

Article

Typological Transformation of Individual Housing in Hail City, Saudi Arabia: Between Functional Needs, Socio-Cultural, and Build Polices Concerns

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Abstract: This research paper traces the evolution of housing typologies in five distinct periods of dwellings in Hail City, Saudi Arabia. The study reviews the formation and historical events of the Hail house by observing the significant changes on the layout, spatial form, and architectural form. The objective is to investigate the embedded socio-cultural and privacy patterns, in conjunction with economic and environmental factors, that influenced the development of housing in Hail City over the last several decades. The methodological approach is based on an ethnographic approach, users' perception survey, and a review of multiple case studies representing local housing typologies from five distinct historic periods: traditional, transitional traditional, modern, transitional modern, and contemporary. The findings show that specific building policies and laws pertaining to house form, privacy, gender segregation, and hospitality influenced the spatial layout of Hail City dwellings and played a decisive role in determining the final built form. Conclusions are drawn to highlight current challenges while also providing projections for future housing typologies in Hail City, around Saudi Arabia, and similar countries.

Keywords: contemporary urbanism; housing transformation; housing production; residential architecture; villa; topology



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1. Introduction

In the making of society's identity, architecture serves as a means of expression as well as a catalyst for social change. Architecture continues to serve as a historical record of society's development and transformations. Therefore, architecture reflects a wide range of social, economic, cultural, and technological influences, and each of these factors determine and contribute to the formation or reshaping of the physical form. One of the most crucial types of architecture for understanding the human-built environment is the residential architectural type. As a result of various cultural issues and technological advancements, such a type has evolved over time, changing not only its appearance but also its function, layout, materiality, and construction techniques. When it comes to residential architecture, we contend that its success is usually determined by how well it meets the functional needs of its users as well as how well it connects to the users' cultural and geographic concerns.

The individual residential architectural type "villa" has a high level of functional complexity. How such an architectural type can reflect user domestic needs while also maintaining physical form quality is a complex phenomenon. We believe that adding cultural expectations, societal norms, and geographical variables to the process increases its complexity. According to Louis Sullivan's aphorism, "form follows function". Sullivan argues that function seeks out relevant forms, and external form manifestations reflect the internal demands of inhabitants [1]. Although form appearance is an important aspect of any type of architecture, in this type of architecture, internal demands should be given greater importance than its counterpart to generate a sustainable residential building that

reflects domestic preferences. Such a viewpoint elevates Sullivan's argument because residential architecture is about the user's perception of function and space connectivity, making form appearance secondary. Even though form appearance is an important aspect of any architectural practice, it should not overpower the importance of the quality of a dwelling space, and a balance must be achieved.

Thus, the importance of studying residential architecture from the perspective of how architecture responds to functional needs within its cultural and historical context cannot be overstated. A thorough understanding of such a link will provide a broader perspective for evaluating and investigating the chronological architectural transformation and human-built experience of the individual residential type "villa" in Hail City, Saudi Arabia. The argument here is that, in current architectural practice, the overapplication of cultural globalization has unduly influenced architecture and architectural form, allowing the concept of transmission and imitation. However, with a limited understanding of socio-cultural issues and climatic distinctiveness, sustainability, and other factors (e.g., locality), such a concept may result in architecture that does not respond to domestic needs, despite possessing certain qualities for which inhabitants have expressed an interest.

The fact that the residential environment in the Kingdom has become of high cultural diversity, high social interaction, with different residential backgrounds in generative processes that resulted in a diversity of dwelling topologies has led to the development of architectural form during the last century. In this case, the residential architectural type "villa" in Hail City will be viewed, examined, and divided into five historical transformational periods in this study: (1) traditional period, (2) transitional traditional period, (3) modern period, (4) transitional modern period, and finally, (5) contemporary period. These periods include approaches to design that span from the introvert traditional house with an inner courtyard to the cement material and reinforced concrete of traditional and early modernity mixture dwellings, to the extrovert model of dwellings that are enclosed, gated, and isolated from their surroundings.

Each period is examined within its historical context utilizing five main factors: (1) climate and environment (geographical response), (2) security and privacy (tangible and intangible processes), (3) economic and building policies (institutional influence), (4) socio-cultural (domesticity and social system influence), and (5) architecture and aesthetic (global trend) (Figure 1). Each period will also take into account another two secondary factors: (1) available materiality and (2) technological construction techniques. Classifying the findings of this study analysis within a historical context will unavoidably result in the identification of what is fixed and unique in the design process within each period, as well as the definition of what is exotic and scalable. Even though not all factors play a vital role or are equal in each historical period, more emphasis is placed on the validity of actions taken in each period, asking the question: do the actions currently in use in Hail City fall within the framework of positive transformation and formal development of housing that is more responsive to socio-cultural, economic, and technological advancement? Also, have these transformations increased consumer comfort and improved the quality of living space, or have the approaches taken the provided solutions for some facts but not for others?

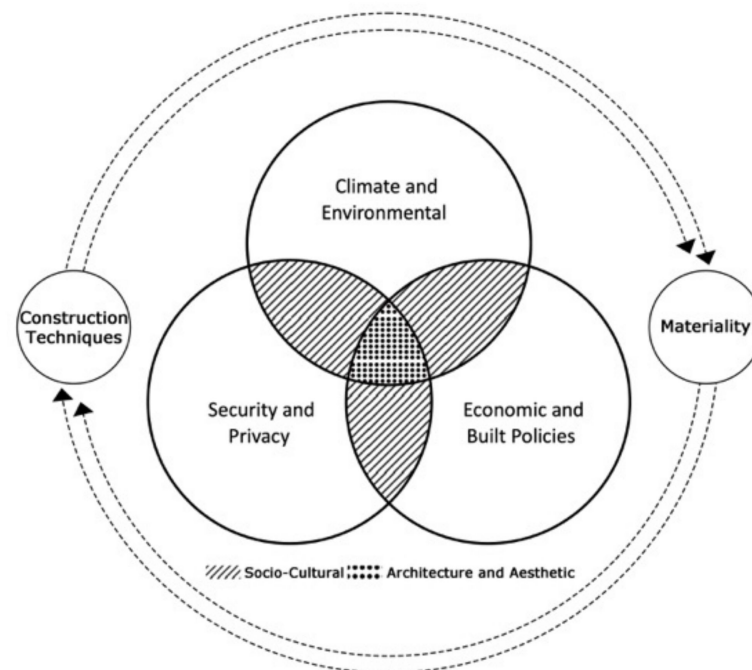


Figure 1. An illustration showcasing the inter-relationship among the five study factors.

2. Hail City, Saudi Arabia Background

Hail City is a city in northwestern Saudi Arabia that serves as the capital and largest city of the Hail Region. It is geographically located on the historical Najd plateau, which stretches from Riyadh to Hail in the north. The Kingdom is one of the six Arab Gulf states, with its own culture and social and economic conditions (Oman, UAE, Qatar, Kuwait, and Bahrain). These countries share many similarities, particularly in terms of population social nature, traditions, lifestyle, and beliefs (Arab tribes spread in this urban environment and united by common kinship ties).

Hail City has a population of approximately 605,930 people [2]. Hail City is primarily agricultural, producing a significant amount of grain, dates, and fruit. A large portion of the kingdom's wheat production comes from Hail Province, where irrigated farms can be found 60 to 100 km to the northeast [3] (Figure 2). Hail City's wealth was historically derived from its location on the Hajj camel caravan route. Hail City is well known in Saudi Arabia and the Arab world for the generosity of its people because it is where Hatim al-Tai lived (Ḥātīm bin 'Abd Allāh bin Sa'ad a'ṭ-Ṭā'iyī was the ruling prince and poet of Arabia's Tayy tribe. Stories about his extreme generosity have made him an icon among Arabs even today, as the proverbial phrase "more generous than Hatim" attests). The climate in Hail City is hot desert, with hot summers and cool winters. Due to its higher altitude, it has a milder climate than other Saudi cities.

Islam is the primary religion of all Arabian Peninsula residents, and Arabic is the primary language. Despite the existence of factors of connection and social unification such as language, religion, and culture, Hail City and many other region societies are divided into two distinct social systems: the desert (bedouins/rurales) and the urbanist (city modern lifestyle) [4] (Bedouins/rurales usually located across Hail region where it is found that it has the highest number of villages and towns (30 and more) among the other Saudi regions [5]). Both are influenced by Arab tribal culture, and, even today, the social structure influences the attitudes of people living in dwellings and plays an important role in defining their dwelling spatial layout and lifestyle, so that, in terms of social and cultural issues, the final product of the dwelling is usually influenced by the degree of conservative social structure.

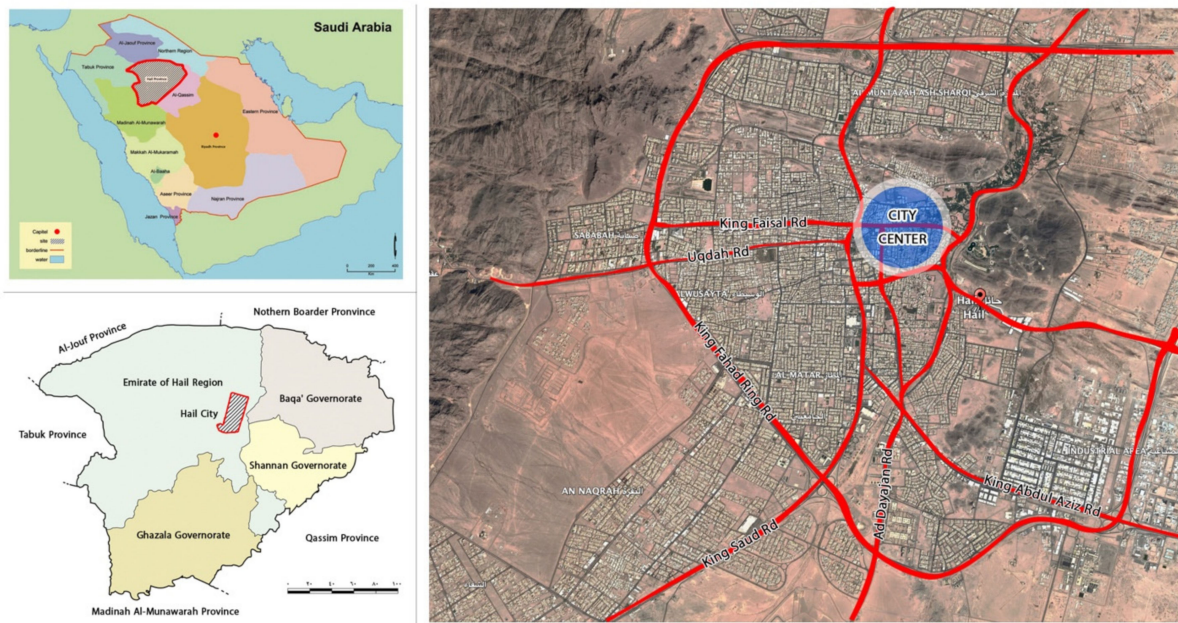


Figure 2. The location of Hail region and Hail City within Saudi Arabia.

This fact becomes significant when tracing the movement of bedouins/rurales into the city when the non-profit development real estate fund was established in 1975, which later encouraged the expansion of Hail City (see modern period) by providing citizens with the opportunity to establish a dwelling (Figure 3). Even though the differences in the physical product are minor among original inhabitants of the city, the arrival of bedouins/rurales caused the emergence of social and cultural issues, particularly in the way inner layouts, fences, and barriers are presented in the physical production of the home environment.

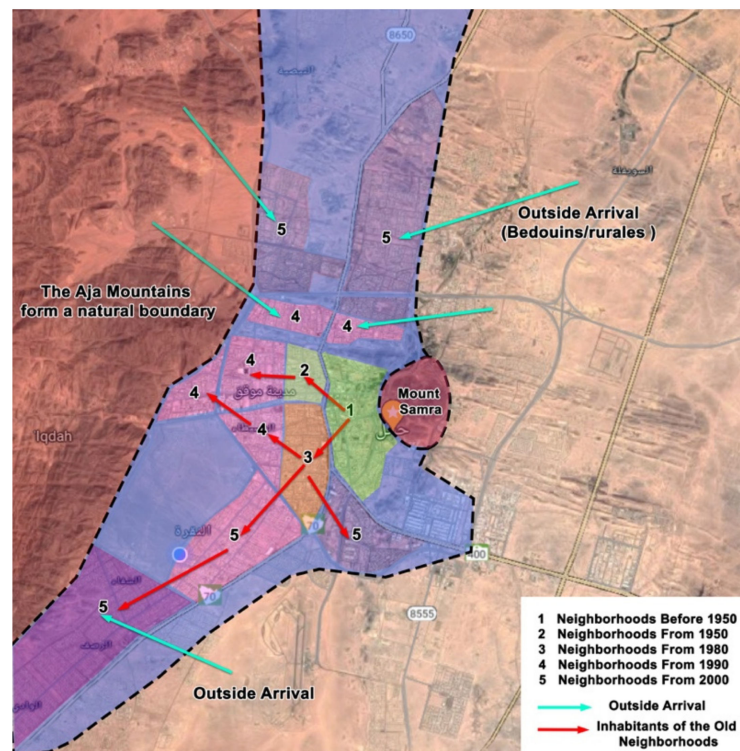


Figure 3. Urban sprawl.

In terms of the nature of Hail City's urban sprawl, we can say that its urban pattern is a stripe shape formed from being adjacent to Aja Mountain, which extends from north to south, and the historical urbanization is concentrated in the central district near Mount Samra, where this ring represents the city's origin. Figure 3 depicts the general urban layout of Hail City as well as the expansion of new neighborhoods to the north and south. The central area is densely packed with historical places such as the Barzan market, the city's most popular traditional market; the historic Al Qishla Palace; the historic Ayrif Castle; and several traditional houses. The general character of Hail City is dominated by mixed urban uses, including high density residential urban areas, and service, commercial, educational, religious, sports, governmental uses, etc. The central area is predominantly historical, with modern elements visible in the city's main streets. We notice the dominance of residential neighborhoods and major projects in the northern part of the city, such as Hail University and the Economic City. The southern side is dominated by residential use, which includes the majority of the luxury neighborhoods.

House Form and Neighborhoods Case Studies

Several literary references presented theories of the forces shaping house form, some implicit (e.g., intangible cultural forces) and others explicit (e.g., structural forces). According to Amos Rapoport, the majority of these forces have been subjected to two attempts. To begin with, the attempts tend to be physical determinism. Second, attempts to attribute the physical form to only one cause tends to be oversimplified (e.g., the attribute of climate). The dilemma is that these attempts have failed to express the complexity in the formation process of the house form, which can only be revealed by investigating the considerable number of variables and their effects in the process of generating the house form. The physical conditions of the site, climate, materials, and so on are only provided as options and are not required [6]. Such a viewpoint sheds light on the idea that if such probabilities are similar, physical determinism should produce the same result between variable sites. However, as Rapoport argues, the forces that modify the shape of the dwelling should be divided into primary forces, which are social and cultural forces; and secondary forces, which are the site, climate, materials, and so on. In this case, the shape of a dwelling is the result of a whole set of social and cultural factors taken in their broadest sense, rather than just physical forces or a single causal factor.

In Saudi Arabia, privacy is the most important socio-cultural parameter that influences the spatial form of houses. Among the many requirements covered are visual privacy, acoustical privacy, and olfactory privacy. Privacy is organized in a hierarchical manner, starting with privacy between neighboring houses and progressing to privacy between family members within a household [7]. While taking into account the social distinctions of family lineages and Islamic architecture, hospitality is another notable socio-cultural pattern that reshapes the spatial form of houses in Saudi Arabia as an introverted typology of veiled nature, which is particularly effective in the country. Thus, dwellings were established to serve a set of complex goals—not just to be a shelter. This is more of a cultural phenomenon, where the organization, layout, and shape of dwellings are greatly influenced by the cultural context surrounding them. Understanding dwellings is a way to understand a culture and its character, and a way to understand the process of a human-built place that is more conducive to understanding the way people live and their needs.

In this study, five neighborhoods in Hail City were chosen to investigate the topological transformation of individual villas. The case studies for the neighborhoods were chosen based on their chronological appearance and dwelling types. The Lubdah neighborhood represents the traditional period up to the 1950s, the Al-Aziziyah neighborhood represents the transitional traditional period until 1975, the Al-Jameaen and AlWusayta neighborhoods represent the modern period until 2000, the neighborhood north of An-Naqrah represents the transitional modern period until 2015, and the neighborhood south of An-Naqrah represents the contemporary period from 2015 to the present (Figure 4).

Three residential case studies are examined in each neighborhood in relation to the five study factors.

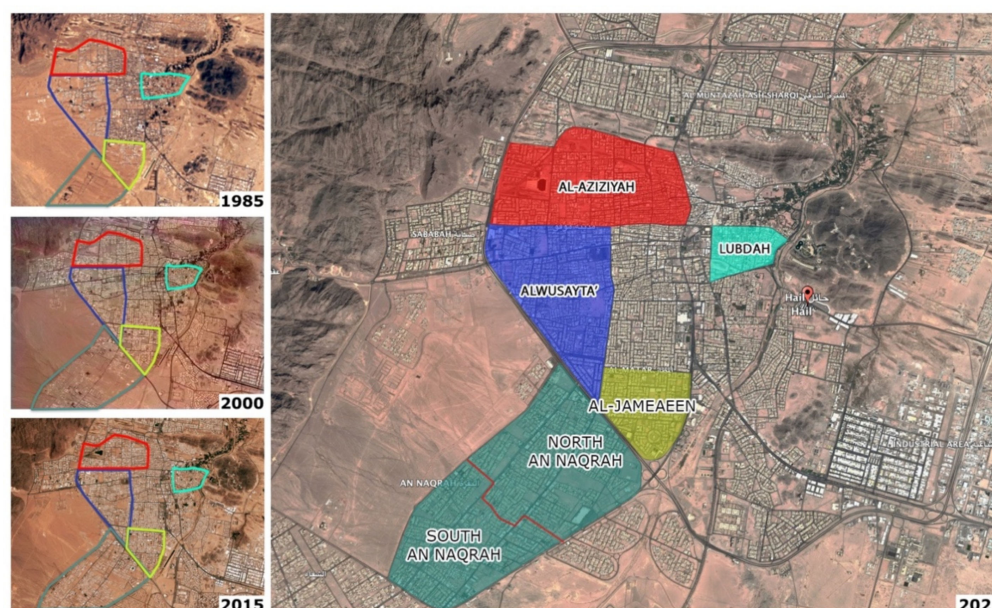


Figure 4. The five chronological neighborhoods of case studies emergence and locations within Hail City.

3. Research Design & Methodology

Building typology is a field of study that is primarily concerned with addressing the conceptual underpinnings that allow buildings to be classified and categorized into types (historically, typology has been used to analyze buildings and cities (analytical typology) or to design buildings (generative typology) [8]). Thus, the examination's central focus is on the evolution of the dwelling's layout, spatial interior spaces, and architectural form over time in relation to the housing unit's composition and functions. Two stages were deployed to identify housing characteristics: the first stage is fieldwork and observation, followed by taxonomy research to investigate and understand the typological forms of the individual residential architectural type in each period. The second stage involves analyzing and examining the first stage data collection to determine how well the data responded to the five factors within their historical contexts. This modeling of data collection and analysis will allow us to gain a better understanding of the individual residential "villa" chronological evolution and determine the extent to which these shapes and forms responded to the requirements and factors associated with each historical period (Figure 5).

The investigation of five neighborhoods was used to investigate the transformation of housing types. The division was based on the architectural style and the chronological appearance of each neighborhood in Hail City, where each neighborhood represents an era in which most housing construction occurred in that neighborhood, even though it is now a mixture of various types. The study will examine the physical, social, and economic impacts of these neighborhoods' historical housing types. Thus, the goal is to investigate three house types in each period, in each neighborhood, and connect them to the five factors studied in order to comprehend the typological transformation of individual housing in Hail City.

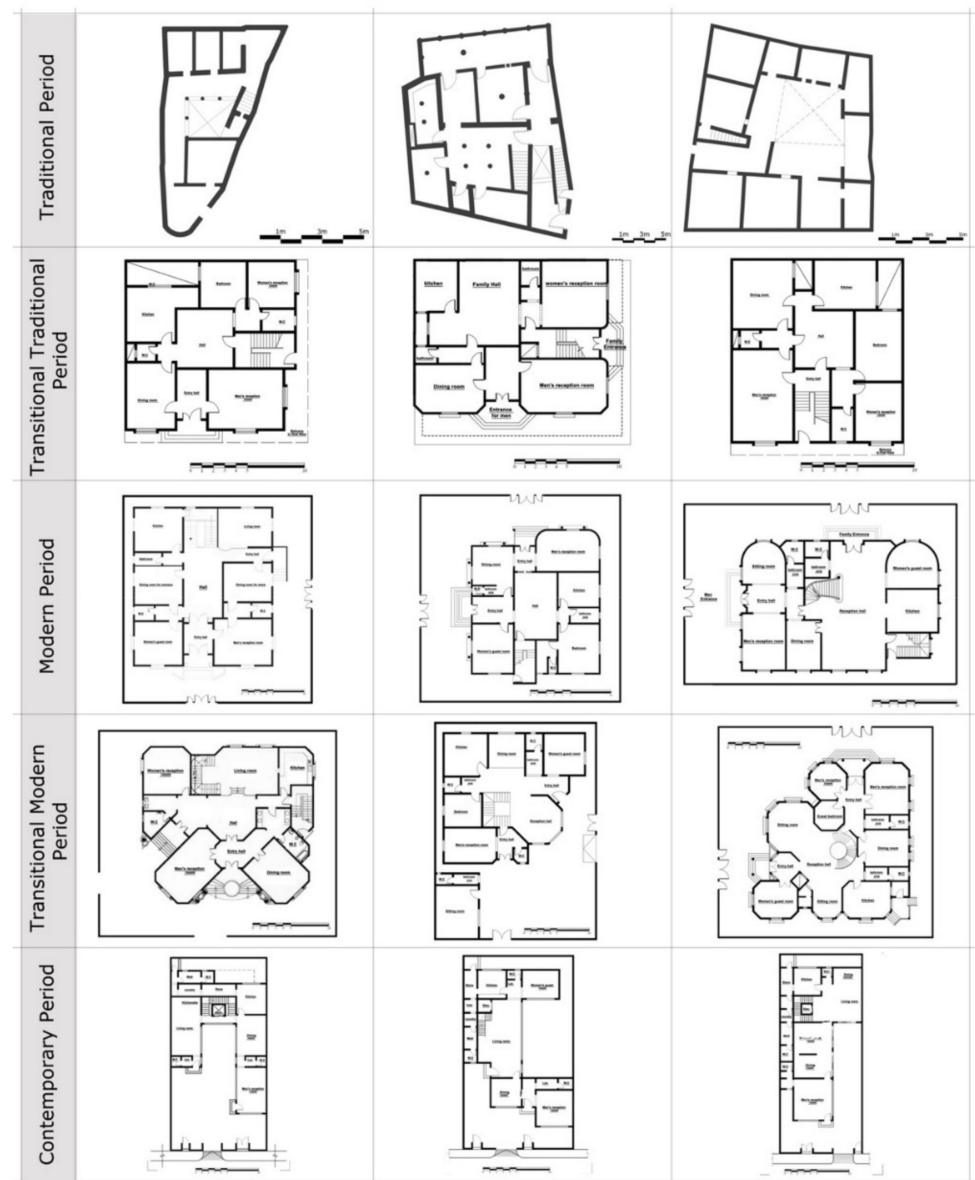


Figure 5. Hail City dwelling case study housing types for each time period.

Spatial analysis techniques are used to highlight change and analyze actions associated with change as part of the investigation [9]. Architectural plans, images, maps, and photographs are scrutinized in order to document spatial and temporal changes and to link changes to individual and institutional decision-making actions. The researchers used an ethnographic method that included non-participant observation and interviews with locals to gain key insights into the housing generative process related to socio-cultural issues. Furthermore, this study benefits from site fieldwork conducted at various time intervals, as well as architectural surveys and floor plan documentation. In the transitional modern and contemporary periods, a user perception survey is conducted to understand and link several research outputs with user behavior and attitudes toward building policies, house form, house comfort, and house design (The researchers discovered that the last two periods are the most recent and valuable sources for understanding users' perceptions of various house topologies).

4. The Home Environment Chronological Analysis

4.1. Traditional Period (Up to 1950)

Global demographic, socioeconomic, and technological shifts, as well as social and political interventions, have all contributed to housing transformations around the world. Housing in vernacular settlements has always been a reflection of the state of construction knowledge, the availability of local building materials, and the climatic and cultural conditions of the area [10]. As a result, it is argued that the community itself, as well as its specific environmental conditions, are the producers of housing typologies, which have typically resulted in a high degree of continuity in architectural styles and representation, even though there is a high level of individuality due to a lack of construction standards. In the modern era, vernacular settlements and their homogeneous housing typologies can still be found and studied in their original context to understand how such a community found solutions to their home environment challenges and requirements even though building policy factors were not yet implemented [11] (Figure 6).

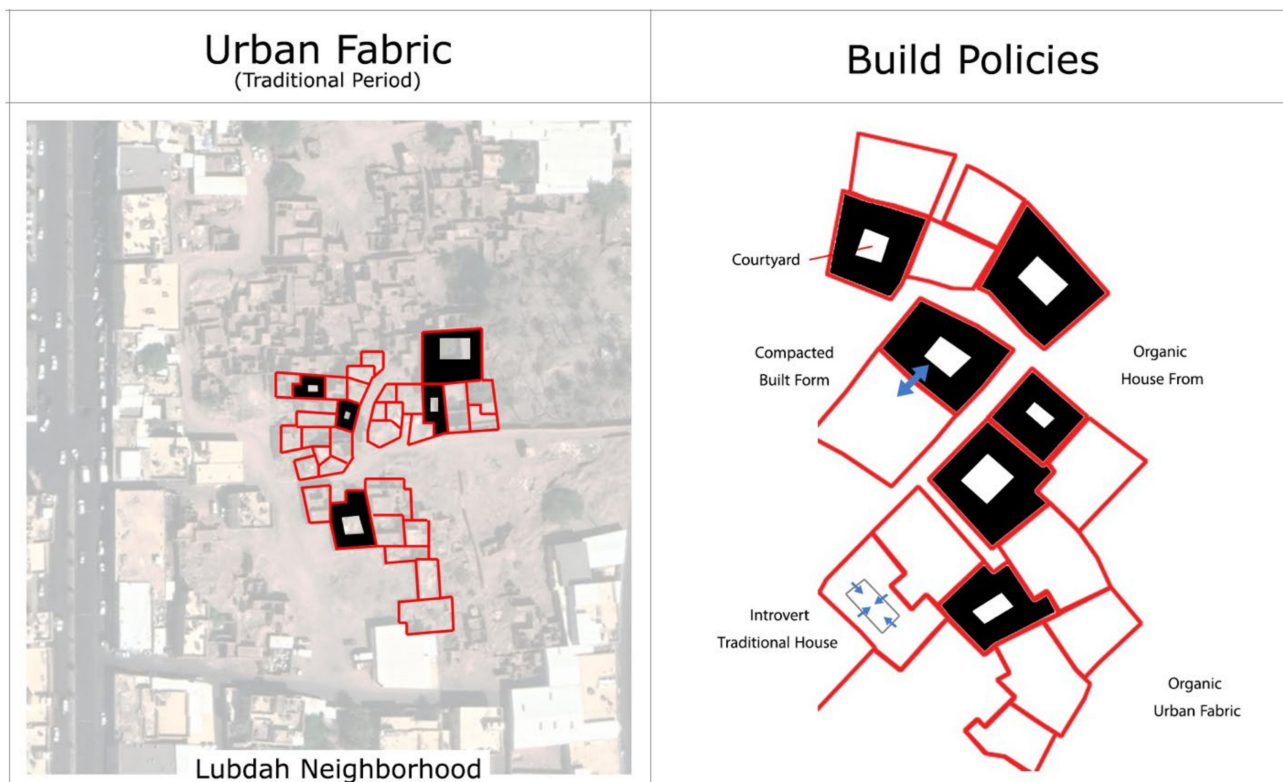


Figure 6. Organic urban fabric showing the traditional dwelling plots.

Observing the traditional period, we can say that the most common buildings in Hail City are dwellings that reflect the owner's level of privacy and social status. It is noted that the traditional house layouts were influenced by the relationship between the family and their community. With this dynamic in mind, it can be argued that most dwellings are divided into three sections: the front is reserved for male occupants and guests, the middle is used by family members, and the back is devoted to pets, utilities, and storage space [12]. Given that these three elements are so important, the house was divided into two domains: guest spaces and private (family/communal) spaces. Based on how far strangers can enter the house, these two domains organize the spatial arrangement of internal spaces. In general, social custom prohibited male strangers from entering the middle of the house, which was only used by women and close male relatives.

Examining traditional housing, it is clear that design in this period was heavily influenced by economic and privacy factors. Due to the harsh lifestyle, limited resources,

and being an Islamic community, dwellings in such a historical context were designed to ensure a high level of security and privacy, as well as to express the social statuses of the individual when possible. For example, the importance of placing the guest space near the door is that it limits the depth with which strangers can interact with the internal private spaces. Indeed, this encourages internal elements, such as the entrance hallway (corridor), to be used near the house door to break the visibility between the door and the courtyard space. This finding emphasizes the importance of the security and privacy factor in a cultural context in determining how a dwelling should interact with strangers and visitors. As a result, several similarities in traditional dwelling topology were discovered among the case studies (Figure 7).

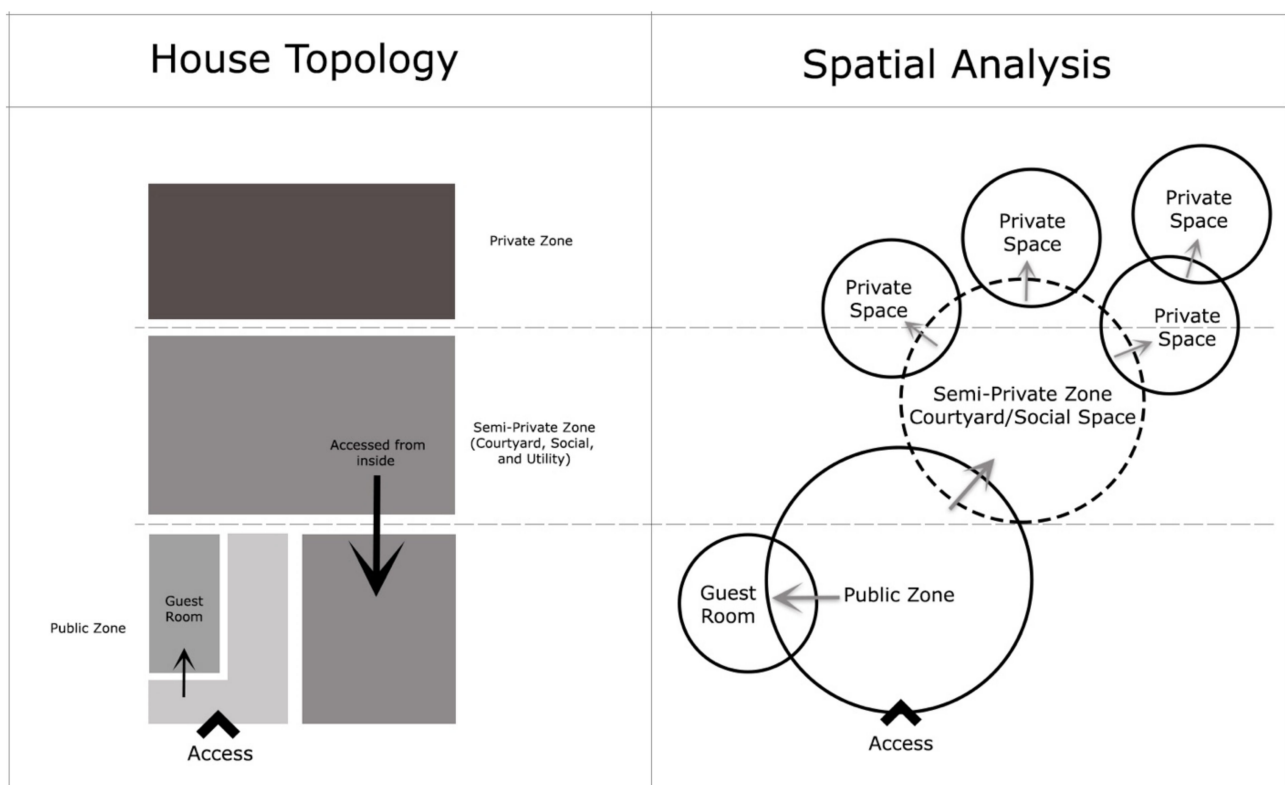


Figure 7. The traditional house topology and spatial arrangement in Hail City.

We argue that the importance of security and privacy in this historical period was the main reason for the formation of homogeneous spatial relationships, which later led users to express their individuality in their home environment without affecting neighbors. Such an argument gains validity when it is viewed from the cultural context in which the dwellings belong. Given that Hail City residents share similar socio-cultural values and religion, a communal formation to house topology is understandable. In spite of the interwoven urban formation that characterizes the traditional period, differences in house form, house size, texture, and house decoration were found to express the individuality of the house owner [13].

The urban fabric evolved in such a way that each settlement's center served as the focal point for public activities and connected the settlement's residents to the larger space (e.g., grand mosque or market). The residential neighborhoods (*hellas*) surrounding the center are usually linked by wide public spaces, and, as one gets closer to the residential area, narrow private spaces appear until they end in cul-de-sacs. This hierarchy arose to balance the settlement where the public domain exists with the middle and smaller private domains (clusters of houses) within neighborhoods.

Ragette acknowledges this study observation and claims that, because of the compacted urban mass, the length of exterior building walls is typically very limited. Windows to the outside are extremely rare in this case, and if they do exist, residents position the windows so that they do not face each other, preventing any potential visual corridors [14]. This results in a design approach that controls and sustains the adjacent internal spaces surrounding the built home to support socio-cultural and environmental needs through the interwoven structure and courtyard space.

In this case, the traditional dwellings in Hail City are usually simple and are highly functional in order to support dwelling users in relation to their cultural domestic needs [15]. When design differences do occur, they usually manifest themselves in the architectural elements, textures, and decorations chosen by the household to express the wealth, social status, and individuality of the household [16] (for an additional interview with several traditional dwelling elderly owners between 22 March 2022–27 March 2022, also see Al-Naim, 2006). It is also noted that most of these differences appear in inner spaces and more extensively in the guest space where men meet inside the house (Figure 8).



Figure 8. Several architectural elements, textures, and decorations in the traditional Hail City dwellings.

It is clear that throughout history, the courtyard has remained a common architectural element of design until recently. Al-Tayyash describes the significance of courtyards in dwellings, saying, “the courtyard house architecture reflected the style and culture of its time. It reflected the owner’s self-image and aspirations, as well as a distillation of historical influences. It appeared in varying degrees of solidity to extreme ornamentation” [17]. Hail City’s traditional courtyard housing typology consists primarily of an open-to-sky court surrounded by interior spaces with openings to allow interaction between the outdoor and indoor spaces.

4.2. Transitional Traditional Period (1950–1975): Foreign and Material Influence

Transitional traditional housing's architectural configuration is somewhat a good relative response to user comfort and was perfectly proportional to the era's and historical stage's technological capabilities. Any change calls into question the formative benefits and drawbacks of the current house model. Traditional house models, for example, necessitate horizontal planning and large space extensions that modern cities may not permit, as well as limiting the possibility of different vertical extensions of buildings due to privacy conflicts. Furthermore, having the open interior space (courtyard) in direct contact with nature allows dust to be transmitted directly into homes, especially in a local environment like Hail City, which is exposed to hot and dust-laden winds during the summer. Despite their distinct environmental characteristics, the resistance of clay building materials to weather factors remains relatively weak, as they require ongoing maintenance, particularly against humidity and rain. This is demonstrated by the fact that buildings made of these materials deteriorated and eroded over time, even with maintenance.

The aggregated need and desire to move beyond the traditional housing model was compelled by the region's introduction of advancements in construction techniques and materials. In the latter half of the twentieth century, new and very broad architectural forms and styles began to infiltrate the local culture of Hail City. The oil boom—as well as the urgent need for additional housing to accommodate the growing population, and foreign employment from neighboring Arab countries—aided in meeting this need for housing accommodations. It appears that housing units had square or rectangular shapes, were urbanely compacted, and, in some cases, lacked an inner courtyard. Alternatively, the housing form was directly overlooking the outer perimeter through window openings, and new elements emerged in the form of balconies. What has emerged demonstrates the inadequacy of previous experiences in dealing with the emergence of this new material, as well as a desire to develop and utilize building material technologies that became available in order to improve living conditions vis a vis traditional housing [18].

Through observation, it is possible to conclude that the chronological development of villa housing in Hail City between the years 1955 and 1960 AD represents an early emergence of the villa type in this period given that there was no strict building legislation at the time, where this early development was still guided by traditional principles. As a result, it was discovered that, during this time period, there is a mix of traditional built forms and advanced construction techniques in the process of housing formation (e.g., use of concrete and reinforced concrete) (Figure 9).

Between 1965 and 1975 AD, different housing façade expressions arose from their traditional counterparts. Several significant changes in the residential type emerged as a result of the emergence of built systems and regulations: the emergence of second floors in some buildings, the emergence of setback distance between built forms and house plots, and the emergence of fenced walls around the house plot. However, there were lax building regulations, as evidenced by the fieldwork observation that dwellings could regress between 2–4 m from the front and only one meter from the sides or adjacent to the building [19]. Given these lax building regulations, communities transferred some of their traditional building principles into their new dwellings, resulting in the house form of this historical period being a mix of two eras “traditional and early modernity” (Figure 10).

Every society creates its own distinct spaces over time. A social environment's architectural structure and cityscape evolve as some or all of that environment's constituents move on [20]. This is the period where you can observe the city's unique character. During this time, residential house characteristics such as no street borders, simple and abstract materials, and unique structured form began to emerge. The urban fabric layout comprised narrow house plots with semi-irregular streets in this area because of each building's use as a determining factor.

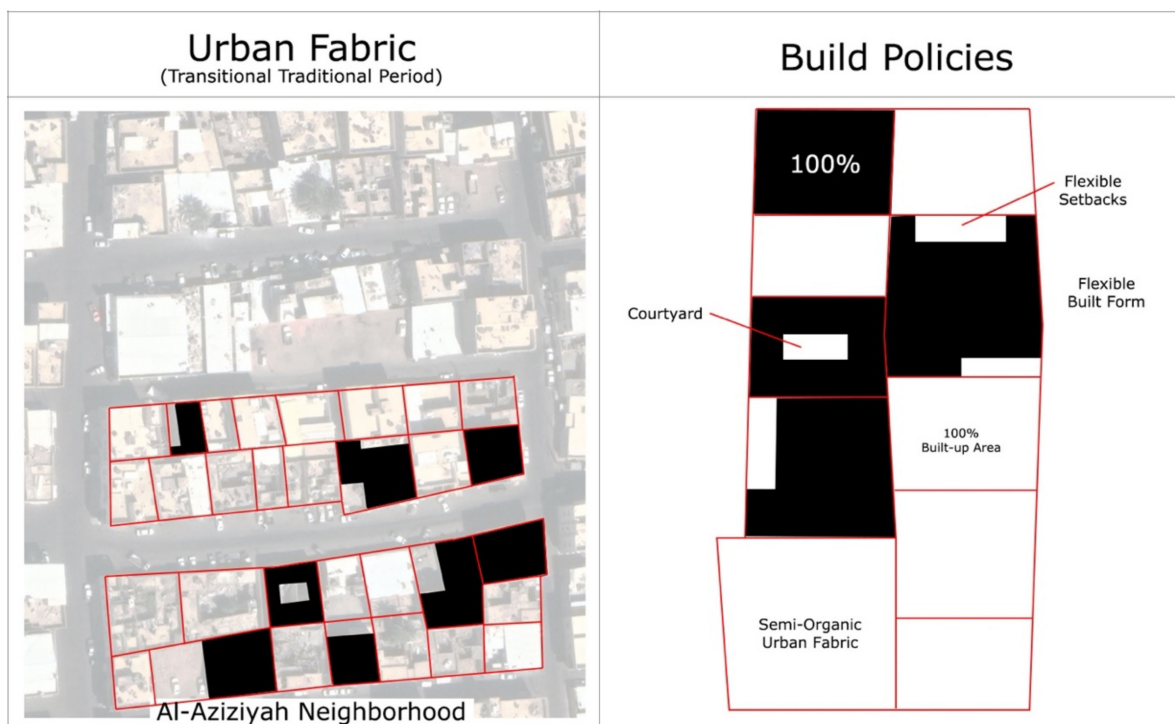


Figure 9. Early emergence of grid urban model showing the division of residential plots.



Figure 10. Examples of the early emergence of the residential dwelling in Hail City.

Currently, we can say that this type of housing is completely out of context and an entirely new concept, coming from different climatic, social, and cultural environments than Hail City. Architects and engineers in the central region quickly adopted a new

architectural style brought to them by Egyptian, Syrian, Sudanese, and Jordanian engineers and architects in the late 19th and early 20th centuries.

4.3. Modern Period (1975–2000): Institutional Influence

The adoption of the grid urban model, which resulted in the division of the residential plot, is significant for this historical period. It is a model that differed from the previous two periods and contributed to the villa becoming a preferred type of housing for users in Hail City due to its defined plot size. The setbacks law enacted in the late 1960s also contributed to the preference of the villa as a residential option for Hail communities, as it was a trend and a way of modernity at the time. The main difference is in the built form, which requires a setback of “one-fifth” of the street width from the front and no less than two meters from the sides and back of the building [21] (Figure 11). The villas in the case studies range in size from 500 to 1000 square meters. The ground floor is mostly made up of guest reception rooms, a kitchen, a dining room, utilities, and the main stair. The first floor typically includes bedrooms, a patio, utilities, and, in some cases, a family living room. There are usually two entrances, one for guests and one for family members only. The villa is frequently fenced along the plot and surrounded by a garden, which allows the windows to be opened due to the setback requirements imposed by law.

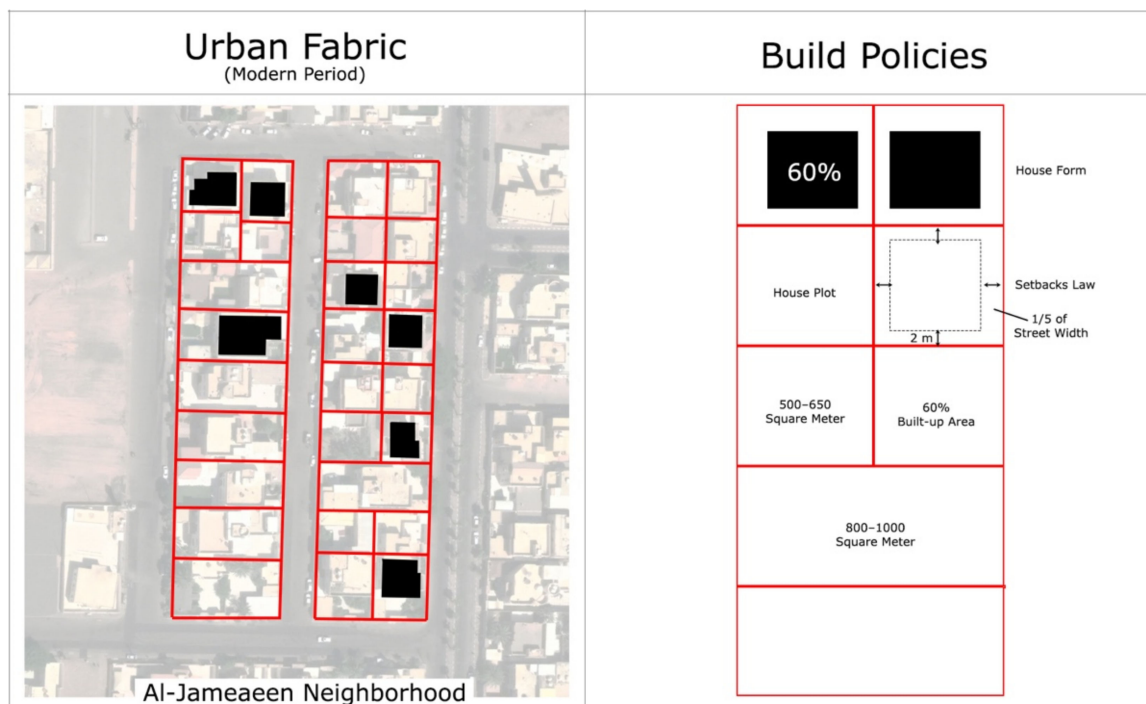


Figure 11. The grid urban model showing the division of residential plots and the setback law.

We can say that the rapid development of the villa residential type is due to the government’s establishment of a non-profit development real estate fund to encourage individuals to own a home. The fund was established in July 1975 and it provides loans to individuals and institutions in order to establish real estate projects for private or commercial use. Since its inception until the end of 1998, the fund has been able to provide 842,443 SAR private loans to individuals and 488,200 SAR investment loans, which have contributed to the construction of approximately 5586 housing units throughout the Kingdom [22] (Hail City’s urban expansion can be attributed to the real estate fund, which encouraged the residents of the villages surrounding the city to move and relocate).

Examining the stock of modern housing, it is clear that the design of this period was highly influenced by economic and building policies as well as socio-cultural factors. Environmental factors were neglected due to the shift from introvert built form (e.g.,

existence of courtyards) to extrovert built form (e.g., large windows to outside space). The setbacks regulation contributed to define the house form and layout (e.g., rectangular or square) due to the strict polices concerning the house plot and adjacent neighbors. All these factors led to the transformation of the house's inner spatial layout, where it is observed that, in most cases, the ground floor is to be designed to accommodate guest (public) space, utility spaces, and the emergence of a first floor that led to space to be designated for family members (private). We argue that this led to a revolutionary transformation in how dwellings in Hail City were used, where the ground floor became 70% dedicated to public use, which led to a new era of how house form was used by the local community. Such a change led to the emergence of two entrances: one for public usage and the other intended for use by family members to accommodate the changes that occurred in the house's spatial layout (Figure 12).

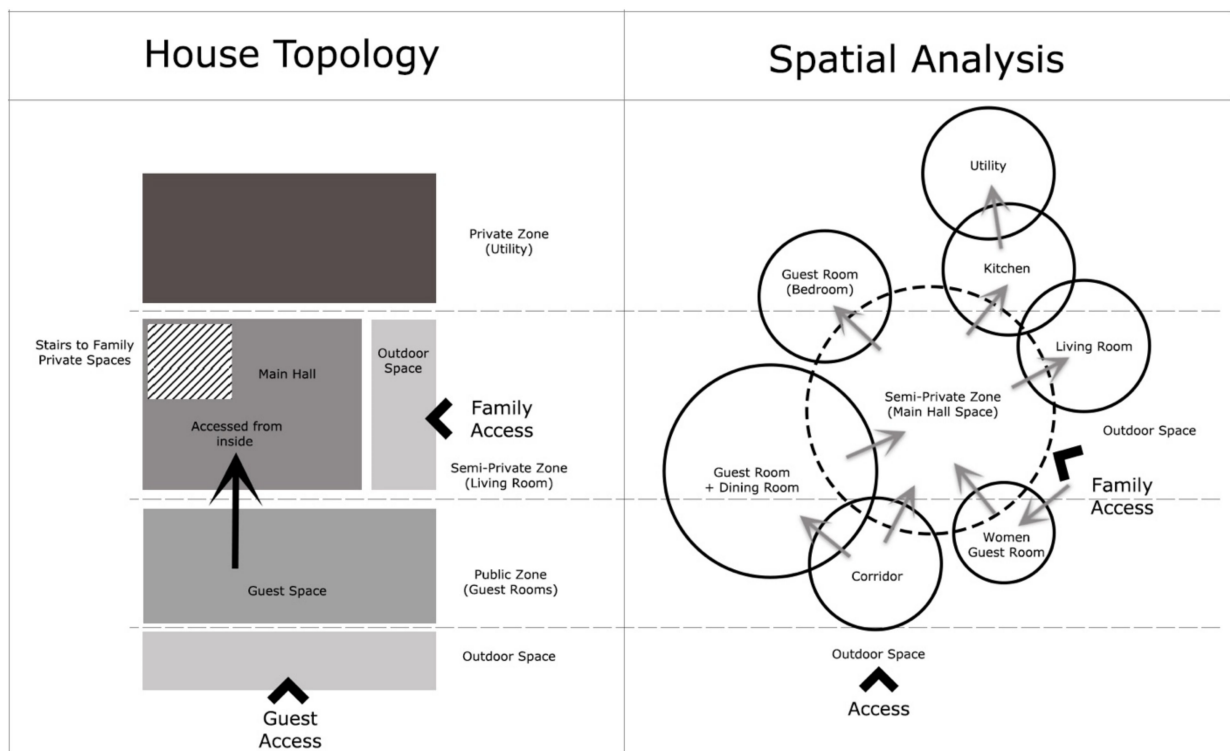


Figure 12. The modern house topology and spatial arrangement in Hail City.

New strategies for construction were implemented in the modern model in response to higher levels of prosperity, which resulted in an influx of foreign engineers and architects, as well as the use of innovative construction techniques and materials. Architects of the period introduced two types of residential units as modern models, a villa and an apartment, with the goal of raising the living standards of local inhabitants. The villa was introduced for the first time by the government as a standard housing typology for locals, and it was designed to adhere to the traditional expectation of private land ownership. A modern villa's internal spaces are oriented outward, toward the surrounding yards or outdoor spaces, in contrast to the traditional courtyard house typology. In similar study context, Remali and others studied the Gulf region (GCC) house form and asserted that approximately one-third of the villa models are one- or two-stories high, and they are situated in the center of the plot, surrounded by open spaces, parking lots, and gardens [23]. Their results are similar to how the Hail City home environment model is set up and built in Saudi Arabia, which has policies about the home environment that are similar to those of other Gulf countries. This resemblance is due to the fact that GCC countries have similar traditions, ways of life, and beliefs, which is why they look so much alike.

We can say that the modern villa retains some of the traditional way of life. Comparable to a traditional house, the guest space was still connected to the main gate and accessed from the outside, with limited access from within the house. On the ground floor, family space is limited and separated from public space. The stairs leading to the first-floor family spaces are hidden and separated from the public areas. We argue that it is a behavioral act demonstrating that the Hail community, despite progress, found ways to adapt to changes and impose some of the socio-cultural roots in modern housing.

The modern dwellings' façades appear to be a design evolution from previous eras (e.g., traditional). The similar use of concrete protrusions/extrusions that appeared and defined the façade elements is the most defining architectural aesthetic of this period. In addition, the use of façade texture in cladding the façades used a regular plastering method with a variety of colors. It is noted that there has been a significant change in the design of the home in terms of gates, patios, and windows, as well as the emergence of curved walls and shapes. The building is represented geometrically by straight walls with balconies in some cases and visible curves. The façade is typically embellished with protruded/extruded concrete around the windows and extended between dwelling floors. Also visible is a brick element, whether in the roof or above the main gate. We can argue that the use of brick, even though it does not apply to the Hail City environment and culture, is due to foreign architects leading the design development of houses during this period due to a lack of professional Saudi architects (Figure 13).



Figure 13. Several architectural elements, textures, and decorations in modern era Hail City dwellings.

Dwellings built by foreigners caused us to notice some changes in the house's development after the owner moved in. These were acts of territorial behavior intended to control the lack of privacy and cross-view among several neighbors caused by the building polices and absences of socio-cultural response in building regulations [24]. For example,

in some cases, fence metal sheet barriers (locally called: shinko cladding) were raised above the fence to provide more privacy, as well as windows being covered by iron or totally closed. This act is noted and justified by a privacy conflict in which the larger windows in the façade and the lower fence did not provide the user with the privacy required by the inhabitants. As a result, the owner altered the house design to address these socio-cultural concerns (as seen in several interviews with dwelling owners between 22 March 2022 and 27 March 2022). It is a practice that demonstrates that the villa system used in the case and statutory laws did not meet the social needs of the user because it was designed by a non-local architect. It is believed that the basic values of society are deeply rooted and therefore persist, so they resist changes and adaptations over time, which is what makes this practice common, and arguably a practice that is not limited to Hail City but is common throughout the Kingdom [25] (Figure 14).

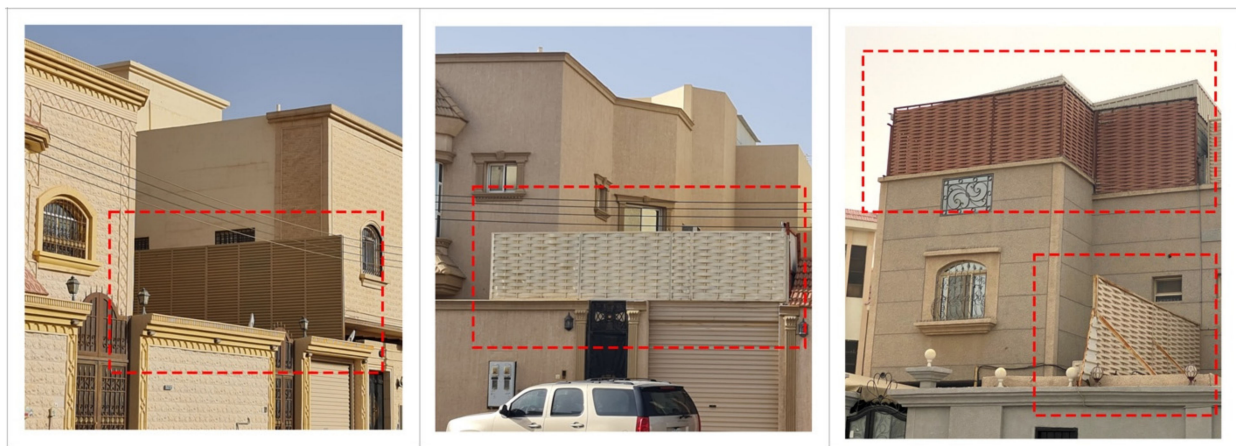


Figure 14. Several interventions in the house design by the end user.

4.4. Transitional Modern Period (2000–2015): Western Influence

We could say that this period is a continuation of the previous period, with only minor changes to building policies and regulations. The grid urban layout remained, and the setback regulation underwent minor changes that contributed to the definition of the house form. Since 2000 AD, building policies have evolved from being only 60% built-up area with a fixed number to the ability to build attached to a street fence with an extra 10% detached structure (extension), resulting in a 70% built-up area overall (Figure 15). This resulted in some flexibility in how the house form was generated, resulting in the discontinuity of some functions and the emergence of a variety of architectural forms. However, the house layout remained somewhat similar, with the only difference being how to approach and connect various internal spaces, as well as a sensitivity to house size.

The spatial and built form was no longer conceived as something enclosed, surrounded by walls or fragments of walls. Inside and outside space have some connection, and it is difficult to identify precisely where the interior and exterior begin at first. Even on the inside, the spaces do not exist in isolation, but rather overlap and flow into one another. Residential physical patterns are changing as a result of technological, economic, political, and socio-cultural changes. It is a natural transformation that elicited conflicting reactions from local users and, later, designers. The majority, if not all, of the responses were negative toward the introduction of new urban patterns (e.g., grid planning), building types, and accompanying regulations. The new transformation could be labeled “modern,” “foreign,” or “western” [26].

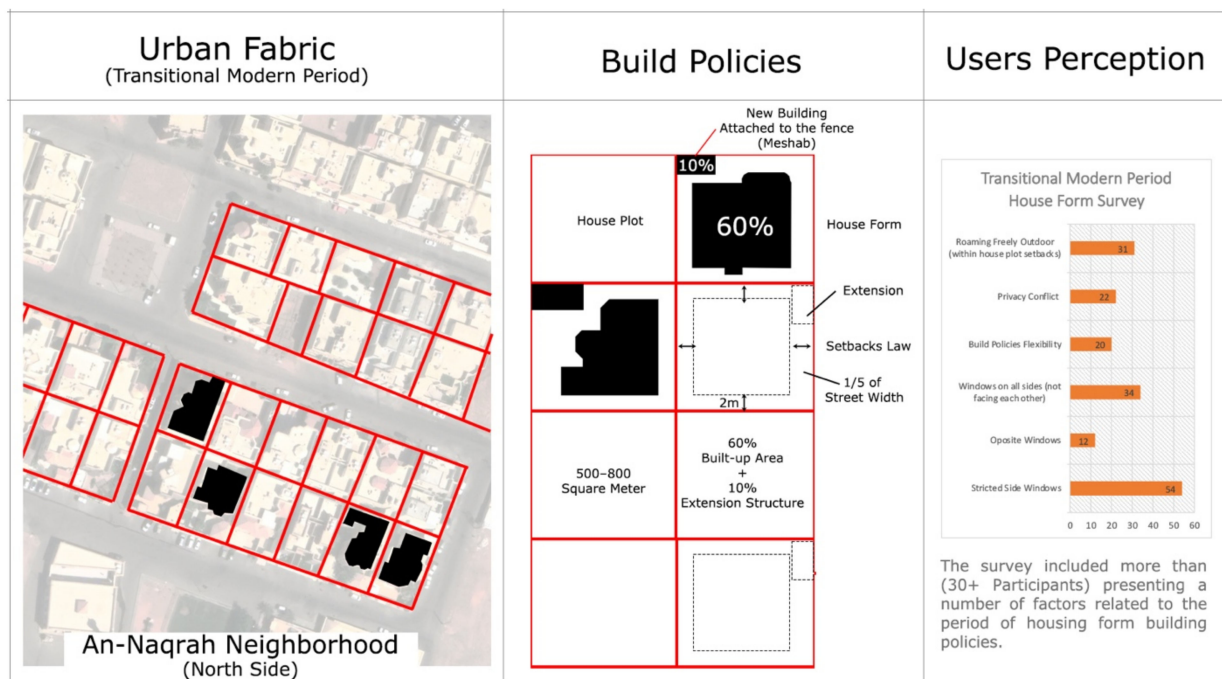


Figure 15. Several examples to the changes towards housing plot design from and users' perception to building policies.

The growth of the city, as well as the increase in wealth of Hail City's inhabitants, influenced changes in the house-building process. Although the changes were minor, the main differences observed were in the built-up area, architectural elements, spatial layout, and façades of the dwelling, as well as how the owners managed their house plot [27]. More open spaces were observed inside the plot house fence, as well as different geometrical forms (e.g., hexagon) that differed from the modern period. The size and built-up area were significant changes as homeowners became more aware of environmental and maintenance issues associated with house size. In addition, the women's guest room has nearly vanished as a result of new policies (e.g., building attached to the fence). As a result, the two-entrance concept was abandoned and the house now typically has a single entrance that leads to the guest space, with a distributor corridor connecting it to the main space of the house (living room). If women's guest rooms are still available, a secondary entrance on the side may occur. The dwelling's spatial layout has more openings, and, in some cases, the living space is double height (Figure 16). New building policies have resulted in the emergence of a new extension space known as the "meshab", which is essentially an additional informal and traditionally laid out guest space attached to the fence and near the main entrance (Figure 17).

The changes to the house form caused users to become more associated with their homes, as new regulations and the disappearance of several functions gave users more freedom to orient inside the house for the family by having the guest space as a detached structure near the fence and main entrance, which is a new building policy that did not exist previously, thereby encouraging the emergence of new forms and shapes. As a result, even though users may still argue otherwise, it provided the ability to create more enclosed outdoor spaces within the house plot; a change made to improve the quality of house plot usage.

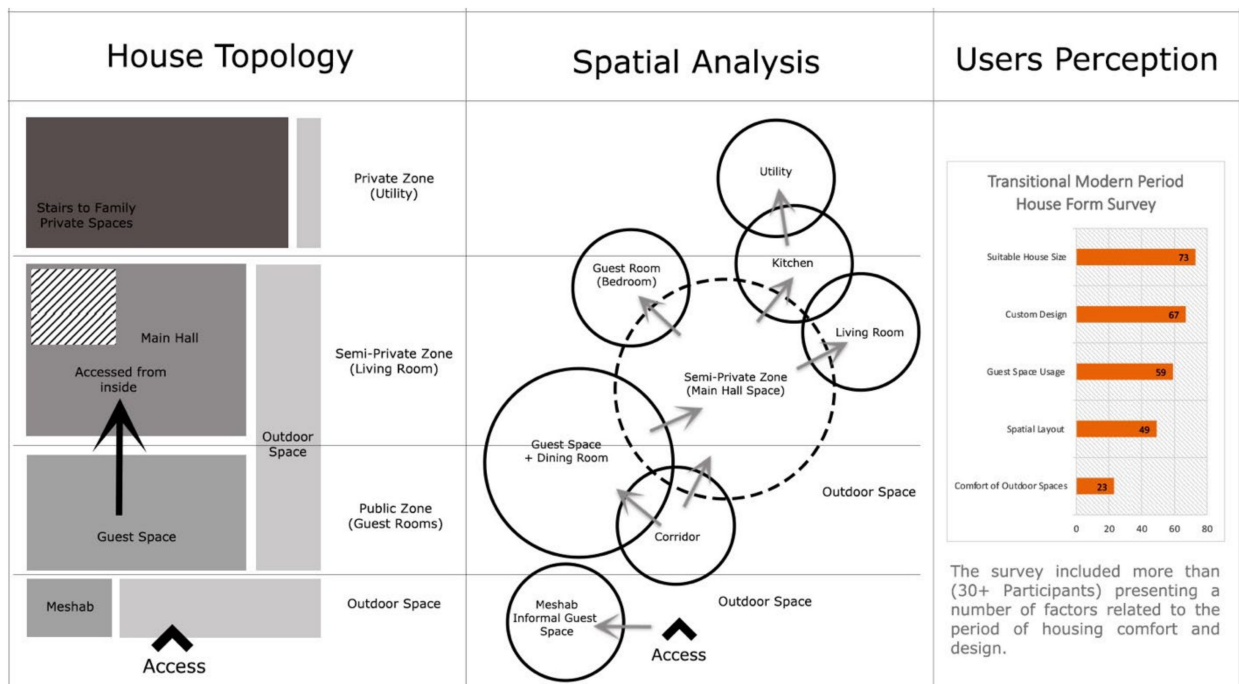


Figure 16. The transitional modern house topology, spatial analysis, and users’ perception to house comfort and design in Hail City.



Figure 17. Several architectural elements, textures, and decorations from “Transitional Modern” Hail City dwellings.

The façade is characterized by dense geometric shapes such as circles and arches. It is in this era that circles began to form the dwelling's windows, and arches are used to define the entrances and balconies. Brick and stone are employed in the façade to add some architectural aesthetics that give character to this type of dwelling and privacy. The number of windows overlooking the front façade of the house is an imprint of this period. In some cases, different architectural styles from around the world (e.g., classic architecture) have been adopted and transmitted to fit local contexts (Figure 17). The house form is typically divided into two geometries connected by a median geometry, with this division used to spatially layout the house's interior spaces between male and female family members [28].

4.5. Contemporary Period (2015-Present): Institutional Transformation

The "Contemporary Period" was influenced by significant intellectual developments and new societal concepts, which had a significant impact on urban restructuring as well as individual perceptions of how cities should be built. The ambitious Kingdom 2030 vision, which paid special attention to the environment and the economy, had a clear influence on the design of this stage's houses [29,30]. There was a significant shift in building policies from detached houses (60% built-up area) with a setback system to houses that became more flexible and could be adjacent to the neighborhood on two sides. The new law provided the owner with a 70% built-up area with no restrictions on setback from neighbor sides while retaining the 1/5 setback towards the street, resulting in a variety of new shapes and forms.

The Ministry of Municipal and Rural Affairs developed a partial construction control towards the house size and plot (period of slowing economy) in the year 2018 AD, which will undoubtedly have an impact on the shape of the residential fabric (Figure 18). According to the previous situation of the legal system, housing units (detached villas and two adjacent villas) are permitted to be built in a percentage not to exceed 60% of the land area and 65% for the first floor. It also allows for the construction of a separate external structure as long as the proportion of construction of the structure and the ground floor does not exceed 70% of the house plot area. It is also permissible to construct an upper structure that does not exceed 50% of the area of the first floor, with no openings on sides with neighbors or the street, and does not exceed the dividing line in the adjacent villas.

Setbacks were defined by the system as the horizontal distance between the property boundary and the building boundary. Setbacks on the opposite side of the street are one-fifth the width of the street, with a maximum of six meters. For all roundabouts, the neighbors' side must be a minimum of 2 m, and if the site overlooks the square, the front setback is 4 m [32]. It is permitted to protrude into the first floor on the front setback towards the street by no more than 1.20 m. Within the limits of the minimum return, it is not permitted to build windows or balconies facing neighbors [33].

The close proximity of the buildings situated in a very hot environment, such as Hail City's climate, allows for a reduction in the areas exposed to the sun's rays, and thus a reduction in the need for cooling. This advancement occurred as a result of the development of the urban policies system during this time period, as the new policies focused on environmental control among various dwelling structures [30]. This amendment also allowed for the formation of an inner courtyard for the house from the total areas that were previously wasted in the setbacks, which is a return to the traditional system of house form. Even though the house plot became smaller than in previous periods (not exceeding 400 square meters in most cases) [34], the built-up area of the dwelling has become more spacious and cost-effective, enabling a shift to more affordable housing strategies [35] (Figure 19).

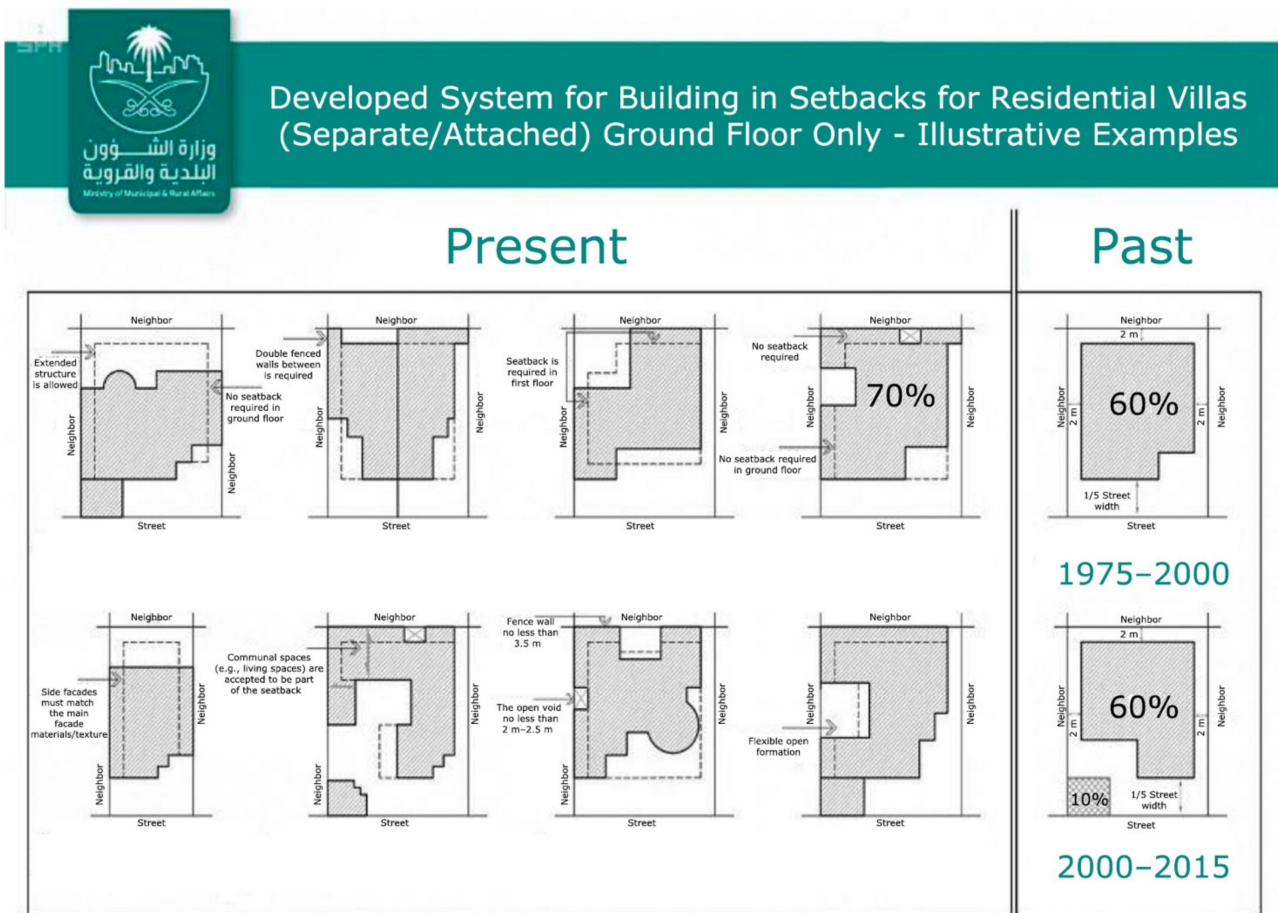


Figure 18. New and modified build policies for residential villas in Saudi Arabia. Source: Reprinted with permission from ref. [31]. 2022 Saudi Press Agency.

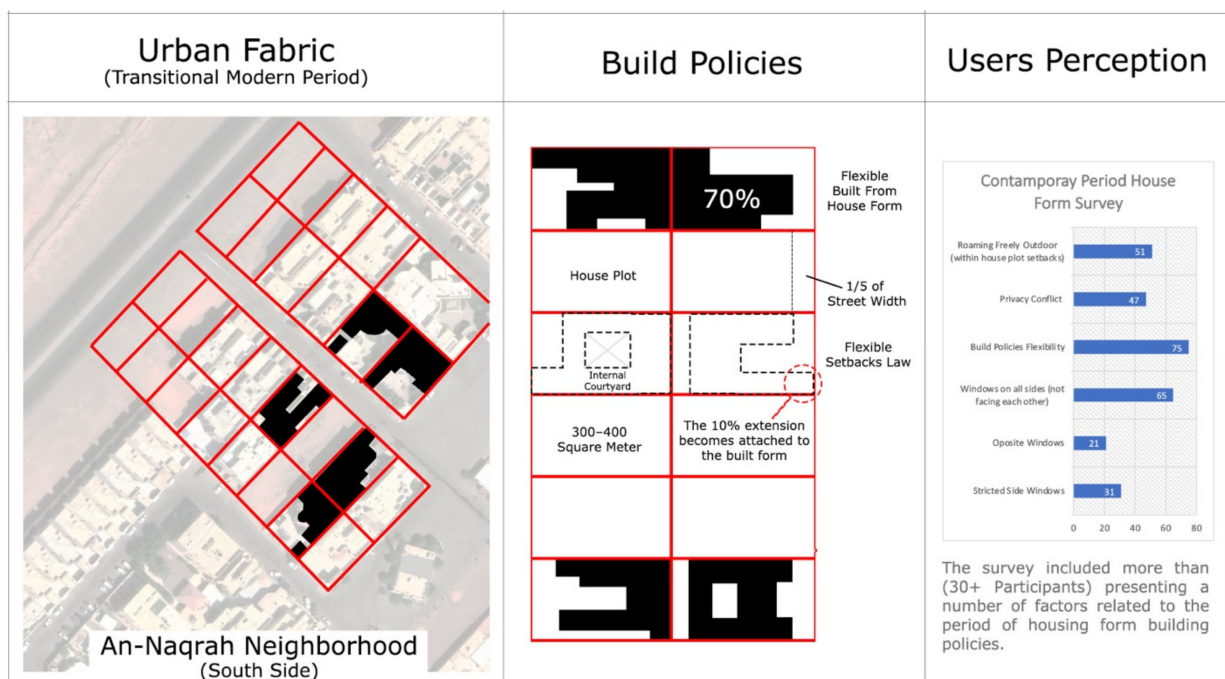


Figure 19. Several examples to the changes towards housing plot design from and users' perception to building policies.

Given these changes in the law had a direct impact on the general layout of the dwellings, they began to take explicit and simple forms, such as the rectangle, the L-shape, the H-shape, and the U-shape. Furthermore, the internal space relationships began to differ from the previous periods, so the house became more open to its internal garden through large window openings, and the house became more private due to the closure from the neighborhood side [36]. In terms of analyzing the internal relationships of the dwelling, we notice the relative disappearance of the guest room for women, with the living hall serving as an alternative location.

The guest section for men has become less spacious in relation to the total built-up area of the ground floor, and the separation of this space has become less severe than in previous periods [37]. In many cases, architects resorted to connecting the men's guest room with the interior section of the house via specific doors that allow separation when needed with a flexible link to take advantage of this part of the dwelling. This period model frequently includes two entrances, one for guests placed closer to the men's guest room and its services, and a less common one on the side of the house intended for the family (Figure 20).

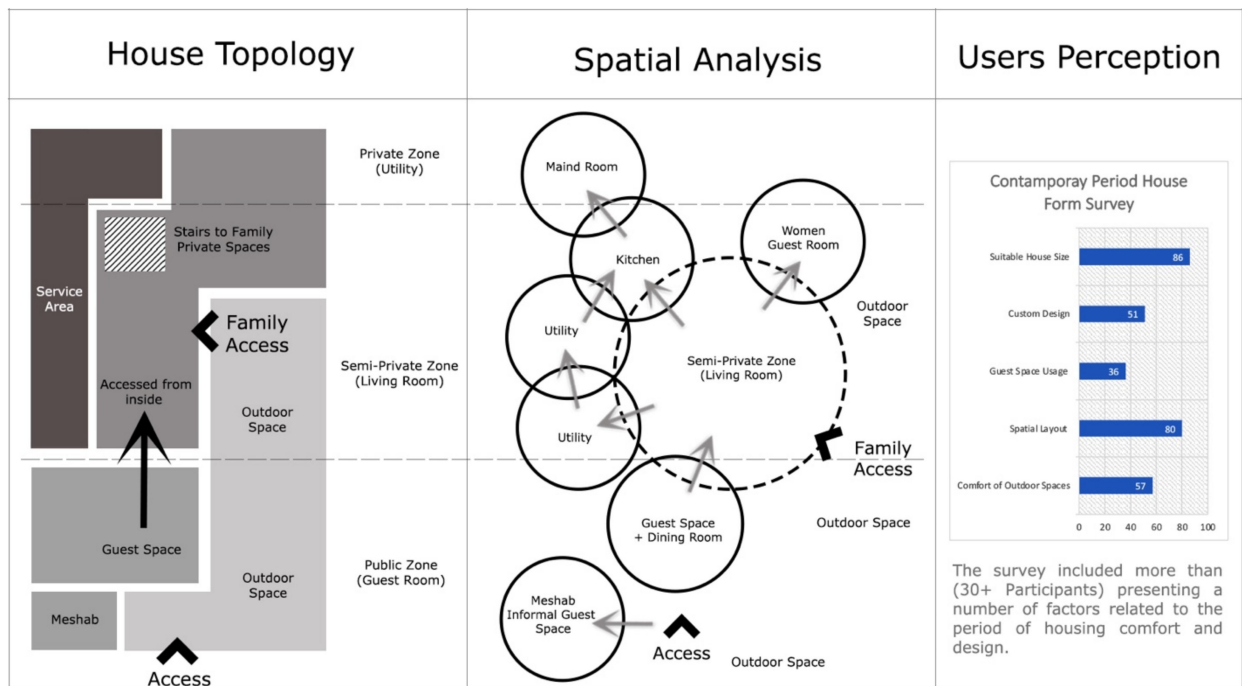


Figure 20. The contemporary house topology, spatial analysis, and users' perception to house comfort and design in Hail City.

In general, the design models for this period allow for the preservation of customs and traditions, particularly those concerning privacy, because there is a separation between the areas of the guests and those of the house's family. The building's façades are dominated by a modern style, they exhibit simplicity and unpretentiousness in design, less decoration or inscription, and the use of simple shapes and openings, as well as regional colors inspired by the surrounding environment (Figure 21).

Finally, the researchers assessed the impact of this system on the housing unit and the built fabric via observations and personal interviews with new homeowners (as seen in an interview with several homeowners between 26 March 2022 and 31 March 2022). It appears that the decision to enact a new law was based on user inquiries and requests about building in the areas left (seatbacks areas) to be retracted and exploited, especially given a history of irregular violations and exploitation of these areas. The findings indicate that the impact of this decision extends beyond the unilateral view of housing, as it may affect the

interconnected processes of the urban fabric, as well as redefining what is public and private between adjacent housing blocks. There is no longer any separation between neighbors because the decision did not address the nature of the spatial relationship between the two neighbors in the regression surfaces. As a result, a number of questions arise, including: will the community reject or accept this direct contact? Will the resulting societal practices in dealing with this area affect the shape of the overall fabric, whether it will bypass or not? To what extent will the community accept the visual and transition to acoustic communication in these areas among neighbors? These issues need to be considered, especially given the high demand for governmental affordable housing in Hail City—with around 8759 families on the waiting list [22].



Figure 21. Several architectural elements, textures, and decorations from “Contemporary” Hail City dwellings.

5. Findings and Discussion

Throughout the course of this research, it became clear that traditional residential architecture formed an innate response to the needs of users at the time. As a result, the overall composition of the dwelling appeared simple in terms of architectural style, and the form came to encapsulate the function, achieving the concept of “harmony within unity.” The central open space (courtyard) is a key feature of the traditional dwelling, where it achieved the required environmental balance with the compacted urban fabric to provide shade and shadow among various buildings. This internal void (courtyard) was discovered to have achieved the necessary social privacy through complete openness from within (“introvert”) that protected several family spaces from external view. Local inhabitants developed such a built form as a solution to socio-cultural and religious requirements and preferences.

The desire for modernity and the need to progress led to the development of transitional traditional housing types, in which users benefited from advanced building techniques and materials. Several early villa dwelling types began to emerge during the second half of the last century with the spread of concrete and reinforced concrete. These are dwellings that deviate from traditional form while retaining some traditional dwelling principles. This is why it was noted that, during this period, some dwellings had courtyards, setbacks, or large open spaces. It could be described as a traditional housing concept with new configurations (e.g., use of concrete material). It was a period dominated by foreign Arab architects, which explains why several dwellings from this era have an architectural style that is disassociated with the local architectural identity. According to what has emerged, there is a lack of knowledge and experience among locals in dealing with the emergence of this new material, as well as a desire to develop and take advantage of what has been made available by building material technology for improving the living conditions in a traditional dwelling. It was a way to express modernity and to show the evolution of Hail City residents' lifestyles and livelihoods.

We noticed that the inner courtyard, which was the centerpiece of the formative concept of the Hail house, had been distributed from the center to the periphery and had turned into a common space around the dwelling plot in residential models developed prior to 2015. It was a shift that redeveloped the Saudi concept of dwelling and introduced a new house form. To overcome such a shift, new policies and built restrictions were introduced in later periods, which resulted in and contributed to modifying the house shape to be fixed square (e.g., modern period), as well as a set of regulations to control privacy among neighbors. For example, building codes mandated that side-opening windows be installed at a minimum height of 1.60 m to prevent neighbors from seeing into adjacent homes. Given that these side windows cannot be larger than two square meters, the privacy of adjacent neighbors is protected. Such policies demonstrate that the shift did not take into account locals' socio-cultural concerns and did not take advantage of traditional solutions and how they overcame these concerns in a densely packed urban fabric.

Furthermore, one of the disadvantages of residential architectural forms that used the setbacks law between 1975 and 2015 is that the house form façade is either narrow or wide depending on the economic and social status of the house owner (e.g., house plot location). The architectural aesthetics of the dwelling façades were hampered by the grid urban fabric and the narrow plot width. It should be noted that many house forms have only one façade due to setback policies, and the side façades were restricted due to privacy concerns, causing them to be aesthetically shallow. Instead of viewing the façades from the inside and appreciating the aesthetic dimension, the façades have become external, and the user frequently only gets to see one or two façade sides of the house. As a result, instead of the user having visual control over the façades of the building, which has a configuration that opens to the inside, the control has shifted to the outside ("extrovert"), and the user is unable to enjoy the aesthetics of his entire home's facades due to the high privacy control established by the setback law—as is the case in a traditional dwelling (Figure 22). It was and persists to be a contentious issue among homeowners because it limited the house form, limited the functional layout, and disrupted the quality of the residential architectural aesthetic.

The majority of housing models examined in the study lacked effective interaction with the surrounding environment. From the high fence requirement to the fixed house form combined with grid urban fabric, the integration of internal and external factors was minimal, resulting in a dwelling that resembled a container. Furthermore, building materials with special chemical compositions are not regarded as having the best performance for dealing with the local desert environment because they absorb heat and store it for an extended period. The nature of the modern form, which we observed in many cases, is copied from western modules that deal with a different topology and way of life, expressing the desire for modernity over locality.

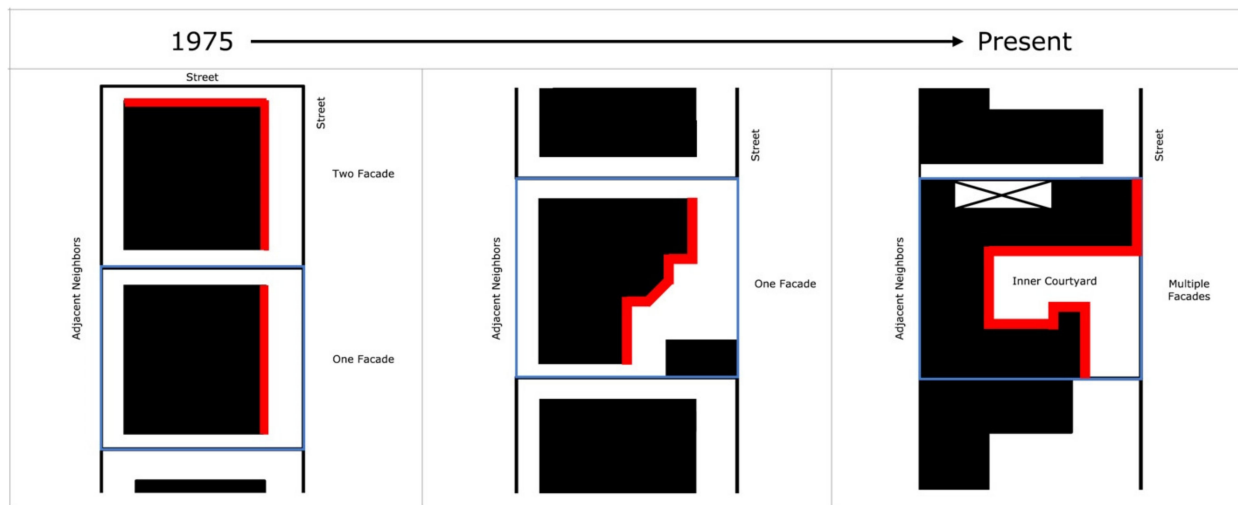


Figure 22. The change of dwelling forms and façades during the last decades in Hail City.

The housing models developed after 2015 are qualitatively different from the previous periods. The significance of these changes stems from the fact that they respond to and improve upon user needs, particularly in terms of economic factors. The house plot became smaller, and the setback law became more flexible, providing more opportunities to respond to local environmental conditions. Social issues such as privacy and acoustic insulation among neighbors must still be addressed.

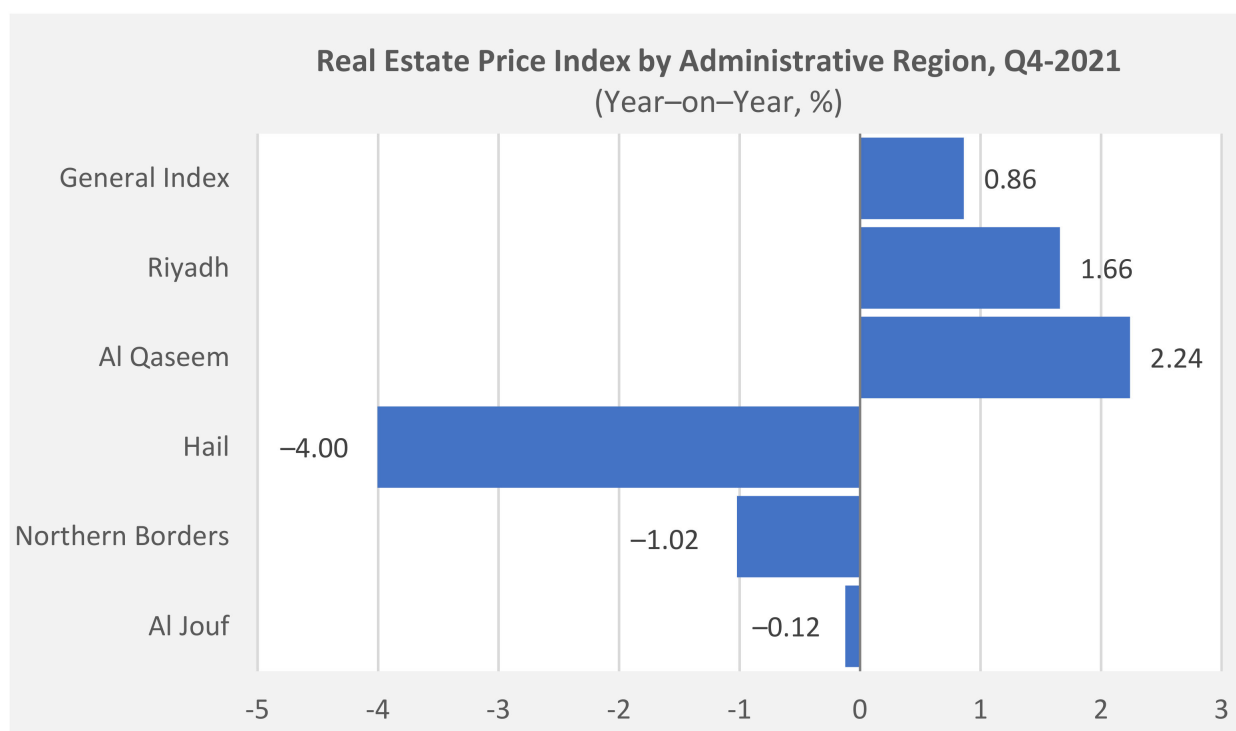
It is important to note that society's rapid and radical transformation has begun to produce contradictory residential architectural forms, particularly in plots with a self-construction system. These forms represent a state of intellectual confusion and a lack of a clear orientation. This is evident in Hail City's residential real estate status, where residential plot prices are beginning to fall due to a lack of buyers and investors, an increase in construction material prices, and regulatory restrictions regarding thermal and sustainable environmental control, which has led consumers to shift their focus to purchasing governmental affordable housing options. (Table 1) and (Figure 23). This is what makes this study unquestionably significant, as it emphasizes the importance of developing research studies that keep up with the house transformation and help society gain a better understanding of the best orientation and practices related to residential architecture.

Reviewing residential models in Hail City over several decades, we discovered that the transformations that are taking place are an incomplete step toward developing a new approach that simulates traditional forms and achieves privacy in a modern way that takes advantage of current era technologies and its wide economic options (Figure 24). The graph shows the changes of users' perception towards house comfort and building policies when comparing the result of transitional modern and contemporary periods. Thus, there is a shift in the way people view the quality of their home form as a result of adopting more stringent norms, factors, and regulations over time. Furthermore, traditional house form principles have been brought back to life in this late policy shift that emphasizes quality and efficiency, as well as responding to thermal and ecological concerns. Hail City is still in the process of developing toward a higher quality housing stock by attempting to shed light on the importance of understanding the local culture and environment, and beginning with what is authentic and stable, to produce modern solutions that delight the user with technical, environmental, and aesthetic compatibility. Is it possible to introduce new building techniques and systems that contribute to the production of creative architectural solutions that take advantage of local elements in traditional architecture and develop them to be suitable for modern forms that better respond to the requirements of the modern home? That is a question that is left for future studies.

Table 1. The residential real estate price index of Hail City compared to neighboring Saudi regions in the last three years [2].

Year	Quarter	General Index	Hail	Riyadh	Al Qaseem	Northern Borders	Al Jouf
2019	Q1	−4.81	1.63	−8.08	−4.93	4.71	−3.275
2019	Q2	−3.80	2.74	−5.27	−2.01	8.92	−2.72
2019	Q3	−2.69	2.95	−3.49	1.34	6.22	−1.847
2019	Q4	0.49	6.34	3.81	2.43	3.57	−0.698
2020	Q1	1.20	3.91	6.94	3.56	−0.09	0.33
2020	Q2	0.68	2.98	5.10	3.05	−2.76	−1.653
2020	Q3	0.50	2.68	−1.81	1.46	−2.40	−1.65
2020	Q4	−0.25	1.00	1.90	0.10	−2.40	−0.4
2021	Q1	0.20	1.31	1.50	−0.64	−1.93	−2.22
2021	Q2	0.39	0.18	1.73	−1.64	−2.68	−0.53
2021	Q3	0.48	−2.43	1.06	−1.00	−2.80	−0.56
2021	Q4	0.86	−4.00	1.66	2.24	−1.02	−0.12

Real Estate Price Index (2014 = 100): Rate of Change from the Same Quarter of the Previous Year by Administrative Region, 2019–2021.

**Figure 23.** The residential real estate price index of Hail City compared to neighboring Saudi regions in the last three years [2].

The shift in user preferences toward the home environment from 2000 to the present defines the home not only in its functional form, which makes it a mere shelter, but also in its expressed image and identity. It is a cultural phenomenon that causes it to always respond to the ever-changing social and technological environment, particularly when this expression is practiced spontaneously. To evaluate which home environment model is preferred, a user survey was conducted, followed by several interviews (Figure 25). Surprisingly, the contemporary model was not the most favorable, owing to the privacy issues, and high requirements in the built regulation, which increased the cost of construction. Also, a new topology that was lately introduced will require time to be accepted as the home environment model in Saudi Arabia, especially considering the shift in land plot size, materiality choices, and with more extrovert approaches.

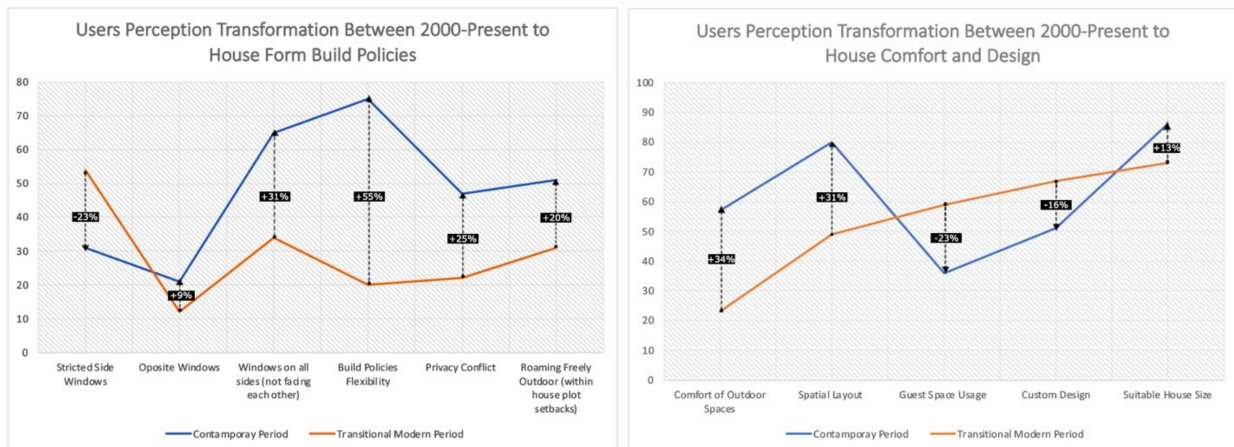


Figure 24. Users’ perception to the old and developed build policies and house comfort between 2000 and Present.

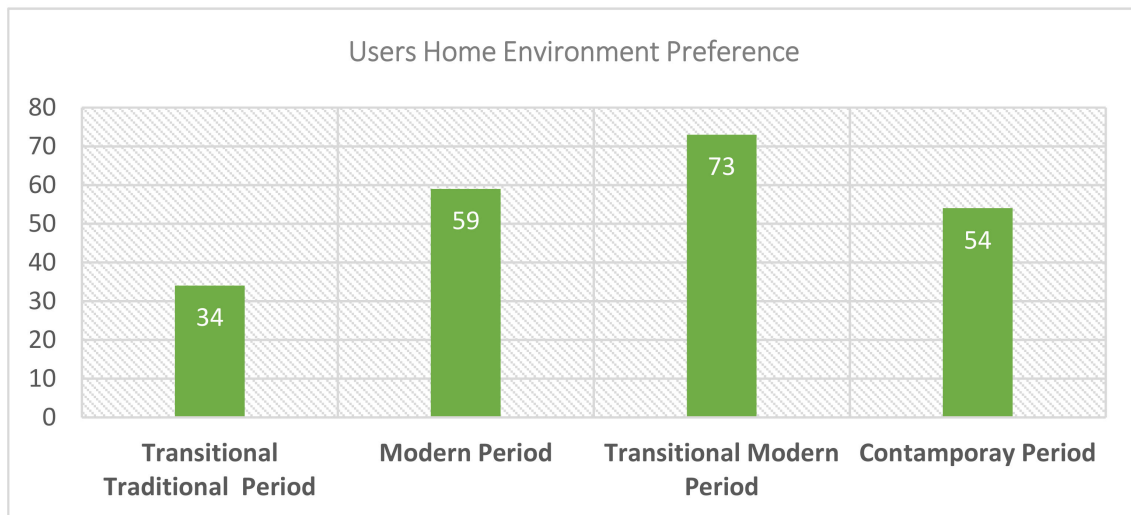


Figure 25. Users’ preference to home environment models among several periods.

It is clear from this study’s results that the “transitional traditional model” is no longer popular, and users argue that it can only be applied to apartment buildings in hot and dry climates such as Hail City, where the existence of balcony elements may be justified. Thus, many homeowners believe that the modern or the transitional modern home is a “house that grows” with their family and meets their social needs. Regardless of the final design of the home, these two models are said to be adaptable enough to meet changing social and family needs (as seen in an interview with several homeowners between 20 May 2022 and 21 May 2022).

6. Conclusions

This study demonstrates that the need and desire for housing development has increased in Hail City, but without adequate time to thoroughly study and evaluate new models. However, the findings clearly demonstrate some inconsistencies, as Saudi residential architecture has been determined to achieve privacy—a critical requirement of Saudi inhabitants—throughout its history. Clearly, the inner courtyard that provided this privacy had been altered and replaced. Instead of the courtyard’s traditional central position, which allowed all of the elements of the house to be centered around it, it has evolved into a common peripheral element outside the house that allows for shared privacy between

dwellings. Preserving the traditional, yet with an improvement? Perhaps this has caused building policies to revert to historical forms and principles by allowing the end user more freedom in generating the house form. It is abundantly clear that the modern architectural models used in Hail City's housing are primarily imported models that arrived as a result of objective conditions, the most significant of which are a lack of local architects at some point in time, cultural globalization, and rapid development in the absence of scientific and objective assessment tools. As a result, not only in the Kingdom, but also globally, there is a strong desire for regional identity and local privacy in architecture, which has become one of the most critical criteria for a positive evaluation of any architectural product.

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