

Research Paper

Family Characteristics and Housing Spatial Configurations: A Study of Intergenerational Changes in Northern Iran

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Abstract

In recent decades, social changes have caused the Iranian family to experience intergenerational structural transformations and lifestyle changes. Studying these changes and their relationship with housing changes can provide a model for the design of desirable housing in the future. Despite the importance of the topic, very few researches were found that reflected the effects of these transformations on the spatial configuration of housing. This study aims to investigate the relationship between the intergenerational changes in the family and the housing configuration system in the context of social changes in Northern Iran. The research method includes a systematic review of previous studies to create a theoretical model using the Sandlovsky and Barroso method, followed by field research that includes the selection of 203 households from the last three generations with a multi-stage cluster sampling method of Sari city houses. The features of their housing configuration were extracted with the depth map software, and the characteristics of the families living in them were extracted with a questionnaire, and then the findings were analyzed. The findings show that some characteristics of the family, such as communication patterns, social relations, women's education and employment, and power equality in the family have increased, and the components of religion, family dimension, and the number of extended families decreased. These transformations were aligned with changes in the housing spatial configuration, including the reduction of the number and types of spaces, rings, the gender function of spaces, and the increase of the function of public and semi-public spaces.

Keywords: Housing, Household, Spatial configuration, Intergenerational change, Family transformation.

INTRODUCTION AND PROBLEM STATEMENT

The house is one of the most important forms of social organization of space, and the place of acquiring existential identity through ownership of a small world (Schulz, 1985), which the organizing principles of the house indicate how social relations between humans are (Tuan, 1977). Therefore, the lifestyle of a person represents how the spatial configuration of his housing is (Hanson, 2003). According to Gifford, the spatial configuration of housing is in accordance with the culture and expresses the social relations between family members (Gifford, 2007). The human's social life in the family and his lifestyle are related to the

housing space (P. Dawson, 2006; Ozaki, 2017), and they influence the housing and its spatial configuration (Asif et al., 2018; Maina, 2013; Z. Toker, 2010; Vialard & Bafna, 2009). The studies on the relationship between housing and family have indicated many examples of coordination and relationship between the features of the housing and the resident group (Al Husban, Al Husban, & Al Betawi, 2021; Kotharkar & Deshpande, 2012; Z. Toker, 2010). In these studies, it was found that the spatial configuration of housing has been formed in response to which category of spatial needs or the values and ideals considered in the family life. In this regard, many studies have addressed the relationship between spatial configuration and social organization

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models (Hanson, 2003; Iqbal, Higuchi, & Miyazaki, 2008; Rapoport, 2005), based on the principle of congruence and fit and according to the hypothesis stating there is always a relationship between housing and the resident group (Al Husban et al., 2021; P. Dawson, 2006). Despite the emphasis of many architectural design theories on the relationship between housing and family characteristics, this relationship has not been paid much attention in housing studies (Lawrence & Low, 1990; Z. Toker, 2010). Moreover, although many buildings are designed based on scientific principles today, the residents' spatial needs, which are defined according to the lifestyles of the families, are usually ignored (Z. Toker, 2005, 2010). Since not paying attention to the spatial needs of the residents will cause the housing space to lose the necessary efficiency for living, therefore studying the transformations in the characteristics of the family and its relationship with the spatial configuration can provide a model for designing a suitable housing. In the recent century, in the course of social developments, the Iranian family has undergone many structural, demographic, functional, attitudinal and cultural changes, and as a result, the lifestyle has changed (Modiri, 2018; Sadeghi Fasaee & Erfanmanesh, 2013; ShokrBeigi, 2009), and examining these changes and how they are related to the spatial needs and spatial configuration can provide a model for designing and building suitable housing.

LITERATURE REVIEW

According to the theory of congruence and fit, many studies have related the space form of housing to the social organization of residents and determined which features of housing and family are related to each other (Hanson, 2003; Iqbal et al., 2008; Rapoport, 2005). In some studies, the family type, and in some others, the household size (Gharavi Alkhansari, 2018) has been introduced as an important factor in the formation of the spatial configuration of housing, and by defining different social organizations, it has been stated how different family types¹ are related to the features of housing (Deshpande & Korharkar, 2015; Karaman & Erman, 2014; Maina, 2013). The results of these studies indicated that in extended or crowded families, as the communications between family members and the number of events in the housing increased, there was a need for more spaces, which is related to the increase in the number and types of space in their housing (Cunha, 2012; Guney & Wineman, 2008; Jeong & Ban, 2014; Lee & Bale, 2016; U. Toker & Toker, 2003). Some studies have concluded that different patterns of kinshipⁱⁱ in the family lead to the definition of different

social structures and the formation of different behaviors among residents, and this is related to spatial configuration (Blanton, 1994; Brown & Bellal, 2001; Kotharkar & Deshpande, 2012; Maina, 2014; Rapoport, 1998; Schwerdtfeger, 1982). Some other research showed that the definition of the power structure in a familyⁱⁱⁱ is related to the social structure of the residents, and the communications between them (Alalhesabi & Korrani, 2013), therefore it is related to some features of housing (Bellal, 2004; Hillier & Hanson, 1989; Lawrence & Low, 1990; Nezhad & Bastani, 2012; Peatross & Hasell, 1992). In this regard, in societies where the power structure is vertical, spaces are located further away from the origin of movement, have a greater depth, or are used more exclusively (Bellal, 2004; Hillier & Hanson, 1989; Rapoport, 1969). Some studies on the relationship between the age of the residents and the housing features indicated that in some societies, as the average age of the families of recent generations has decreased, the number of activities done in housing has decreased and some activities that were previously done at home have been moved outside the home (Bienkowski & Chlebig, 1991; Orhun, Hillier, & Hanson, 1996; Rapoport, 2000). On the other hand, some studies have introduced the gender factor related to the spatial configuration of housing and stated that in some societies, gendered spaces such as the kitchen, which is mainly used by women, were located at greater depth compared to other spaces (Bellal, 2013; de França & de Holanda, 2003; Maina, 2013; Peatross & Hasell, 1992; Ullah, & Ammar, 2024). Some other studies have related the role of gender to the privacy of space (Atak & Çağdaş, 2015; Blanton, 1994; Elmansuri & Goodchild, 2021; Kent, 1991; Maina, 2013; Z. Toker, 2005). Another category of studies has addressed the role of gender in the formation of spatial configuration (AL-Mohannadi, Furlan, & Grosvald, 2023; Shabani, Tahir, Shabankareh, Arjmandi, & Mazaheri, 2011), and related it to the components of hierarchy, realms, link of space, and space neighborhoods (Varmaghani, Soltanzadeh, & Dehbashi Sharif, 2016). In this regard, considering social developments in the last century, some studies have related the growth of education in a family to some housing features and stated that this component was related to the number of cells and the gender function of some spaces (Guney & Wineman, 2008; Iqbal et al., 2008; Z. Toker, 2010). Many studies have related the cultural characteristics and customs of the residents to some components of spatial configuration, including integration, ring, space type, space function, hierarchy, space privacy, space realms, and space gender (Al-Mohannadi, Major, Furlan, Al-Matwi, & Isaifan, 2023; Al-Harbi, Al-Ansi, & Alrubayan, 2022; Fardanesh, Mohammad Hoseini, &

Heidari, 2022; Mehri, Soheili, Zabihi, & Saed Samiei, 2020; Moqadam, & Nubani, 2024; Obeidat, Abed, & Gharaibeh, 2022; Siadatian & Pourjafar, 2014; Yazdanfar, Hosseini, & Zaroudi, 2014; Zainuddin, Aziz, Yuserrie, & Yusoff, 2023). Another group of studies has related the family social class to housing features (Abdolhoseyni, 2011; Afshari & Pordeihimi, 2016) and stated that it is related to the number and types of space, space function, hierarchy, and realms and the housing features change as the family social status changes (Bikoulis, 2013; Heidari, Mohammad Hoseini, & Behdadfar, 2014; Maina, 2014). According to some studies, there is a relationship between the pattern of family activity and lifestyle, and the spatial configuration of housing (P. C. Dawson, 2008; Madahi & Memarian, 2017; Pourdeihimi, Mashayekh Faridani, & Nourtaghani, 2013; Yazdanfar et al., 2014). These studies stated that patterns of family activity and lifestyle are related to housing features such as the number of spaces, types of space, depth, integration, ring, function, hierarchy, realms, link of space, neighborhoods, and space privacy (Bellal, 2013; Deshpande & Korharkar, 2015; Karaman & Erman, 2014; Ozaki, 2017; Saatci & Onder, 2015). Other studies have related the beliefs and religion of the family, and the adaptation of related behaviors to the spatial configuration (Elmansuri & Goodchild, 2021; Khakpour, Ansari, Sheikhmehdi, & Tavousi, 2015; Memarian, Hashemi Toghroljerdi, & Kamalipour, 2010). Some of these studies have referred to the relationship between religion and the ring of spaces and stated that increasing the number of rings leads to the enhanced right to choose paths. This issue, especially in societies where attention to religious beliefs and privacy is of great importance, allows the residents to choose appropriate paths to protect their family's privacy, according to the specific behavioral requirements governing the family (Hillier & Hanson, 1989). Also, to maintain privacy in societies where religious beliefs were of great importance, some spaces were located at a greater depth (Bellal, 2004; Kent, 1991; Marcus, 2006). In this regard, some studies have stressed the relationship between the religious component and the greater number of various spaces in societies where special spaces are required to perform religious rituals (Kotharkar & Deshpande, 2012; Rapoport, 2000). Other studies have emphasized the relationship between the religious component and the change in the type of space neighborhoods and stated that as the dimension of religion increases and the need to protect the privacy of the family enhances, private spaces were mostly placed adjacent to transit-communication spaces (Brown & Bellal, 2001; Lawrence & Low, 1990; Marcus, 2006). As a result of

contemporary social developments, several studies have related the change in women's position in society and the reduction of their presence at home to the changes in the spatial configuration of housing (Asif et al., 2018; Bellal, 2013; Bellal & Tacherifte, 2003; Saatci & Onder, 2015). These studies stated that the increase in women's education, women's employment and the acceptance of social roles by women has led to a decrease in the gender performance of spaces and an increase in the flexibility of spaces such as the kitchen (Asif et al., 2018; Bellal, 2013; Iqbal et al., 2008; Z. Toker, 2005). To prove the theory of congruence and fit, several studies have introduced wealth and economic status of the family as factors influencing the spatial configuration of housing and stated that changes in wealth and economy of the studied societies have caused changes in the number of cells (Bienkowski & Chlebik, 1991; Cil, 2007; Hillier & Hanson, 1989; Kramer, 1979). Also, in societies where a part of the housing is used for livelihood activities, the pattern of family livelihood is related to the spatial configuration of housing (Bellal, 2004; Bikoulis, 2013; Furlan, 2015; Maina, 2014; Rapoport, 2005). Some studies have emphasized the relationship between the spatial configuration and how and the amount of communication between family members (Hosseini, Jafarzadeh, & Rohban, 2016), and identified them to be related to characteristics such as depth, number and types of space, rings, space function, hierarchy, space realms, space neighborhoods, space gender, privacy (Asif et al., 2018; Mustafa, Hassan, & Baper, 2010; Nezhad & Bastani, 2012; Shabani et al., 2011). Also, many studies have examined the relationship between the spatial configuration of housing and the social relations of the family (communication with guests or clients) or family housing groups such as servants (Afshari & Pordeihimi, 2016; Alalhesabi & Korrani, 2013; Madahi & Memarian, 2017; Okhovat, 2013) and stated that these components are related to characteristics such as depth, the number of cells, integration, ring, types of space, functions of space, hierarchies, realms, transition spaces, space neighborhoods, gender of space, and space privacy (Bandyopadhyay & Merchant, 2006; Bellal, 2013; Cunha, 2012; de França & de Holanda, 2003; Furlan, 2015; Maina, 2014; Trusiani & Rigatti, 2016; Vialard & Bafna, 2009)

Based on the results of previous research, each of the family components and housing are related. Table 1 shows the relationship between family components and housing characteristics, and Figure 1 shows the relationship model of the main family components with the characteristics of space configuration and system of setting.

Table 1. The Relationship Between Family Components and Housing Characteristics Based on the Results of Previous Studies (The * symbol indicates a relationship between two component)

		Housing	Housing characteristics							Number of relationships between each family component and housing characteristics according to research history				
			System of setting			Spatial configuration								
Family			Type of space	Space function	Gender function of space	The number of cells	Space integration	Space rings	Space realms	Transition spaces	Space neighborhoods	Space depth and hierarchy		
			Family components	Structural feature 19%	Family type	*	*	*	*	*	*	*	*	*
Family dimension	*	*			*								3	
Pattern of kinship								*	*	*	*	*	4	
Power structure in family		*			*	*	*	*	*	*	*	*	6	
Demographic feature 13%	Gender	*		*	*		*	*	*	*	*	*	7	13
	Age	*		*	*								3	
	Level of education			*	*	*							3	
Socio-cultural feature 33%	Culture and customs	*		*	*	*	*	*	*	*	*	*	8	33
	Family social class	*		*	*	*	*	*	*	*	*	*	5	
	Pattern of activity and lifestyle	*		*	*	*	*	*	*	*	*	*	9	
	Beliefs, and religion	*				*	*	*	*	*	*	*	6	
	The role, position, and employment of women			*		*	*	*	*	*	*	*	5	
Economic feature 7%	Wealth					*							1	7
	Economy					*							1	
	Pattern of livelihood	*		*	*	*	*	*	*	*	*	*	5	
Communicative -interactive feature 28%	Communication between family members	*		*	*	*	*	*	*	*	*	*	10	28
	Family Social Relationships	*	*	*	*	*	*	*	*	*	*	10		
	Family housing groups	*	*	*	*	*	*	*	*	*	*	8		
Number of relationships between each housing characteristic with family components according to research history		12	14	7	11	7	9	12	6	10	12	100		
			33					67						

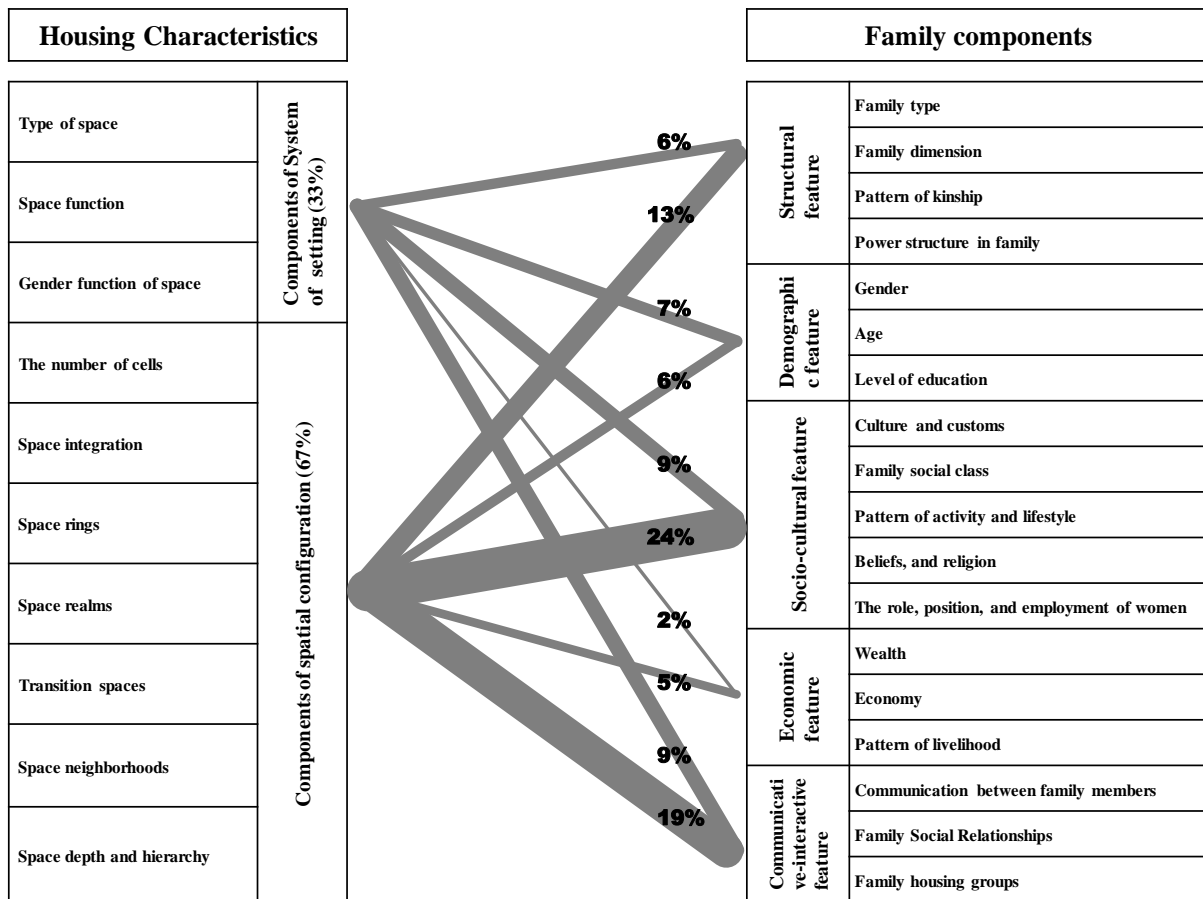


Fig 1. The Frequency Percentage of the Relationship Between the Main Features of Housing and Family Based on the Results of Previous Studies

This research intends to examine this model in small and medium-sized cities. In this regard, the city of Sari in the northern region of Iran, and the capital of Mazandaran province, has been chosen. The main goal of this research is to find the answer to the question of how the changes in the spatial arrangement of contemporary housing have a relationship with the changes in the characteristics of the families living in it during the 3 generations studied. To study this general question, the following two research questions were proposed and studied in the research process:

1) In the three studied generations, what is the relationship between the spatial configuration of their housing and the characteristics of the families living in them?

2) What is the relationship model between changes in housing and family characteristics?

RESEARCH METHOD

This fundamental research aimed to investigate the relationship between the features of contemporary housing in Sari city and the characteristics of 3 generations of families living in it. So, it was empirical

descriptive-survey research carried out using field methods and inductive reasoning. The correlation analysis was used to investigate the relationships between variables. Different correlation coefficients were used to calculate the correlation between variables due to different measurement scales (i.e. nominal, ordinal, interval, and relative). According to the nature of some data, qualitative data were first converted into quantitative ones, and then analyzed using different statistical methods, and the relationships between them were investigated. To collect data, field tools including questionnaires, interviews, observations, and plan surveying were used. The two main parts of the questionnaire assess housing and family characteristics. To study different dimensions of the family, part of the questions was taken from the Iranian Family Psychological Function Scale (IFPFS) (Kimiaee, Khademian, Farhadi, & Ghimati, 2012). This scale measures the dimensions of the family based on a 7-point Likert scale for all dimensions or each dimension. Pearson's correlation coefficients confirmed the significant relationship between the scores of each dimension with the total score of the questionnaire at the 99% confidence level,

and the Cronbach's alpha of the whole questionnaire was estimated to be 0.88, indicating the high correlation between the questions themselves and the correlation between them and the whole questionnaire, and confirming the reliability of each field. To develop the questionnaire, a wide range of answers was obtained for each question by conducting a flexible face-to-face interview, and then the final questionnaire was designed. After sorting the questions, 50 questionnaires were filled out as a pilot to review their shortcomings. Multi-stage stratified sampling was used to select the samples. Considering the statistical population, type of classification, and the use of multi-stage sampling, according to Kline's model, a total of 200 samples were selected from 33 main districts of the city (6 family units from each district). To ensure the accuracy of the implementation, the inflexible face-to-face interview method (questionnaire with interview) was used. To avoid errors in the implementation, the questionnaire was administered by the researcher. The mother of the family was asked to complete the questionnaire, and if she was not able to answer, the father or the child older than 18 years was asked to fill out the questionnaire and answer the interview questions. In the present study, the sample unit was the family, and the statistical population included 101932 families who lived in 101608 residential units. Families with no housing (homeless, temporary, and unstable housing) were not included in the study.

According to the research objective, to study the relationship between changes in housing and contemporary family characteristics, the samples were classified into generation groups. Although generational classification was used in the selection of families, in order to increase the accuracy of the study, in accordance with the definition of generation in the Iranian Statistics Organization, 3 generational groups were also categorized by age (Zavareh, ShokrBeigi, & Azad Armaki, 2017). According to this definition, the first generation included families in which the parents' average age was over 55 years and at least one of their grandchildren had formed an independent family. In the second generation, the average age of parents was between 30 and 54 years, and at least one of their children has formed an independent family, and the third generation included families in which the average age of parents was below 29 years old and none of the children had formed an independent family. Although the sample size was considered to be 200 persons according to Klein's model, to coordinate with the generation-age classification of the population according to the latest census, the sample size was increased to 203 samples by randomly selecting from the city areas and 32 samples from the

first generation, 64 samples from the second generation, and 107 samples from the third generation were selected.

To collect data on the spatial configuration, plans were surveyed. Due to the lack of permission to survey the plans or take photos of some samples, or low satisfaction with housing and forced residence in some samples, several samples were replaced with upper, lower, or adjacent housing units. After removing unacceptable questionnaires, a total of 203 questionnaires were included in the research process. To investigate the spatial configuration, the characteristics of the number of cells, the number of transition spaces, average depth, integration, rings, space neighborhoods, and space realms were examined as dependent variables in the present study. Since, as emphasized in the research background, the behavioral settings were directly related to spatial configuration, it was necessary to study its components as dependent variables. Therefore, the components of the types of space, the space function, and the gender function of the space were also studied. In this regard, the data on the components of the number and types of space, the space function, the degree of flexibility or exclusivity of spaces, private to public realms, and gender realms were collected through the questionnaire and observing the spaces. To measure the variables of depth, integration, and ring of the spaces, after surveying the plan and drawing the space graph, the maps were analyzed in Depth map software. To measure the number of transition spaces, all the spaces with the transit-communication role were identified. To assess the variable of space neighborhoods, considering the relationship between the neighborhood of the kitchen and some family characteristics, as mentioned in the research background, the type of space neighborhoods was studied.

Considering the relationship between some family and housing features, as emphasized in the research background, the variations of these variables were investigated as independent variables over three generations. Moreover, the relationship between them and the spatial configuration of housing was studied. The components of family type, size, level of education, economic status, income, property ownership, occupation, number, and type of family housing groups were investigated considering relevant questions in the demographic part of the questionnaire. The components of the family power structure, beliefs, religion, the communication between family members, and family social relations were investigated by studying the average of these dimensions in the IFPFS. Due to the homogeneity of the kinship type component in all the studied

populations, this component was not investigated. To investigate the family cultural factors, some topics from the category of family culture and customs, which were emphasized to be related to the spatial configuration of housing in the research background, including how to perform activities, ceremonies, and rituals, were investigated by including some questions in the questionnaire. The family social class component was investigated in the demographic questionnaire since the relationship between the components of income, education, and occupation

with the family social class was emphasized in the research background (Kraus, Callaghan, & Ondish, 2019). The communication between family members, the type of family collective activities, the spaces used for these activities, the types of family social relations, and the spaces used in these communications, were determined by including questions in the questionnaire. After extracting data from the questionnaires, they were entered into statistical analysis software and the results were analyzed.

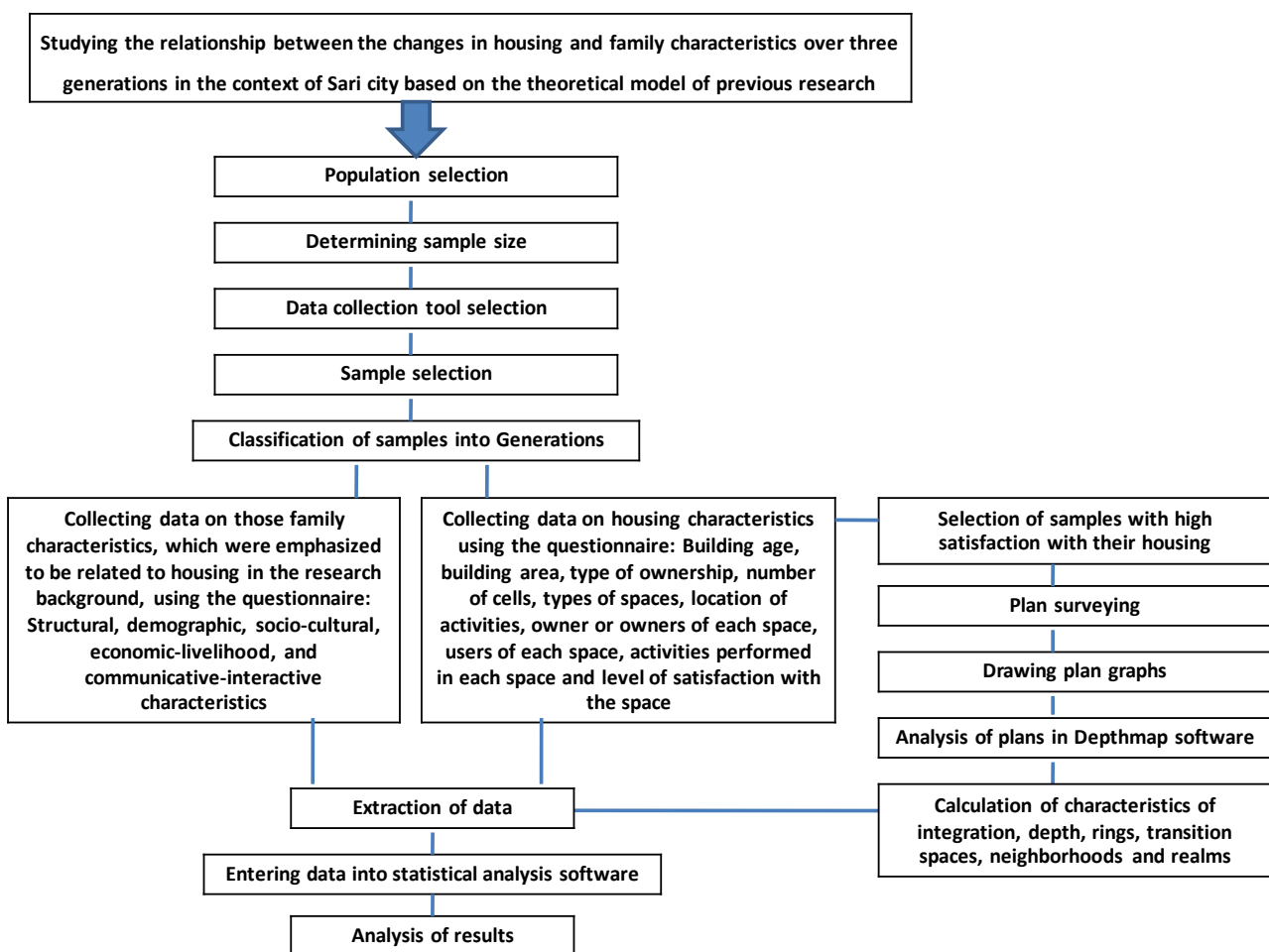


Fig 2. The Stages of Implementing the Research in the Context of Sari City

FINDINGS AND DISCUSSION

In the present study, the changes in the components of the spatial configuration of housing, including the number of cells, types of space, space depth, integration, ring, space realms, link of space, space neighborhoods, space function, and space flexibility were investigated over three contemporary generations and it was investigated how they were related to family intergenerational transformation.

In the first group of questions, the relationship between the components of types and number of spaces and family characteristics was investigated and the results indicated that the average types and number of spaces decreased from the first to the third generation, respectively, as shown in Table 1. The houses of the previous generations were the place of more activities. Some of these activities included annual food preparation, livelihood activities, the residence of relatives, holding ceremonies, communal cooking, and activities performed in open and semi-open spaces. As the functions occurred in the housing decreased and many activities were transferred outside it, the relevant spaces were eliminated. On the other hand, with a reduction in the per capita house area and the increased desire to connect or integrate some spaces (living room, drawing room, or kitchen), the types and number of spaces decreased. Despite the gradual decrease in the types and number of spaces, the percentage of private spaces (bedrooms) has increased. This can be explained by the increasing desire for independence, having a specific space, and further partitioning of private spaces in the housing of the next generations. The results showed that with the decrease in the number of extended families and the decrease in the average household size over three generations, as seen in Table 1, on the one hand, the need for multiple spaces has decreased, and on the other hand, it has led to a decrease in functions and communications in the home space, and in line with the previous results, it has caused a decrease in the number and types of spaces. In this regard, as emphasized in the research background, the relationship between the families' social class (its three main indices including education, occupation, and income) and the types and number of spaces was examined. To investigate the education index, the parents' average education level was used in the analysis and it was found that this index increased from the first to the third generation, as seen in Table 1. The results of the analysis did not show a statistically significant relationship between the education index and the components of the types and number of spaces. And only in an exceptional case, a significant direct relationship was observed between the education of mothers and the types and number of spaces. These

results indicated that these components are not necessarily related to each other, while they were more related to other parameters such as wealth, income, or household size and type. To explain this result, one can mention the coordinated decrease in household size with the increase in education level. Also, the enhanced education level of mothers and accepting social roles, and thereby their reduced presence at home has led to the non-performance of some activities and the removal of the spaces related to them. On the other hand, it was found that the tendency to partition and divide public spaces was less in families with high education. This relationship was investigated considering the mentioned relationship between the type of occupation and livelihood pattern with the number and types of space in societies where livelihood activity or part of it takes place at home, in the research background. Despite the fact that in the research context, the type of livelihood mostly included self-employment, employment, or jobs requiring no specific space at home, 78% of the first-generation, 52% of the second-generation, and 82% of the third-generation did part of their business activities at home, indicating the re-enhanced role of housing as a place for carrying out business activities. Although the parents' bedroom was the most used space for these activities, 44% of families have used the living room to perform their business activities. Considering the gradual decrease in the number of cells and types of spaces over three generations, and the increased use of housing as a place for doing business activities by the third generation, new functions have been inevitably added to existing spaces, leading to the enhanced flexibility of the spaces. Therefore, contrary to the previous results, this issue does not support a direct relationship between the increase in the number of cells and types of space with the performance of business activities in the home space. Moreover, with the gradual change of the occupational pattern, performing these activities did not require a specific space, and did not necessarily lead to an increase in the number of cells and types of space. The next variable of social class was family income. The results showed that with the decrease in per capita income from the first to the third generation, as seen in Table 1, and also with its decrease in each generation group, the type of spaces and the number of cells have decreased. This result is consistent with the results of previous research. Regarding family beliefs and religion, the results indicated that this component has experienced a decreasing trend from the first to the third generation, as shown in Table 1. Despite the emphasis of the research background on the existence of a direct relationship between family beliefs and religion and the components of the types of space and the number of cells, as well as the coordinated decreasing changes

between them, no significant relationship was observed between them but due to the lack of a need for a specific space for performing religious rituals in the context studied and the findings did not support the research background. Investigating the relationship between the components of the types of space and the number of cells with the component of communication between family members revealed that despite the decrease in the components of the types of space and the number of cells, the communication between family members increased, as seen in Table 1, and according to the research background, there is an inverse relationship between them. This issue can be explained by the gradual removal of some spatial boundaries (between the living room, drawing room, and kitchen), and the increase in communication between family members compared to previous generations. In most sample houses of the second generation, removing the spatial boundary between the living and drawing rooms and the kitchen, as well as the integration of the living and drawing rooms in the houses of the third generation, have led to increased communication between family members. This result is consistent with the results of the previous research supporting the inverse relationship between these components. The family social relations (the presence of guests at home) was another component whose relationship with the types of space and the number of cells was investigated in the present study. The results showed that despite the emphasis of the research background on the direct relationship between these components, the family social relations (the presence of guests at home) have increased as the dimension of recreation and leisure time has significantly increased. The average score of the types of space related to family social relations (spaces related to the presence of guests) has decreased from the first to the third generation according to Table 1. This issue can be explained by the removal of the border between the spaces related to the presence of guests, or merging them with the living space, which has led to the reduced types of space and decreased the number of cells. Also, despite the increase in family social relations in the third generation, the guest presence model has changed from long-term stay to short-term stay, and the type of guests was mainly more familial than in previous generations, making it possible for them to be present in the living and drawing rooms and making it unnecessary to consider a separate drawing room to ensure the privacy of the family. In the last question of this category, the relationship between the number of spaces and the family housing groups was investigated. The results indicated that from the first to the third generation, with the decrease in the number of cells and the types of space, the average number of family housing members has decreased, as seen in

Table 1. This issue can be explained by the greater household size in the past generations, the need for more division of space limits, as well as the multiplicity of functions at home, and the findings support the results of previous research.

In the second category, the relationship between the space function variable and family variables was investigated. Examining the relationship between this component and the type of family indicated a gradual decrease in the number of extended families as well as the number of functions occurring in the home. Also, as emphasized in the research background, the space function component is related to the average age of the family members in intra-generational and intergenerational samples, and the increase in the average age of the parents was associated with the increase in the average number of activities performed at home (regardless of the activities related to the presence of children in the second and third generation). To explain this issue, one can refer to the activities that were done in the houses of the previous generations but were not done in the houses of the next generations. Another component whose inverse relationship with the gender function of some spaces such as the kitchen was emphasized in the research background was the family education (average education of parents). According to Table 1, with the increase in the education index over three generations, the belief in the gender function of the kitchen has decreased and the research results support the previous findings. Also, investigating the relationship between the "bonds of relationship" component as one of the cultural aspects of the family, with the performance of public spaces (living and drawing rooms) indicated that the average of the "bonds of relationship" component has increased significantly from the first to the third generation as the performance of the public space has increased, as seen in Table 1. Moreover, it was observed that the variations of these two components were continuous, and there is a direct relationship between them, as mentioned in the research background. The next question studied the relationship between female employment and the gender function of spaces (kitchen). The female employment rate has increased from the first to the third generation according to Table 1, and as emphasized in the research background, an inverse correlation was observed between them.

The third group examined the relationship between space flexibility variables and family characteristics. According to the research background, the greater the number of functions of each space the higher its flexibility, and the smaller number of functions implies the specialization of the space. Therefore, the number of functions of each space was examined, and the relationship between the household size component and

the flexibility of the spaces was investigated. The results showed that over three generations, with the gradual reduction of the household size and the reduction of the house area, some spaces were removed and their functions were transferred to other spaces, leading to the increased flexibility of those spaces. In this regard, the flexibility of public and semi-public spaces (living and drawing rooms) increased. Also, with the change in the pattern of spending leisure time, and the addition of equipment such as television and satellite TV to the house space, the desire to use the living space increased while in the past, the yard was mostly used to spend leisure time, and the flexibility of the yard in the first generation's housing reached its peak. Also, the flexibility of the kitchen has increased over 3 generations, and with the reduction of the household size, activities such as eating or washing clothes have been done in this space and its functionality has increased. On the other hand, with the gradual increase in the bedroom per capita in relation to the household size, the bedroom has become a more private space and has become a place for personal activities, study, playing, and recreation. Therefore, in line with the previous results regarding the relationship between the household size and the function of the space, with the decrease of the flexibility dimension, the public spaces have increased, and the private spaces have become more specialized. Also, according to Table 1, investigating the family power structure component over three generations showed more equality of power among the family members in the second and third generations compared to the first generation. Comparing the relationship between this component and the function of the main spaces revealed that in the second and third generations, there was a significant relationship between the equality of power and the increase in the function of public spaces. In these two generations, in line with the equality of power between family members, children have been able to be more present in the public and semi-public spaces of the house, and some functions that have been done in the bedroom have been transferred to these spaces. In the second generation where children were in a higher age group, public spaces were used to carry out business activities or entertain their guests, while the children of the third generation used these spaces for studying, playing, and having fun. Therefore, in line with the research background, these two components have been related. Also, as emphasized in the research background, the relationship between female employment and education with the flexibility of the kitchen space was studied. The results indicated that there was a significant direct relationship between the average number of kitchen functions and the components of female employment and female

education over three generations and that they have experienced an increasing trend. The reason for the addition of some activities (e.g. eating) to the kitchen area was the ease and higher speed of doing it in the life of working women. Also, removing the spatial borders between the living room and the kitchen in the housing of the next generations, which was the preference of most working women, has made it possible to simultaneously work in the kitchen and communicate, observe, and control the performance of other family members, which was an important factor in the lives of working women. Therefore, in line with previous results, intra-generational and intergenerational analyses indicated that female education and female employment are directly related to the increase in the functions of the kitchen. In this category, the relationship between the flexibility of space and communication between family members was also studied. The results showed that the communication between family members has increased from the first to the third generation. The most widely used space for interaction and communication between family members was the living room, which has been the most flexible space in the housing of the three generations. Although in the first generation, most of the communication between family members was done in the yard or porch, in the second generation and especially the third generation, the yard was the least applied space in the house. To explain this, one can mention the removal or transfer of many functions from the yard to other spaces, the change in the function of the yard in the housing of the next generations (mainly used as the parking lot), as well as the change in the type of its ownership from private space to the shared space in apartment housing. Therefore, contrary to the results of previous research, with the gradual increase in communication between family members, the flexibility of open and semi-open spaces decreased.

In the fourth category, investigating the space depth component showed that according to Table 1, the mean depth of the house has increased from the first to the third generation. Contrary to the research background, which emphasized the reduction of the depth with the increase of the equality of power between family members, the overall depth of the house increased over three generations. To explain this result, it can be mentioned that with the gradual reduction of the house area and the proximity of the spatial boundaries, and the addition of transition spaces, the need to create privacy has been satisfied, leading to an increase in depth. In the next question, the changes in the depth of the kitchen, as a gendered space, were studied. Contrary to previous findings, despite the reduction of the gender function of the kitchen over three generations, its depth has increased. Studying the sample houses indicated that

the kitchen in the housing of the previous generations was adjacent to the yard or in a two-way relationship with the yard and the interior, causing its depth to decrease. In the houses of the next generations, the displacement of it from the yard to the interior has caused its depth to increase. In the next question, the relationship between the religious component and the depth of space was studied. Contrary to the research background, which emphasized the direct relationship between them, in spite of the decrease in the religious dimension, the overall depth of space has increased over three generations. To explain this, one can mention that in frequent examples of apartments, due to the reduction of the house area compared to the past, the use of multiple transition spaces to protect privacy has caused spaces to be placed in a hierarchy further away from the root, leading to an increase in the depth. The bushy graph of the houses in the first generation, and the gradual transformation of the graph into a tree form in the housing of the next generations show the increase in the space depth.

In the fifth category, to investigate the relationship between the component of space integration and family characteristics, first, the relationship between the integration of guest spaces and the kitchen with the family social relations was investigated. As the bonds of relationship have increased over three generations, the integration of the drawing room has decreased, as seen in Table 1, showing a decrease in integration and its spatial fragmentation over three generations, especially in the third generation's housing. In this regard, in the houses with no border between the living room and drawing room, due to the necessity of connecting them with the rest of the spaces, there was a smaller decrease in the integration of this space. Therefore, with the increase in bonds of relationships and the need to maintain more privacy, the integration of the drawing room has decreased. This result is consistent with the previous studies. Also, according to Table 1, the integration of the kitchen space has decreased over three generations, and its physical location has gradually changed from the yard (in some examples of the first generation) to the interior of the house, and adjacent to the living room or drawing room. With the reduction in the integration of the kitchen and the increase in its depth, its privacy has increased, and even in many samples, its privacy has increased by adding a cookhouse to it. The next question studied the relationship between religion and integration of the housing. The results showed that despite the emphasis of the research background on the inverse relationship between these two components, the average of the religion dimension, as well as the integration of the whole house have decreased over three generations according to Table 1. This issue has occurred due to the

gradual reduction of the area per capita, the reduction of the number of cells, the removal of some spatial borders and the proximity of spaces to each other on the one hand, and the need to create privacy on the other hand, through increasing the depth and reducing the integration. The next question studied the relationship between the integration of spaces and communication between family members. Contrary to the research background, despite the decrease in the total integration of housing over three generations, the communication between the family members increased. This can be explained by the increased need to ensure the privacy of the spaces despite the reduction of the housing area per capita. Among the main spaces, the bedrooms had the lowest degree of integration, which is explained by the need to ensure the privacy of the family members. In all the spaces of the house, the lowest degree of integration was related to the warehouses in the first generation's housing, the restroom, and the bathroom (due to the change of their location from the yard to the interior of the house and the need to provide distance and privacy) in the second generation's housing, and the terraces in the third generation housing. To explain this, one can mention the change in their role to be used as service spaces and the need to provide more depth. The highest degree of integration was related to the yard, and the corridors in the next two generations' housing, which can be explained by their role in the organization of the connection between the surrounding spaces.

The sixth category of questions examined the relationship between the space rings and the family characteristics. The rings of spaces have decreased over three generations. This issue shows the reduction of the distribution of house spaces, meaning that there were fewer choices to reach other points in the housing of the next generations. The highest degree of the ring was observed in the housing of extended families of the first generation and was mainly used to create separate communication, separate paths, provide privacy, and separate realms. While in the third generation's housing, the rings were mainly related to communicative or service spaces. Also, the ring was more related to the type of communication between family members than the amount of communication between them, and the findings, in line with the research background, support the relationship between the ring and communication between family members. In the next question, the relationship between family social relations and the inter-space rings was studied. Despite the increase in family social relations over three generations, the ring has decreased. The increase in the number of rings has increased the right to choose the paths, making it possible to meet the special behavioral and communication requirements between the family and the guests by separating the private spaces from the

paths of the guests. The ring has reached its peak in the first generation's housing and decreased in the next generations despite the increase in family social relations. To explain this, the results indicated that despite the increase in family social relations in the third generation, the type of social relations has changed with the presence of more intimate guests compared to those in previous generations. Also, in the previous generations, when the dimension of religion was greater, the need to maintain privacy in the conditions where the house was the venue for various ceremonies and the presence of strange guests necessitated the need for a higher degree of ring. Examining the relationship between the ring and the number of family housing groups indicated that the highest level of ring and also a greater number of family housing groups existed in the first and second generations, and these two components had a direct relationship. This issue was due to the requirement to separate the privacy of the family, to separate the paths of the crew from the rest of the spaces, and to increase privacy. These were provided by the increase in the ring. This result is consistent with the research background. Studying the relationship between religion and the ring of the spaces showed a decreasing trend over three generations for both components and a direct relationship between them. In this regard, in families where religion has a higher average and maintaining the privacy of spaces is very important, in line with the research background, the degree of the ring has increased.

The seventh category of questions studied the space realms and examined the relationship between the realms of guests or clients and the family social relations. The results showed that despite the emphasis of the research background on a direct relationship between them, with the increase in family social relations over three generations, the realms related to the presence of guests have decreased. In the first and second generations' housing, the drawing room was the most widely used realm by the guests, and with the gradual removal of spatial boundaries and the integration of spaces, in the third generation's housing, the living-drawing area was the most widely used realm by the guests. This issue can be explained by the gradual reduction of the per capita area of the house, the change of the group of guests, as well as the non-holding of many ceremonies in the house of the next generations, and despite the increase in the family social relations, the realms of the presence of guests have decreased. Also, with the gradual change of the role of the yard from a space for welcoming guests to a shared space, this space has been deducted from the realms of the guests.

The eighth category examined the transition space variable. The results showed that the average number of

transition-connection spaces in the first generation's housing was significantly more than in the next two generations, and this difference is related to the change in the type of configuration and type of plans. In most of the sample houses of the first generation, the spatial configuration of the house was defined based on the centrality of the yard, and the rest of the spaces were available through the transition-connection spaces around the yard. On the other hand, most of the second generation's houses had villa plans with courtyards, where the spaces were accessible from inside the house instead of being placed on the courtyard sides. In this type of organization, the role of the yard as the main connecting space was reduced and the kitchen, restroom, and bathroom spaces were also moved inside the house, leading to a gradual reduction in the number of connection-transition spaces. The study showed that the increase in the number of transition-connecting spaces in the first generation's housing was directly and significantly related to the increase in the number of extended families. The increase in these spaces can be explained by the increase in the household size and the number of family housing groups in the extended families, and the need to preserve privacy through the creation of transition spaces. This result is consistent with the results of the previous studies. Also, investigating the relationship between the component of religion and the number of connection spaces showed that since connection spaces as transition spaces provide gradual communication and spatial hierarchy, with the increase in the dimension of religion, their number has increased to provide more privacy. Therefore, in line with the previous results, over three generations, with the gradual reduction of the dimension of religion, the number of transition spaces has decreased, and there has been a significant correlation between their changes.

The ninth category of questions investigated space neighborhoods. The research literature referred to the relationship between the types of neighborhoods of the kitchen space as a gendered space with some family characteristics. The results showed that the kitchen was the most adjacent to the transition-connection corridors (82% of the samples) in the first generation's housing, the living space (60% of the samples) in the second generation's housing, and the living-drawing space (72% of the samples) in the third generation's housing, indicating that over three generations, this space has gradually changed from being adjacent to transition corridors to being adjacent to semi-public and public spaces. This issue can be explained by the gradual changes in the per capita area of the space that led to spatial compaction, as well as the family's desire for a visual and spatial connection between the kitchen and public spaces. On the other hand, the degree of

connection between the kitchen and public spaces was significantly related to changes in the dimension of religion. Over three generations, with the reduction of the average dimension of religion, the connection between the kitchen and the neighboring public spaces has increased by removing the spatial boundary between them. In this category, the relationship between female employment and female education with the type of spaces adjacent to the kitchen (gender space) was also studied. The results showed that with the increase in the female employment and female education indices from the first to the third generation, kitchen neighborhoods have changed to semi-public

and public spaces and working women have tended to remove the visual-spatial boundary between the kitchen and the living-drawing space. One of the most important reasons for this is their reluctance to cut off the visual, auditory, and spatial communication between them and the family during the limited time they are at home, as well as having a more open atmosphere despite the reduction of the housing area. These results are consistent with the results of the previous studies. Table 2 shows the relationship between changes in housing and family characteristics in an intergenerational study of contemporary housing in Sari.

Table 2. The Relationship Between Changes in Housing and Family Characteristics in an Intergenerational Study of Contemporary Housing in Sari

	Housing features									Score												
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	First generation	Second generation	Third generation	Changes over three generations									
Housing	Type of space	The number of cells	The total number of functions occurring in the kitchen	Belief in the gender function of the kitchen (Percent)	Performance of drawing room	The flexibility of public spaces (hall and)	The flexibility of semi-public space	The flexibility of private spaces (bedrooms)	Overall depth of the housing space	Integration of the whole housing space	Integration of drawing room	Integration of kitchen	Space rings	Guest space realms	The number of transition-connection spaces	The adjacency of gender spaces with public spaces						
Family																						
Family components	Extended family type	↕	↕	↕										↕	55%	11%	1%	↘				
	Household size	↕	↕			↕	↕	↕						↕	6.65	4.6	3.25	↘				
	Equality of power in the family					↕	↕	↕	↕						5.53	5.75	5.77	↗				
	The average age of parents			↕											72	55	39	↘				
	Family income index	↕	↕												0.97	0.88	0.63	↘				
	Work from home jobs (%)		↕												78%	52%	82%	↗				
	Family beliefs and region	↕							↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	5.06	4.91	4.22	↘
	Communication between family members		↕			↕	↕	↕		↕	↕	↕	↕	↕	2.82	2.63	2.83	↗				
	Family social relations	↕	↕			↕	↕			↕	↕	↕	↕	↕	5.22	5.29	5.41	↗				
	Family housing groups	↕	↕							↕	↕	↕	↕		0.81	0.13	0.01	↘				
	Family education index		↕		↕										2.13	3.39	4.23	↗				
	Female education index			↕				↕							2.31	2.66	4.57	↗				
	Female employment index			↕				↕							1.52	2.43	3.47	↗				
Score	First generation	5.44	7.10	39	87.5	10.6	10.3	3.77	11.5	4.78	0.84	0.87	0.81	1.14	2.81	8.67	23%					
	Second generation	4.39	6.21	37	60	12.2	11.2	4.72	11.1	5.33	0.73	0.79	0.77	1.08	2.70	5.80	72%					
	Third generation	4.08	5.93	35	0	12.8	11.9	5.14	10.5	5.46	0.71	0.70	0.71	1.03	2.41	5.73	90%					
Changes over three generations	↘	↘	↘	↘	↗	↗	↗	↘	↗	↘	↘	↘	↘	↘	↘	↗						

Direct relationship: ↕ Inverse relationship: ↗

Increasing trend over three generations: ↗ Decreasing trend over three generations: ↘

CONCLUSION

The present research has investigated the relationship between housing and intergenerational changes in family characteristics in Sari City. The statistical results indicated that there is a significant relationship between the changes in these characteristics. In this regard, some housing features, including the flexibility of public and semi-public spaces, the overall depth of housing, and the adjacency of gender spaces to public spaces, have incrementally changed while the types and number of spaces, the number of functions occurred in housing, the gender function of spaces, the flexibility of private spaces, integration, rings, the number of transitional-communicative spaces, and the number of guest realms have decreasingly changed. Among them, the number of spaces, space function, and the type of space, are most related to family characteristics. Regarding family characteristics, the number of extended families, household size, and the number of family housing people, religion, and per capita family income have decreased. While the equality of power between family members, communication between family members, family social relations, education, and female employment have increased. Among the family characteristics, the communication between family members, family social relations, and religion, are most related to the housing features, respectively.

As emphasized in the research background, there is a relationship between the communication between family members and housing features, the results of the present study indicated that as this characteristic has increased over 3 generations, the features of the types and number of spaces, rings, integration, and flexibility of open and semi-open spaces have decreased, indicating a significant inverse relationship between them. In the research background, it was found that there is a direct relationship between family social relations and the number and types of spaces, but the results of the present study indicated an inverse relationship between them, which can be explained by the integration of public and semi-public spaces in the housing of the next generations. The same relationship was observed between the rings and the family social relations, which can be explained by the change in the type of family social relations, as well as the reduction of the religious dimension, which led to less consideration of the need to create more rings to maintain the family privacy compared to previous generations. This result is also inconsistent with the results of the previous research. Regarding the relationship between family social relations and housing features, the results of the present study are consistent with the research background and they

indicated that there is an inverse relationship between family social relations and the integration of guest spaces. On the other hand, an inverse relationship was observed between the amount of family social relations or inviting guests at home dimension and the number of guest realms, which is inconsistent with the previous research. This result can be explained by the gradual integration of the public spaces of the house due to the reduction of its area. Regarding the relationship between the family religion and the housing features, contrary to the research background stating there is a direct relationship between this characteristic and the types and number of spaces, the results revealed that there is no significant relationship between them due to the need for no specific space to perform religious rituals in the research context. Also, it was observed that there is an inverse relationship between the family religion and the overall space depth, which is inconsistent with the results of the previous research. This issue can be explained by the use of multiple transition spaces to protect privacy due to the gradual reduction of the house area in the housing of the next generations. The use of transition spaces leads to an increase in depth and a decrease in integration. Investigating the relationship between the family religion and the space rings showed a significant direct relationship between them. Examining the relationship between the family religion and the number of communication spaces revealed that there is a significant direct relationship between them and both of them have decreased over 3 generations. This result is consistent with the results of the previous studies. Also, over three generations, with the decrease of the average dimension of religion, the desire to connect the kitchen space to public spaces has increased by removing the spatial border between them. This result is in line with the previous findings. The number of family housing people has decreased over three generations and this has been associated with the reduction in the number and types of space, indicating a direct relationship between them, as supported by the results of previous research. The direct relationship between the number of family housing people and the space rings, as mentioned in the research background, was also confirmed by the research results. The findings revealed that as the family type changed, due to the increase of nuclear families and the reduction in the number of extended families, the features including the number and types of spaces, the number of functions occurring in housing, and the number of communicative-transitional spaces, have decreased. This is consistent with the research background. Moreover, the household size has decreased over three generations and its changes were directly related to the reduction

of the number and types of space. With the reduction of the household size, the flexibility of private spaces (bedrooms) decreased and the flexibility of public spaces (living and drawing rooms) and kitchens increased. In other words, the reduction in household size over three generations has been associated with the enhanced function of public and semi-public spaces and the reduced function of private spaces. On the other hand, over three generations, the equality of power between family members has increased. This change has been associated with the increased flexibility of public and semi-public spaces and the reduced flexibility of private spaces. In other words, with the increased equality of power between family members, people's desire to use public and semi-public spaces, and perform more activities in them, has increased. Also, over three generations, female education and female employment have increased, and this change has been associated with a significant reduction in the gender function of spaces, enhanced

flexibility of the kitchen space, and also with a change in the type adjacency of kitchen to semi-public and public spaces. Figure 3 shows the relationship (in percent) between family components and housing. Among the family components, communication between family members is most related to the housing features, followed by family social relations, family beliefs, and religion. Figure 4 shows the relationship (in percent) between housing components and family characteristics in contemporary housing in Sari City. About 59% of the family characteristics were related to the spatial configuration, and 41% of them were related to the system of setting. Also, among the components related to the spatial configuration and system of setting, the components of the number of cells and the space function were most related to the family characteristics, followed by the components of the types of space, integration, rings, neighborhoods, and gender function of space.

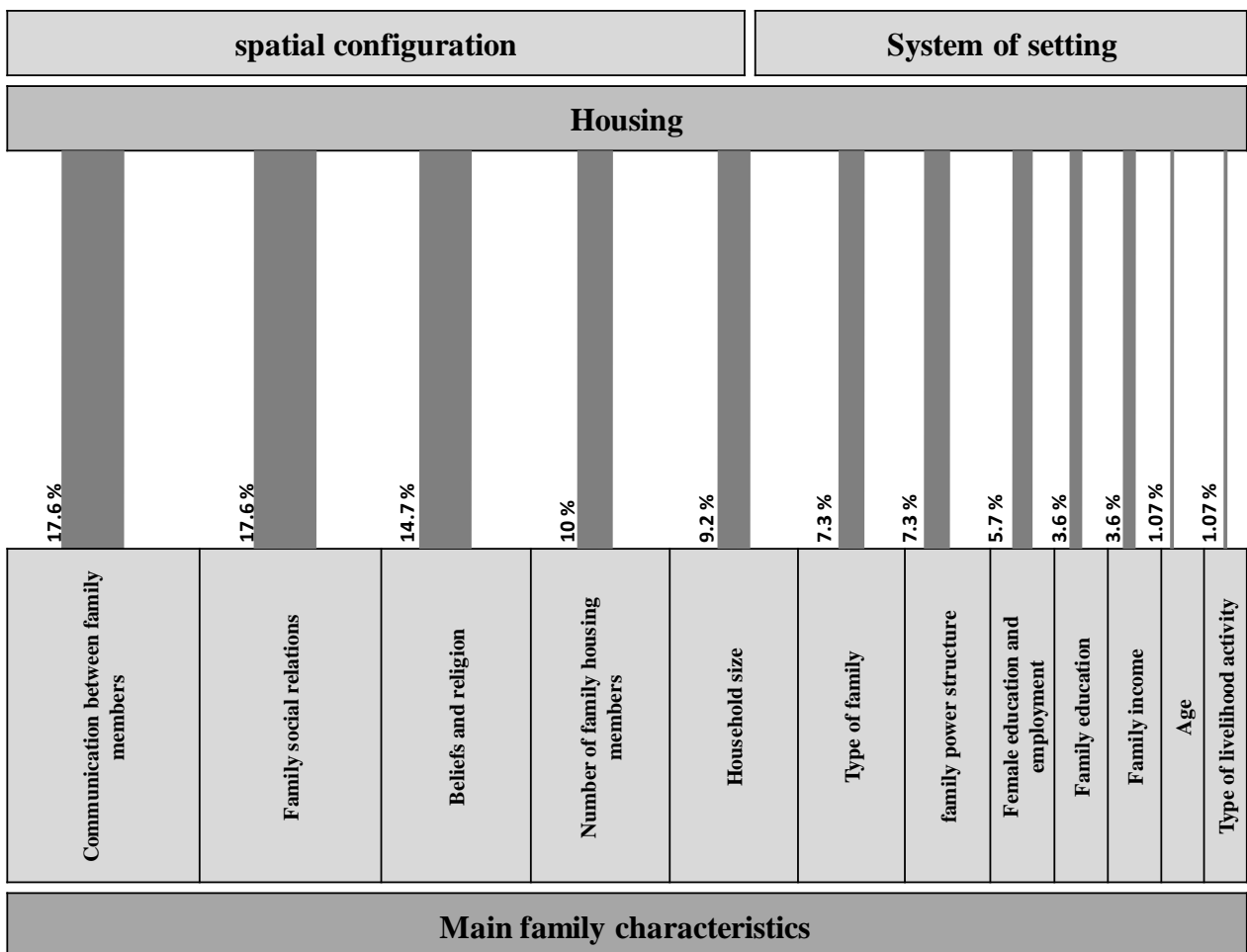


Fig 3. The Relationship (Percent) Between Family Components and Housing in Contemporary Housing in Sari City

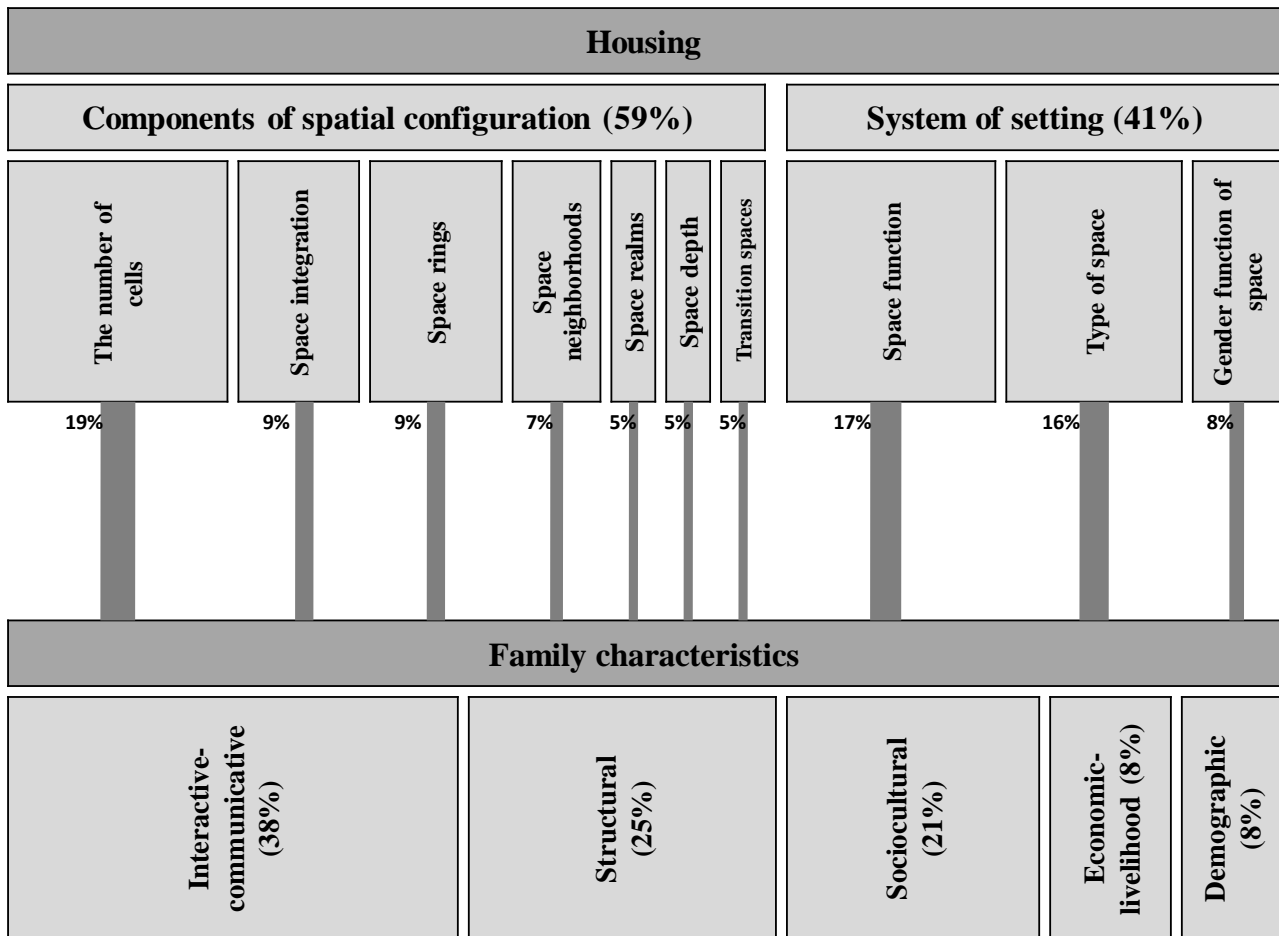


Fig 4. The Relationship (Percent) Between Housing Features and Family in Contemporary Housing in Sari City

Figure 5 shows the relationship (in percent) between the housing components and the five main family characteristics in contemporary housing in Sari City. Among the five main characteristics of the family, communicative-interactive, structural, socio-cultural, economic-livelihood, and demographic characteristics are most related to housing features, respectively. Moreover, the spatial configuration is most related to the communicative-interactive characteristic, followed by the socio-cultural characteristic while the system of setting is most related to the structural characteristic, followed by the communicative-interactive characteristic. The results

of the research showed that intergenerational transformations in family characteristics are related to the changes in the spatial configuration and system of setting of the housing space. Considering the change of family characteristics, for appropriate housing design, housing design patterns should be reviewed, and research findings on housing design patterns should be taken into consideration. It is suggested to investigate the transformations of family characteristics with other features of housing such as physical features and semantic configuration of housing in future studies.

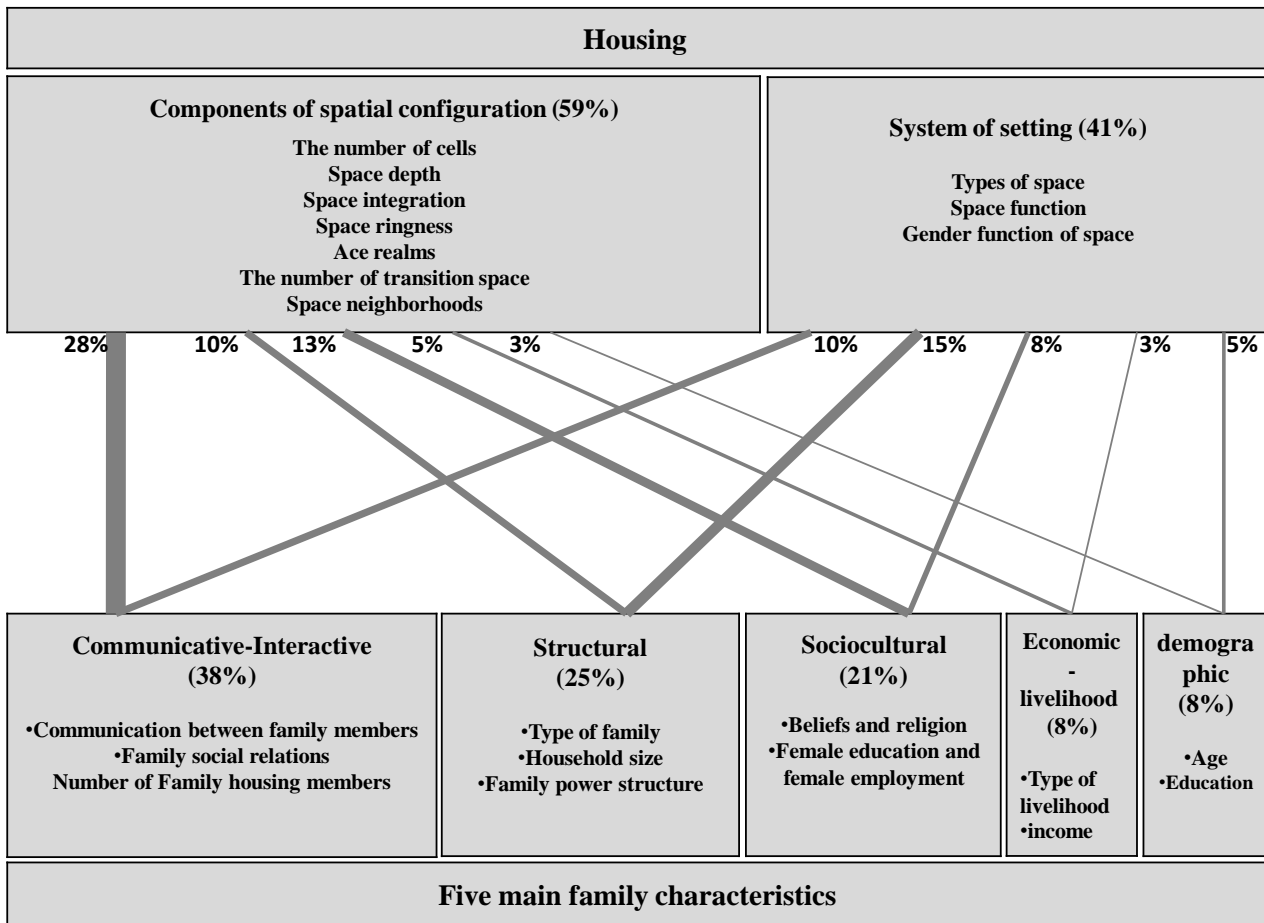


Fig 5. The Relationship (Percent) Between Housing Components and the Five Main Family Characteristics in Contemporary Housing in Sari City

NOTES

1. Different types of family include, for example, nuclear family, extended family, molecular family, joint family, incomplete family, etc. (Sharma, 2013).
2. Different patterns of kinship include blood kinship, marital kinship, and contractual kinship (Azadarmaki & Bahar, 2006).
3. Different power structures in the family include horizontal power structures or the same power between family members, or vertical power structures such as patriarchy and matriarchy (Saroukhani & Amirpanahi, 2006).
4. Based on the statistical results of the Iranian Statistics Center.
5. Based on the relative concept of generation, families were classified as the parents' generation as the first generation, the children's generation as the second generation, and the grandchildren's generation as the third generation. On this basis, the parents' family is considered the first-generation family, the children's family is considered the second-generation

family, and the grandchildren's family is considered the third-generation family.

6. Based on the statistical results of the Iranian Statistics Center.

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