

Examining Dwelling Interior Conditions for Informal Settlement Upgrading Along the Mae Kha Canal, Chiang Mai

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Abstract

This article delves into the internal features of habitat in slum-like informal settlements, focusing on the challenges faced by the locale in the Mae Kha Canal informal settlements in Chiang Mai, Thailand. The study aims to clarify the dwelling characteristics as well as understand the interplay between housing and the living circumstances of the occupants. A mixed-methods approach was utilised, primarily employing field surveys, house investigation including arrangement and utilisation of space, and in-depth interviews with residents. A total of 80 households were sampled and analysed. The findings reveal that the previous relocation plans made by local authorities, which offered only a single room per family as a one-size-fits-all strategy, are not suitable for the current inhabitants' living conditions. Consequently, this article concludes with alternate suggestions for the forthcoming practical Mae Kha Canal Housing Upgrade project. It emphasises the potential of applying the idea of interiority to examine the distinctive interior conditions, thereby contributing to better dwelling design for the locals.

Keywords: housing and slum upgrading, dwelling, room arrangement and layout, inhabitant conditions, informal settlements

Introduction

In present-day urbanisation, the phenomenon of low-income individuals migrating to major cities in pursuit of better opportunities, employment, and infrastructures under a secure capitalist system is prevalent (Fuchs, 1994; Padawangi, 2019). However, whereas urbanisation may offer possibilities, it also poses challenges for migrants and cities. Individuals facing economic disadvantages in several developing countries consistently encounter social inequality due to spatial constraints in urban areas, combined with ineffective governance and urban planning (Mahabir et al., 2016). Consequently, they are compelled to squat and reside in slum-like informal settlements, characterised by overcrowding and substandard living conditions (Davis, 2006; UN-Habitat, 2003).

To address the issues of slums, world organisations such as the United Nations Human Settlement Programme (UN-Habitat) and local governments in each country adopt a range of strategies, including methods like eradication, forced eviction, relocation of low-income families to a different location, and the provision of affordable housing and services in other places (UN-Habitat, 2015). Similarly, in Thailand, especially in Bangkok and several cities across Asia, the common approach to reducing urban slums is displacement and eviction (Viratkapan & Perera, 2006). The implementation of relocation projects, followed by the displacement of households into standardised housing, may offer potential benefits to the government in terms of time and cost savings. However, those governments' decisions have been carried out without conducting a comprehensive analysis of the inhabitants and disregarding the collection of their perspectives or their involvement in the decision-making process. Several academic studies have argued that eviction and relocation initiatives are the primary cause of residents' loss of original social, cultural, livelihood, and community connections (Dan & Shiozaki, 2011; Meidwinna, 2019; Sattayakorn et al., 2023). In addition, the United Nations' (UN) Cities Alliance (2021) asserts that each slum possesses its distinctive characteristics. Therefore, it is crucial to have a comprehensive understanding of the unique circumstances and challenges present in that specific context, including the active participation of inhabitants in decision-making and design processes before improving conditions within each slum (Gooding, 2016; Killemsetty et al., 2022; Rigon, 2022; Wekesa et al., 2011; Yang & van Oostrum, 2020).

This article presents a case study of urban informal settlements in Chiang Mai, situated along the Mae Kha Canal. Local authorities had proposed a plan to relocate the residents to high-rise affordable

housing units designed to be one-size-fits-all and located a considerable distance from the original site. At the same time, the dwellers strongly prefer for living close to the city centre since it provides them with convenient access to their workplace (Ribeiro & Srisuwan, 2005; Srisuwan, 2005). To get a thorough grasp of the housing circumstances, this article adapts the interiority concept to investigate the dwellings as internal conditions of low-income informal housing in the designated study areas.

Various techniques to study the interior condition, by analysing the nature of inhabitants, examining living space territories, and observing user behaviours, can be used to determine inhabitants' perceptions and utilisation of space and their ability to reconfigure and fully understand the arrangement of rooms. These techniques have been applied to low-income households and residents in high-density areas (Aryani & Jen-Tu, 2020; Bruyns, 2018; Paramita & Schneider, 2018). Eventually, the studies can shed light on the users' preferences and provide an opportunity to challenge and indicate alternate strategies for managing the local area to relevant authorities in the context of contemporary urbanisation (Atmodiwirjo & Yatmo, 2022; Bruyns, 2018). By adopting the aforementioned concepts and methods, this research clarifies the inhabitants' dwelling characteristics while understanding the interplay between housing, socioeconomic, and socio-cultural aspects of those living in the Mae Kha Canal's informal settlements, with the intention of promoting fairness and reducing government bias using critical housing analysis. This study aims to make a scholarly contribution to the practical projects focusing on upgrading slums and housing in this specific context. The findings will serve as a fundamental reference for architects and urban planners involved in policy development for forthcoming redevelopment projects in Chiang Mai.

The Informal Settlements Along the Mae Kha Canal in Chiang Mai

Background of informal settlements

Chiang Mai is a renowned ancient city founded in 1296 by King Mangrai, which holds a wealth of cultural and historical significance in Thailand (Ongsakul, 2005). The city has flourished as a prominent centre for commercial, educational, and healthcare activities while also being a historic and natural tourism destination in the country's northern region. Like other global hubs, Chiang Mai city has experienced exponential growth due to its status as a key economic portal in the region. However, rapid urbanisation and modernisation have transformed the city's agricultural society into one based on capitalist economic pursuits (Wang et al., 2022). As a consequence

of such factors, the city emerged as an intersection for the working class, attracting low-income rural labourers to the city in search of jobs around the city centre (Figure 1).

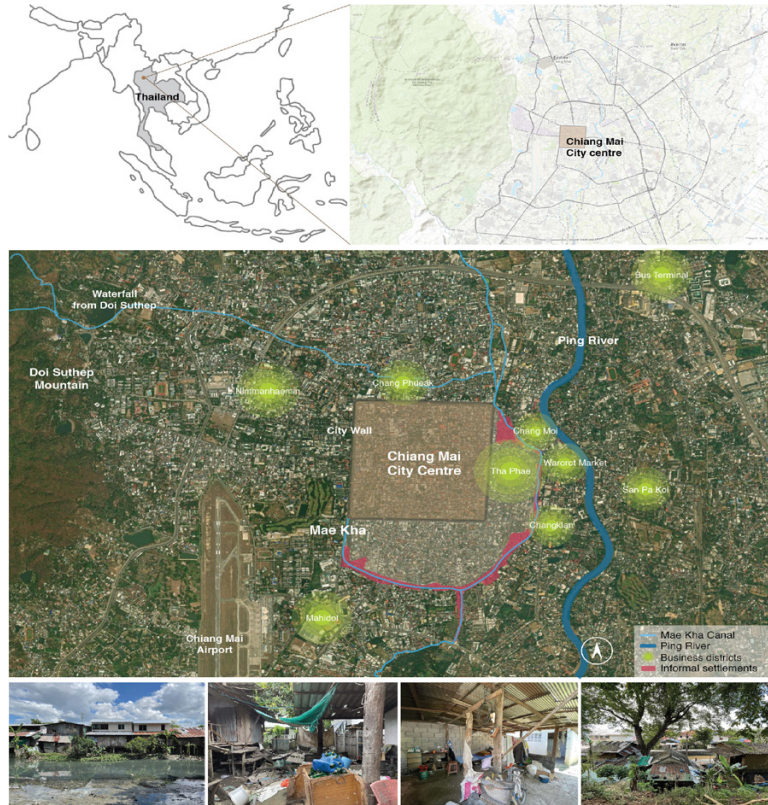


Figure 1
Location of the informal settlements in Chiang Mai City (top, middle) and the condition of the informal settlements along the Mae Kha Canal (bottom) (Images and photographs by authors)

As shown in Figure 1, the business sectors around the vicinity of the city centre are densely populated and have become an attraction for low-income migrants from rural areas and other cities in Thailand who come to seek job opportunities in these areas (Charoenmuang, 2007; Guntamueanglee, 2022). In light of inadequate urban areas, the migrants resorted to squatting along the Mae Kha canal and the city's outer wall as their living arrangements (Satayanuruk, 1999). During the period of squatting, the areas adjacent to the Mae Kha Canal were seen as wastelands and neglected by those in charge (Saiyudthong, 2019). As a result, the areas neighbouring the canal have been transformed into slum-like informal settlements where inhabitants live in cramped conditions without sufficient public spaces and lack proper and durable homes (Figure 1, bottom). The informal settlements comprise 11 communities. The problems in the Mae Kha Canal slum have implications for both the environment

and the welfare of humans (Nuanla-Or, 2016). The matter has been a persistent challenge for Chiang Mai City due to the involvement of numerous stakeholders, which has made problem-solving complex

Previous proposals for relocation

As mentioned previously, the ownership structures of the landowners involved in these canal areas are rather complex, in which the Chiang Mai municipality, the Treasury Department, the Fine Arts Department, and the Marine Department are included. According to a study by Srisuwan (2005), at the beginning of 2000, the Department of Fine Arts launched an effort to evict squatters and slum-dwellers so that space could be cleared for the preservation of historic elements, the outer wall, and the Mae Kha canal. Conversely, those who lived in the area opposed this eviction because they did not wish to reside too far away from their places in the city centre. With the support of non-governmental organisations (NGOs), Mae Kha inhabitants began enhancing the physical environment by planting trees, cleaning the area, and relocating the dwellings on the wall to a plot of land. Ultimately, the authority permitted residents to remain in their current location with some restrictions, including avoiding squatting on the wall and staying away from the water and the historic moat (Ribeiro & Srisuwan, 2005; Srisuwan, 2005).

Despite this, as more low-income individuals have migrated to the city and space has grown increasingly limited, squatting has gradually returned. Local authorities, therefore, decided to relocate the inhabitants once more to the Chiang Mai Provincial National Housing Nong-Hoi Subdistrict (NHA housing), which is located a short distance from the city centre (Figure 2, left). However, many low-income residents along the canal declined to participate in the National Housing Authority (NHA) relocation programme since it is inconvenient for them and also far from their workplaces.

After a long period of time, the Treasury Department, which represented Thailand's Cabinet (Prayut Cabinet during 2014–2023), proposed another relocation proposal for the city's low-income residents in 2018—the *Bann Kon Thai Pracharat* housing project. For this project, large apartment complexes with 1,170 room units spanning 24,000 square metres and accommodating 3,500 people were to be constructed near the foothills of Doi Suthep (Chiang Mai Provincial Treasury, 2020) (Figure 2, right). Nevertheless, this undertaking provoked serious opposition from Mae Kha inhabitants and Chiang Mai civic groups towards government representatives. Civic organisations, academic experts, and networks have strongly objected to the idea and urged authorities to examine three aspects:

the structure's height, the environment and ecoculture of Doi Suthep Mountain, and the densely populated layout (The Citizen Plus, 2022). To support their standpoint, the groups have held public forums and forwarded local administrations the results of a survey of Chiang Mai locals. As a result of the favoured response, the relocation plan was eventually shelved.

Figure 2
Previous proposals
to relocate the Mae
Kha canal slum: (A)
The Chiang Mai
Provincial National
Housing, Nong-Hoi;
(B) *The Baan Kon Thai
Pracharat* housing
project (Images by
authors, adapted
from Chiang Mai
News)



Current agenda for the Mae Kha informal settlements: From the proposal of the community architects to the city agenda

Decades have passed, and there has been little progress in addressing the issues of squatting, settlements, water, and environmental concerns in the Mae Kha Canal from the relevant authorities. In order to rectify the shortcomings of state policy, local architects—Kon Jai Baan—have launched a community engagement-based development plan for the Mae Kha Canal (Wijitporn, 2020). The architects, in collaboration with affiliated networks and civic societies, initiated a project called *Imagine Mae Kha* to raise public awareness regarding environmental and housing concerns along the canal. To foster connections and provide support for the areas, the *Imagine Mae Kha* organised various events, including design workshops, activities for local children, community-driven bridge construction, public meetings, and the presentation of housing development and surrounding improvement proposals to local authorities.

As a result of the persistent efforts of architects and citizens, the authorities are currently looking into the Mae Kha Canal issues. By the end of 2022, the city governance had formed problem-solving committees and working groups to deal with issues related to canal water, environmental matters, and housing. The leader of the design team, which consists of members of the Mae Kha community, municipal administration, Community Organisations Development Institute, and Kon Jai Baan or JaiBaan Studio architects, among others, is currently in charge of developing the housing development plan with an on-site upgrading approach. Mae Kha canal housing and slum upgrading in the pilot communities of Kampaeng Ngam and Hua-Fai are scheduled to be completed by 2027. Within the context of developing countries, communities often lack a strong relationship with the state administrators in community development and thus require a third party, which could be NGOs, architects, and urban planners well as academic researchers, to facilitate interactions or advocate on their behalf to the local government. Therefore, this investigation supports the architects' proposal by analysing living conditions and highlighting the challenges faced by the inhabitants to ensure that local authorities would better understand residents' realities.

Research Methodology

Methods

This study uses a mixed-methods approach emphasising qualitative methodologies, particularly field survey studies and analysis. To begin, previous literature on Mae Kha areas and the study of slums was reviewed, and initial observations were conducted to determine the specific locations for the study. Subsequently, a field survey was carried out in four specific communities during August and September 2022. The survey employed an approach drawn from vernacular architectural studies to gain a comprehensive understanding of the dwelling characteristics and nature of the inhabitants. The study involved investigating a selection of residential dwellings and in-depth interviews with the inhabitants of those houses, using random and snowball sampling techniques.

The number of sample households is 80 in total. Upon obtaining the owner's permission to measure and collect data, the housing investigation covered room layout, including floor height, dimensions, and housing features, by drawing, measuring, and taking photographs. We interviewed each family member using a structured questionnaire, which included general background information (e.g., number of household members, origin place,

reason for staying here) and socio-cultural and socio-economic status (e.g., religion, income, occupation, workplace). In addition, locals were interviewed in unstructured interviews to get their perspectives on potential improvements to slums and issues within communities along the Mae Kha Canal.

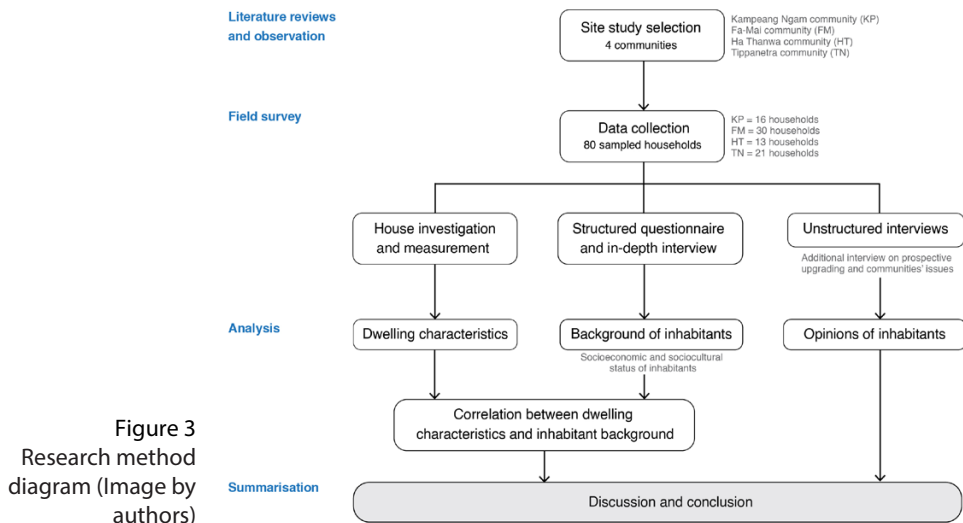


Figure 3
Research method
diagram (Image by
authors)

The following section provides an analysis of the field survey results, consisting of dwelling characteristics, background of inhabitants, and residents' perspective. Then, the study was done on the correlation between dwelling characteristics and the background of the inhabitants. Figure 3 provides an overview of the research method diagram.

Target study areas

The target areas of study were four communities located along the Mae Kha Canal, well-known for being informal settlements that represent people with low incomes within the city. The four communities, namely Kampaeng Ngam (KP), Fa-Mai (FM), Ha Thanwa (HT), and Tippanetra (TN), were chosen due to the fact that the areas are densely populated with residences, while other areas have a more diverse mix of residential and commercial properties. The areas are situated in the southern region of the city centre of Chiang Mai. The total area is approximately 210,065 square metres, with a population of 2,253 people residing in 883 households. The total number of houses in the sampling is 80; 16 houses in KP, 30 houses in FM, 13 houses in HT, and 21 houses in TN (Figure 4).

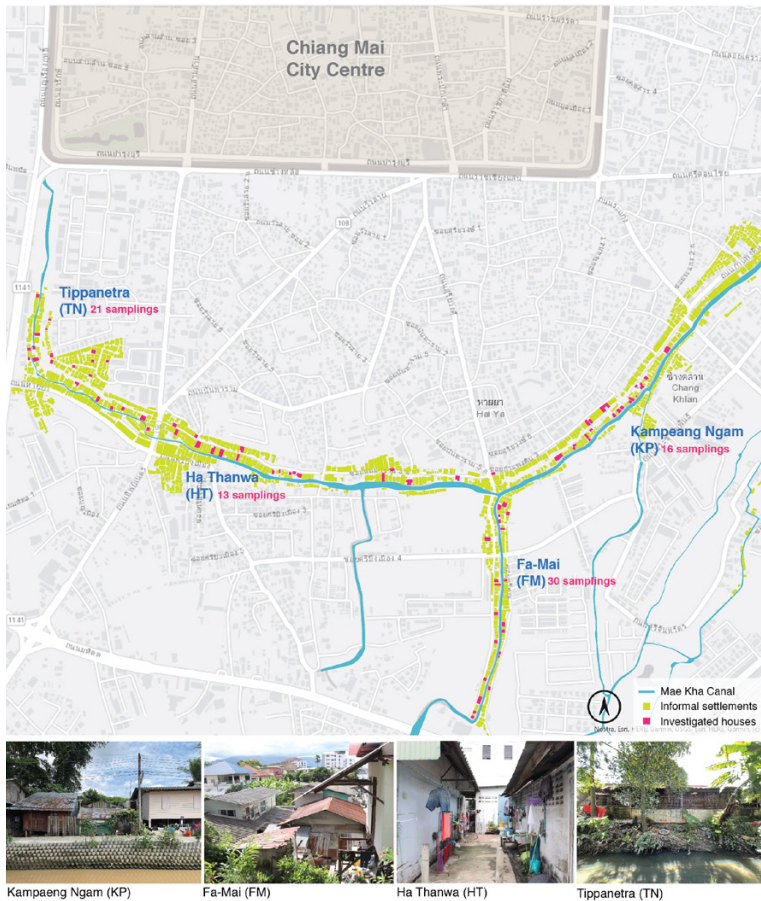


Figure 4
Location of target study areas and investigated houses (top) and the condition of the investigated informal settlement communities (bottom) (Images and photographs by authors)

Field Survey Results and Analysis

Dwelling characteristics

Based on the survey, most of the properties consist of single-family houses, with only a limited number of semi-detached houses, multifamily homes, and mixed-use buildings that incorporate restaurants or shophouses. Most of the houses are categorised as small (up to 120 sqm), while there are just a few medium-sized (121–200 sqm) and large buildings (above 201 sqm). The maximum number of floors is two. Figure 5 shows the house survey findings, including layout plans, building details, and justified graphs (J-graph) of each house's spatial structure.

Considering the use of space, each home is constructed with primary features that optimise the utilisation of space and support the inhabitants' daily activities. Typically, the functions include a living

area, dining area, kitchen, storage, a bedroom, and a toilet with a shower enclosure. The layouts and photographs demonstrate that most dwelling units possess a functional mix and adaptability (Figure 9), including combinations of dining and kitchen areas, dining and living areas, and even dining, kitchen, and living areas within a single room. While most homes lack storage room, a few houses feature storage space. The storage function has been integrated with another principal room, such as the living room or underutilised space. Interestingly, although the bedroom is a crucial separate space in every household, it does not serve extra functions.

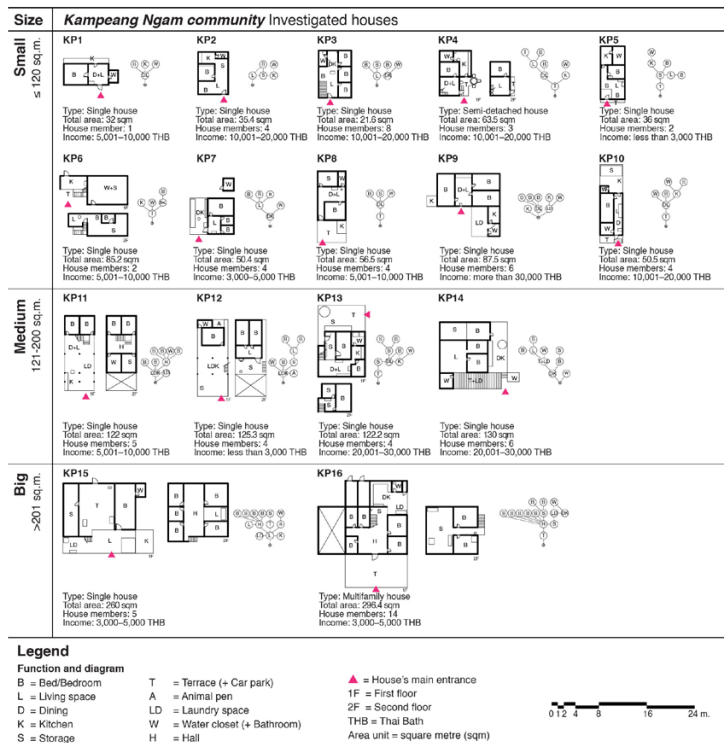


Figure 5
The room layout and use of space of investigated houses in Kampeang Ngam (Images by authors)

Regarding the spatial arrangement, following the plan diagram of each house (J-graph), the predominant space hierarchy ranges from 2 to 4 levels of hierarchies, as illustrated in Figure 10. It indicates that the greater the number of hierarchies, the greater the level of privacy. According to investigations, it has been shown that only a small number of houses have more than four levels of hierarchy. This indicates that almost all the dwellings that were examined had a simple and easily accessible layout with little privacy. The J-graph shown in Figure 10 illustrates the characteristics of all the homes under investigation. Although there are varying levels of space, the

main functions found at the first level of the hierarchy usually include a terrace, living space, dining area, kitchen area, and laundry area. The bedroom, storage area, and toilet or bathroom are the most personal areas and are found at the highest level of the hierarchy.

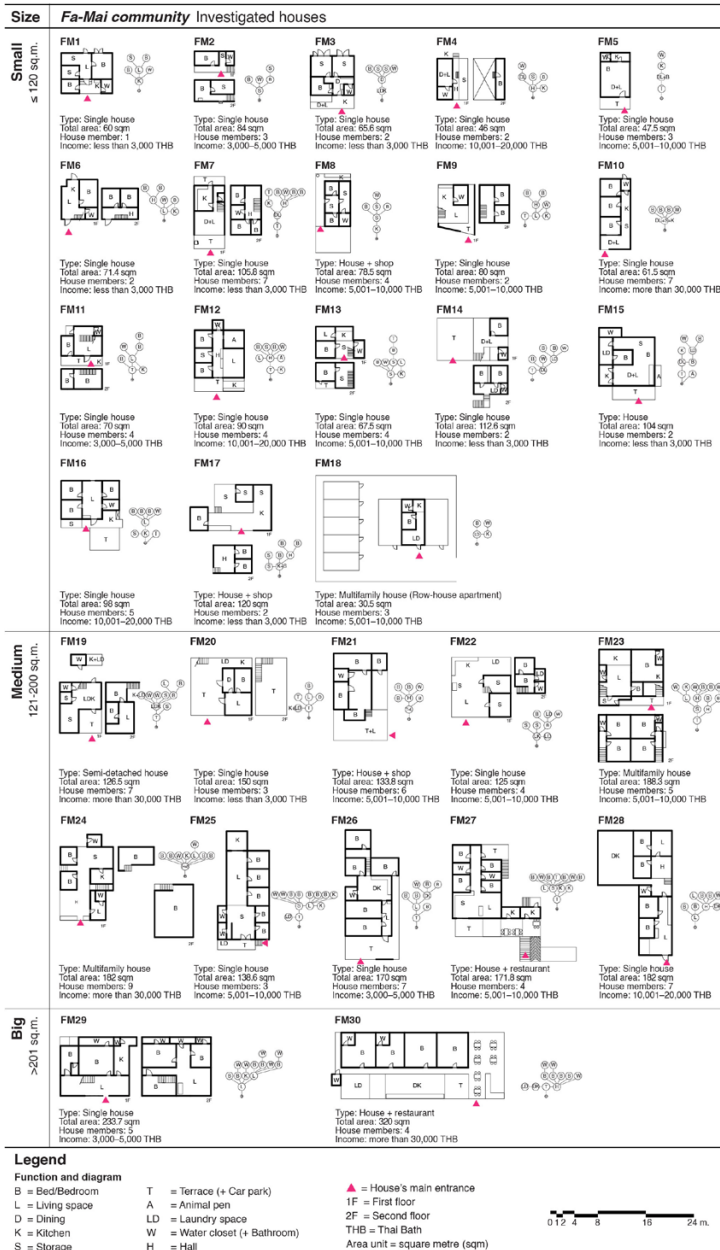


Figure 6
The room layout and use of space of investigated houses in Fa-Mai (Images by authors)

In addition, many houses have an interconnected area or partially secluded area that serves as a link between the communal and individual areas, such as a common living area and a hallway. The overall housing characteristics of the residences investigated in the selected study communities are detailed in Table 1.














Size	Ha Thanwa community Investigated houses				
Small ≤ 120 sq.m.	 <p>Type: Single house Total area: 80 sqm House members: 2 Income: 3,000–5,000 THB</p>	 <p>Type: Single house Total area: 38 sqm House members: 2 Income: 5,001–10,000 THB</p>	 <p>Type: Single house Total area: 74.5 sqm House members: 3 Income: 5,001–10,000 THB</p>	 <p>Type: Single house Total area: 62.5 sqm House members: 2 Income: 5,001–10,000 THB</p>	 <p>Type: Single house Total area: 50 sqm House members: 2 Income: 3,000–5,000 THB</p>
	 <p>Type: Single house Total area: 112 sqm House members: 4 Income: less than 3,000 THB</p>	 <p>Type: Single house Total area: 85 sqm House members: 3 Income: more than 30,000 THB</p>			
	 <p>Type: Single house Total area: 125.4 sqm House members: 2 Income: 5,001–10,000 THB</p>	 <p>Type: House + shop Total area: 152.2 sqm House members: 3 Income: 10,001–20,000 THB</p>	 <p>Type: House + shop Total area: 160 sqm House members: 2 Income: 5,001–10,000 THB</p>	 <p>Type: Single house Total area: 126.3 sqm House members: 2 Income: less than 3,000 THB</p>	 <p>Type: Single house Total area: 134.6 sqm House members: 2 Income: 3,000–5,000 THB</p>
	 <p>Type: Multifamily house (Apartment) Total area: 494.5 sqm House members: 16 Income: more than 30,000 THB</p>				

Figure 7
The room layout
and use of space of
investigated houses
in Ha Thanwa (Images
by authors)

Legend

Function and diagram

- B = Bed/Bedroom
- L = Living space
- D = Dining
- K = Kitchen
- S = Storage
- T = Terrace (+ Car park)
- A = Animal pen
- LD = Laundry space
- W = Water closet (+ Bathroom)
- H = Hall
- ▲ = House's main entrance
- 1F = First floor
- 2F = Second floor
- THB = Thal Bath

Area unit = square metre (sqm)



By analysing the primary function of the entrance, we can classify all the investigated houses into one of three categories: houses with entry from the terrace (T), houses with entry from the living room, dining area, or kitchen (LDK, L, DL, DK), and houses with entry from other spots, including the storage area or kitchen (Figure 11). Houses that have access from the terrace have a transitional space from the exterior before entering the main functional areas of the house. On the other hand, houses that have entry points from other functions, such as the living room, kitchen, storage, and dining area, indicate

that these functions are essential and easily accessible for daily use by the inhabitants. Furthermore, this study found that many houses combine these activities, such as using a terrace as a kitchen, storage, and dining space.

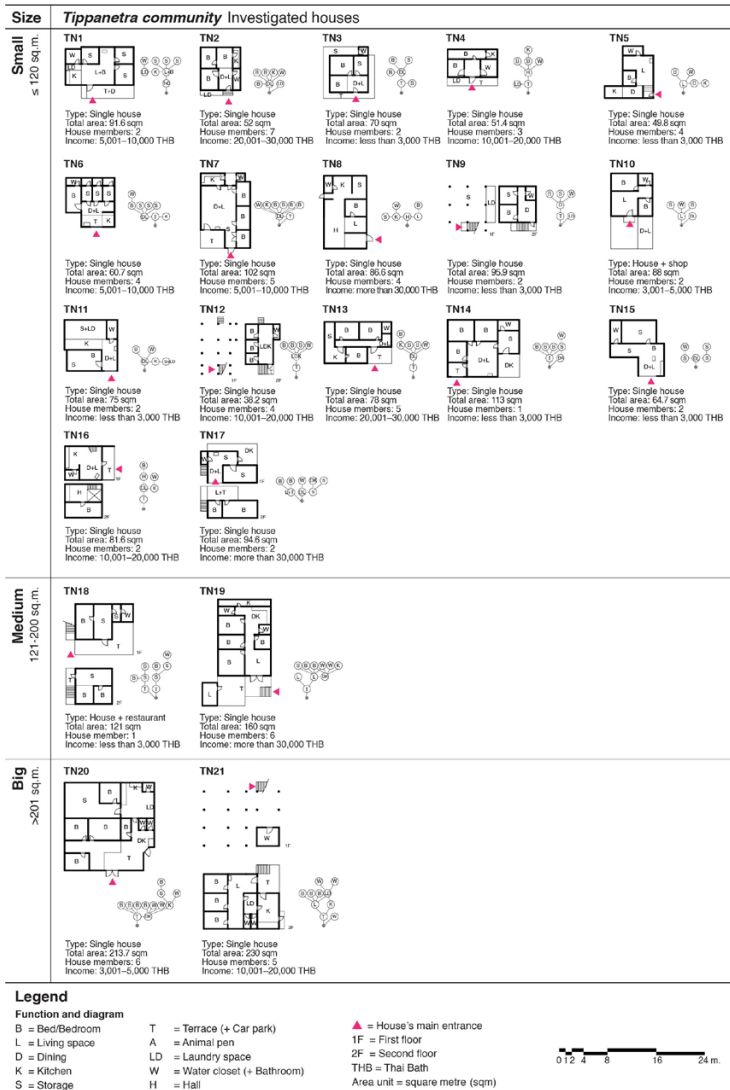


Figure 8
The room layout and use of space of investigated houses in Tippanetra (Images by authors)

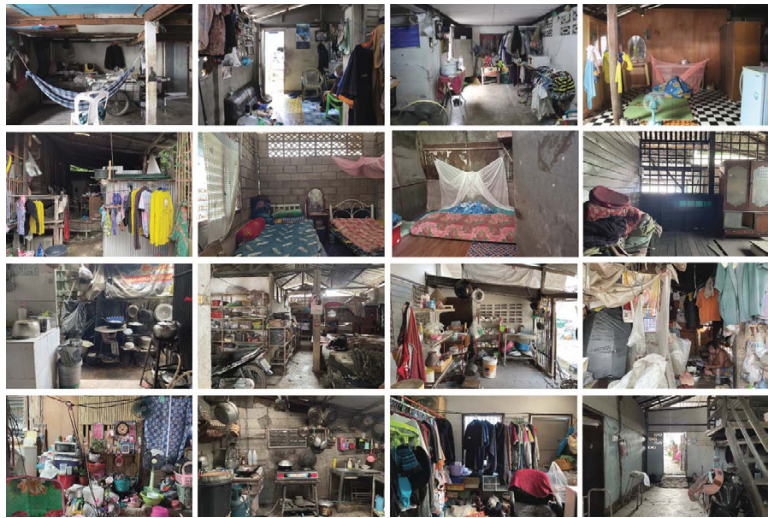


Figure 9
The Mae Kha Canal informal dwelling spaces show interior condition, functional mix, and adaptability (Photographs by authors)

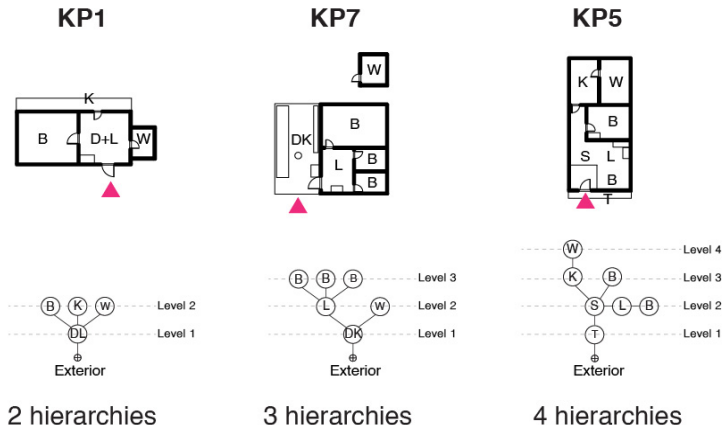


Figure 10
Examples of the spatial layout of investigated houses (Image by authors)

Background of the inhabitants

A study conducted by Srisuwan (2005) reported that in the 1950s, 4–5 pioneering families migrated to the area, and, over time, their relatives and other migrants illegally occupied the land, resulting in the formation of canal-side informal communities that rapidly became overcrowded. Srisuwan (2005) revealed that there were 132 households living in Kampaeng Ngam, about half of which came from Chiang Mai's mountainous regions, while the rest were migrants from low-lying regions surrounding Chiang Mai.

To gain a deeper understanding of the present background and the cultural, economic, and social structures of the inhabitants residing along Mae Kha Canal today, we conducted in-depth interviews with the members of each household in selected study communities.

Table 2 presents comprehensive information on the background, socio-cultural, and socio-economic status as well as the social and relationship status of the inhabitants.

Attributes		KP		FM		HT		TN	
		N	%	N	%	N	%	N	%
Type	Single	14	87.5%	21	70%	10	76.9%	19	90.5%
	Semi-detached	1	6.3%	1	3.3%	0	0%	0	0%
	Multifamily	1	6.3%	3	10%	1	7.7%	0	0%
	Mixed-use	0	0%	5	16.7%	2	15.4%	2	9.5%
Size	Small	10	62.5%	18	60%	7	53.8%	17	81%
	Medium	4	25%	10	33.3%	5	38.5%	2	9.5%
	Big	2	12.5%	2	6.7%	1	7.7%	2	9.5%
Number of floors	1	9	56.3%	16	53.3%	9	69.2%	15	71.4%
	2	7	43.8%	14	46.7%	4	30.8%	6	28.6%
Number of bed spaces	1	3	18.8%	5	16.7%	4	30.8%	8	38.1%
	2	4	25%	8	26.7%	6	46.2%	4	19%
	3	5	31.3%	8	26.7%	3	23.1%	7	33.3%
	4	2	12.5%	5	16.7%	0	0%	1	4.8%
	> 4	2	12.5%	4	13.3%	0	0%	1	4.8%
Count of hierarchy	2	4	25%	2	6.7%	2	15.4%	8	38.1%
	3	5	31.3%	18	60%	3	23.1%	7	33.3%
	4	7	43.8%	10	33.3%	6	46.2%	6	28.6%
	> 4	0	0%	0	0%	2	15.4%	0	0%
The first function from the access	T	7	43.8%	16	53.3%	11	84.6%	14	66.7%
	LDK/L/DL/DK	9	56.3%	7	23.3%	2	15.4%	6	28.6%
	Others	0	0%	7	23.3%	0	0%	1	4.8%
Sum total		16	100%	30	100%	13	100%	21	100%

Table 1
Overview of housing attributes in the selected study communities

Most residents in our study generally live in nuclear households (1–4 members). There are a few medium-sized families (5–7 members), but the number of large families (more than seven members) is relatively limited. Most families under investigation had a significant number of adults (aged 21–60) and seniors (aged over 60). Many interviewees are Thai and specifically from Chiang Mai City, however, others are from various cities within Chiang Mai and other locations around Thailand. Some families belong to Akha, Burmese, and Shan ethnic groups. Moreover, we discovered that the residents are migrants who have stayed in the area for varying durations, ranging from the oldest or first-coming families who arrived during World War II to the younger generations and more recent comers who arrived just a few years ago. The main reasons for them to choose

to live in the Mae Kha neighbourhood include the proximity to their places of employment and children's schools, closeness to family, and the area's low cost of living.

Regarding socio-cultural and economic status, nearly all families practice Buddhism, while a minority identify as Christians and a smaller proportion as Muslims. A large number of respondents are unschooled and have only completed high school. It is important to note that many inhabitants have lost their jobs as a result of the COVID-19 pandemic, yet in normal circumstances, the majority of them would work as labourers or merchants, selling their artisanal handicrafts and other goods at marketplaces in and around Chiang Mai Old Town. Several are employed in the construction and industry sectors. It is also discovered that many employments are located in the heart of Chiang Mai, and most people commute by foot, trailer, or motorbike. According to the national income criterion, most inhabitants in target research regions are classified as low-income.

Types	Sample houses	
Terrace access The first function from the access: T	KP5 	KP10
LDK access The first function from the access: LDK/L/DL/DK	KP3 	KP11
Others The first function from the access: K/S/H	FM1 	FM8

Figure 11
 Three dwelling types were characterised by access and interior utilisation (Images and photographs by authors)

Due to a scarcity of job opportunities, their revenue was significantly reduced during COVID-19. To be more specific, the average monthly income for one household is roughly 10,000 Thai baht (THB).¹ With this level of income, most families pay land rental payments of less than 1,000 THB annually to landowners, which vary depending on the area.

Attributes		KP		FM		HT		TN	
		N	%	N	%	N	%	N	%
General background									
Family size	Small	10	62.5%	20	66.7%	12	92.3%	15	71.4%
	Medium	4	25%	9	30%	0	0%	6	28.6%
	Big	2	12.5%	1	3.3%	1	7.7%	0	0%
Ethnicity	Thai	14	87.5%	28	93.3%	13	100%	20	95.2%
	Akha	2	12.5%	0	0%	0	0%	1	4.8%
	Burmese	0	0%	1	3.3%	0	0%	0	0%
Origin	Shan	0	0%	1	3.3%	0	0%	0	0%
	Within the city	10	62.5%	17	56.7%	3	23.1%	9	42.9%
	Out of the city	4	25%	6	20%	10	76.9%	8	28.1%
Length of stay (years)	Other provinces	2	12.5%	7	23.3%	0	0%	4	19%
	0–10	4	25%	3	10%	3	23.1%	3	14.3%
	11–20	1	6.3%	7	23.3%	2	15.4%	4	19%
	21–30	5	31.3%	8	26.7%	2	15.4%	4	19%
	31–40	2	12.5%	5	16.7%	3	23.1%	4	19%
	41–50	0	0%	5	16.7%	2	15.4%	0	0%
Reason to stay	> 50	4	25%	2	6.7%	1	7.7%	6	28.6%
	Workplaces	7	43.8%	10	33.3%	1	7.7%	3	14.3%
	Family reason	6	37.5%	10	33.3%	7	53.8%	10	47.6%
	Cheap living costs	1	6.3%	2	6.7%	2	15.4%	6	28.6%
	Education	0	0%	3	10%	2	15.4%	1	4.8%
	No specific reason	2	12.5%	5	16.7%	1	7.7%	1	4.8%
Socio-cultural and socioeconomic status									
Belief	Buddhism	13	81.3%	25	83.3%	13	100%	19	90.5%
	Christian	3	18.8%	2	6.7%	0	0%	2	9.5%
	Islam	0	0%	2	6.7%	0	0%	0	0%
	Irreligion	0	0%	1	3.3%	0	0%	0	0%

Table 2
Background of inhabitants of the selected study communities

¹ THB stands for the Thai Baht, Thailand's official currency. 1 THB = 0.028 USD (per 16 January 2024). The term 'low-income people' in Thailand refers to individuals whose annual income is less than 100,000 THB.

Attributes		KP		FM		HT		TN	
		N	%	N	%	N	%	N	%
Education level	No education	4	25%	4	13.3%	1	7.7%	3	14.3%
	Junior high school	10	62.5%	19	63.3%	5	38.5%	10	47.6%
	High school	1	6.3%	6	20%	5	38.5%	6	28.6%
	University	1	6.3%	1	3.3%	2	15.4%	2	9.5%
Occupation	Unemployed	1	6.3%	6	20%	2	15.4%	3	14.3%
	Labour	5	31.3%	9	30%	4	30.8%	7	33.3%
	Trader	8	50%	7	23.3%	6	46.2%	5	23.8%
	Student	1	6.3%	0	0%	0	0%	0	0%
	Officer	1	6.3%	1	3.3%	0	0%	0	0%
	Industrial	0	0%	0	0%	0	0%	1	4.8%
	Restaurant/ café owner	0	0%	2	6.7%	1	7.7%	1	4.8%
	Others	0	0%	5	16.7%	0	0%	4	19%
Workplace	Unemployed	1	6.3%	6	20%	2	15.4%	3	14.3%
	Within the city	8	50%	18	60%	7	53.8%	13	61.9%
	Out of the city	1	6.3%	3	10%	0	0%	1	4.8%
	Home	5	31.3%	3	10%	4	30.8%	4	19%
Commute to work by	Foot	2	12.5%	10	33.3%	7	53.8%	12	57.1%
	Trailer	2	12.5%	6	20%	2	15.4%	2	9.5%
	Motorbike	11	68.8%	11	36.7%	2	15.4%	5	23.8%
	Private car	1	6.3%	3	10%	2	15.4%	2	9.5%
Household's income per month (THB)	< 3,000	1	6.3%	8	26.7%	2	15.4%	7	33.3%
	3,000–5,000	2	12.5%	4	13.3%	4	30.8%	1	4.8%
	5,001–10,000	4	25%	9	30%	4	30.8%	4	19%
	10,001–20,000	7	43.8%	5	16.7%	1	7.7%	4	19%
	20,001–30,000	1	6.3%	1	3.3%	1	7.7%	2	9.5%
	> 30,000	1	6.3%	3	10%	1	7.7%	3	14.3%
Annual land rental costs (THB)	< 1,000	12	75%	24	80%	8	61.5%	16	76.2%
	1,001–2,000	1	6.3%	1	3.3%	3	23.1%	2	9.5%
	2,001–3,000	1	6.3%	5	16.7%	0	0%	1	4.8%
	> 3,000	2	12.5%	0	0%	2	15.4%	2	9.5%
Social and relationship in the community									
Relative in community	Have	12	75%	25	83.3%	12	92.3%	19	90.5%
	None	4	25%	5	16.7%	1	7.7%	2	9.5%
Community groups/ parties	Join	6	37.5%	27	90%	12	92.3%	20	95.2%
	Not join	10	62.5%	3	10%	1	7.7%	1	4.8%
Social interaction with neighbors	Always	13	81.3%	29	96.7%	13	100%	21	100%
	None	3	18.7%	1	3.3%	0	0%	0	0%
Interviewee/household in total		16	100%	30	100%	13	100%	21	100%

Considering social and interpersonal interactions in the community, nearly all of the surveyed residents have relatives and family members living nearby. Almost all individuals engage in communication with their neighbours, as seen by groups of residents conversing and groups of children playing together along the canal, whereas only a small proportion of members of the community choose not to connect with others. With the exception of the Kampaeng Ngam community, the majority of residents participate in community groups or parties.

Correlation between dwelling characteristics and inhabitant background

With the aim to develop design strategies for future housing upgrades of Mae Kha Canal, this study examines the correlation between inhabitants' backgrounds and dwelling characteristics by analysing data collected through field research. The criteria for the selection were based on the background of the inhabitants, specifically their family size and family income. From dwelling characteristics, housing conditions, including sizes, a number of bed spaces, and levels of spatial hierarchy were selected. The study assumes that there is a clear correlation between family size, income, and housing attributes. As the family size increases, the size of the house also expands. Table 3 summarises the correlations between dwelling characteristics and inhabitant background.

Table 3 highlights a direct correlation between the size of a dwelling and the size of the family. Most of the small families dwell in houses of small size. Most medium-sized families live in houses ranging from small to medium. More than 50% of the inhabitants of a big family live in a large house. However, there is no interplay between family income and the size of a house.

The number of bedrooms in houses is significantly affected by both the family's size and the number of bed spaces required. On average, small families occupy 1–3 beds while medium-sized families are typically comprised of 3–4 bed spaces. More than half of the big households have more than 4 bedrooms. Nevertheless, income does not have any impact on the number of sleeping areas in residences.

We determined that the number of hierarchy levels for spatial dwellings is also influenced by family size. Generally, small families have a hierarchical structure with 2–4 levels inside their family. Medium-sized families usually have 3–4 levels of hierarchy, whereas over half of large families have four levels of hierarchy. However, no relation can be found between housing hierarchy and family income.

The findings in this part reveal that prior relocation tactics implemented by local governments to accommodate residents in NHA and Pracharat housing, which provide just one room per family—one-size-fits-all housing—do not meet the residents' living standards. This is due to their way of life, which requires bigger accommodations, more sleeping areas, and a higher hierarchy level to accommodate the number of family members. While the affordable choices for housing provide an interior area of just 30–33 sqm per family, this is insufficient given the conditions of the residents since many houses have several family members, including four, five, six, or more people. However, we were unable to draw significant conclusions on monthly income because of respondents' lack of clarity and unemployment during the COVID-19 pandemic.

Table 3
Correlations
between dwelling
characteristics
and inhabitant
background

		Inhabitant background							
		Family size			Household's income per month (THB)				
		Small	Medium	Big	< 3,000	3,001–10,000	10,001–30,000	> 30,000	
Dwelling characteristics	Size	Small	44	7	1	15	19	13	5
		Medium	12	8	1	4	10	4	3
		Big	1	4	2		4	1	2
	Number of bed spaces	1	20			7	9	3	1
		2	23	1		5	9	5	3
		3	11	9	1	6	8	7	2
		4	2	4	1		3	2	3
		> 4	1	5	2		6		1
		Count of hierarchy	2	11	3	1	4	5	3
	3		25	6	1	9	16	5	3
	4		19	10	2	5	13	9	2
	> 4		2				1		1

Note: All surveyed residences in every community were included in this calculation. The total number of dwelling is 80.

Perspectives of the inhabitants

During comprehensive interviews and conversations with residents living along Mae Kha Canal in the research sites, they were asked two primary questions: firstly, what challenges do you encounter in the community? Secondly, what are your opinions and needs regarding the future management of housing along the Mae Kha Canal and the project targeted at upgrading slums? Figure 12 displays the number of issues voiced by inhabitants of the study areas. One interviewee or household was able to answer multiple issues they experienced within the community.

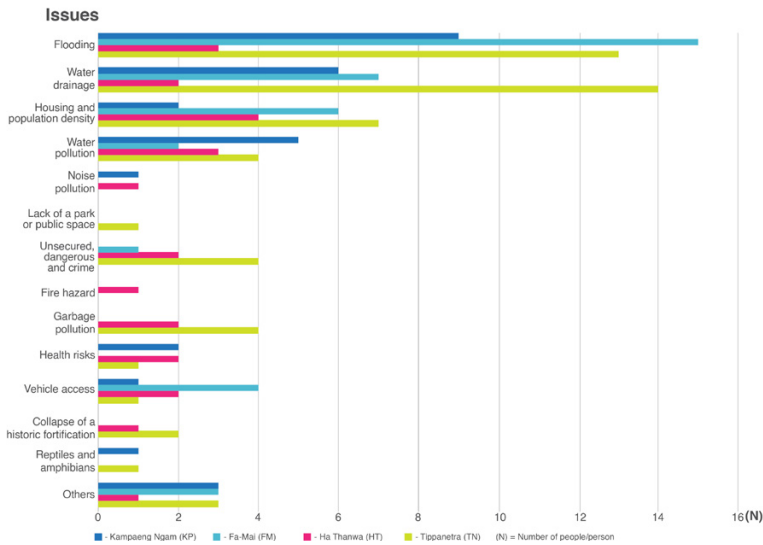


Figure 12
Issues voiced by
inhabitants of the
selected communities
(Image by authors)

According to the data presented, flooding and water drainage were common major concerns for all communities. From the interview, it was revealed that during the rainy season of each year, the canal causes unavoidable floods, and in certain areas, the water drainage system proves to be ineffective or inadequate, resulting in prolonged surface water. In some areas, there is a presence of waste and water pollution caused by garbage, which also results in an unbearable smell. In addition, some residents expressed their complaints about housing and population density as their homes are in such close proximity that they cannot avoid hearing the noise from the surrounding neighbourhood. Inhabitants in certain communities, especially Tippanetra, were concerned about a lack of safety and the potentially dangerous incidents related to crime and drugs. Difficulty with vehicle access was also mentioned, as various areas are not easily reachable by cars or motorbikes. Furthermore, they highlighted issues with nature creatures, including mosquitos, worms, birds, and reptiles, all of which add to community health risks. Additionally, in Ha Thanwa and Tippanetra, a historical wall has collapsed, causing damage to residents' houses (Figure 13). These concerns should be addressed in future upgrade projects.

When discussing the prospective housing development, all of the interviewees expressed concern about relocation attempts. Table 4 presents some opinions from those who were interviewed on the topic of improvements to the Mae Kha Canal.

Regarding the perspectives of the inhabitants, they had no desire to go or move to a faraway location from this place. They were worried about being evicted and forced to move to other locations. They prefer to stay in the same place and on the same plot of land, even if future upgrading would result in their losing houses' space and area, requiring them to build a new home or renovate an existing one. In practice, modifying or relocating these informal housing units requires more in-depth investigation and negotiations with the current occupants. This is based on the findings of interviews, which revealed that most respondents supported future housing and slum upgrading.

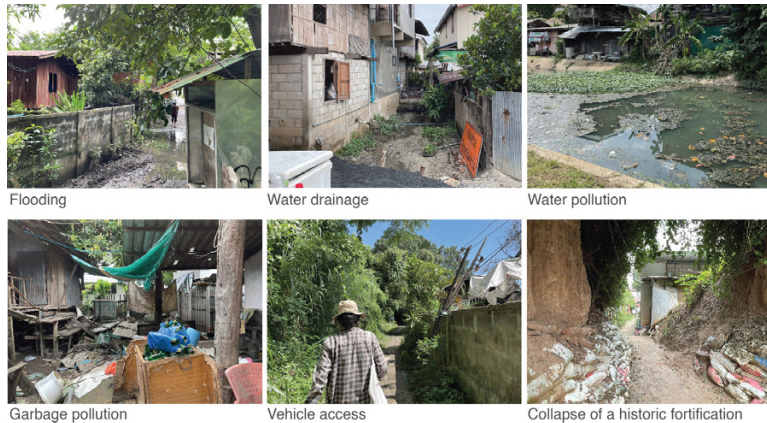


Figure 13
Issues observed in
communities during
the field survey
(Photographs by
authors)

This study sheds light on the comprehension of these urban settlements by taking into account their surroundings and the perspectives of their inhabitants before any improvements were made. In addition to physical components, the social sphere and interpersonal connections are also significant factors (Gooding, 2016; Mahabir et al., 2016; Wekesa et al., 2011). Moreover, conducting comprehensive interviews proves to be crucial for acquiring a more profound knowledge of inner matters and the true necessities of the locals (Purwanto et al., 2017). Likewise, the inhabitants understood that the land on which they reside is not legally theirs, yet they demonstrated interest in participating in the redesign process and expressed a willingness to abide by majority decisions in shaping the future of their community. Therefore, future upgrades and housing provisions for low-income individuals residing in slums or informal settlements ought to require the participation of all relevant authorities, stakeholders, and particularly those who live in the locations.

Interviewee	Opinions
KP6	I want the area to be more well-organised, cleaner, and more realistic place to live.
KP13	If this can be done, it will be good for housing development. People who are already living there should continue to stay there; I don't want anyone to leave. Please help come up with solutions to problems like floods and inequality.
KP15	I want everyone to live in their area so no one invades others. Each home should have a separate border. Keeping residents all together is terrible because it is lack of privacy and excessive sounds prevent sleep. Also, I agree with the plan to enhance the slums in the future, but I'd like to live on the original piece of land.
FM5	Landscape along the canal should be enhanced but one should also think about safety because there are a lot of women living here.
FM8	I wish for it to get better in a lively way, unlike a housing estate project.
FM13	I don't want to lose space around my house, but if it makes the scenery better, I can accept that. I agree with the upgrading project but I don't want to leave because this place is close to where I work.
HT6	I want the government to take care of the canal. I do not want you to evict me. I wish to remain in my current location but ready to setback. There should be a negotiation. The city plan and development plan are both delayed, and the area has been ignored, it is a forgotten area.
TN9	I want to improve the area. I'm okay with anything, even if it involves setting my house back a few meters from the canal, but I'd like to negotiate first.
TN16	I'd like to stay where I am now. Not keen on going far. We're waiting for the setback control law. After that, I'll renovate my house.

Table 4
Some examples of residents' opinions on Mae Kha Canal upgrades

Conclusions

The objective of this study is to examine inhabitants' dwelling characteristics of 80 samples from the perspective of people in order to gain insight into the relation between living characteristics and occupants for the purpose of providing valuable information for future housing development along the Mae Kha Canal, Chiang Mai.

In the case of the Mae Kha Canal informal settlements, this study is able to better grasp the nature of inhabitants' dwellings by using the interiority concept to investigate how the spaces are used and rooms are arranged. The analysis reveals that the size of a family directly influences the qualities of their dwellings, including the overall size of the house, the number of available bed spaces, and the level of spatial hierarchy. Thus, it suggests that previous strategies relied on by the local authorities, which intended to give just one room per family—one-size-fits-all housing—are not in line with the people's present living conditions. Likewise, those who live have stronger requirements to continue living in such areas, but they may be upgraded and are willing to participate in decision-making based on the interviews. As a result, the study suggests that local authorities

should engage in negotiations and collaboration with the local community before proceeding with the upgrade.

This study provides a case of contemporary urbanisation, where some constraints emerge regarding limited housing choices and locations. Such limitation affects mostly those who are economically disadvantaged, especially in the Third World. As a result, many informal settlements have occurred. This study demonstrates that examining the spatial arrangements, activities, and qualities that characterise the interior condition of housing from an insider's viewpoint, along with analysing various elements such as social patterns and community interactions, might help us better understand the dwellings and provide insightful ideas for future development. By studying such kinds of informal settlements through an interiority perspective, one may gain an understanding of not only a large-scale urban context but also the aspects of architecture and interior design and how they should be integrated effectively. This knowledge can contribute to better home design for locals as well as can be applied to other locations facing challenges such as complex layers and disagreements between local communities and governmental entities, leading to more efficient solutions under specific circumstances.

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