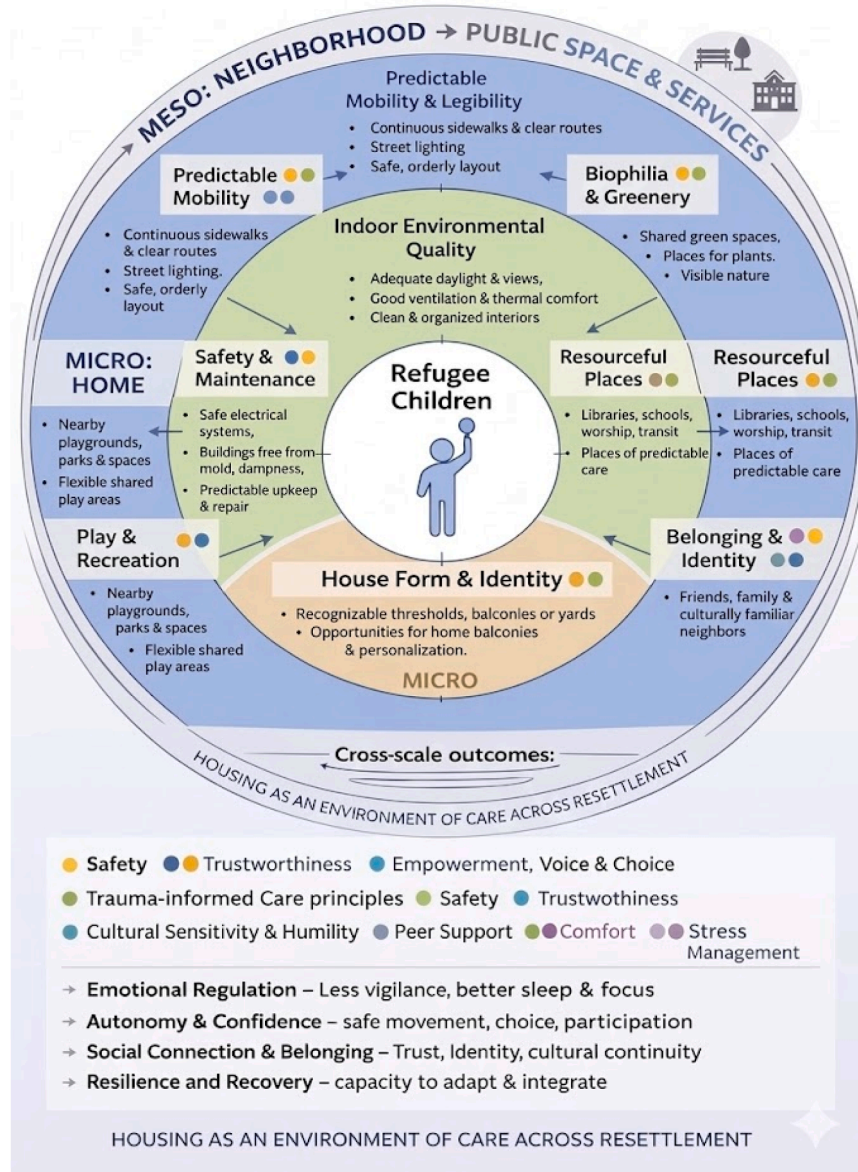


Fig. 21. (A) Mothers' and (B) children's perceptions of challenges at home and neighborhood levels, and (c) Shared perceptions of challenges at home and neighborhood levels.

limited opportunities to build skills and confidence in their neighborhoods. These findings align with the WHO concept of capacity building, which emphasizes strengthening both individual capabilities and collective conditions that influence health (World Health Organization, 1997).

5.2. Policy implications for refugee housing and child well-being

The U.S. resettlement process often treats housing as a logistical step rather than a critical determinant of children's recovery and development. Placement decisions frequently prioritize speed, cost, and availability, which can result in overcrowded units and neighborhoods that limit safe movement, play, and social connection. In such environments, stress from past displacement is reinforced through daily living conditions.

Housing dissatisfaction, therefore, reflects not only physical conditions but also limited mobility, weak neighborhood connections, and restricted access to supportive environments. When safe play areas, clear pedestrian routes, and community anchors are absent, children remain indoors, and household stress increases. Yes, current policies rarely monitor housing quality, neighborhood safety, or child well-being after placement (Timmer, 2024).

Housing should be treated as an ongoing condition of resettlement rather than a one-time placement decision. This requires stronger coordination among resettlement agencies, housing providers, and local governments, as highlighted in the past research (Zucker, 1983). Integrating trauma-informed and child-centered criteria into housing placement, neighborhood assessment, and post-resettlement monitoring could reduce exposure to harmful conditions and better support long-term recovery and integration. These findings also highlight the



Fig. 22. Trauma -informed housing design model for refugee children.

importance of child-centered participation in housing policy and planning. Children can meaningfully communicate trauma and aspirations through drawings and storytelling (Corrado, 2025), offering valuable insights for housing and neighborhood environments.

5.3. Implications for trauma-informed housing and neighborhood design

This study provides practical insights for trauma-informed housing and neighborhood design by centering refugee children's voices through participatory visual methods. TID should move beyond safety compliance or aesthetic improvements to actively support healing, dignity, and belonging.

Future housing and urban policies must therefore move beyond adult-centered frameworks and incorporate children's spatial experience and design aspirations. Based on the findings. This study proposes a trauma-informed housing design model (Fig. 21, Fig. 22) that integrates home- and neighborhood-scale design strategies. The model positions refugee children at the center and links spatial adequacy, environmental quality, safety, mobility, play, and social belonging to trauma-informed care principles (SAMHSA, 2014). These interconnected design domains

create cross-scale pathways that support emotional regulation, autonomy, social connection, and long-term recovery during resettlement.

Key Design recommendations include:

- Design Homes that Prioritize Safety and Comfort in Space

Eliminate hazards (e.g., mold, exposed wiring), provide adequate space and daylight, and incorporate biophilic features like plants and gardens. These reduce sensory stress and enhance comfort, dignity, and mental health.

- Ensure Privacy and Promote Ownership

Include private rooms or semi-private spaces for children. This fosters autonomy, emotional regulation, and a sense of control, key aspects of trauma recovery.

- Create Walkable, Playable, and Green Neighborhoods

Integrate sidewalks, safe crossings, and play infrastructure within

walking distance. These enable autonomy, movement, and social interaction, critical for psychosocial development.

- Embed Cultural Belonginess

Incorporate multipurpose community rooms, outdoor gathering areas, and design elements reflecting cultural familiarity. These promote collective resilience and a sense of identity.

- Engage Children and Caregivers in Design and Policy

Use participatory tools such as drawings and photovoice to inform refugee housing design. This ensures that environments reflect lived experience and local needs rather than top-down assumptions.

6. Strengths, limitations, and future research agendas

6.1. Strength

This study has several strengths. First, it foregrounds refugee children lived experiences through participatory methods that allow children to communicate meaning through drawings and narrated explanations. This approach treats children as knowledge holders and makes visible the sensory, relational, and spatial qualities that shape everyday wellbeing. Second, integrating children's drawings with caregiver photovoice, including the use of emojis as a trauma-sensitive communication tool, strengthens credibility through triangulation also aligned with community-based participatory research (CBPR), like other studies (Bokore et al., 2023). Third, the cross-scale design (home and neighborhood) supports an ecological understanding of stress by showing how daily routines, mobility, play, and social connection are shaped within immediate settings and by links between settings. Finally, the findings advance trauma-informed design by translating principles such as safety, predictability, dignity, control, and connection into concrete design priorities identified by families.

6.2. Limitations

Several limitations should be noted. The sample is small and drawn from one resettled community in a single city, so the goal is analytic transferability rather than *statistical generalization*. Children's drawings may also vary by age, drawing confidence, and comfort discussing sensitive experiences, which can shape what is shown or left out. In

addition, the study focuses on perceived stress, safety, and well-being rather than *clinical diagnosis*, so implications should be framed in terms of *trauma-related stress* processes rather than *diagnostic claims*. Finally, the study is cross-sectional and cannot capture how housing and neighborhood conditions shape mental health trajectories over time. One limitation of this study is the variation in participants' legal status, including access to U.S. citizenship. Legal status may confound housing and mental health outcomes by influencing safety, stability, and access to resources. Because this factor was not controlled, findings should be interpreted with caution, and *future research should account for legal status*.

6.3. Future research agenda

Future research should follow families longitudinally to examine how changes in housing quality, crowding, privacy, mobility, and neighborhood safety influence emotional settling, belonging, school engagement, and resilience. Mixed methods studies could combine participatory data with indoor environmental measures, including air quality, temperature, noise, and lighting, to strengthen design guidance. Comparative work across housing types and resettlement neighborhoods would clarify which environmental conditions most strongly buffer stress. Finally, intervention studies are needed to test trauma-informed upgrades such as maintenance and repair, improved lighting and ventilation, privacy supports, safe play access, walkable routes, and culturally welcoming community spaces, and to evaluate which actions produce meaningful improvements in daily wellbeing.

7. Conclusion

The study provides empirical evidence that trauma-informed and child-friendly built environments are critical to the well-being of refugee children. Addressing deficiencies in home and neighborhood environments through trauma-informed design and policy reform can enhance resilience, reduce stress, and support the long-term integration of refugee families. Future research should explore interventions that bridge trauma-informed architecture with resettlement policies, ensuring that built environments contribute positively to the social, emotional, and cognitive development of refugee children. Prioritizing safety, walkability, and cultural attachment in urban planning can foster inclusive and supportive communities that facilitate long-term stability for refugee populations.



Ethics statement

The authors ensure that this study was performed in compliance with relevant laws and institutional guidelines. This study was approved by the University of Oklahoma's institutional review board approval (IRB # 16,394).

CRedit authorship contribution statement

Salma Akter: Writing – review & editing, Writing – original draft, Visualization, Validation, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Suchismita Bhattacharjee:** Writing – review & editing, Validation, Methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

We are indebted to Zomi Children and their mothers for their valuable time and feedback during the study. We also thank the cultural liaison and the first contact person who helped us get the connection. We extend our sincere gratitude to the respected reviewers for their constructive and thoughtful comments, which were instrumental in making this research publishable.

This study is supported by the Gibbs Design Activism Award (2023–2024), University of Oklahoma, to conduct the fieldwork.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.wss.2026.100384](https://doi.org/10.1016/j.wss.2026.100384).

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