

## Adaptability in Interior Space: Public Housing for Lower-Middle Income Group in Dhaka

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### Abstract

*This research examines the spatial characteristics of domestic spaces, their use, and adaptations to analyse their changing morphology. It also examines inhabitants' preferences and requirements for the functional utilisation of the interiority of dwellings. Fifteen apartments in Dhaka were analysed to compare the initial design with the later modifications by occupants. The research followed an ethnographical method to depict the lives and experiences of individuals. The research has identified significant changes in activity zoning and their pattern, thus creating a new spatial organisation of the house that is different from the original design. Activity analysis reveals that most spaces are multipurpose; moreover, maintaining segregation and privacy is challenging. Lack of privacy is a significant concern during the alterations. Households are usually the extended type with a large number of members. Hence, this research finds the need for extra rooms within the given space. Another reason for alterations is the need for adequate functional space. A discrepancy exists between the dwelling space design and the actual needs and preferences of the occupants. This discrepancy highlights gaps between the designer's solution and the user demand, which prompts adjustments in the aspirations of the house through modifications and adaptations.*

*Keywords: domestic space morphology, spatial organisation, space use pattern, alteration, adaptation*

## Introduction

The population density and growth rate of Dhaka, the capital of Bangladesh, are more significant than any other megacities in Asia. It has the sixth-highest population density in the world (Opu, 2022). Additionally, Dhaka is predicted to have a population of 28 million in 2030 (URBANET, 2022). More than 0.1 million new dwelling units will be needed every year if the population of the urban area reaches 100 million by 2050 (Bengal Institute for Architecture, Landscapes, and Settlement, 2019).

Moreover, Dhaka is a 'land-hungry city' with the minimal provision of public housing, particularly for the lower-income groups. Here, different government agencies supply housing as rentals and home ownership to their staff, which is very insignificant to the actual needs. Lower-middle-class families cannot financially support themselves to afford home ownership, so they rely mainly on rental houses. In the public sector, government staff housing is the only housing provider for these income groups. According to government accommodation rules, every government employee is entitled to a standard floor area on a rental basis. In the sociocultural context of Bangladesh, income groups can be defined by categorising the government pay scale. This category establishes the income status and reflects the social status of government employees (Chowdhury, 2013). According to Bangladesh's national pay scale, the lowest-grade employees of the government are class III and IV, ranging from grade 11 to 20, considered lower-middle-income families. The allotted dwelling area for this group ranges from 46.5 to 74.3 sqm (Ministry of Housing and Public Works, 1992). It is essential to mention that this form of public housing is highly subsidised for its tenants. However, the government cannot provide them with larger apartments against their lower income range (Figure 1). Hence, primarily, large families—either nucleus or joint—occupy these houses as they cannot afford bigger apartments with their limited income.

Figure 1  
Azimpur, Green Road,  
Mirpur BCSIR, and  
Palashi Government  
Staff Housing (left to  
right) (Photographs  
by authors)



The occupants of the government staff housing usually stay for a long period in these apartments once allotted. In such circumstances, modifying the spatial layout according to the users' requirements is a common trend in these apartments. The residents who live in a limited

space must adjust their way of life to adapt within. Their apartments typically undergo numerous physical alterations. Sometimes these alterations change the intended use of space. Living in such small areas makes appropriate functional uses and activities challenging for these families. In addition, for economic benefit, the occupants of the government staff housing rent out part of the apartments. Although an illegal endeavour, in such cases, both families adjust to the limited spaces and share the common facilities.

Realising the connection between spatial morphology and social interactions improves the opportunity for better design (Hanson, 1998). Additionally, the study of residential space configuration establishes a connection between home design and social implications (Hillier et al., 1984). Therefore, further investigation is needed to reveal the functioning of the housing units concerning their changed social context. To create a more suitable dwelling design for lower-middle-class people, it is necessary to study the morphological characteristics and their changes. To support the residents in performing domestic activities, from social to personal ones, a house should offer a variety of spatial properties. Since compact spaces accommodate a variety of activities inside the 'key-space,' residents who live in small apartments have relatively no fixed areas for any specific activity and use. Conflicts between spatial needs are harder to resolve when only a small amount of physical space is available. Residents may adjust by reducing certain activities by carrying out potentially incompatible activities within the same area. What activities will be discontinued and which ones will start to cohabit spatially is the genuine concern here? Moreover, how and why do inhabitants mix different activities to make the most of their limited space?

Comprehending the lower-middle-class house organisation is essential in terms of space utilisation to design a better dwelling for these families. This research examines the spatial dwelling pattern related to its space use to identify the alterations and their causes. Hence, while people must live in a small space, the specific aim is to discover how they satisfy their domestic space requirements regarding function and social interaction. Additionally, it might give insight into how lower-middle-class households live and their spatial needs, which might benefit designers who design dwellings for this income group. Authorities will be able to reassess the housing design for the future by having a better understanding of the trend and the cause of the changes.

## Public Housing in Dhaka

The development of Dhaka's urban housing pattern, form, and interior design is influenced by several socio-political, cultural, economic, and geological influences that played to various degrees and at various times (Imamuddin, 1982). The urban character of Dhaka city underwent a significant demographic shift because of the mass migration between 1947 and 1971. In 1953, the Public Works Department (PWD) first presented the idea of the nuclear house (Shabin, 1997). Following this, housing colonies for public employees were built.

Regarding housing for its employees, the government is by far the most significant housing supplier. Despite the wide variations in designs and accompanying detailing, a four-storey apartment building could be identified as the government-initiated urban housing prototype. The only difference between these prototype units is their size (Saha, 2006). Palashi Barracks, Dhakeshwari Quarters (single-storey row houses), and Azimpur Estate were the earliest housing projects (medium-rise multi-storeyed walk-ups). Urban dwellings of the post-colonial era combined the living and service spaces into the same block, known as the consolidated type, which served as the prototype for later mass housing.

The provincial government built a two-flat two-family housing typology. Within the Azimpur Housing Area, 470 apartments out of 3,000 were built in 1992 utilising five-storey structures and could each house 10 families. Three different zones—formal, informal, and service zones—were created within each house. High levels of compartmentalisation are evident in the interior arrangements and a corridor-like space runs through the middle. The corridor may occasionally be converted into a large connecting room for dining or family living. The types were the more compact and relatively smaller area in response to the vast number of staff demanding a house in Dhaka.

In 1971, Dhaka saw a new growth phase. Due to its increasing population, multi-storey compact flats were built to satisfy the growing housing need (Rashid, 2000). The multi-storey housing stock was distributed to various groups of people by housing societies and developers. The real estate industry began in the late 1970s and a substantial shift in attitudes toward apartment living occurred in the 1980s. Multi-storey apartments had fewer rooms because of compact interior space. Units surrounded the stairs and lift cores that served the apartments. The compact layout makes dining a 'linking spot' for all the adjacent spaces. Two types of household activities occurred in urban houses: family and formal. The inner zone of the house is

where family activities like working, eating, sleeping, and cooking are carried out. Contrarily, formal actions like socialising, entertaining visitors, and participating in community affairs are done in the frontal zone of the residence close to the entrance (Imamuddin, 1982; Islam, 2003; Khan, 1999; Rashid, 2000; Shabin, 1997).

### **Adaptability and Functionality**

In Hanson's (1998) opinion, a house is more than just a collection of rooms or activities. A house is a layout of spaces that adheres to intricate norms regarding space types, connections, and spatial order—additionally, as the integration and segregation of various household activities. People need houses that can accommodate their needs. According to Ukoha and Beamish (1997), adding more housing units without considering whether they are suitable for the actual requirements of the people does not provide a reliable indicator of how successful a housing program is. Housing appropriateness refers to the home's ability to accommodate residents' spatial needs with the purposes for which those spaces would be used. It can be assessed based on the amount of privacy and flexibility it provides during various periods of a household's life cycle, as well as the space's size, layout, and circulation patterns (Agyefi-Mensah et al., 2010). The occupant's activities and physical capabilities determine any space's needs, use, and dimensions.

According to Brunson et al. (2001), if a space can allow various human activities, it has diverse meanings for different people. As a result, the same place may take on a distinct shape because of its activity. According to de Jong and van der Voordt (2002), the user's needs to define the function of space. Tipple et al. (2002) proposed that activities within a space influence its use. Every home will have a different amount of space depending on the culture and traditions of the occupants. The utility of a space is determined by the user's activities according to Lawson and Ogden (2006). Therefore, for the space to be functional, it must be modified to accommodate the activities of its users. Users will frequently adapt to the given area at the same time. To fulfil evolving user needs over time, some adjustments are also necessary.

A building is considered functional if it meets the programs established by the spatial needs, specifications, and effective maintenance of building components. It demonstrates the capacity to fulfil the intended function. Functionality is the potentiality of a design to allow users to conduct their tasks as intended. The capacity of spatial designs to allow functional and dimensional changes needed by the inhabitants is called adaptability. There are many

ways to define adaptation, similar to ideas like flexibility. Generality (changes of functions without changing quality) and flexibility (enables the space to adapt to users' changing needs) are significant factors that determine adaptation that can be gleaned from the literature (Bullen, 2007; Douglas, 2006).

The most significant characteristics of flexibility for low-income dwellings relate to the user's ability to change how they utilise their living space over time and add new features as needed. Low-income housing is where adaptation in interiors is most needed. Low-income families are less financially, intellectually, and technically capable. As a result, they must modify their home and their capacity to create the original design to produce one consistent with their power and affordability (Septanti, 2015). This research aims to determine whether the available space is suitable for completing the household's everyday domestic tasks. In this investigation, adaptability refers to the ability of spaces or rooms to be altered and customised for various domestic tasks following the user's needs.

### **Methodology**

This research follows a qualitative methodological framework and uses ethnographic techniques, through interviews and observation, as a means to acquire data on everyday life. Through observation, data collection, and visual and statistical representation, ethnography as a research approach can explore new methods to represent people's lives and experiences. Interacting, observing, and reacting to specific individuals, times, places, and circumstances are the key features of ethnography (McGowan, 2011; Pink, 2009).

In this study, the unit of analysis is the single apartment and the family living there. The study employs open-ended methods (including questionnaire survey, interview, and observation), allowing all types of observation to be connected. Images and survey responses are textually converted into the data format. The study aims to evaluate the spaces designed originally and after occupant modification. The domestic space use and the adaptations of the lower-middle-income families' housing units are studied with their functional roles. To better understand the adaptations and users' needs, the original plans are compared with the transformed ones. Users' adaptations to a single space and the use of the same space for various activities were evaluated.

The field survey involves collecting data (photos and drawings) about the users, observation, and questionnaire survey. The questionnaire survey helped to investigate the home's socioeconomic and

demographic structure to understand better the activity domain, the adjustments made by residents, and the reasons for those changes. It has also investigated the patterns of space use, the reasons for furniture arrangement, and the home utilities consumed in the house. The response to the questionnaire was collected during the field study from the female head as she could better describe the household conditions. The focus of the observations was to look for alterations inhabitants make to their homes to meet their specific needs, such as a change in furniture position, changes through doors, or partition walls. Photographs helped as a great tool when evaluating floor plans, use, and activities of domestic interior spaces and comparing measurements collected on-site.

Due to the government allotment procedure, the case studies match all the socioeconomic variables of the cases, increasing the research's internal validity. The buildings are consolidated walk-up type apartments. Integrating living and service into a single unit distinguishes the consolidated type from other architectural styles. Although the units that lower-middle-class families are eligible for range from 46.5 to 74.3 sqm, during the field survey, many houses were found to be as low as 39.5 sqm. The area includes only the interior space of the apartments without any common spaces like stairs or a lobby.

Fifteen apartments were selected from Dhaka's government staff housing, ensuring the participants are homogeneous (Guest et al., 2006). In selecting the sample, the cases must have some modifications by occupants to satisfy the research purpose. Five different layouts have been selected with extremely compact internal designs with different plans. Despite having the same initial design, when residents eventually settle in, they customise each home differently based on their preferences and needs. To discover adequate and potential alternate adjustments, fifteen cases with five different plan layouts were chosen for this research. Every three case studies have the same original plan layout but are altered differently. A, B, C, D, and E denote the samples' original plans. A-1, A-2, and A-3 denote the altered examples of the original layout A, and similarly for samples B, C, D, and E (Figure 2).

The social aspects are summarised from the data obtained from the respondents' questionnaire survey and the photographs and drawings from the field survey. Most of the respondents, the female heads, are homemakers. The household expenses range from 18,000 to 40,000 BDT. Five are nuclear families and the remaining ten are extended families with a household size range from 3 to 7. Here, the

alterations of spaces are investigated concerning their use and activity. The original and modified plans' comparison and analysis depend on several social factors, primarily the respondent's perspective.

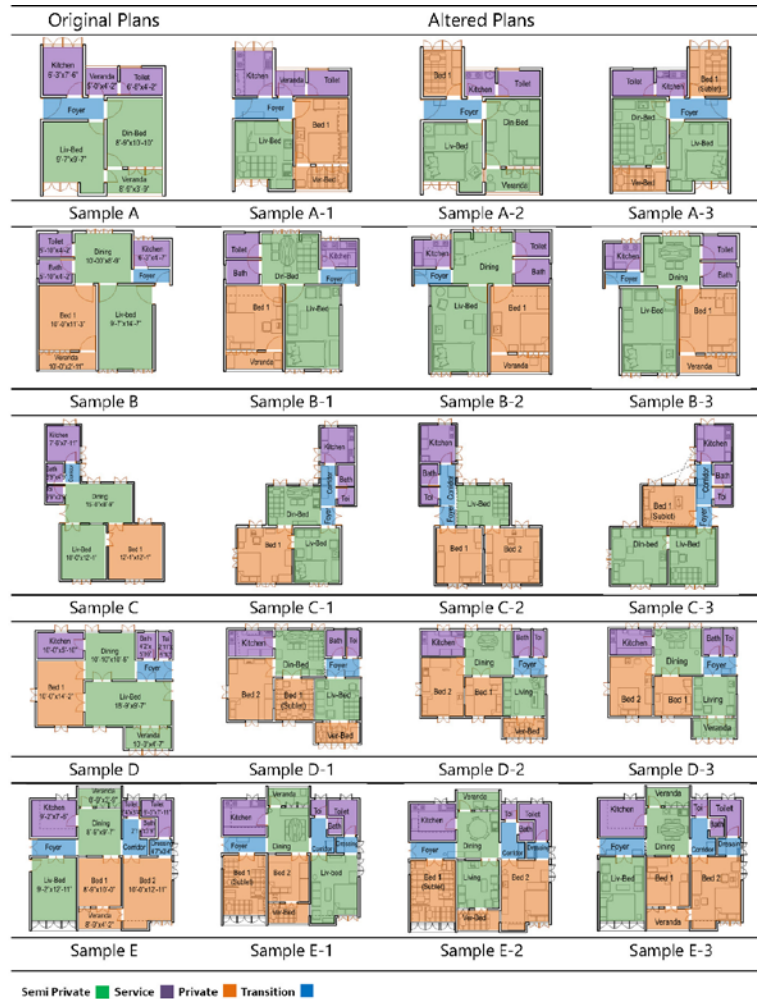


Figure 2  
Plans of the case  
studies (Image  
by authors)

### Components of Domestic Space

A typical apartment layout for the lower-middle-income group can be categorised into three central areas: entry and circulation, main activity areas, and services. In the original case, 60% of apartments have two entrances (Figure 2; Sample B, D, and E), and 40% have only one entry (Figure 2; Sample A and C) from outside. In the case of two entrances, one goes right into the living room and the other through a foyer. When there is only one entry, it enters directly into a common area (Figure 2; Sample A) or the dining (Figure 2; Sample C). In the



original layout, 80% of samples have foyer space, whereas 100% of respondents have ensured the foyer space after alterations (Figure 3). Sometimes, very small corridors have often been used to connect all the inner spaces (Figure 2; Sample E).

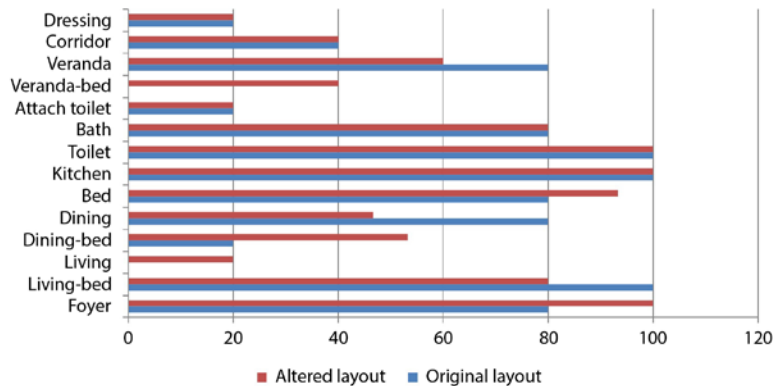


Figure 3  
Percentage (%) of domestic space components, comparing the original and the altered layout (Image by authors)

The primary activity spaces in these small apartments are living, dining, and bedrooms. Living rooms are designed for multipurpose use. Most samples accommodate sleeping in addition to entertaining guests. The dining and veranda are also used as multifunctional spaces. Sometimes the front or living rooms are comparatively large (Figure 2; Sample E). Dwellers have converted this room into two areas by providing a simple partition because they need an additional bedroom. The dining space seems essential because of its position on the layout. It serves as an area of transition. It is a semi-public activity that integrates every other site including the service and private spaces. To improve functionality and usage, many of these units have separate bathrooms and toilets (Figure 2; Sample B, C, D, and E). In very few cases, an attached bathroom has also been found.

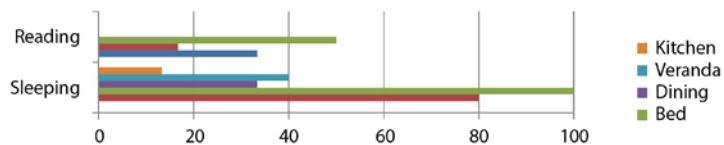
### Space Use Pattern through Activity

The space has been analysed according to activity. As different respondents have used different spaces for the same activity, the percentage of space is calculated based on the number of respondents' statements about using space for any particular activity. In many cases, the significant spaces have multifunctional use. The daily household activities usually held within a domestic interior are categorised in three broad divisions: private, semi-private, and service. In this research, when a living room is also used as a bedroom parallel to its original use, it is indicated as a *living-bed*. Also, when the dining is used as a bedroom meant as a *dining-bed*. However, this situation is growing more frequently in altered

instances. Here the veranda is also used for sleeping. The examples are denoted as a *veranda-bed*.

It is preferable for private activities (reading or sleeping) to take place in a quieter area of the residence (Figure 4). These apartments often contain one or two bedrooms, according to the unit size. Due to the shortage of bedrooms, the kitchen and veranda are also used for sleeping sometimes. Usually, male children lived on the veranda if needed. The male children favoured the veranda over the shared room because it gave them privacy. In some situations, it is kept for emergencies, for example, if a guest has arrived for a night's stay. The dining room was frequently used as a bedroom by the young children or elders of the family. Sometimes the kitchen is altered into a bedroom and another space (i.e., veranda) is used as the kitchen (Figure 2; Sample A-2 and A-3). However, several respondents have mentioned that they want their children to read within her visual area so that she can help them with their homework. Therefore, the children often use the dining area for reading. Children who use the living-bed for their reading must shift the room often when guests come to the house. Hence, they do not have any fixed space for reading.

Figure 4  
Space use according  
to private activities  
(Image by authors)



Semi-private activities (family gatherings, watching TV, entertaining visitors, and eating) as mentioned in Figure 5 generally occur in a shared space. The occupants used the dining space for eating and sleeping in some apartments for the shortage of the required number of bedrooms. In a few cases, the users have no separate dining space (Figure 2; Sample A); the bedroom or living area is used for dining purposes. Sometimes, one large room is designed to be multifunctional (living and bedroom) in these apartments. However, only some respondents have transformed those large spaces by giving partitions and creating a dedicated living area (Figure 2; Sample D-2 and D-3). As the families do not have separate family living, they prefer to gather in the room with the TV. To save the electricity bill and communicate with the other family members, residents sometimes use different spaces like the dining or bedroom instead of the kitchen for the preparation of cooking. Those without a veranda use the outside common stair or window to dry clothes (Figure 6).

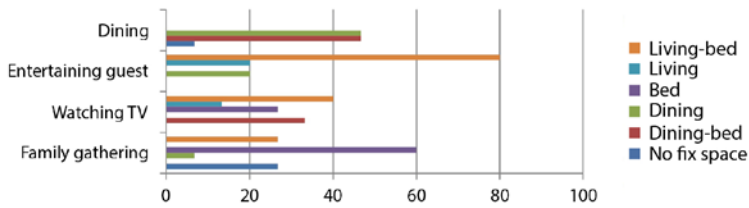


Figure 5  
Space use according to semi-private activities (Image by authors)

Due to the minimum space, it is not easy to maintain the separation between various activities. More area is needed to dedicate a particular activity to a given space. The same activity is typically placed in multiple rooms rather than just one. They must therefore use various activities inside the same space but numerous times under different situations.

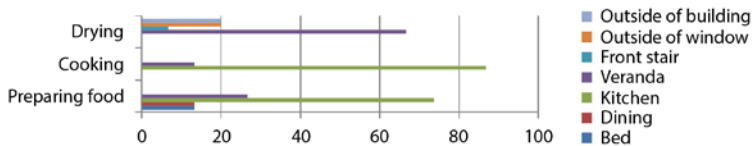


Figure 6  
Space use according to service activities (Image by authors)

### The Categories of Adaptations and Their Reasoning

The respondents usually make the changes to fit their daily needs within their dwellings. For instance, they have created new rooms by partitioning an existing large room and employed curtains in various locations. Additional doors are required to enter the apartments directly, and the interconnection between rooms is no longer necessary. Therefore, they temporarily block those doors by positioning furniture in front of them to meet their needs to place the furniture. Significant alterations have been found in the case studies, which generally took place in three ways: use of partition, control of access, and relocation of activity.

#### Use of partition

A curtain is commonly utilised to keep the apartment's interior private from visitors. In some situations, the residents require separate living areas and bedrooms rather than a large multifunctional living space, so they use partition walls. Thus, designed rooms are modified permanently or altered for a specific time to accommodate a large number of family members and ensure their privacy and enable economy. Sample D-1 respondents use a curtain to keep the dining-bed private from the entry because it is also used for sleeping at night. The occupants closed the direct entry to the living, so guests also used access through the foyer, which required extra privacy than usual (Figure 7).

Figure 7  
Use of partition wall and curtain  
(Sample D-1) (Image by authors)

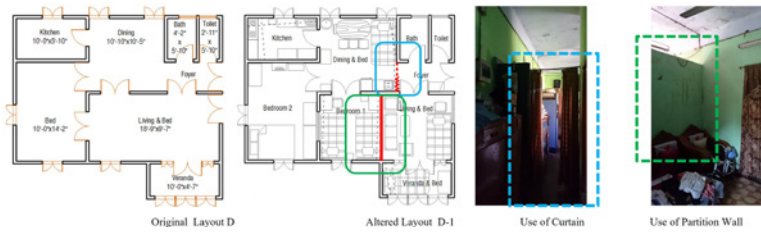


Table 1 shows the reasons for partition walls or curtains in the apartments. Most respondents mentioned the need for privacy. Respondents also said the need for additional sleeping space and separate living or bedrooms.

Table 1  
Percentage (%) of alterations and their reasons by partition

Alterations	Reasons	Number of cases	Percentage	Total % of alterations
Reducing room size by a partition wall	Privacy	2 out of 15	13.3	33.3
	For the extra bedroom	1 out of 15	6.7	
	For separate living and bedroom	2 out of 15	13.3	
Use of curtain	Privacy	3 out of 15	20	20

**Control of access**

For those who have two entrances to the apartment, one leads directly into the living room and the other through a foyer. Users place furniture in front of the doors, thus temporarily closing it off (Figure 8). The residents have mentioned that they require more space for the furniture. Maintaining the two entries, which may not be necessary, is also challenging to decide which one to use and when. They use only one entrance that is attached to the foyer. Hence, the residents have increased the functionality of space through the maximum use of space within their fixed limited area.

Figure 8  
Direct entry to living from outside and interconnected is blocked by furniture (Sample D-1) (Image by authors)



In some instances, a door connects two rooms. The veranda occasionally has more than one room linked to it. Due to maintaining the privacy of the adjacent room and the lack of space to arrange their furnishings, the residents have closed the other doors, leaving only one open. Table 2 gives an overview of how the

residents have altered the existing layout of accessibility according to their spatial needs. When it comes to bedrooms, the users are primarily concerned about privacy. In other cases, functionality and maintenance are the reasons.

Alterations	Reasons	Number of cases	Percentage	Total % of alterations
Between living and exterior	Functional	4 out of 9	44.4	100
	Security Maintenance	5 out of 9	55.6	
Between the veranda and bedroom	Functional	5 out of 6	83.3	83.3
Between two bedroom	Privacy Functional	5 out of 6	83.3	83.3

Table 2  
Percentage (%) of alterations and their reasons by control of access

### Relocation of activity

People sometimes use the spaces differently than how they were intended to be used. Additionally, there have been some changes to the space type. Most apartments typically have a living area that may also be used as a sleeping area. Though the government does not allow it, sometimes residents sublet one room (mostly a living room) to a tenant for financial benefit and relocate the function of that room to another room (Figure 9). Subletting is a prevalent practice for limited-income families explains how badly these families need secondary income sources. Despite having trouble accommodating their household, they are forced to rent out part of the house.



Figure 9  
Alternate use of the living room for subletting (Image by authors)

Due to lack of bedrooms, the dining room is occasionally used for sleeping (Figure 8). Additionally, the living room is occasionally utilised as a bedroom (for sublet); in that case, the dining room often serves as a living room also. In such cases, the residents have no specific dining place (Figure 10). They have eaten in their bedrooms without any fixed arrangements.

Figure 10  
Dining is used as a  
living-bed  
(Sample C-2) (Image  
by authors)



Figure 11  
Kitchen is used as a  
bed and the veranda  
is used as a kitchen  
(Sample A-2) (Image  
by authors)



Very rarely, the kitchen is converted into a bedroom (Figure 11). It occurs only when an apartment is small (425 sq. ft). In that case, occupants cook in the veranda instead of the kitchen. It is also a common practice to set up a bed on the veranda for bedroom shortages. It is usually utilised in an emergency. The veranda is used during the day for food preparation and other culinary tasks while it is used for sleeping at night (Figure 12).

Figure 12  
Veranda is used as a  
bed (Sample A-1  
and E-1) (Image by  
authors)



Table 3 illustrates the original and altered uses of the space and their reasons. The table shows that the use of areas is unique and unusual. Most of the rooms are used differently than they were initially intended. Most spaces are adapted for new functional use and activities, primarily, due to the shortage of sleeping areas. Hence, the residents use almost all possible rooms for sleeping either for occasional or permanent use. Another important reason is the financial benefit. They use part of their house as a secondary earning source by subletting the room. The new adaptations and the reasons give quite a unique insight into these income group families' social dilemmas through their everyday living practice.

No	Original Use	Altered Use	Number of cases	Percentage	Total % of Alterations	Reasons
1	Living-bed	Bed	3 out of 15	20	20	Lack of bedroom
		Dining-bed	3 out of 15	20		
2	Dining	Living-bed	1 out of 15	6.7	33.4	Economic benefit
		Bed	1 out of 15	6.7		
		Dining-bed	2 out of 15	13.3		
3	Bed	Living-bed	2 out of 15	6.7	26.7	Lack of bedroom
		Living	1 out of 15	6.7		
4	Kitchen	Bed	2 out of 15	13.3	13.3	
5	Veranda 1	Bed	7 out of 12	58.3	58.3	
6	Veranda 2	Kitchen	2 out of 6	33.3	33.3	

Table 3  
Conversion of  
space use

### Interior Space Adaptations as User's Strategy

Several conceptualisations have focused on the interior as a functional process. However, its priority still barely registers in contrast to the socio-economic factors reshaping cities or on a global scale, as the models that have influenced urban planning (Bruyns, 2018). Hence, this paper has tried to look into the domestic interior space to find out how the socioeconomic and cultural factors influence the spatial morphology of the dwelling. The study's findings indicate how physical items transform into tactical tools in inhabited spaces and how occupants adapt or modify them to meet their demands. The economic situation strongly impacted lower-middle-income families' way of life and family structure. Lower-middle-class families were compelled to compromise on their preferred way of life and living space because it was unaffordable. They had to simultaneously uphold social norms (e.g., privacy and entertaining guests) and their quality of living (e.g., uninterrupted and adequate functional spaces). They are facing trouble keeping these two in balance. To accommodate their daily needs and lifestyle, the residents modify their interior space so that sometimes it also changes the spatial connection and arrangement of the apartments; thus, the apartment's initial design has also changed.

Hillier (2007) claimed that when spatial form disregards social norms and significant physical indications, occupants may either adjust behaviour patterns to adapt to the spatial form or alter the space to accommodate what they need (Dassah, 2011). The most prevalent forms of personalisation found in this research are the adaptation of unintended activities of spaces and multifunctional uses of space. Several other significant changes were made by the residents to accommodate their preferences. The dwellers must create and utilise



the foyer to abstain from using the living-bed directly from the outside. All the spaces, e.g., living room, dining room, or veranda, are primarily multifunctional used for sleeping in addition to their original use. The dwellers have created more rooms by dividing the current large one. By dividing the larger room into two sections, they may utilise one as a combined living room and bedroom while renting out the other. If there were more than one way to access any given space, they may shut the additional door by keeping one open. They may also repurpose an area other than its original purposes, such as using the kitchen as a bedroom or the veranda as a kitchen.

The social and spatial analysis of the apartments in the case studies has revealed several issues influencing the residents to adopt a changing organisation for their house that is different from its original arrangement. The new arrangement is not advised by any professionals but rather a spontaneous intervention by the residents that aligns more with their actual changing needs. This phenomenon clearly explains the gap between the fundamental need and the design of these apartments, thus, the existing information gap between the designer and the user. Machado (2004) and Zeisel (1984) also stated that designer-user gaps are created in the existing mass housing manufacturing process when architects cannot interact with end users throughout the project's design phase. All these mismatch happened primarily for a functional reason, the need for extra room and to accommodate the furniture in minimal space. Moreover, there are other reasons, e.g., for privacy, maintenance, and in some cases, economic benefit. Maximum spaces have multifunctional use, hence the boundary of private-semi-private is impossible to maintain correctly in these houses. Almost all the spaces are shared by multiple users and for multiple activities. Due to space limitations, the separation between various activities is not possible.

The study by Omata (1992) in Japan reveals that smaller homes have a less functional distinction between rooms. Different semi-private and private activities coexist in the exact location through the multifunctional utilisation of the space. Hence, the space should be categorised and designed not by the type of activities but according to the time. The same space could be used differently at different times. The study of Hong Kong dwellings also indicates a similar phenomenon. The intensive use of foldable furniture, sliding walls, and curtain used in the space for different activities is a standard solution that has given greater flexibility. At the same time, the residents could achieve maximum functionality, segregation, and privacy (Rooney, 2003). Due to the insufficiency of the housing estates, apartment buildings and their functional spaces show a greater



affinity to tactical strategies either using appropriations, occupation, extension, or adaptation and alteration of space. Reappropriation of objects in interiors where people live is made possible by dissociating design from the designer's original intention. The interior changed depending on the time and season (Bruyns, 2018).

Through these adaptation strategies, the functionality of the space would be enhanced. Flexibility should be considered when designing these houses so the users can accommodate their changing functional needs accordingly. Housing is frequently made for people with conventional needs and abilities without considering the users' changing demands in the future (Baldwin & Tomita, 2007). Hence, changing the house is not an option for the low-income group families. Privacy is another crucial issue for these apartments as it is the most vulnerable factor due to the limited area and large household size. To ensure privacy, the residents often prefer to live on the veranda or kitchen rather than sharing the room with other family members. Also, curtains or partition wall is a prevalent practice to add more layering to the apartment's privacy from visitors and household members. Hence, it is better to provide an additional room, instead of having a large room.

Monteiro (1997) states that timing, not space, determines privacy in smaller apartments in his investigation into the spatial pattern of domestic activities in Brazil. His focus was on the activities and furniture placement in each room. As these families are economically not well-established, subletting is a common phenomenon in these housing though the authority does not permit it. The space is insufficient for the residents themselves, yet they are bound to do this for the economic benefit of the family. Designing for these families is critical regarding their unique family type and household size. The focus should be more on how to enhance the functionality of any space and, at the same time to keep their social and personal requirements satisfied. Though it is very challenging, following the time diary of their daily activities and their social interaction level could be beneficial for the designers to make the decision.

## **Conclusion**

The domestic space arrangement of public housing in Dhaka showed incompatibility of the design in accommodating the users' demands and goals. This research investigates how the dwellers' needs have been met in the existing dwellings. The study found that the dwellers accommodate their daily needs through adaptations in the apartments. The families reside for an extended period in these flats. Hence, personalisation becomes a 'tool' to ensure the current

state of the home. They have attempted to address the arising spatial necessities by modifying their current homes, thereby adjusting the place to their shifting needs. Residents who lack the financial means to relocate to a larger or more suitable home can deal with the insufficiency of their homes through the changes.

Family members must have a high tolerance level when using the same place for several purposes and activities. Time management and space zoning allow the spaces to be more functional for different activities. Spaces are highly functional when they can facilitate various activities. However, to ensure space functionality, there should be no conflict between activities that do not fit these contexts. The household must find solutions to the issue due to a lack of available space and the cost of obtaining appropriate space. This research demonstrates that while the house's initial space purpose had been established, the following extra factors still need to be considered. Space can be determined by activity (e.g., depending on who occupies it, the same space can serve as a living room, a working space, or both). Space is a container of activities where every function can take place, even if not planned out in advance. In other words, it is strongly advised that space be used for different purposes, especially in low-income homes.

The research offers some findings that could potentially lessen the gap between the expectations of architects and users. However, this research focuses only on the public sector housing of Dhaka, and the sample size is also small, so more investigation is needed to justify this phenomenon adequately. The investigation in the private sector can broaden the area of the study and produce more conclusive results. Additionally, a comparison with other cities is advised to comprehend the cultural change and variations in housing usage, design, and adaptation. The research's conclusions favour early end-user involvement in decision-making about housing design, as this can help minimise later phases of adaptation and conversion. It might increase the chances of dwelling designs pertaining to current demands. A good research topic may be to investigate the potential for end users to be involved in the initial stages of housing design. The research's conclusion suggests a favourable viewpoint toward user modifications of dwellings in emerging economies.

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