SAFETY OF CHILDREN IN TRADITIONAL INDIAN SETTLEMENTS - CASE OF TRADITIONAL SETTLEMENTS IN KARAIKUDI

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Abstract

In several countries across the globe, the concept of a child-friendly approach to urban planning is gaining increasing attention. Safety and security are important for creating more inclusive, resilient, and healthy cities. If future developments are attractive and safe for both children and families, it builds an enduring appeal to all age groups. This resulted in the creation of a vibrant neighbourhood to live, work, and grow up in. Regarding child safety, studies in the past have concentrated more on urban design elements such as streets, traffic patterns, open spaces, housing units, etc. Little research has been done on the planning aspects, investigating the relationship between the layout of traditional or old settlements that are still in use today and child safety and social cohesion. This study aims to understand how traditional settlement planning ideologies' have given the utmost importance to child safety. To demonstrate this, the authors have taken two settlements, Pallathur and Kottayur, in Karaikudi district as their case studies. Based on the above study, the paper aims to develop a set of design-based guidelines to improve the quality of the built environment (housing) that enables the transformation of our cities towards a more sustainable urban form that fosters a safe environment for children.

Keywords: Aerodynamics, Forebody and afterbody, Next keyword, Projectile, Supersonic speed.

1. Introduction

According to census 2011, 259.6 million populations in India are between 5 and 14 years old, which is 21.3% of the total population [1]. In India at this juncture, it is extremely important to develop a broad child-friendly approach to spatial planning, which can be induced by embedding child-friendly affordances through neighbourhood planning. For instance, vacant, abandoned lots and deserted streets offer refuge to potential criminals and other illegal activities such as theft, sexual abuse, drugging, and gambling [2]. Cities need to be more sensitive to the needs and requirements of children with active spaces that enhance their social cohesion [3]. The presence of spaces that are more ecological and safer in terms of traffic and crime will improve their interpersonal dynamics and cultivate a sense of community [4]. A recent study by Behere et al. highlighted those social and psychological factors such as lack of open space, lack of children's participation, stress due to traffic and congestion, and dysfunctional family structure have adverse effects on the mental well-being of children [5]. Hence, the built or unbuilt spaces govern certain activities in a settlement.

1.1. Background

From the literature, one can come to the conclusion that the spatial layouts in traditional settlements are deeply influenced by the social background: form, space, and the internal organization of settlements are dominated by the concentration of a homogenous community. The compactness of settlements arises from their identity based on blood ties, which makes their settlement a safe living space for all age groups [6]. The physical and psychological safety norms were part of the town planning and house planning systems. Such settlements include Havelis' in Rajasthan[1], Wadas' in Maharashtra[2], Chettinadu Settlements in Tamil Nadu[3], etc.

In addition, each village is designed in such a way that the settlement layout (walled village, grid village, and cluster village) and their dimensions enhance surveillance, and the surrounding topography acts as the safest defensive periphery [7]. In 1961, Jane Jacob advocated the concept of "eyes on the street," which proposed an informal "natural surveillance" where activities in streets and other public areas keep the movement going and enhance the security of the settlement [8]. The size of the settlements depended upon the extent to which the people could visually connect. The seamless connection between indoor and outdoor spaces enabled ease of use of the space and at the same time created drama and surprise for the children when they used the space. One can notice that in modern cities, spaces for children are restricted only to play areas. The roads and house design do not cater to the use of children [9]. This confirms that a safe spatial layout provides the foundation for the life and development of people in traditional settlements and is also one of the important indicators of sustainable development both nationally and worldwide. The recent hype in the industry focuses on the "disabled-friendly built environment," where the total population of the disabled in the country is 2.2 per cent [10] (even the disabled population has to be taken care of).

1.2. Research Objectives

The purpose of this research is to study and investigate the traditional settlement and establish the links between planning principles and aspects of social cohesion with respect to child safety in two selected villages - Pallathur and

Kottayur[4]. Based on the issues identified the authors developed a set of design-based guidelines to improve the quality of the built environment (housing) that enables the transformation of our cities towards a more sustainable urban form fostering a safe environment for children.

2. Literature Review

2.1. Children's safety

Child-friendly cities are part of the recent flagship missions in India [11]. They include the Smart Cities Mission and the Atal Mission for Rejuvenation and Urban Transformation (AMRUT). Authors Dhar and Thakre (2020) suggest that children's voices should be heard more in city planning and design to develop a child-responsive environment that will make our cities smart, safe, resilient, and vibrant for every individual [12]. The study made by Sheela Patel emphasizes the equality of spaces for women and children in urban spaces [13]. Similar studies are being conducted to study the safety of children in urban environments in other countries. In the context of Turkey, authors Karagoz and Gencer examine how the lack of safety in urban streets and public spaces is becoming an increasingly inhospitable environment for children [14]. In another piece of research carried out in Sweden, there has been a comparison between community trust and safety in rural and urban areas. Although this study was carried out by a medical research group, they found that a greater proportion of children's perception of trust and safety with respect to the community was better in rural areas. This research demonstrates that there is a direct correlation between geographic isolation and community socialization [15]. When it comes to children's safety, the researchers are keen on studying the streets, roads, and traffic patterns, as well as open spaces and housing units in the present scenario. Little research has been done on the safety aspects of the traditional cities and settlements that are in existence today.

2.2. Indian traditional settlements

In the past decade, much research has focused on key issues like how traditional or indigenous building strategies have emerged as a response to diverse climatic factors, their construction techniques, conservation, and adaptive reuse. In one of the research papers, S. Radhakrishnan et al state that traditional architecture houses in Chettinadu[5] are more climate-receptive to the environment [16]. Their study focused on continuously monitoring indoor and outdoor conditions by using a custom-made instrument called the "Architectural Evaluation System" [17]. The conference proceeding on "Adaptive reuse and restoration of Chettinadu mansions″ highlights how indigenous construction techniques, materials, and principles could be used in modern contemporary architecture. In this paper, Ravi Ramadoss attempts to do a scientific analysis of the mortar and plasters used in Chettinadu houses, establishing the properties of different materials corresponding to the composition and ratios of mortar and plaster [18]. The author Ranee Vedamuthu et al studied the Pudukottai Chettinadu houses in terms of reviving the cultural heritage, where the effort was to restore Chidambaram Vilas into accessible and usable spaces while sustainably revitalizing a region and providing a valuable window to the past. The study focuses on how an authentic conservation strategy has been adopted for the adaptive reuse of the Chettinadu Mansion as a hotel by restoring the main structure and reorganizing

the interior spaces to suit the typology of the hotel rather than changing the building to suit the requirements of the activity [19].

In the journal article "Investigating the residents' attitude towards the preservation of palatial houses built - heritage in Chettinadu region," the authors aim at studying the existing conservation and rehabilitation patterns and surveying the palatial house owners' attitudes towards architectural heritage preservation [20]. In another piece of research, the author Asmita Patwardhan [21] carries out a similar study on the existing Chettiar community settlement and tries to understand the various rationales for the demolition of the built heritage. She aims at increasing the shelf life of these traditional houses in their regenerated form. From the above case study, it is evident that there has been no study that focuses on the safety of the people, especially children, in these traditional settlements with respect to the Indian context.

3. Research Design

In our paper, a mixed-methods study approach has been adopted in two districts, Pallathur and Kottayur. The research focuses on studying the impact of architectural spaces on children's safety in a neighbourhood. Therefore, the research demands combination of qualitative and quantitative studies. Qualitative methods were necessary to understand the nature of spaces while the quantitative methods were useful in terms of the user agreements and needs in today's context. Methods used to carry out the study were physical documentation, natural observation, and a structured survey. Thorough documentation of the two houses was deliberately carried out during the presence of the users. The users generally live abroad and use their ancestral house during ceremonies and festivals The space vs children behaviour was observed. The documentation and observation helped in understanding the scale of the space and the way the children perceive with respect to physical and emotional safety. A structured survey is conducted as part of the mixed method. The broad parameters covered in the interview questions are the sense of safety in the neighbourhood and house, issues in a modern context and recommendations based on the issues. Practising architects from the Karaikudi region are interviewed to understand the client's requirements and participation in child-safe design.

4. Discussions

4.1. Safety of children in the neighbourhood (planning and house design) at the Town planning level

The streets of the traditional Chettinadu town are planned in a grid pattern. This grid pattern planning dates traces back to antiquity; similar to ancient civilizations such as Mohenjo-Daro, Egyptian and Romans etc. This grid layout gives their inhabitants a sense of orientation and made the wayfinding convenient. It also provides interconnectedness and enables visual connectivity through the streets across all levels of the block [22]. The size of the village was determined based on the extent to which one can have visual control across the boundaries. The Chettiyar[6] community were wealthy and hence they had a strong need to protect their houses, family, and wealth [23]. As shown in Figs. 1(a) and (b), the narrow streets amplified the effect of shade that enabled the children to play on the streets in the neighbourhood. This shade provides welcome relief from the sweltering

summer heat and protects the inhabitants from the hot weather. The streets often ended in a temple or a water body, which acted as a social space for the men and women of the neighbourhood. These men and women also had visual control over the children walking or playing in the streets.

The village layouts had main streets in a north-south direction and service streets in an east-west direction. The service roads were often used for carts, while the main street mostly remained pedestrian. The houses often had windows opening towards these service streets (Fig. 1), which enabled visual connectivity with the streets. These openings are on the first floor, which enabled surveillance while at the same time protecting the privacy of the family members.

   **(a) View from North-South Street.**   **(b) East-West Street view.**

Fig. 1. Pallathur with monumental ancestral houses with narrow streets.

## 4.2. Kinship, gender, and space

The families of the traditional villages were close-knit groups of interrelated families who were migrants from Poompuhar[7]. These families were connected in terms of marriages since their alliances were within their territorial divisions, which created a very strong social network. This acquaintance helped ensure the physical safety of the children. Once a girl was born into a family, it would already be decided that once she attained puberty, she could enter into a contract for marriage. Female children are more protected in society, and anyone causing physical or sexual harm to them has to face serious repercussions.

The majority of the people in the Chettiyar community have a basic preference for having *a* male child over *a* female child. The male children were taught the ropes of business functions, and the female children were taught culinary and home maintenance skills. The design of traditional Chettiyar houses places emphasis on gender-segregated spaces that are enforced by the social system and turn these spaces into their respective domains. For example, the male children had the privilege to use the front portion of the house and the street (semi-public and public spaces), while the female children were restricted to the second courtyard, which is the domestic or private portion of the house as shown in Figs. 2(a) and (b). The front portion of the house is used by the male children to learn and practice business which is called Kaipazhagudal[8]. After attaining puberty, the female children were not allowed to use the first courtyard area of the house, which is popularly called Valavu[9] near the entrance of the house, and everyone in the house should strictly

adhere to the above guidelines. The female children on the streets had to be accompanied by their family members.
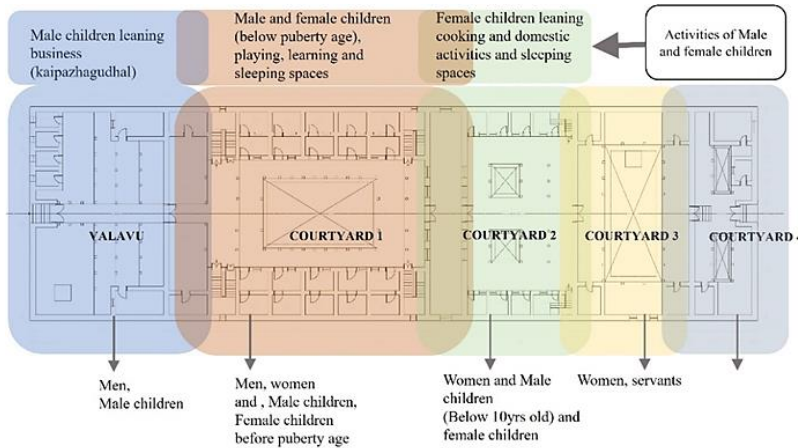
(a) Ancestral house in Pallathur.
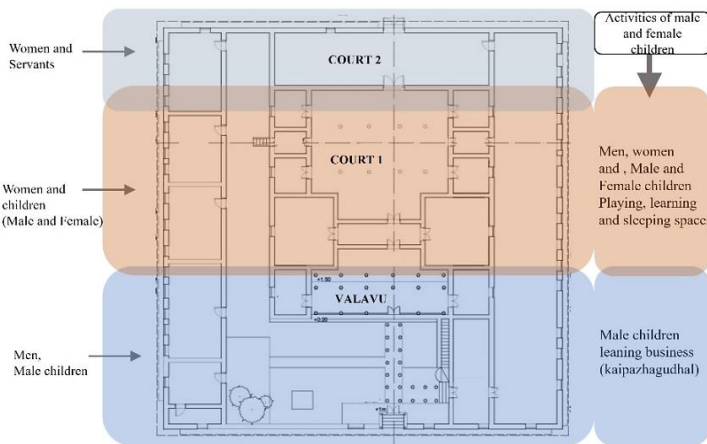
(b) Bungalow house in Pallathur.

**Fig. 2. House plans to show the hierarchy of spaces
and activities of children with respect to gender.**

4.3. House, safety, and dimensions

The traditional houses are designed around a courtyard or multiple courtyards, which are considered the nucleus of the living environment. The courtyard and the passage around the courtyard become a safe place for the children to play. The house has a central axis and is symmetrical. The arrangement of doors along the central axis provides visual connectivity from one end to the other end of the house. These doorways also facilitate auditory connectivity between different spaces. Hence, family members are aware of their children's activities, which can be heard

from activities in different spaces through sound. Light and shade and varying proportions of heights amongst the spaces enable different moods in the house. This enabled the children to feel psychologically safe in a few places and overwhelmed in others. For example, the entrance veranda (Mugappu) [10] had a higher ceiling compared to the spaces around the courtyard. The high-ceiling spaces like the dining hall or marriage hall were often used by important men of the house. The low ceiling spaces were more personal and less intimidating for the children of the house, as seen in Fig. 3.

The house is designed with child-friendly anthropometrics. The courtyard level differences are 20-30 cm, which is not dangerous to toddlers, as shown in Fig. 3. The columns and other details in the columns have softer edges. The roof or beam projections are at least 1.5 meters high to avoid accidents. The windows have lower sill levels (20-30 cm), which enables kids to sit on the sill and connect to the other side. The children are mostly restricted to the ground level. The stairs to the second and attic levels are restricted to children under age 5 since the stairs are narrow and the riser of the steps can be up to 25 cm. The parapet (65 cm) and the stairs in the first-level passage do not follows child-safe anthropometry and can be unsafe as per modern standards. Hence the children are under an adult's supervision while they are using the first level to the third level of the house.

(a) Mudal Kattu (first courtyard).   **(b) Rendam Kattu (second courtyard).**

Fig. 3. Interior courtyard spaces and proportions.

4.4. Discussion on the survey

The inferences drawn from the survey indicate the various aspects that are associated with the notion of safety. 17 female and 17 male respondents consented to participate in the survey as shown in Fig. 4. Each respondent was provided with 11 questions with choices to select to identify probable patterns and the notion of safety (Table 1). Of the respondents, 20 were between the ages of 40 and 60, and 14 were between 60 and 80 years old in the selected villages of Pallathur and Kottaiyur. The gender is kept as a variable in the study because the behaviour of children of different gender is strongly dictated by the culture of the community. The age of the sample groups was strategically chosen to be above 40 years. The reason is the fact that the population of these villages migrated to other countries to earn their living in the 1960s. The sample group of that age group has experienced living in a traditional society and a modern society.

The experiences of the users in the traditional and modern society aid in deciding the safety scenarios in the modern neighbourhood based on the traditional

approach. In this research, the authors found no necessity for revealing the identity of each of the users.
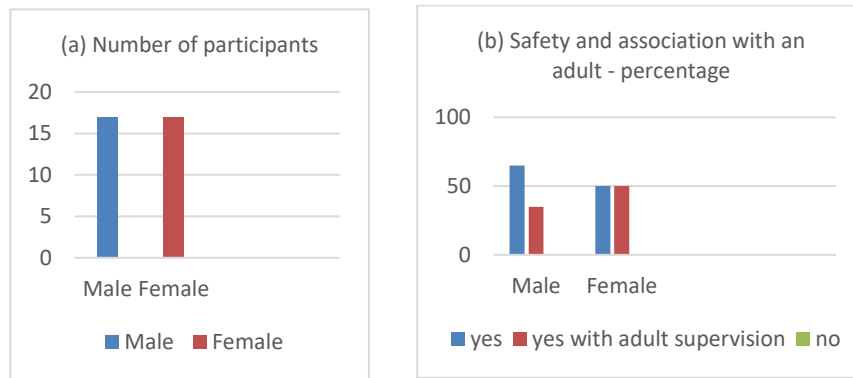
(a) Gender.	(b) Safety and association.

Fig. 4. Charts showing the survey results on the feelings of safety in the neighbourhood and house based on gender.

Table 1. Survey results of the users who spent their childhood in the ancestral village and have experiences of modern neighbourhoods.

Survey question themes	Female participant response %	Male participant response %	Discussion
Age	32% of participants from age 40-60 and 68 % of participants are above 60 years old.	27% of participants from age 40-55 and 73% of participants are above 55 years old.	The age group from 40 and above years old have spent their childhood in ancestral homes. The next generation, however, had migrated to the cities in search of livelihood.
Gender	50% Female	50% Male	An equal distribution of the female and male population was retained to understand the patterns and notions of safety.
Safety of the settlement	94% felt it was safe during their childhood.	All felt it was safe during their childhood	The notions of safety were influenced by several extraneous factors like strangers and unknown people in the neighbourhood, phobias, family, and neighbourhood conflicts, etc.
Safety and association	50% of women were comfortable being on their own in the neighbourhood. 50% of the women wanted an adult's presence when they were young.	65% of the male participants were feeling safe without an adult's presence when they were young.	The sociocultural role of festivals and other community gatherings, where children participate, has been seen to be a greater degree of feeling of safety. at an early stage. These cultural festivals bring a predictable social pattern.

Safety inside the house environment	30% of the women did not feel safe inside the house.	100% of the male participants feel safe inside the house	4 of the 17 women in the survey did not feel safe in the home. For the other 13 women and all the 17 men, the house was experienced as a safe and predictable space. The female members, who felt unsafe, were due to fear of a certain family member or a phobia of space.
Intimidating spaces in the house	71% of the female participants felt unsafe at the main entrance and Valavu (spaces largely used by men) and 29 % of the female participants selected the first courtyard (Mudal Kattu) as feeling unsafe.	64% of the participants chose the second courtyard of the house as feeling unsafe (Rendam Kattu, which is used by women in the house.)	The female children felt unsafe in the adult male zones of the house such as Valavu and first courtyards. The male children felt intimidated to use the second courtyard spaces, used by the women of the house.
Navigation through the village	72% of the female participants agreed that it was convenient to traverse the village streets safely.	89% of the male participants agreed that the streets were safe to travel.	The predictable street pattern and the familiarity with the village made it safe and convenient for children to navigate the streets. Vernacular elements of the houses reinforced the orientation while navigating the village as well.
Issues of modern settlements	74% choose the lack of close-knit communities, 23% of them choose the development of motor vehicles and 13% said the inefficient planning of the city	63% of them choose the development of motor vehicles, 24% choose the lack of close-knit communities, and 13% said the inefficient planning of the city	The lack of predictable neighbourhood and unsafe streets is said to contribute the unsafe environments
Recommendations of the sample group	53% of the female participants desired a well-knit community, and the remaining 35% preferred ancestral home design principles with modern amenities. 12% of the women were content in the present circumstances.	47% of the male participants desired for well-knit, community and the remaining 47% preferred traditional planning principles with modern amenities. 6% were content with the present circumstances	The need for a well-knit community with a more predictable neighbourhood and planning keeping in mind the safety of children was observed.

The survey also indicated overwhelmingly that the village precinct was by and large perceived to be safe, with 32 respondents feeling safe and only 1 stating that the environment felt unsafe. Twenty of the people surveyed said that they were able to walk the streets safely as children, while 14 required adult supervision for a feeling of safety. The home environment was safe for 28 members in the survey, while 3 indicated that the home felt unsafe. Within the different spaces of the home, the Valavu was perceived to be uncomfortable by 16 of the 34 members surveyed. The Mudal Kattu (first courtyard)[11] was determined to be unsafe by 7 members in

the survey, and the Rendam Kattu (second courtyard) [12] was recorded as unsafe for 11 members in this survey. The kitchen area was part of Mundram Kattu[13]. Among the women participants, the Rendam Kattu was recorded as the safest as a child.

Given the fact that the villages were relatively safe, 26 members recorded that they were familiar with all the streets in the village, while 8 were not. Female respondents made up 5 of the 8 - members who were unaware of all the streets. Members were also invited to share their notions regarding the streets, open grounds, and areas outside the village as well. 15 members recorded feeling unsafe in open grounds; 6 felt unsafe on the streets; and 13 felt unsafe anywhere beyond the village boundary. While identifying other related aspects of safety, 12 members believed that fragmented planning was responsible for the feeling of unsafeness, while 8 said it was due to unpredictable traffic, and 14 attributed feeling unsafe to unfamiliar neighbours. The final part of the survey invited suggestions on how the modern neighbourhood could be improved. 16 members suggested that encouraging familiarity and social interaction in modern societies could improve the neighbourhood. 14 members believed by repeating the ancestral village and house planning patterns with modern facilities, it could improve the situation. Three of the surveyed members were happy with the existing modern community they were living in. Thus, the survey indicates that the overall environment in the village was relatively safe, while certain areas that were more public, like the compound, open grounds, and streets, were prone to feeling unsafe. Almost half the surveyed members preferred the principles of their ancestral homes, introducing modern facilities. This survey thus generates broad indicators to record the sense of safety and identify the areas that are prone to being unsafe in a village and the home.

5. Conclusion

The Chettinadu villages were designed to safeguard the residents, including children. Although society preferred male children, female children have been given the utmost protection. The entrances of the houses are lit using oil lamps, which light up the streets during the night. For security purposes, they have strict rules that say female children are not allowed to go out after sunset for safety reasons. Most families are related to one another, and this acquaintance lessens the chance of child abduction and burglary targets. The punishments were kept severe if any adult misbehaved with the children in the village. These strict regulations within the community also helped maintain the safety of children.

Unlike traditional houses, in a modern residential community, the houses are identical, and there is no scope for catering to the various needs of children. Traditional settlements had scope for the expansion of houses when there was an expansion in the family. When the practising architect was interviewed to understand the contemporary scenario, he confirmed that while altering the interior of the house, children are not given priority in many cases. Rather, the adults make the decisions about the spatial needs of the children. Often, the main living area is kept open for the toddlers to play, and a study room is provided once they start going to school. The spatial provisions do not extend beyond that.

6. Recommendations in house planning and settlement planning

The survey results are mapped with the documented and observed data to understand the influence of architecture on the safety of children in a

neighbourhood and within the house. The co-relational analysis has assisted in framing the design recommendations for a child-safe neighbourhood and house layout. The factors indicating the design guidelines are activities, familiarity, connectivity, and surveillance. Child-inclusive designs with respect to activities, scale and proportions are suggested at the neighbourhood and house levels. The recommendations based on analysing the data are:

- Considering the children of the house while planning spaces keeping in mind their interests and expansion over the period of time (based on different phases of life of a child).
- Apart from study rooms and entertainment rooms, including multifunctional spaces for children that can make children explore different possibilities than restricted to a single function.
- The extent of the neighbourhood is restricted to 2.7km (According to Vastu) [14] to ensure that the residents of the neighbourhood are familiar with each other.
- The planning of the neighbourhood in predictable patterns such as grid iron (as seen in Chettinadu villages), and other geometric patterns with thorough streets at intervals.
- Avoiding dead ends in the streets while planning a neighbourhood.
- Creating more social spaces for the community to gather to ensure familiarity among the people. (Parks, gardens, multi-functional spaces, walking tracks etc., that would engage all ages of the population rather than age-wise division of functions)
- Considering the scale of the children, providing eye-level connectivity to build and unbuilt spaces as in the low sill windows in traditional houses.
- Creating bright spaces, routines with respect to using the spaces, and the demarcation of tangible and intangible boundaries that would enhance the psychological safety of children like the courtyard area of the traditional houses.
- Creating a low-level barrier between the walkways and the roads to avoid children crossing the invisible boundary and getting into accidents.
- Designing a neighbourhood in such a way that any adult is available on the call of the children. The noise levels ensure the reach between the adult and the child.
- Ensuring visual connectivity and accessibility in all the spaces in and around the neighbourhood to avoid isolation of children.
- Involving children in the decision-making of neighbourhood planning.

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Endnotes

[1] The palatial stone mansions of the Marwari community in Rajasthan are characterised by two or more storey buildings with intricate lattice screens and courtyards.

[2] The house complex of the Maratha community in Maharashtra is characterised by two or more stories with rooms arranged around courtyards.

[3] The palatial houses of the Chettiyar community from Tamil Nadu are characterised by two or more stories with rooms arranged around courtyards.

[4] Two Chettinadu villages out of 73 villages from the Karaikudi region of Tamil Nadu

[5] Group of villages where the Chettiyar community lives.

[6] The wealthy moneylender and merchant community who carried out trade with Burma, Sri Lanka, Myanmar, Malaysia, Indonesia, and China

[7] Capital of early Chola Kingdom

[8] Tradition of male children being thought business and financial management in the Chettiyar family.

[9] Living space in the Chettiyar house with two or four platforms at the entrance and other parts of the house.

[10] The entrance and reception of the house

[11] First courtyard of the Chettiyar house, used by the men of the house.

[12] Second courtyard of the Chettiyar house, used by the women of the house.

[13] Third courtyard of the Chettiyar house with Kitchen and service used by women and servants.

[14] Building science of India