

# Examining the Design Parameters for Balcony in Muslim Sudanese Apartments with a View to Enhance Social Interaction and Visual Privacy

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## Abstract

The balcony is considered an important element that makes valuable contributions to residential buildings at various levels, such as its function, use, design, and values. Balconies should be designed to improve the residential unit's internal environment and be used for significant functions not only as a service area but also as a place for social interaction. Therefore, this study aims to analyse the balcony design variables that improve the degree of activity, privacy, interaction, and comfort for apartment unit residents, especially in Khartoum, where most of the population is Muslim. In order to evaluate the different variables and responses from residents, a mixed-method approach is used, combining questionnaire surveys and case study approaches. The findings revealed the significance of balcony space in Sudanese culture; also, respondents strongly support the idea that balconies might replace the function of traditional house yards if they evolve with a particular level of privacy and acceptable size. Hence, this paper provides design guidelines for balconies in apartment blocks that are suitable not only for the Sudanese but also the Muslims in general to preserve the good social culture.

Keywords: Balcony design, apartment units, visual privacy, social interaction space

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## 1.0 INTRODUCTION

In a Muslim house, privacy is defined as the ability to conduct everyday activities at home without being observed by an outsider (Hashim et al., 2006; Khozaei & Wahid, 2008), while visual privacy is defined as the ability to do the daily activities, without being noticed or detected by non-family members (Pecora et al., 2017), or in Islam by the non-mahram people. Since visual privacy in the built environment is affected by physical elements of design attributes, such as the design of fenestration (windows and doors position, louvres, mashrabia), and materials used (whether they are transparent, semi-transparent, or non-transparent). The provision of visual privacy in Muslim houses has always been one of the primary considerations of Islam (Rahim, 2015). Buckman et al. (2014) defined comfort as the condition of mind that expresses satisfaction with one's environment. Jenkins (2014) further defined "social" as being related to activities in which people meet each other to work individually, collectively, interactively, institutionally, or for pleasure. Meanwhile, Kreijns et al. (2014) defined social comfort as the way people act and interact generously with their immediate social environment while giving respect to their privacy, cultural traditions, religion and backgrounds.

Hence, this paper main aim is to uncover the significance of the design and function of balcony in terms of visual privacy and social comfort in residential apartment buildings in Sudan. Currently, there is a lack of study that emphasise the importance of balcony and even less, on the design considerations as well as privacy level at the balcony and exposure with the surrounding neighbours especially for the Muslim ladies who are used to the traditional courtyard house. In the absence of a yard space, there is the need for an outdoor space to compensate, designed as a breathable space and a transition space, such as a balcony (Kisnarini et al., 2018).

## 2.0 LITERATURE REVIEW

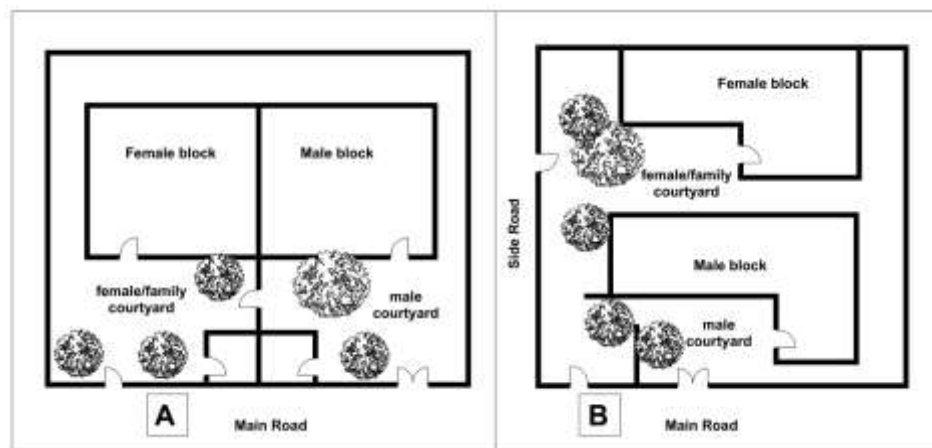
The single-storey courtyard house is the traditional type of house in the northern and middle states of Sudan, including Khartoum. Apartment-villas or apartment-houses are the second type of housing being up to 3 floors. The design of apartment, whether it is part of an apartment building or an apartment-villa, should always respect and reflect the local culture of Sudan. In Sudanese culture, the internal house design has several key points that need to be considered (Yousif & Aziz, 2021), which are:

- Sudanese have strong social bonding which includes extended family, friends, and neighbours.
- Long term visitors are always expected.
- Gender separation in space layout is very important between the family and the male guests (two zones).
- A veranda is an important part of the design, for daily use, as it represents living space.
- Yards are used for both personal and social activities due to the limited number of rooms which are not for any specific family member.
- Provision of solid wall fence on the house boundary for privacy and security.

Respecting the community culture and their need, the balcony importance within the multi-storey residential unit could be categorized under two main functions:

### 2.1. Balcony to replace the yard space in traditional Sudanese house

The importance of balconies in apartment units in Khartoum come from the significance of the yard space in traditional Sudanese houses, as the latter is used daily for various social activities such as having tea and refreshments, family gatherings, sleeping, playing, and even as a working space during special events. The yard space is always furnished with metal outdoor furniture including beds. The privacy of the yard space is an important issue; thus, in a traditional house design, there is a front yard and backyard, or two front yards separated by a high wall for females and males as illustrated in Figure 1. The separation considers visual privacy, outdoor private and semi-private spaces, and thermally comfortable environment due to shady trees, climbers and creepers as part of the yard landscape (Yousif & Aziz, 2021).



**Figure 1.** Traditional Courtyard house, layout (A) and layout (B)

Source: Author



**Figure 2.** Sudanese courtyard space is prepared with outdoor metal beds after sunset  
(Source: Om Raffif Saud, 2019)

Even though the general layouts of traditional Sudanese houses have various courtyard designs, all serve the same function for family and guest gathering at various occasions throughout the day. As shown in Figure 2, the beds are used for sleeping outdoor under the clear sky and with natural ventilation.

The absence of the yard space in contemporary house design and apartment buildings has interrupted the Sudanese lifestyle and culture in terms of visual privacy, gender separation, and entertaining long-term guests or close relatives. In comparison, the small balcony provision in many apartment buildings barely satisfies the need for an outdoor space function, where a large balcony has similar uses as a yard. Though cost is one of the most important aspects to consider in building construction, the designer should take serious considerations into the spaces and functions that represents the culture of the locale, not just to follow the international design style.

Table 1 represents the characteristics of the yard space of the Sudanese traditional courtyard house that should be available in the balcony of an apartment unit to be a social space that take into considerations the visual privacy and thermal and social comfort.

**Table 1.** Propose balcony characters that represent the traditional courtyard character

<b>Courtyard space characters</b>	<b>Balcony space characters</b>
Yard is a visually private space due to the use of high fence wall	Use screens to create private or semi-private balcony
function for socially activities with gender separation for guest	Reasonable size and shape to encourage social activity.
Thermally comfortable	Use of shading devices and correct orientation to direct wind and prevent direct sunlight
Mostly planted with shaded tress and ornamental flowers.	Balcony gardens
Partially shaded from building and tress.	Recess design (semi-recess or full recess)
Safe and secure	Safe and secure through good balustrade design and materials

In Khartoum, when size of the balcony is reasonable, the Sudanese used it as a fun-filled guest area and barbecue area on Eid and special occasions. Therefore, for a variety of private activities and functions, the balcony area should be of an appropriate size and have an adequate level of visual privacy, social comfort, and security able to fit most of the requirements, if not all.

## 2.2. The balcony design parameter

A balcony is an important façade element to determine a building style and plays a significant role in building appearance as well as providing a social space to enjoy the cool breeze and a place to meet and converse with neighbours or welcome visitors (Hawkins et al., 2015). The fundamental function of a balcony is to provide residents with rapid and easy access to the outdoor environment (Papamanolis (2004). A balcony is regarded as a bridge, a

transition layer or a mediator between the building's interior and exterior environment as it blocks or reduces direct sun heat and severe sun glare, provides natural ventilation and views, reduces outdoor noise, and may reduce heat transfer Safarkhani (2016). Ek et al. (2020) further emphasize that balcony is also a transition space between private and public spaces.

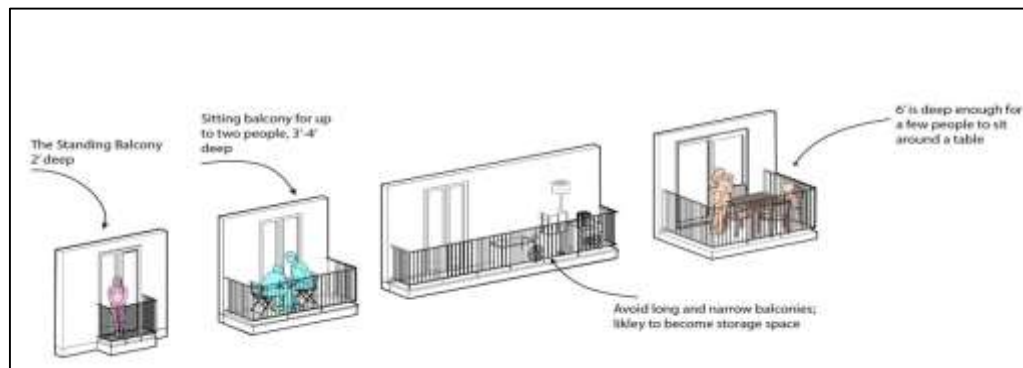
Papamanolis (2004) further explained the advantages of having a balcony in today's buildings based on numerous viewpoints. First, a balcony influences the building's appearance and aesthetic. Second, a balcony affects natural daylight and sun shading, as the transparent opening is essential to increase natural light filtering indoors. Furthermore, the accurate projection, materials, and orientation should be considered to avoid excessive heat and the greenhouse effect. Third, a balcony has impact on heat transmission. If the temperature on the balcony increases, the heat may be transmitted into the interior space by infra-red radiation and stored in the building envelope. Positively, a study by Wing Chau et al. (2004) indicated that having a balcony in apartment units has the advantage on property pricing, despite the noise and air pollution that comes with it.

### 2.2.1. Balcony physical parameters

The physical parameters of balcony have impacts and influences on the functionality and usage of the balcony and its related spaces which include the shape and size, view and visual access or restrictions, material of balustrade, safety, and security; and its placement in relation to other spaces in the unit influences its uses and functions.

Firstly, the shape and size of the balcony determine the type of activities on the balcony; as the size increases, the use and social activities also increase. Moreover, the unavailability of the service area and storage space in apartment units led to the use of balcony for utility space or as store.

There should be a minimum size for the balcony that could help and encourage different activities and functions, as balcony size also has a direct link to the apartment unit size (Aydin & Sayar, 2020). The reference is made to the human scale as a person needs a minimum of 60 cm for one person to stand comfortably. The smallest usable depth for a balcony for standing is between 45 cm to 60 cm (1.5 to 2 feet). At 90 cm (3 ft) depth, two people can sit for coffee, while at 180 cm (6 ft) depth, the space can accommodate four people sitting at a dining table. A balcony at the size of 180 cm to 240 cm (6 ft to 8 ft) is comfortable when hosting larger groups (Naama & Misha, 2017), as shown in Figure 3.

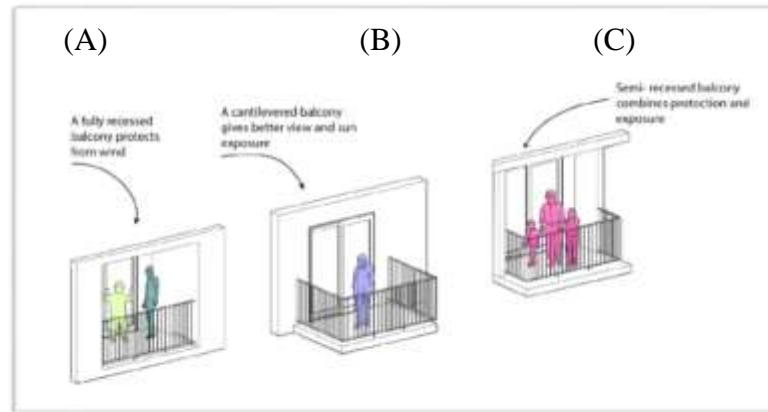


**Figure 3.** Different balcony size, shape and furniture layout influence the use of balcony.

Source: Naama and Misha, 2017

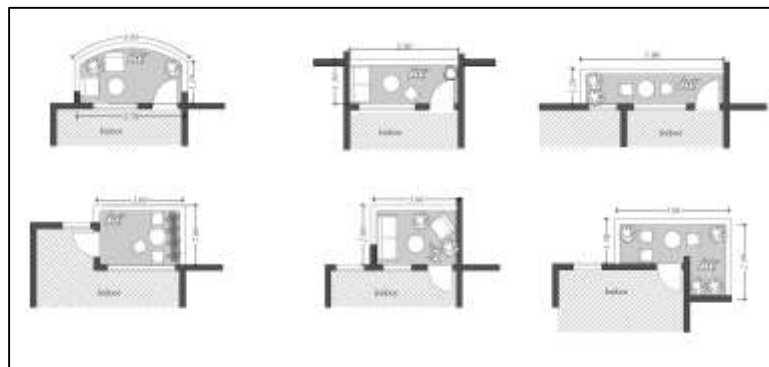
Secondly, the design of balcony recess which are the fully recess, semi-recessed and cantilever balcony, as shown in Figure 4, which able to improve the visual privacy and comfort. Design (A) shows a full inner recessed balcony that is sheltered from the wind. It is also protected from neighbours' views on both sides of the balcony. Design (B) is a cantilevered balcony with a better outdoor view and less sun exposure. Lastly, Design (C) shows a semi-recessed balcony that protects occupants from the wind and sunlight. A semi-recessed balcony in Khartoum may also be good if the façade is not facing the sun. Regardless of the orientation, the balcony's design influences the building's aesthetic features, level of privacy, and range of activities. The most suitable balcony design in Khartoum is design A, while design B and C is not recommended unless it is shaded and facing the evening sun. According to the world's climate

region, Khartoum is in the tropical climate within the dry tropical region. It has dry-hot summer with high temperature, rainy season and dry winter (Levy & Latif, 2007).



**Figure 4.** Different balconies recess and sun exposure effect on each design.  
Source: Naama and Misha, 2017

For the shape design, a rectangular, thin, and long balcony at an approximate width of 120 cm to 160 cm is the more useful in modern compact apartment designs. Figure 5 shows six (6) designs of balcony shape with the same area of six metres squared: with different shape, furniture layout, and recess. The shape of the balcony has a direct relationship to its functions where proper dimensioning can lead to better furniture layout and improve its usage.



**Figure 5.** Six different models and furniture layout for 6-meter sq. balconies.  
Source: Author

Furthermore, Mohammadi et al. (2010), reiterated that the design of the opening, balcony arrangement, and internal space division significantly impacted on the internal air circulation.

Thirdly, safety and security in the design of the balcony is critical due to the presence of children and the fear of falling, as well as protection from thieves and crimes. This need depends on the elements used on the balcony to enhance the safety of occupants, such as the balustrade or railing, in terms of height and materials used. Figure 6 shows the owner using a metal grill above the balustrade to fully cover the balcony for safety and security reasons, especially on low-level floors.



**Figure 6.** Metal grill on the balcony with climber plants and flowerpots in Khartoum.  
Source: author

Different countries have their own standards of balustrade and barrier height for children's safety. In Australia, a balustrade's height is 89cm. In the United Kingdom and New Zealand, balustrades are 110 cm in height, and openings between the balustrade and balcony slab must not exceed 10 cm. Singaporean balustrades are generally 100 cm height, and Canada has exterior balconies (single-family dwelling units) that are 90 cm high with exterior stairs and landings of more than 5m above the surface below (150 cm in height) (Yusuf et al., 2015). While in Sudan, it is 90cm for residential buildings. The requirements for the height of balustrade are for the security reasons, not for visual privacy.

Lastly, materials used for the balustrade are also essential for building aesthetics, security, and visual privacy. For example, the use of the glazed balustrade gives the occupants an open view but reduces the privacy of the occupant as the activities on the balcony can be seen by the public, as illustrated in Figure 7 (Kennedy et al., 2015).



**Figure 7.** Glass balustrade reduces the visual privacy, especially at night when curtains are put aside.  
Source: Kennedy et al., 2015

### 2.3. Balcony for social activity and interaction space

Balcony is an important social space for interaction and communication (Calvo & Bejarano, 2020). Balconies are used differently from family to family and for personal use in the morning and evening to relax and enjoy nature, social interaction with family members or between the close neighbours (Smektała & Baborska-Narożny, 2022). However, Cowan (2011) argued the balcony position exposed individuals to public gaze and gossip, allowing them to see and hear the environment below and across.

In reality, balconies are also used as a utility area when there are no such provisions to store or hang clothes in the apartment unit. Moreover, a study conducted in Turkey by Mohammadi et al. (2010), determined that gender, age, household size and number of children in the house did not affect the use of balconies but it affects its functions.

During the Corona-virus pandemic in 2020, the use of balconies became more important (Aydin & Sayar, 2020), when most cities are under lock-down period and citizens are not allowed to leave their houses without strong reason. The lockdown experience heightened the debate regarding the need for outdoor spaces and natural environment to alleviate mental health (Pouso et al., 2021; Smektała & Baborska-Narożny, 2022). Emekci (2021) stated that the balcony has lost its identity and importance in the 21st century as one of the façade architectural elements; however, during the pandemic, people started to discover their balconies again “as a new form of freedom”. People living in apartments in Italy, find ways to interact with their neighbours by dancing, singing, and playing musical instruments from their balconies. This also happened in Spain (Calvo & Bejarano, 2020), where the Spaniards organise dancing and theatre competitions, as well as religious parades; children's banners with motivational messages have been posted, and neighbours have organised poetry readings, all on the balcony.

### 2.3.1. Privacy and social interaction elements

The visual privacy and social comfort of balcony inhabitants are mostly determined by the screening techniques utilised in balcony and façade architecture. Many elements are used in a façade design and balconies which would improve visual privacy and control the level of interaction desired such as blinds, mashrabia, screens and plants.

Mashrabia is one of the oldest shading and privacy strategy in the Middle East countries' traditional architecture, such as in Egypt, Morocco, Saudi Arabia, Gulf countries, Iraq, and Sudan, which certainly include Port Sudan in the East of Sudan, so that the female can watch the street without being observed by other people (Abbasoglu & Dagli, Jan 2019). Figure 8 illustrates modern design of mashrabia while Figure 9 indicates the method of using fabric of similar tone and colours for one whole façade as a flexible way to control direct sun exposure and visual privacy.



**Figure 8.** Modern design of mashrabia in the form of sliding screen used at the balcony of Barceló resort Mussanah, Oman.

(Source: Maysa Yousif, 2023)



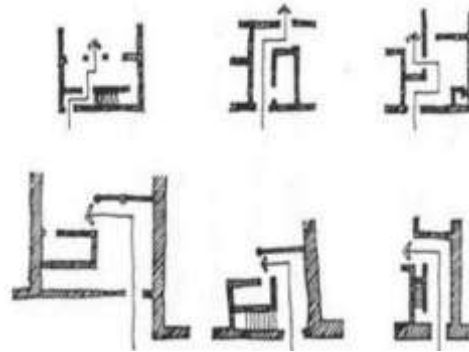
**Figure 9.** Curtains to control the level of privacy, interaction, and sun exposure level on their balconies in Beirut, Lebanon

(source: The Legal Agenda, 2019).

The use of plants to provide more privacy in any outdoor space is relatively an old technique used in a courtyard. Climbing plants on building façades facing main roads or within a short distance from neighbours may provide essential privacy and reduce noise. Plants have significant effect on human performance, productivity, psychological health and well-being, cognitively lowering stress and physically filtering contaminated air (Sharp et al. (2008) and Singh (2017).

Having plants on balconies that can produce vegetables will have significant advantages such as heightening food security, recycling organic waste, providing an economic advantage for urban areas, reducing transportation emissions, and providing inspiration for planners and designers (Bal & Pal, 2020).

Nevertheless, in many apartments unit's layout, the entrance directly faces the living space, which affects the level of visual privacy into the interior space. Therefore, entrance treatment is required, such as suggested by Bahammam (1987) cited in Othman et al. (2015) in Figure 10, to prohibit a direct line of sight from the guest to the private space while giving family members adequate time to make themselves presentable to greet the guests. Modern apartment designs should incorporate the indirect entrance concept, and balcony should be included in this application. In small apartment unit, visual privacy could also be achieved using the indirect entrance by providing a balcony at the entrance, movable partition, or fabric curtains, which could be part of the interior decoration (Yousif & Aziz, 2021).



**Figure 10.** Indirect entrance ideas in Muslim houses for higher visual privacy  
Source: (Bahammam, 1987; Othman et al., 2015)

### 3.0 METHODOLOGY

This study explores the significance of balconies and physical design parameters employed in balconies that contribute to the level of privacy, comfort, and utilisation in Khartoum residential units in order to recommend appropriate balcony design guidelines that suits the Muslim Sudanese culture as a social space.

Data is collected using a mixed method. Firstly, questionnaire survey is used to investigate the importance of balconies in apartment living and their contribution to Sudanese culture; respondents are Sudanese residents living in apartment units with balconies in Khartoum. The second method is a case study that examine six (6) apartment units with balconies in Khartoum, through observation, photography and prepare the unit's layout. The observation includes defining the positioning of the balcony and its relation to other spaces within the unit, accessibility, balcony orientation, balcony parameters, evaluation of visual privacy on the balcony, and ultimately the activity undertaken by the occupants. The observation was done over three consecutive days for each case. Two main criteria for the selection of the case study are the unit should be a minimum four-storey apartment-villa or apartment building located in Khartoum and has various balcony designs to provide opportunities for various analysis.

Six (6) residential buildings were selected with immediate owner's approval for the author to do data collection. Table 2 summarises the six (6) case study samples' floor plans and view of the balcony (which are also illustrated by Figures 11 to 22).



**Table 2.** Case study layout plans and view of balcony

Floor plan	Balcony view
<p>1</p>  <p>*Figure 11: Case study 1 floor plan</p>	 <p>Figure 12: case study 1 exterior view Source: Ministry of Reconstruction and Housing Fund, Sudan (2012)</p>
<p>2</p>  <p>*Figure 13: case study 2 floor plan</p>	 <p>*Figure 14: Case study 2 exterior view Source: Maysa Yousif, 2017</p>
<p>3</p>  <p>*Figure 15: Case study 3 floor plan</p>	 <p>*Figure 16: Case study 3 room balcony Source: Maysa Yousif, 2017</p>



\*Figure 17: Case study 4 floor plan



Figure 18: Case study 4 exterior view  
Source: Maysa Yousif,2017



\*Figure 19: Case study 5 floor plan



\*Figure 20: Case study 5 entrance balcony interior view. Source: Maysa Yousif, 2017



\*Figure 21: Case study 6-unit plan



Figure 22: Case study 6, Exterior view.  
Source: Maysa Yousif, 2017)

\*Source : Yousif, M. & Aziz, A. A.,2021.

4.0 DISCUSION AND FINDINGS

4.1. Questionnaire survey result

The survey contains questionnaire with certain answers to provide certainty and prevent confusion. It was carried out through monkey survey program send via social media under Facebook and personal WhatsApp within one-month period from June 24 to July 25, 2018. The survey was analysed through the Statistical Package for Social Sciences (SPSS) in the form of graphs and tables. This analysis is based on responses from 150 respondents, 107 (71.3%) females and 43 (28.7%) males. The age of respondents who answered this questionnaire is set in five age groups from the age of 18 to the age of 55 and above as shown in Figure 23.

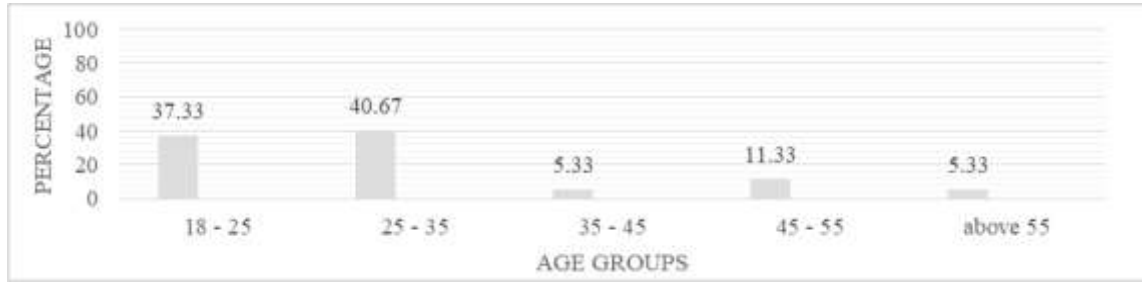


Figure 23. Respondent age groups

Table 3 represents the respondents answer on the importance of the balcony in their apartment units. Almost 80% of respondents rated the balcony as important, while 20% said it was either less important or not important to them. Their answer may reflect the functions and size of the balcony.

Table 3. Importance of balcony

	Extremely important	Very important	Important	Less important	Not important	Total
Percentage	33.33 %	24.83%	30.20%	9.40%	2.68%	
Frequent	50	37	45	14	4	150

In the next question, respondents were asked to determine the size of their balcony based on the typical balcony plan with scale furniture. The balcony scale is based on the capacity to fit type and numbers of furniture; a small size balcony is between 3 to 5m<sup>2</sup>, a medium size of 6 to 9m<sup>2</sup> and a large size for more than 9m<sup>2</sup> area. Figure 24 shows almost 46% of the respondent have small balcony while 29.9% have large balcony.

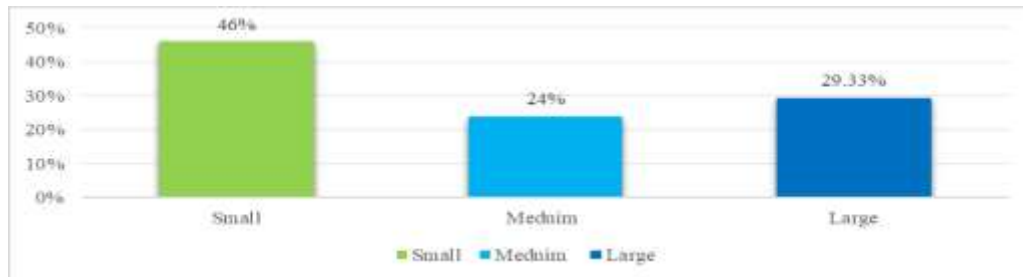
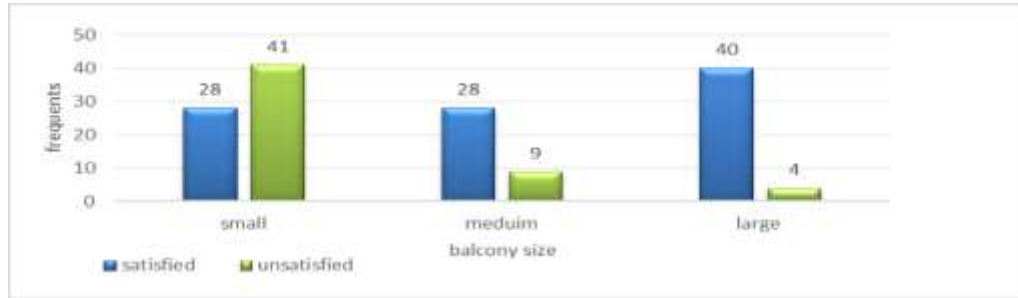


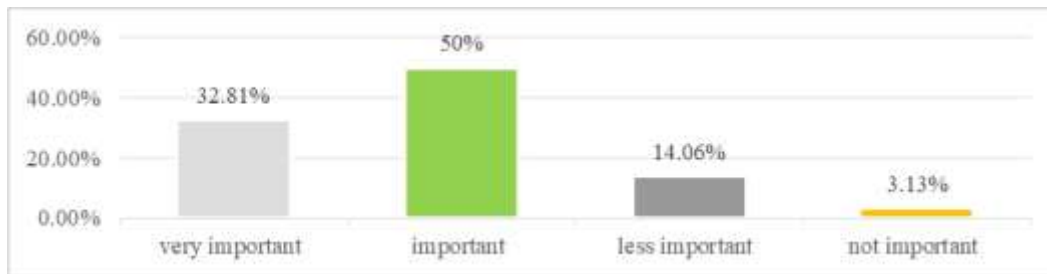
Figure 24. Respondents' apartment balcony size.

Consequently, respondents were asked to determine the satisfaction level according to the balcony's size. The results indicate that occupants with small and medium-sized balconies were less satisfied than occupants with large balconies as illustrated in Figure 25.



**Figure 25.** The relationship between balcony size and respondent's satisfaction

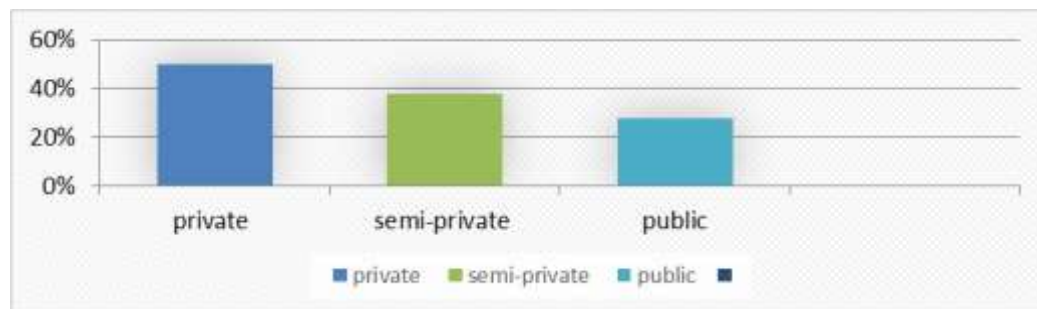
Further, respondents were asked to express the importance of having large balconies. Results are shown in Figure 26.



**Figure 26.** Importance of having large balcony

Balcony design directly relates to the users' behaviour, which means a well-designed balcony in terms of size, shape, solar shading, and privacy screens will automatically encourage or discourage the use of the balcony especially for female.

Next, respondents were asked to determine the status of privacy of their balcony, either a public, semi-private or private space. Here, the privacy status relates to what the respondents feel when they are using their balcony and whether it is a private space for them. The privacy status as shown in Figure 27, automatically gives an indication of the social comfortability and activity of the balcony.



**Figure 27.** Privacy status for balcony

In relation to the importance of having a large balcony, respondents were asked to choose what they normally do on the balcony between the stated activities and the importance of each activity from their perspective: social interaction with friends, morning tea and refreshment, lack of electricity, the balcony as a family space for talking and hosting visitors, and for drying clothes. According to Figure 28, the balcony is very important during an electricity blackout (which is quite frequent in Khartoum) and for drying clothes; the second level of importance is as a family space and for morning tea.

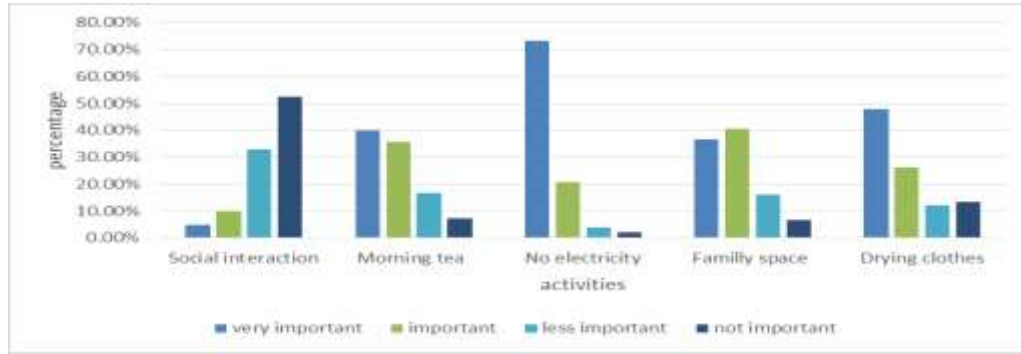


Figure 28. Activities on the balcony and its importance.

In Table 4, respondents were asked about the visual privacy of their balcony according to the existing situations, whether they had ever thought of covering the balcony with curtains or fibre panels to increase the level of privacy. 36% confirmed their need for more privacy, 51% said no, which meant they are comfortable with the current level of visual privacy.

Table 4. Covering balcony with fibre panels

Consideration of covering the balcony to increase visual privacy?	Response rate	Frequency
Yes	36%	54
No	51%	77
Sometimes	12.65%	19
Total		150

Assuming the balcony space is a social place, communicating with surrounding neighbours may be one of the considered factors in balcony designs, with the provision of the appropriate visual privacy level, as the design of the balcony varies between open, semi-open or semi-closed space. The balcony design may allow occupants to greet their neighbours, spread the ‘Salam’ as taught by the prophet Muhammad. As illustrated in Figure 29, 51% agrees they are able to talk with their neighbour while being on the balcony.



Figure 29. Respondents' ability to communicate with neighbours while being on the balcony

The yard space in traditional houses is a very important social space, and its omission in apartments reduces the number of outdoor activities especially the interaction between family members. Accordingly, the respondents were asked to show their acceptance of replacing the yard space with balcony, 69% of respondents agreed with the idea as shown in Table 5.

Table 5. Respondents' agreement level to replace the yard space with a balcony.

Replacing yard with balcony	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Percentage	36%	33%	16%	10%	4%	
Frequency	54	50	25	15	6	150

Respondents were asked on their willingness to grow plants on the balcony as one of the methods to increase level of visual privacy. Table 6 indicates 80% of the respondents agreed by using plants will increase the level of privacy.

**Table 6.** Respondents' opinions on using climbing plants on a balcony to provide visual privacy.

Opinion on using climbers plants to increase visual privacy	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Percentage	36%	44%	11.33%	7.33%	0.67%	
Frequency	55	66	17	11	1	150

#### 4.2. Case study results

Data from the observations of the six (6) case studies was interpreted through structured observation, and documenting the architectural plans shown in Table 2. Further analysis of the available balconies is presented in Table 7 which indicates the parameters in relation to their shape, size, characters, accessibility, and elements.

**Table 7.** Balcony parameters, activity, and privacy level.

Case study	Size	Balcony access	Privacy screens	Orientation	Recess	Activities	Privacy level
Cs 1	6 m <sup>2</sup> 1.2 m width	Bedroom	No screens	-	Cantilever	Utility area drying clothes	Low
Cs 2	14 m <sup>2</sup> (Rectangular)	Saloon	No screens	North	-	Sitting/ family use	Low
	2.5 m * 4 m (Rectangular)	Bedroom	No screens	North	-	Drying clothes, social use of family and friends	Moderate
Cs 3	12 m <sup>2</sup> (Square)	Master bedroom	Wooden mashrabia	West	Fully recess	Private use	Moderate
	13.5 m <sup>2</sup> (Square)	Living hall	No screens	West	Cantilever	Social use	Low
Cs 4	21 m <sup>2</sup> (Rectangular)	Front entrance	Horizontal metal strips screen	South	Fully recess	Social activities	High
Cs 5	16 m <sup>2</sup> (Square)	Front entrance	Vertical metal grill	East	Cantilever	Social activities	High
	Long narrow	Back of the living Hall	Vertical metal grill	South	Fully recess	Utility area, dry clothes	High
	Long narrow	Front of the living hall	Vertical metal grill	North	Fully recess	refreshment	High
Cs 6	Width 1.2 m	Living hall	No screens	East	Fully recess	Refreshment, personal use	Moderate

Case study 5 has the highest visual privacy level for balcony, probably because the unit has three different types of balcony which are secluded from each other and all has different functions and much related to the accessibility. The square balcony located before the entrance door allows for visitors to interact with occupants outside of the occupants' private domain, the visitor can access to the toilet; however, to do so, he or she has to enter inside the unit. On the other hand, the house occupants also able to serve drinks to the visitor as the location of the balcony at the main entrance is next to the kitchen and accessible through the private door without the visitor entering the unit. Serving at least drinks to the short-term visitors is considered as good manners to the Muslim in terms of respecting guests.

The final discussion from the survey and case study will focus on two primary points: balcony position within the residential unit and the visual privacy and exposure level of the balcony.

### **4.3. Balcony positioning within the unit**

Balcony could have three proposed positions in any apartment, whether it is adjacent to the bedroom or linked to the living space. When the balcony is accessible from the bedroom as in case study 1 (\*Figure 11), it is considered as private space and the users are meant only for family members. However, when it is accessible from the bedroom as well as from the living area as in case study 4 (\*Figure 16 and \*Figure 17), any visitors also may access the private space which may reflect on safety and security. When the balcony is linked to a public area such as the living room or the guest space as in case study 5 (\*Figure 19), it is accessible to both family and visitors for shared activities and non-specific functions (Yousif & Aziz, 2021).

Each case study above showed different balcony designs and consciously different uses. Large balconies such as in Case Study 3 (\*Figure 15 and \*Figure 16), Case Study 4 (\*Figure 17 and \*Figure 18), and Case Study 5 (\*Figure 19 and \*Figure 20) had more social uses than the others, mainly due to the size and the screening techniques available. The questionnaire confirms this, as respondents have high degree of satisfaction with large balcony and high level of dissatisfaction with small balcony and the rate for the use of balcony for social activity especially during the blackout are more than 70%.

Meanwhile, small balconies have become popular in modern design due to high construction cost and expensive land values in general. Façade are left as an open structure without any privacy screens, such as in Case Study 1 (\*Figure 12), Case study 2 (\*\*Figure 14), and Case study 6 (\*Figure 22). The balconies mostly took a narrow, rectangular shape for quick access to the outdoor environment, such as in Case Study 2 (\*Figure 13) and Case study 6 (\*Figure 21); this is also confirmed by the questionnaire as 46% has small balcony and only 29.33% has large balcony.

In Case Study 1 (\*Figure 11 and \*Figure 12), the balcony is a small area with access from the bedroom and there is no provision for service area in the apartment unit. Hence, the balcony is used as a storage area and for drying clothes, this led to the importance of having separate utility area away from the main balcony, the same to what is provided in Case Study 6 (\*Figure 21). Almost 50% of survey participants use the balcony for drying clothes.

Having a balcony located at the entrance as in Case Study 5 (\*Figure 19 and \*Figure 20) has two primary advantages. It creates a transition space before the main entrance to the unit which created a similar transition yard space in the traditional Sudanese house. With a reasonable size, the balcony also becomes a space to entertain short term visitors especially male visitors without the need for them to enter into the unit (Yousif & Aziz, 2021). Referring to the survey, nearly 69% of respondents agreed to replace the yard with a balcony in order to satisfy the need for a yard in apartments.

The owner of Case Study 5 has renovated the balcony subsequent to the investigation. The wall and door with access to the utility area from the balcony was replaced by metal screen wall with a sliding door as shown in Figure 30. This modification enhances the spaces functions and improved the level of interaction, ventilation and lighting between the service area and the balcony.



**Figure 30.** Case Study (5) after renovation: screen door and wall separate the utility balcony from the living balcony  
Source: House owner (2023)

The artificial green coloured climber plant on the metal screen adds more privacy to the space, while the artificial carpet grass helps to reduce glare and heat from the evening sun compared to the previous tiled floor. Even though they are not real plant, it positively influences the balcony atmosphere.

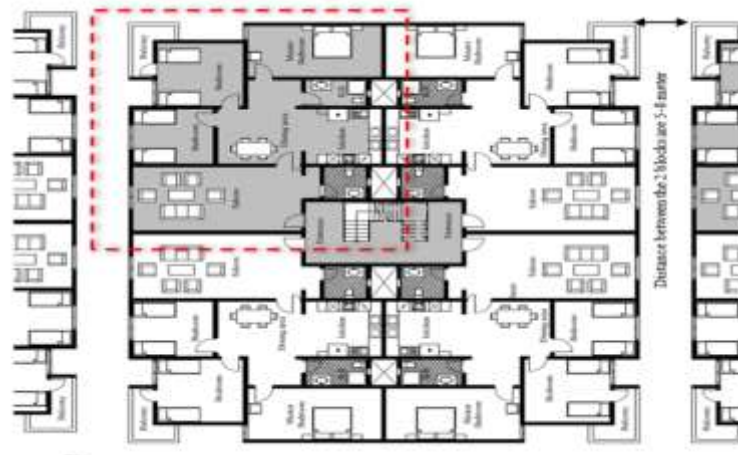
#### 4.4. Visual privacy and exposure

Smektała and Baborska-Narożny (2022) firmly stated that a well-designed and spacious balcony can act as a substitute for a private garden or yard, consequently contributing to the fulfilment of psychological demands for various spatial experiences and purposefulness.

In order to achieve the ideal residential building design, social interaction and visual privacy are equally necessary. A balance is needed to achieve these two needs (Altman and Chemers (1984) including the need for a stable and sustainable situations (Marufa et al., 2021). Balconies, as a privately owned outdoor space, can be treated as a private or semi-private space depending on the treatments used to improve visual privacy, distance from neighbours, and other factors to achieve a balance between social interaction with neighbours and the surrounding environment while maintaining a desired level of visual privacy to act and perform various activities.

The exposure level and interaction between the users and their neighbours of the case studies also varies. Case Study 1 (\*Figure 12) has low level of privacy but high level of interaction between neighbours as the building blocks are located within a short distance of only 5 meters away within the compound as in Figure 31, having the balcony on the main facade do not justify the building aesthetics when the users have to use it as service area. 51% of the respondent in the survey confirmed that they are able to talk to their neighbour, which indicates high level of interaction within the neighbourhood. However, 36% have thought about covering the balcony with something that would increase the level of visual privacy and 12% occasionally feel needed, indicating the importance of controlling both visual privacy and interaction. Therefore, an adjustable feature that allows the occupants to fully or partially open and close is advised to suit the needs.





**Figure 31.** Case study 1: part of the master plan for the building blocks. El-awda complex project.  
Source: Ministry of Reconstruction and Housing Fund, Sudan (2012)

For balcony in Case Study 2 (\*Figure 14), despite the lack of screens and privacy elements, it offers a moderate amount of exposure and privacy due to the distance between the front yard and road; hence, the user may converse with passers-by on the street.

Case study 3 (\*Figure 15) has two balconies, one is a private balcony linked to the master bedroom and featured with wooden mashrabia, and it has moderate exposure level with their surroundings environment and neighbour due to the building blocks distance. The other is a public terrace that linked to the living room, it is public in use and highly exposed to the surrounding with large size of 13m<sup>2</sup>; however, visitors have to enter the house to be entertained and this reduces the level of privacy for the ladies while they are working.

Case Study 4 (\*Figure 17) has a fully recessed balcony with an area of 21 squared meter, semi-enclosed with metal grille providing a good visual privacy and low level of exposure and interaction to the environment. The owner has the idea to expand the enclosed area for the family expansion in later years.

Case Study 6 (\*Figure 21 and \*Figure 22) has a fully recessed balcony with a reasonable level of visual privacy and exposure due to its height and that there is no other building located in front of it. Despite the absence of privacy features; the building location becomes important. This balcony faces the Nile making it visually private while maintain low level of social interaction as shown in Figure 32.

Lastly, an idea has also been thrown to the respondents on improving the visual privacy on balconies by using climber plants (Table 6), similar to Case Study 5 (Figure 30), 80% of the respondents agreed that this will definitely improve the visual privacy level. As plants provide numerous benefits for people's psychological health, they also make a space more beautiful.



**Figure 32.** case study 6 balcony view toward the Nile as seen from the living room.

Source: Maysa Yousif, 2017

Hence, to summarise, factors that affect the use and comfort of a balcony as a social active space are as follows.

- i. Size: There should be a minimum size for the balcony, which would encourage different occupants' activities and functions with reference to the human scale for at least two persons to sit.
- ii. Shape: the balcony shape will affect the building aesthetics; however, the shape should enable proper use of the space to fit furniture and minimal access surrounding it.
- iii. Balcony design: A recessed, semi-recessed or fully cantilevered balcony have different effects on the level of visual privacy, sun exposure and view. The choice of balcony design should consider not only the climate in terms of orientation, sun exposure and wind direction but most importantly provide visual privacy from adjacent buildings.
- iv. Access to the balcony: access influences the occupants' activity and use of balcony. If the balcony is intended for private used, it should not be accessible from semi-private space to ensure the privacy and security of the private space.
- v. Balcony balustrade: The design, height and materials used for the balustrade are important, not only for the security and safety of the occupants but also the visual privacy and building aesthetic. In contemporary architecture, a glass balustrade provides an open view, looks pleasant on the façade and increases natural lighting. However, it needs a layer of dark film or other suitable material to provide privacy to the occupants.
- vi. Privacy screens/Sun protection elements: The need for the privacy element is higher than before due to the close proximity of building blocks; furthermore, use of glazed windows and doors and heat absorption building materials increases the indoor temperature. Horizontal and vertical screens, mashrabia screens or climber plants enhance visual privacy, while simultaneously allows natural ventilation and prevent direct sun exposures.
- vii. Balcony gardens: The use of plants in balconies provide good psychological impact to the occupants, increase the building aesthetics and able to reduce the indoor temperature. However, care should be taken for the need of additional maintenance.
- viii. Minimum number of balconies in any apartment unit should be two: one main balcony for social usage and another for utilitarian functions.

## 5.0 CONCLUSION

In conclusion, it is important to have a private outdoor space in every apartment unit that considers not only the physical parameters but also the emotional parameters such as visual privacy, interaction and both social and thermal comfort levels, in order to achieve maximum and effective use of the balcony space. Furthermore, balcony in apartment buildings could replace the yard space that reflects the people culture and beliefs of the Muslim Sudanese in this research.

This study has showed it is necessary to improve the balcony design for domestic buildings, with regard to Islamic laws and regulations to provide guidance to achieve the minimum standard for view, safety and security, social comfort

and social interactions including privacy levels which have never been included in the rules and regulations of balcony design and façade treatment not only in Sudan but also to other Muslim countries.

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