

# Climate-Responsive Architecture and Social Cohesion: The Role of the Verandah in Kutch's Traditional Dwellings

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**Abstract**—The verandah, a time-honored architectural space, has garnered substantial interest due to its adaptability across varying climates. This study explores the historical significance of verandahs, focusing on their evolution, typologies, and functional roles while emphasizing their adaptability in hot and arid regions. This study specifically investigates the intricate relationship between verandahs in traditional houses of the hot and arid region of Kutch and the lifestyle of its inhabitants. The primary objective is to analyze the verandah's role within dwelling spaces and how it responds to contextual and climatic factors, shaping human behavior and social interaction. In the hot-dry climate of Kutch, verandahs play a crucial role in mitigating extreme temperatures through strategic architectural features such as wide overhangs, low-sloping roofs, and enhanced ventilation. The study systematically explores these elements, revealing the symbiotic relationship between verandahs and residents' lifestyles. The findings underscore the verandah's ability to promote thermal comfort, airflow, and environmental cohesion while simultaneously serving as a social and cultural space. By emphasizing how these spaces, rooted in traditional dwelling design, address both climatic challenges and social dynamics, the research contributes to a deeper understanding of the built environment in hot and arid regions, highlighting the continued relevance of verandahs in contemporary residential architecture.

**Keywords:** Climate-responsive Architecture, Social Cohesion, Traditional Houses, Hot and Arid Regions, Human Behavior, Contextual Parameters, Culture.

## INTRODUCTION

The architectural fabric of a place evolves through a complex interplay of multiple layers, encompassing various physical and cultural dimensions. It unfolds as a reflection of the dynamic relationship between the living and cultural patterns of societies, social structures, historical connections, climatic conditions, available material and resources, economic dynamics, and technological advancements, as well as the aspirations of the people. Each layer within this intricate tapestry contributes distinctively, culminating in a complex yet harmonious whole.

Traditional house forms, evolving over extended periods, undergo numerous refining stages. Despite external

influences, a continuity of tradition persists, assimilating changes while preserving fragments of its past, upholding intrinsic value. This refinement process, primarily driven by the people inhabiting these spaces, results in a near-completeness of architectural character. Traditional houses are indigenously developed, utilizing local resources and skills effectively. The relationship between inhabitants and these spaces forms a symbiotic bond, guided by traditional principles and spontaneous responses.

In the context of the Indian climate, verandah spaces have played a pivotal role in shaping the lifestyle of its inhabitants.

They maximize daylight use and provide climatic comfort, especially in the absence of mechanical ventilation. In the traditional framework, the use of verandas, unlike in some societal contexts, has never posed social problems related to privacy. The veranda, therefore, gains significance not only for climatic and social reasons but also in terms of its role in the constructional fabric of traditional dwellings.

The veranda acts as a transitional space, acting as a mediator that seamlessly connects interior spaces, characterized by controlled light and climate, with the natural environment, marked by the unpredictable elements of climate, such as sun, wind, and rain. This research endeavors to delve into the nuanced layers of traditional architecture, particularly focusing on the role of verandas, to unravel the profound connections between built environments and the societies they inhabit.

The exploration of the term "veranda" unfolds a rich tapestry of linguistic heritage and functional diversity, bridging cultural practices with architectural innovation. Originating from an intricate interplay of languages, including Hindi and Bengali, the term finds its etymological roots intertwined with the Portuguese and Spanish word "veranda," connoting a railing, balustrade, or balcony. Defined with precision as an open portico or a light-roofed gallery that graces the front and occasionally other facets of a dwelling, the veranda embodies a multifaceted architectural element designed for protection and interaction with the elements, notably the sun and rain. This nomenclature, particularly in regions such as New Zealand and Australia, extends to denote a structure that not only provides shelter but also interfaces with public spaces outside business premises (Murray & James, Ed. 1989).

A nuanced description elevates the veranda beyond its architectural confines, presenting it as an open, yet occasionally screened area, supported by pillars and often encircled by a balustrade. The veranda's adaptability enables interaction with both the vibrant activity of street life and the peaceful privacy of the home. In the specific climatic and cultural context of Kutch, the veranda is reimagined as a semi-open space, strategically positioned to mediate environmental conditions and social interactions.

The architectural rationale behind the veranda's prevalence in the hot-dry climatic zone of Kutch verandahs emphasizes its role in mitigating heat ingress through strategic material choices, ventilation mechanisms, and spatial planning. The verandah, an essential feature of traditional houses in Kutch, provides not only climatic comfort but also serves

as a socio-cultural space. While this study focuses on verandahs in the hot and arid Kutch region, it is essential to note that verandahs or similar architectural elements have been employed in other hot-dry climates around the world. In traditional Islamic architecture, the iwan serves as an integrated shading system that protects walls and openings while enhancing indoor comfort. This semi-open space promotes airflow and reduces heat in hot, dry climates, effectively connecting various areas of the home (Eskandari, Saedvandi, & Mahdavinejad, 2017). Its diverse forms and placements reflect its adaptability, akin to the verandah in Kutch, which also provides shade and ventilation for much of the year.

The concept of the courtyard, prevalent in North African and Middle Eastern homes, serves a similar role, offering shaded areas for cooling and social gatherings (Oliver, 1997). As noted in the study of Islamic house design in Saudi Arabia and Pakistan, courtyards are strategically designed to optimize airflow and maintain privacy, aligning with Islamic values of modesty and spatial segregation (Malik & Mujahid, 2016). The inward-oriented layout of these spaces not only enhances privacy but also fosters microclimates, helping to lessen the effects of the harsh desert climate.

Furthermore, in Iran, the iwan and sardab—a cooling underground space—are integrated into homes to combat the hot climate, showing parallels to the Kutch verandah's climatic role (Mirmoghtadaee, 2009). These cross-regional examples demonstrate a convergent evolution in architectural responses to environmental pressures, as cultures from different regions have developed comparable strategies to create comfortable living environments in hot-dry climates.

This study posits that successful housing must address socio-cultural, economic, and environmental sustainability. The veranda is evaluated in a framework that includes site-specific conditions such as topography and microclimate, along with cultural and symbolic values.

Recognized as a transitional space, the veranda operates at the nexus of the interior and exterior realms, embodying characteristics that are simultaneously semi-outdoor, semi-open, and semi-closed. Its architectural integration as an attached or supplementary element of the main building underscores its pivotal role in facilitating a nuanced interaction between dwellings and their immediate environment, eschewing the inclusion of palaces, institutions, and commercial structures to maintain a focused analytical lens.

This study aims to explore the role of verandahs in the traditional built environment of Kutch. Specifically, it seeks to understand how these spaces are shaped by local climatic and cultural factors, and how they contribute to both environmental comfort and social cohesion. By focusing on verandahs as integral components of residential houses, the study examines their function in balancing climatic challenges and facilitating community interactions.

### BACKGROUND

Kutch, an ancient land with a distinctive turtle-like shape, is a peninsula situated between Sindh and Saurashtra in the northwestern part of the state. It is bordered by Pakistan to the north and northwest, Rajasthan to the northeast, Banas Kantha and Patan districts to the east, Surendranagar district to the southeast, the Gulf of Kutch and Rajkot district to the south, and the Arabian Sea to the southwest. Being the largest district in Gujarat, it boasts a coastline of about 406 km. and covers 45,674 sq. km., representing 23.27% of the state's total geographical area. With 51% of the area as a high saline unproductive desert and 34.73% under agriculture, Kutch is characterized by treeless and barren Rann, rocky hills, and low-lying plains.

The Kutch Peninsula is segmented into nine sub-micro regions, each distinguished by topography, climate, geology, soils, and natural vegetation.

### CLIMATE OF KUTCH

The climatic profile of Kutch unfolds with distinctive seasonal variations, characterized by arid and hot summers, cold winters (except in coastal areas), and a notable monsoon season accompanied by strong-willed winds. The annual cycle is categorically divided into four seasons: a frigid interval from December to February, a sweltering phase spanning March to May, a southwest monsoon season extending from June to September, and a post-monsoon period unfolding in October and November.

Throughout the summer and southwest monsoon seasons, the region encounters gentle to moderate winds, intensifying notably in coastal zones, particularly during the monsoons. The period from June to October witnesses prevailing westerly to southwesterly winds, rarely giving way to calm weather conditions. Wind patterns undergo

a shift from west to northeast in October, north to east in November and December, and west to northeast in January and February. Between April and September, prevailing winds predominantly originate from the west or south-west. The subsequent months observe a fluctuation between southwest and northwest winds, occasionally veering north or northeast, especially in the afternoons. The colder months are characterized by rigorous east and north winds succeeded by robust south-westerly gales. Dust-laden air is a common occurrence, with April and May ushering in scorching winds and dust storms. October and part of November are distinguished by oppressive and muggy weather. Thunderstorms are prevalent during the monsoon, and sporadic dust storms manifest in summer, particularly within the district's interior.

Positioned beyond the reach of the southwest monsoon along the Tropic of Cancer, Kutch undergoes a sub-tropical monsoon climate within the arid and semi-arid expanse. The annual precipitation from June to September fluctuates between 250-350 mm, with July registering the highest rainfall, encapsulating the climatic intricacies of this region.

### KUTCHI PEOPLE, THEIR CULTURE AND TRADITIONAL KUTCHI HOUSES

Kutch has undergone a remarkable economic transformation over the past 23 years, becoming an industrial and tourism hub despite various challenges. This transformation is facilitated by strategic ports like Kandla and Mundra, connecting the region to global trade routes. Also, limited resources prompted some Kutchis to seek opportunities abroad, leading to a diverse diaspora engaged in various businesses.

Kutch is a melting pot of communities, with people speaking languages like Kutchi, Sindhi, Gujarati, and Hindi. The predominantly Hindu and Jain population follows a vegetarian lifestyle. Kutchi costumes, known for their uniqueness, feature intricate embroidery and mirror work and reflect the rich tapestry of different communities, which are identifiable by distinct handicraft patterns and dress styles. The area's unique geography has cultivated a rich culture known for diverse arts and crafts.

The architectural landscape in Kutch exhibits a nuanced variability contingent upon the diverse climatic regions

within the district. This variation is particularly pronounced in the hot-humid and desert regions, each influencing the design and construction of traditional dwellings.

Kutch's socio-cultural fabric is deeply rooted in a respect for native culture and caste. While the joint family system persists, it undergoes gradual disintegration due to occupational diversification. Women play a pivotal role in household management, and their substantial engagement in economic activities, agriculture, labor, and handicrafts, especially in rural areas, contributes significantly to the social dynamics of the region.

The climatic regions of Kutch have a profound influence on the development of traditional dwellings. In the hot-humid region, characterized by high humidity, dwellings incorporate large verandas and semi-open spaces to harness winds while minimizing solar heat gain. The hot-dry region emphasizes smaller openings, with extensive use of large verandas and overhangs to combat solar heat and hot winds. In the extreme hot and cold climate, minimal openings prevail, with verandas strategically constructed to enjoy moderate climates during specific times. Diverse building materials, including stone, wood, grass, and clay, contribute to the distinctive forms of houses across Kutch.

The architectural approach to house design in Kutch seeks a harmonious integration of various elements to achieve an optimal balance between the desire for the evening sea breeze, daytime heat protection, and a seamless connection with the outdoors. The design aims to shield occupants from the hot breeze and solar radiation while facilitating the influx of cool breezes. Notably, the veranda stands out as a vital and historically significant climate-friendly space. The veranda dynamically adapts to the climate, allowing controlled exposure to sunlight and facilitating the flow of cool breezes. It seamlessly integrates indoor and outdoor activities, accommodating a variety of uses for both household members and visitors. In essence, the veranda emerges as a flexible and inclusive space, responding to the diverse needs of its occupants within Kutch's unique climatic context. This study aims to delve into the intricate details of these veranda spaces, motivated by the diverse background of Kutch and its rich interplay of history, culture, and architectural innovation.

## METHODOLOGY

This research delves into the relationship between traditional verandah spaces and lifestyles through a primary study of selected case studies. The methodology ensures a rigorous exploration of verandas in the hot-dry region of Kutch, examining their contextual, climatic, and social significance.

The first stage includes a careful selection of case studies based on predetermined criteria. In the second stage, detailed data compilation in various formats involves drawings, charts visually representing activity patterns, and summaries from interviews to provide deeper insights. A pivotal aspect of the study involves a nuanced understanding of occupants' activities, emphasizing the seasonal variations that influence engagements. Veranda comparisons contribute to constructive inferences. The third stage examines compiled data, focusing on context, typology, built conditions, climate response, social parameters, and human interactions within the veranda. The systematic evaluation of its spatial dimensions and layout, aims to provide valuable insights into the intricate dynamics inherent in residential environments.

The concluding stage involves a comprehensive comparison of gathered information, emphasizing the identification of constants and variables. Synthesized insights draw upon extensive analysis and inferences made throughout the research study.

## DATA COLLECTION AND ANALYSIS

This research focuses on the village of Naredi in the Abdasa Taluka, Kutch district, covering 2,398.26 sq km with 168 villages. Naredi, situated 60 km from Bhuj, has a historical background dating back 400 years, transitioning from a Rajput community to including Jain, Bhanushali, and Muslim residents. The village, housing around 2500 people, maintains ancestral homes and exhibits gradual growth compared to nearby centers. Its selection is deliberate, considering its distance from the 2001 earthquake epicenter, resulting in less damage and offering an opportunity to study older houses. Migration-related vacant homes pose limitations but provide a unique research opportunity.

# Climate-Responsive Architecture and Social Cohesion



**Image 1: Map of India** **Image 2: Showing the Location of showing the Gujarat state**

**Image 3: Showing Location of Selected Houses in Naredi Village, Abdasa, Kutch**

**Reference: Survey of India, Department of Science & Technology**

**Reference: Image 2 & 3: Google Earth**

**Table 1: A Comparative Study of Residential Data Collection**

No.	HOUSE / ISSUES	HOUSE 1	HOUSE 2	HOUSE 3	HOUSE 4	HOUSE 5	
1.	What is there in front of verandah.	 Large open space in front, having otala and one tree.	 Back verandah having more open space and Large otala.	 Veranda facing Small closed chokh and narrow street.	 Paved Open space in front with high wall of vanda.	 Small open space in the center and back of house.	What kind of external things matter in the way verandahs are used.
2.	Scale and Proportion of veranda	 Ratio of Depth to length is 1:6.6 and Width to height is 1:1.4	 Ratio of Depth to length is 1:4.4 and Width to height is 1:1.1	 Ratio of Depth to length is 1:6.7 and Width to height is 1:1.2	 Ratio of Depth to length is 1:7.1 and Width to height is 1:1.5	 Ratio of Depth to length is 1:2.9 and Width to height is 1:1.5	Is there any influence of this ratio on the way verandah is being used.
4.	Degree of openness of verandah. • Area of veranda in smt • Area of frontage of veranda smt	 Area of veranda: 57.36 Area of frontage of veranda: 84.27	 Area of veranda: 12.76 Area of frontage of veranda: 28.05	 Area of veranda: 18.74 Area of frontage of veranda: 18.02	 Area of veranda: 26.89 Area of frontage of veranda: 32.05	 Area of veranda: 34.87 Area of frontage of veranda: 33.07	What is the effect of such openness on the way spaces of verandah.
3.	Elements in verandah	1. Stapes 2. Plinth 3. Lean roof 4. Wooden Column & Beam 5. Non-loadbearing deco column 6. Door and window 7. Wooden Railing 8. Fascia	1. Stapes 2. Plinth 3. R.C.C Slab 4. R.C.C/Precast Column and Beam 5. Door and window 6. Gokh	1. Stapes 2. Plinth 3. Lean roof 4. Wooden Column and Beam 5. Door and window 6. Gokh	1. Stapes 2. Plinth 3. Lean roof 4. Stone Column and Wooden Beam 5. Door and window 6. Facia 7. Gokh	1. Stapes 2. Plinth 3. R.C.C Slab 4. Wooden ceiling 5. Door and window 6. Zapali 7. Wooden grill 8. Gokh 9. Kyaro	Studying the responses that gets developed around such elements in veranda.
6.	Available terrace / other veranda / otala. • Ojala • Veranda • Terrace						Is there any influence of such other open / semi open spaces available on the way main verandah is being used.
7.	Serraounding conditions	House is located on Main Street of the village. On its backside, there is small open ground. All residences around are of the same scale.	House is located on the adage of the village. House has two entrances and both are open up in the small chokh. On its backside, there is a seasonal river. All residence around.	House is located on the adage of the village. It has no vanda and its veranda is open up directly to the small chokh which leads to the tertiary street of the village. On its backside, there is a seasonal river. On its side there is vacant plot and all residence around.	House is located almost in the middle part of the village. On its side and back, there is a same type and same scale residences. On its front, there are new one-story residences only for the Jain community. We can access through it from the tertiary street of the village.	House is located in the center of the village chokh, which divide the single street in to two main village streets.	How such conditions influences the manner in which verandah is used.

**Table 2: A Comparative Study of Residential Data Collection**

No.	House Built in	House 1	House 2	House 3	House 4	House 5
1	No. of Family	1907	1945	1975	1935	1925
2	No. of Family Members	12	6	5	6 Members	5
3	Occupation	Electrician	Farming, Village Sarpanch	Job in GIDC	Farming	Farming
4	Veranda type	Linear	Linear	Linear	Linear	L Shape
5	Total plot area in smt.	917.38	653.3	115.66	346.11	463.1
6	Area of vanda in smt.	917.38	653.3	-	346.11	208
7	Frontage of verandah in smt.	265.73	51.34	-	101.62	27.8
8	Area of backyard in smt.	-	289.1	-	-	38.74
9	Living area in smt.	17.94	11.98	12.63	52.19	32.96
10	Sleeping area in smt.	49.19	30.89	16.91	14.84	23.15
11	Cooking area in smt.	16.77	5.16	7.79	6.55	3.3
12	Verandah area in smt.	57.36	12.76	18.74	26.89	34.87
13	Total built up area in smt.	424.58	221.5	113.08	225.9	129.1
14	% of Built up to plot area	46.28 %	33.90 %	97.77 %	65.27%	27.88%
15	Built-up area available per person	35.38 %	36.92 %	22.62 %	37.65%	25.82%
16	Veranda area available per person	4.78	2.13	3.75	4.48	6.97
17	Percentage of verandah	13.5 %	5.76%	16.57 %	11.90%	27.01 %
18	No. of doors in veranda	3	5	2	2	4
19	No. of windows in veranda	2	7	4	6	8
20	Number of Rooms in House	3	2	2	2	2
21	Type of structure	Load bearing				
22	Avg. structural span in meter.	3.5 m	3.8 m	1.3 m	2 m	2.1 m
23	Main structural material	Wood, Stone				
24	Number of houses in chock/ street	5 Houses	3 Houses	1 Houses	5 Houses	More than 10 Houses

**Reference: Table 1 & 2: (Source : Author)**

## RESULTS AND DISCUSSION

In the framework of this research paper, the discussion is systematically categorized to delve into specific aspects of the veranda. These categories include Veranda and Typology, Context, Built Conditions, Construction, Climate, Social Parameters, Human Interaction, and Human Psychology.

The human interaction and psychological parameters are analyzed through the mapping of the activities of the individual, observations, as well as interactions. This systematic categorization allows for a comprehensive exploration of the multifaceted roles played by verandas in the lives of individuals and communities.

The veranda serves as a semi-open space intricately linked to indoor areas and exhibits distinct characteristics such as low height for solar radiation protection, a strong link with the front street or Chowk, a higher plinth defining its territory, and accommodation of facilities for various activities. The key is its open frontage, sometimes partially covered, enhancing control and maintaining a connection with the surroundings. The presence of posts/columns not only serves structural purposes but also reinforces the sense of territorial boundaries. Important assets like Paniaaru, raso, charpai, and hichako contribute to the functionality of the veranda.

During visits to Kutch, observed verandas not only displayed vibrancy and liveliness but also held significance in terms of social connectivity, privacy without complete isolation, low-profile dominance, family spaces with community relevance, and the seamless integration of tradition with contemporary needs. These verandas, acting as dynamic spaces, effectively accommodate both familial and occupational requirements. In this well-defined architectural space, by analyzing the behaviors of individuals within these varied criteria, we can gain valuable insights into the dynamic nature of verandas and their significance in the broader socio-cultural context.

### VERANDA AND TYPOLOGY

In the hot and arid region of Kutch, verandahs play a critical role in mitigating climatic extremes while simultaneously functioning as spaces of social interaction, shaped by the cultural practices of the region. The verandah, a pivotal architectural feature in Kutch, has evolved as a significant element of traditional houses. Three main shapes characterize the typology of verandahs in this area: Linear, L Shape, and C Shape Verandah. The Linear verandah, oriented towards the street or front open space ('vando'), establishes a strong connection with the front, while sporadically, houses incorporate verandahs in the expansive rear open spaces. The L-shaped verandah strategically manages connections with outdoor spaces, whereas the C-shaped verandah, though rare in Kutch houses, distinctly isolates outdoor areas.

The positioning of verandahs in specific architectural patterns—linear, L-shaped, and C-shaped—produces different functions and perceptions within the home. Linear verandahs, often opening directly to the street, offer a strong visual connection to the public realm and are typically used for welcoming visitors, casual conversations, or monitoring street activities. However, this positioning may limit privacy, especially in homes where multiple

households share communal spaces. The L-shaped verandah, by contrast, carves out a more personal territory. Its configuration allows for discrete activities, creating more intimate, sheltered spaces that offer a higher degree of privacy for family members. C-shaped verandahs, although less common, are introverted by design, enclosing a central space that enhances privacy and control over activities within the household.

The typology of verandahs not only determines their spatial arrangement but also influences the social interactions and daily routines of the inhabitants. In Kutch, where homes serve as both private and communal spaces, the layout of the verandah plays a critical role in defining the balance between public engagement and familial privacy.

This architectural vocabulary emphasizes that verandah placement plays a critical role in determining how spaces are perceived and utilized, whether for social interaction, private family time, or functional tasks.

### *People, Veranda and Typology*

Having explored the basic typology of verandahs, it is essential to understand how these variations influence the daily lives and behaviors of the inhabitants in the context of Kutch's traditional architectural practices. Within these verandah categories, variations emerge, influencing the opportunities they afford to individuals. Linear verandahs, when linked to a linear house form, may impose limitations, guiding human responses based on edge conditions and expectations. The close connection with the street makes linear verandahs more accessible to public interaction, but also limits privacy, especially for houses where the verandah is directly exposed to communal spaces.

L-shaped verandahs carve out a well-defined personal territory, fostering opportunities for discreet activities and introducing greater tonal variations to satisfy diverse needs. These verandahs are more flexible, providing semi-private areas where family members can engage in intimate conversations or household chores without being in full view of passersby. Although not extensively covered in case studies, general observations imply that C-shaped verandahs exercise heightened control over central open spaces, resulting in a more introverted typology characterized by enhanced privacy.

In structures with ground + one story, a common configuration involves verandahs on the ground floor and terraces or balconies on the first floor. Verandahs are vibrant spaces during the day, often transforming into

sleeping quarters on hot summer nights. In contrast, upper semi-open spaces see reduced activity during the day. Surprisingly, the presence of trees has a limited impact on verandah usage, unlike their more pronounced influence on open spaces. This exploration scrutinizes the intricate relationship between verandah design, typology, and human behavior in the dynamic context of the Kutch region.

In Kutch, verandahs are prominently oriented towards the front of the house, directing their facades either to the street or the front open space, locally known as 'vando.' The frontage of the house emerges as a substantial contextual force, intricately shaping the verandah and dictating activities in its proximate vicinity.

### **Contextual Determinants of Verandahs in Kutch**

The contextual determinants of verandahs are multi-layered, encompassing several key factors:

- **Shared Spaces:** Adjacent linear verandahs contribute to the creation of shared spaces.
- **Extension through Vegetation:** The presence of trees and otla (raised platforms) in the frontal area extends the influence of the verandah.
- **Utilization of Front Space:** The utilization of the front space sets the overarching context for verandah activities.



**Image 4: A linear verandah spans across adjacent houses along a village street.**



**Image 5: The adjacent tree and otla function as an extension of the veranda.**



**Image 6: Birds are on the otla located in front of the veranda.**



**Image 7: Cows are in front of the veranda**

**Images 4,5,6 & 7**  
(Source: Author)



**Image 8: The formal entrance to the veranda, a paved path, small plants surrounding the periphery, and a lawn collectively contribute to creating a pleasant ambiance.**

**Image 8 & 9**  
(Source: Author)



**Image 9: The veranda is well-suited for easy accommodation of household members, children and visitors.**

## Climate-Responsive Architecture and Social Cohesion

- Verandahs, meticulously designed in response to their immediate surroundings, are shaped by the conditions at the front of the house. The size of the front space plays a pivotal role in influencing the intricacy of the verandah, where open areas serve as versatile, multipurpose family spaces. Notably, verandahs situated along busy streets may have elevated plinths to accommodate specific activities tailored to their dynamic surroundings. This research explores the interplay of environmental and spatial factors in shaping verandahs in the Kutch region, with similar parallels drawn from other hot-dry climates.

### People, Veranda, and Context

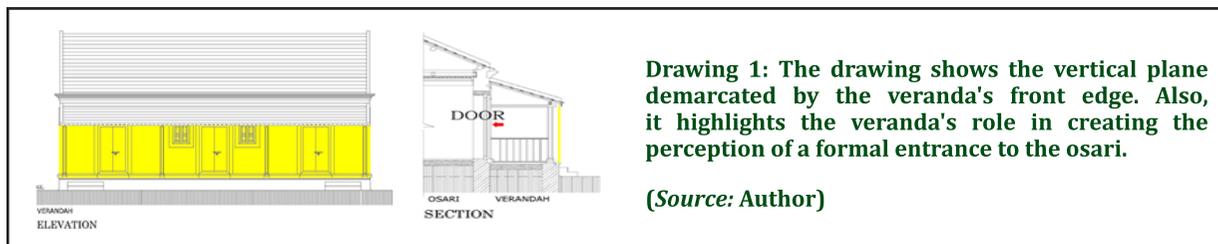
Understanding the multifaceted roles that verandahs play within the architectural and social fabric of communities, it becomes essential to transcend mere architectural analysis and delve into the realm of sociocultural dynamics that shape their utilization. These contextual determinants create a foundation upon which individual and communal interactions with verandahs evolve, influenced by cultural and environmental factors. This broader exploration reveals how local traditions, cultural norms, and social structures intricately influence the patterns of verandah usage, rendering these spaces as narratives of the communities' living culture.

In Kutch, the immediate physical environment—including elements like local vegetation, elevated plinths, and designated cattle areas—significantly dictates the functional dynamics of spaces adjacent to verandahs. Such environmental factors not only delineate spatial usage but also shape the social interactions that unfold within these thresholds, thus defining the verandah's role in enhancing human connectivity and communal cohesion (Zuhairuse Md. Darus *et al.*, n.d., as cited in Darus *et al.*, 1999). Additionally, the interplay between physical conditions and human behavior underscores the complexity of interactions

enabled by verandahs, highlighting their capacity to influence and be influenced by the local context (Bay & Ong, 2006, as cited in Darus *et al.*, 1999). Similar to the Malay traditional houses, where verandahs serve as transitional spaces adapting to both social and environmental needs, the Kutch verandah serves as an interface between indoor and outdoor spaces, reinforcing communal and family bonds through its architectural layout (Philip Gibbs, 1987, as cited in Darus *et al.*, 1999).

Direct physical linkages, such as street-facing verandahs and proximity to natural features like shade trees, further impact the activities conducted on these verandahs. Such features extend the spatial and perceptual boundaries of the verandah, inviting a diversification of activities that blur the lines between public and private domains, a distinctive feature of Kutch's communal life (Ozaki, 2001, as cited in Darus *et al.*, 1999). In both Malay and Kutch contexts, verandahs oriented towards the front street not only enable engagement with community activities but also maintain a sense of privacy for household members, facilitating a strategic spatial arrangement that enhances daily life interactions (Philip Gibbs, 1987, as cited in Darus *et al.*, 1999). In essence, verandahs in Kutch serve as dynamic architectural elements that respond to and shape their contextual environment. They are sites of complex interactions, where architectural design, environmental factors, and sociocultural dynamics converge, catalyzing a spectrum of activities that enrich the local residential experience. Elevated verandahs on busy streets, much like those in Malay traditional housing, demonstrate an adaptation to social and environmental demands, creating spaces that reflect and reinforce cultural values within the Kutch community. Through this lens, verandahs emerge not merely as physical structures but as vibrant arenas of social engagement and cultural expression, mirroring the nuanced lifestyles of Kutch inhabitants. These verandahs stand as cultural and social markers, dynamically shaping and reflecting the values, behaviors, and identities of the communities they serve (Bay & Ong, 2006, as cited in Darus *et al.*, 1999).

### VERANDA AND BUILT CONDITIONS



The verandah's significance within the architectural arrangement is shaped by material composition, orientation, construction techniques, and connections with front and back elements. The integration of local materials and traditional construction techniques highlights the verandah's meaningful role in the broader context of traditional dwelling spaces.

In the creation of verandahs, various elements play distinct roles in shaping built conditions. It is crucial to understand these elements and their inherent characteristics:

- **Roof Structure:** Verandahs typically exhibit a lean-to roof with a front slope, fostering an introverted ambiance. The spatial arrangement between columns simultaneously invites connection and introspection. This roof can either be an extension of the house's roof or an attached lean-to structure.
- **Parapet Walls:** Verandahs may feature small parapet walls in front, serving as an additional layer of protection and functioning as versatile elements that can be utilized in various ways.
- **L-shaped Houses:** L-shaped houses provide a higher degree of privacy in the front verandah, fostering freedom in accommodating personal family activities. In such cases, even cooking and dining may frequently take place in the verandah.
- **C-shaped Verandahs:** C-shaped verandahs can be likened to semi-courtyard houses, where the central open space becomes a vibrant family hub. This space extends as an extension of every room.
- **Functional Areas:** Verandahs often house primary activity spaces, such as cooking areas and water-related wet zones. The configuration of these spaces varies based on the verandah's shape, whether L-shaped, C-shaped, or linear.
- **Furniture Placement:** The arrangement of furniture in the verandah is primarily dictated by the general circulation pattern and lighting conditions within the space.
- **Grills and Privacy:** Verandahs adorned with grills convey a heightened sense of privacy and confidentiality, offering protection from dust and heat. However, this comes at the cost of reduced openness, connectivity with the outside, and diminished wind flow. Grilled verandahs are often favored in houses with frequent closures.
- **Proportional Area:** The area of the verandah typically ranges from 16% to 26% of the total house area. In smaller houses, the verandah area tends to be more substantial, serving as an effective multipurpose space. Larger houses, on the other hand, witness compartmentalization of activities, with verandahs retaining a traditional and connecting role.
- **Verandah Facing Open Space:** Verandahs with larger dimensions facing open spaces act as meeting points between indoor and outdoor realms, alternating between being a room and an open area. In essence, the functionality and definition of verandahs are significantly influenced by the quality and nature of the built house.



**Image 10: Verandas with small parapet walls in front**



**Image 11: A veranda featuring a grill.**



**Image 12: The small linear veranda visually extends the house's roof. Within the veranda, the raso is positioned at its edge, extending onto the opla.**

**Images 10,11 & 12**  
(Source: Author)

## Climate-Responsive Architecture and Social Cohesion

- **Evolution of Verandahs Over Time:** Over the generations, the role of verandahs in Kutch has evolved significantly. Traditionally, verandahs were essential for climatic adaptation, serving as spaces for family interaction, work, and leisure. However, with the advent of modern technology, including mechanical cooling and shifts in family dynamics, the function and perception of verandahs have changed. In contemporary Kutch, particularly in urban areas, verandahs are often designed to be smaller and more decorative, emphasizing visual appeal rather than serving the diverse functional purposes they once held.

As families transition from joint to nuclear structures, the verandah's role as a transitional or social space has diminished in urban areas. Verandahs in cities tend to reflect a shift towards indoor living, with their functional roles increasingly relegated to aesthetics. However, in rural areas, the verandah remains a vital part of daily life, preserving its traditional multi-functionality as a space for work, family gatherings, and rest. The evolution of verandah use over time reflects broader socio-economic and cultural changes, signaling a shift in how architectural spaces are used to meet modern needs. Despite these changes, verandahs continue to be integral to the environmental and social life of Kutch, maintaining their importance in adapting to the region's climate and lifestyle.

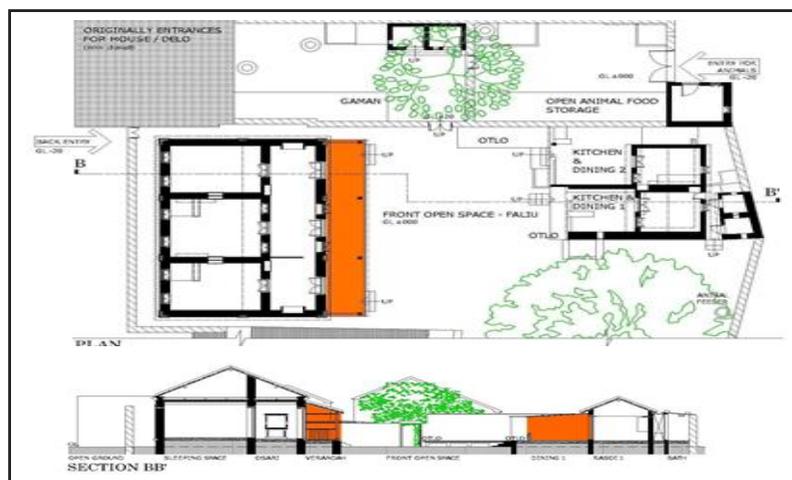
### People, Veranda, and Built Conditions

The constructed verandah holds immense potential for diverse uses, but these applications are inevitably influenced by the available fixtures and facilities. The form and size of

the verandah direct attention to the front through a vertical plane, often defined by its front edge. This plane may find support from single or multiple columns, with parapet walls reinforcing its verticality. While such walls facilitate visual communication, they simultaneously limit direct physical connections with the external space. The extroverted quality of verandahs, characterized by their reach out to the public, renders them extensively used.

Verandah doors act as formal entrances, marking private areas, and changes in roof profiles further distinguish the nature of privacy. The scale of the verandah is carefully calibrated to ensure comfort, making it the most amiable space within the dwelling. By its nature, the verandah becomes a friendly and inviting space, offering an appropriate scale, simple articulation, good orientation, necessary connectivity, engaging accessories, climate-friendly conditions, social relevance, a traditional perspective, and ample potential for activities.

Specifically, elders gravitate towards sitting near freestanding columns or in cornered spaces, emphasizing a sense of proximity. Housewives seek locations that afford visibility while maintaining a degree of seclusion, controlling the entire space when engaged in household activities. Men, utilizing the verandah during early and late hours, prefer spaces that provide a sense of personal territory. Children claim the entire verandah as their domain, utilizing every corner for play, meals, sleep, and study. The verandah's familiar nature, grounded in traditional materials and details, makes it an easily accepted and predetermined space. The integration of various structural and decorative elements enhances the verandah's functionality and visual appeal, contributing to its meaningful role in the overall dwelling experience.



**Drawing 2: Plan and Section show the Relation of the veranda with indoor and outdoor spaces. (Source: Author )**



**Image 13, 14, 15 & 16:** In this veranda, the fundamental need is to establish individual territories while fostering interaction. In the first house, a charpai serves as a temporary element to delineate personal space. In the second house, a permanent element is introduced in the form of a wall with a substantial puncture, not only defining space but also providing a seating element for interpersonal interactions. The 15th & 16th image shows the differentiation of activities within the veranda through changes in flooring conditions.

**Image 17:** Strategically placed plants significantly modify the verandah space, introducing additional layers to create a welcoming environment.

Images 13,14,15,16 &17 (Source: Author)

### VERANDA AND CONSTRUCTION

The dimensions of dwelling spaces, beyond the constraints of available land, are significantly governed by materials and technology. While traditional houses predominantly utilized materials such as mud, brick, stone, wood, and clay tiles, with bricks, and stone forming vertical load-bearing elements, and wood used in roof structures. These materials played a vital role in shaping the thermal dynamics of the dwelling. Thick mud and brick/stone walls prevented thermal conductivity, ensuring a comfortable internal climate. Wood's heat-resistant properties enhanced overall

thermal performance and clay tiles allowed the escape of hot air, providing a distinctive breathing quality. The use of local materials like mud lipan and natural stone flooring contributed to climatic comfort in both the veranda and the entire house.

In essence, the veranda's significance within the architectural arrangement is shaped by material composition, orientation, construction techniques, and connections with front and back elements. The integration of local materials and techniques from traditional house construction highlights the veranda's meaningful role in the broader context of traditional dwelling spaces.



**Image 18:** Contemporary materials are utilized to create a veranda of a similar style.

Images 18 & 19 (Source: Author)



**Image 19:** In the creation of a veranda for a double-height house, traditional aesthetics were achieved with stone as the primary building material.

### VERANDA AND CLIMATE

The climatic attributes of the veranda play a significant role in enhancing its comfort. Its nearly blocked side prevents cross-ventilation of hot air, and two perpendicular sides impede heat entry. A low roof profile minimizes direct solar

heat gain, transforming the veranda into a pleasant space for year-round use when strategically oriented. In the selected region, addressing direct solar heat gain and hot air flow is crucial due to high temperatures and dryness. Traditional wisdom in this region addresses climatic challenges through methods like thick mud brick walls to enhance thermal

resistance, lower-leaning roof profiles and larger overhangs for shading. Preventing cross-hot air circulation through small or closed windows, leveraging sea breezes, utilizing outdoor conditions during the monsoon, and strategic orientation with vegetation as a modifier when applicable.

The region of Kutch experiences a daily cycle of wind direction, with cool and pleasant breezes during the day flowing from the sea and reversing at night. The low roof height reduces solar heat gain to some extent (extreme

hot conditions still pose challenges), and the high plinth keeps dust away. Hangings, movable partitions, and water sprinkling provide temporary protection from seasonal forces. During winter, winds shift direction, and in the monsoon, occasional rain is welcomed. As outdoor temperatures fall in the evening, the veranda becomes comfortable and socially active. It consistently maintains its use in different seasons, with only the timings of activities shifting. Activities find an appropriate space in the veranda, adapting to the varying seasons.



**Drawing 3: The drawing depicts a veranda with a low roof height, designed as a wind-catching device. It also shows the veranda level and temporary sun protection achieved through hangings.**

(Source: Author)

### VERANDA AND SOCIAL DYNAMICS

The verandah, with its distinct character, persists as a continuous and well-established trend in building typology, transcending professions and cultural backgrounds. It fosters a sense of belonging, transcending caste and community, and serves as a defining feature of both the dwelling and the family. A glance at the verandah often reveals the social and economic status of a family, positioning it as the most "public" space within the dwelling, accommodating everyone without discrimination, yet maintaining a degree of confidentiality through high plinths or the use of grills.

### *Socio-Economic Variations in Verandah Usage*

Verandahs in Kutch are not uniformly utilized across socio-economic classes. Wealthier merchant families, for instance, tend to use verandahs as leisure spaces, often elaborately decorated to reflect status. These verandahs are typically larger, intended to accommodate social gatherings, and act as a display of the family's wealth and social standing. In contrast, in lower-income or agricultural households, verandahs serve multifunctional purposes, such as spaces for household chores like weaving or food preparation. The

size, orientation, and function of the verandah reflect the socio-economic standing of the family. In traditional farming households, the verandah may serve as a storage area for tools, food grains, or even cattle. The use of verandahs as markers of socio-economic identity becomes clear when examining the types of activities and the degree of formality associated with the space, varying from highly communal spaces to personal or work-related areas.

By comparing verandah usage across different socio-economic strata, this research highlights their role not only in climatic adaptation but also as socio-cultural symbols reflecting a family's status within Kutch society. In addition to these socio-economic variations, the verandah's role extends beyond its economic symbolism, functioning as a critical social space for families across various strata.

The size and decoration of the house communicate status within the social hierarchy, reflecting a family's aspirations and choices. The verandah acts as a buffer space, preserving sanctity, privacy, and confidentiality for the indoor areas. Building finishes and furniture richness convey occupants' impressions, while verandah size mirrors lifestyle and occupation. Houses without verandahs signify a sense of 'isolation' from the broader societal context.



**Image 20: Traditional rituals are conducted near the verandah, and spectators occupy the verandah space to witness and partake in the enjoyment of these rituals.**

**Images 20 & 21** (Source: Author)

In the broader context of the house, the veranda emerges as the most socially activated space, facilitating interactions within the family and with visitors. Here are observations in this region tell its key roles:

**Family Hub:** The veranda serves as the space where most family conversations unfold, setting the tone for the family's nature and concerns.

**Multifunctional Space:** It acts as a passage and a participatory space, creating a sense of family, belongingness, and authority. Children engage in homework and play, women balance household work and conversations, elders oversee and participate, and men relax while cherishing family bonds.

**Social Nexus:** The veranda establishes both casual and formal social linkages, accommodating activities ranging from tea gatherings to marriage discussions. It serves as a stage for negotiations and conflict resolution, religious rituals, social functions, and even household industries like papad-making or agricultural product storage.

**Public Image:** Society perceives families through their verandas, making it a check for the image projected by each family. The veranda establishes a strong connection with and exposes the family to society, embodying mutual connection and control.

**Cultural Mirror:** Families project themselves through their houses, and in traditional houses, the veranda becomes a reflection of the house. Just glimpses of the veranda can provide insights into a family's social and cultural status.

**Versatile Space:** The inherent nature of the veranda grants freedom for diverse uses, making it a space with



**Image 21: During the evening hours in the veranda, children engage in observation and playful interactions with friends. Simultaneously, mothers are involved in embroidery, with daughters actively attempting to acquire and master this skill.**

maximum potential for interventions and interactions. Philosophically, the veranda represents a phenomenon that offers considerable liberty in personal, social, and cultural dimensions.

Any space that is climatically comfortable and contextually appropriate inherently accommodates a range of human activities across different layers.

### ***Veranda as a Social Institute within the Dwelling***

The veranda can be considered a social institute; it is primarily an integral part of the house. As the face of the house, the veranda plays a crucial role in meeting social requirements more profoundly with warmth and depth.

**Women's Social Haven:** Neighboring women gather in the veranda, engaging in various feminine activities during afternoons, transforming it into a genuine social institute for women.

**Children's Playground:** Children and their friends converge in and around the veranda, maintaining constant visual contact with elders who guide, control, and monitor them. The veranda becomes a nurturing space for various activities.

**Elders' Wisdom Corner:** For elders, the veranda is a place to impart life lessons, teach skills, values, and engage in activities based on their health.

**Men's Retreat:** For working men, the veranda serves as a leisure space and a private retreat. Depending on personal preferences, it can also function as a dynamic community space, though this may require balance to avoid disrupting other family activities.

## Climate-Responsive Architecture and Social Cohesion

In essence, the veranda goes beyond being a physical structure; it is the beating heart of the home, fostering connections, nurturing traditions, and reflecting the diverse tapestry of family life.

### VERANDA AND HUMAN INTERACTIONS

The veranda, primarily oriented towards the front, serves as a crucial space for diverse human activities, influenced by visual connectivity, climatic comfort, and perceived authority. Usage within a family is strategically determined by daily roles played by individuals, and the location of amenities shapes veranda utilization. Elders prefer supportive areas with facilitating furniture, adults align spaces with their purpose, and children, being adaptable, find spaces wherever available. Veranda activity peaks in the mornings and early evenings, reflecting human responses influenced by local climate patterns.

Similar to the hierarchy observed in houses, verandas exhibit a spectrum of spaces ranging from interactive to silent, climate-friendly to discomforting, and accommodative to less accommodative. Users recognize these qualities and adapt their activities accordingly. Once established, veranda spaces are generally accepted, and users adjust to existing conditions, fostering a lively atmosphere.

Verandas, due to their inherent nature, become versatile spaces accommodating short-term storage for both occupational and household needs. Despite the presence of storage, veranda patterns remain relatively stable, displaying the adaptability of the space. The veranda's unique characteristics, offering minimal permanent facilities but maximum flexibility for bringing in additional furniture, contribute to its dynamic use.

Individuals seek varied conditions for activities, making verandas adaptable for diverse uses, from study desks to collective dining setups and makeshift sleeping arrangements for guests. The dynamic and versatile nature of verandas positions them as the most usable spaces within a house, providing opportunities that other areas may not, and family members optimize their usage based on personal expectations and house limitations.

### People, Veranda, and Human Interactions

According to Indian Darshan-shastra, human responses are influenced by an individual's nature and preconditioning, external factors, and the connection between the external factors and the individual. Despite diverse social groups in Kutch, the nature and features of verandas remain relatively

constant, contributing to consistent behavioral patterns.

Veranda's responses show limited diversity due to the constant climate, culture, resources, values, and the consistent nature of verandas across social groups. Despite varying house typologies, response patterns remain relatively constant. Verandas, beyond their utilitarian function, evoke strong connections due to familiar conditions, serving as the heart of the house and accommodating diverse needs throughout the day.



**Image 22: Placing a 'toran' at the entrance within the veranda not only conveys a welcoming atmosphere but also showcases the skill of the women.**

**Images 22 (Source: Author)**



**Image 23: To avoid allowing certain community members into the house, exchanges take place in the veranda. In this manner, the veranda serves as an intermediary space, fostering comfort for all involved.**

**Images 22 & 23 (Source: Author)**

Women showcase skills through crafts, children use verandas as play and learning areas, and adults engage in sharing, participating, and personal growth. Elders find verandas conducive to staying in touch, guiding

younger members, feeling responsible, and engaging in chosen activities. Positive responses stem from favorable conditions like climate responsiveness, human-scale design, The veranda, with its diverse opportunities, every family member, reflecting its significance beyond functionality.

### VERANDA AND PSYCHOLOGICAL DYNAMICS

The verandah plays a pivotal role in establishing profound psychological connections among individuals. Unlike enclosed spaces, it fosters a sense of interconnectedness, granting freedom to engage with external events. This lack of confinement allows for movement and creates an ambiance where individuals, even in inactivity, find their minds captivated by various elements and events surrounding the verandah.

The design promotes social interaction, acting as a catalyst for the close-knit community. The aesthetic elements within the verandah contribute significantly to its welcoming and friendly nature, enhancing the overall psychological impact.



**Image 24: Grandmother observed children engaged in play and leisure activities in the open space, while seated in the veranda.**

**Images 24: (Source: Author)**

Cultural influences are also integral to understanding the verandah's impact, as cultural elements can shape perceptions and interactions within this space. Examining whether individuals tend to personalize the verandah further enriches the observation, shedding light on the role of personalization in strengthening the psychological connection to the environment.

In summary, the verandah, with its friendly scale and absence of overpowering elements, not only serves as a physical space but also as a facilitator of a harmonious and inclusive psychological environment. Considering

social dynamics, aesthetic elements, seasonal variations, cultural influences, and personalization and personalization captures the multifaceted nature of the verandah and its psychological significance comprehensively.

### CONCLUSION

This research highlights the pivotal role of verandahs in the traditional architecture of Kutch, emphasizing their importance in addressing both climatic and socio-cultural needs. Verandahs not only enhance the quality of life but also contribute to safety, social interaction, and cultural continuity. The study addresses a research gap by exploring the multifunctional role of verandahs within the built environment. Key findings include:

- i. **Climatic Adaptation through Contextual Design:** Verandahs in Kutch are shaped by essential needs and contextual factors. Their design, characterized by elements such as scale, plinth elevation, and a controlled semi-open structure, creates climate-responsive and interactive spaces. These constants challenge the notion of significant variation, as shown in Images 10, 11, and 12.
- ii. **Balance between Public and Private Spaces:** Verandahs act as transitional zones, blending public visibility with private domestic functions. As shown in Image 12, they serve as spillover spaces that indicate ownership while restricting specific actions.
- iii. **Plot Size and House Orientation:** Traditional house orientation in Kutch is influenced by plot size and resources, rather than solely by climatic conditions. Table 2 challenges the assumption that climate is the primary factor, revealing practical considerations as key determinants.
- iv. **Proportionality of Verandah Size to House Area:** The size of the verandah correlates with the overall house size, typically comprising 18% to 26% of the total house area, as seen in Table 1. Smaller houses utilize verandahs more intensively, showcasing their flexibility in resource-constrained households (Images 8, 9, 10, 16, 17, and 21), while larger houses allocate a smaller percentage of space to verandahs, reflecting a preference for larger indoor areas.

- v. **Versatility in Social Dynamics:** The verandah is a versatile space that reflects the social dynamics within a household. The verandah's openness, casual ambiance, and connectivity make it a preferred space for various activities, fostering social interactions. The verandah's unique blend of public and private elements allows it to host events ranging from intimate family gatherings to broader community functions, as shown in Images 20 and 21, highlighting its role as a socially integrative space that extend beyond their purely domestic function.
- vi. **Consistency Across Diverse Orientations:** Despite differences in orientation due to microclimatic conditions, verandahs across Kutch maintain consistent use and design, as illustrated in Image 12. This adaptability to both environmental conditions and occupant preferences underscores the verandah's significance as a semi-social space hosting diverse activities beyond its domestic function.
- vii. **Role of Gender Dynamics in Verandah Use:** The verandah's function shifts depending on women's involvement in household activities. Image 22 illustrates how tasks such as embroidery and social interactions shape verandah use, emphasizing its role in household gender dynamics. In conservative families, restrictions may apply, while in households with predominantly female occupants, the verandah becomes the most vibrant and dynamic space, influenced by the frequency and nature of activities.
- viii. **Adaptability Across Age Groups:** The verandah's adaptability is evident among younger family members, as seen in Image 24, where it is used for various leisure activities. This dynamic use across generations highlights the verandah's continued relevance, shaped by local climatic conditions and social values, contributing to its multifunctional role.

In conclusion, this study reveals how architectural decisions, local climate, and social values shape space usage. Verandahs, as dynamic semi-public spaces, foster connection and reflect individual preferences while contributing to the broader cultural landscape. As social beings, humans

transform spaces like verandahs into vibrant areas that not only enhance daily life but also strengthen social cohesion.

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