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QUALITATIVE AND QUANTITATIVE ANALYSIS OF HOUSING INDICES AT THE NEIGHBORHOOD LEVEL: CASE STUDY OF REGION 6 OF TEHRAN MUNICIPALITY

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Abstract

Most of the cities in Iran have experienced very rapid development. The urban population in the last decade has been increased by migration, and cities in Iran are faced with many problems. Housing is becoming one of the major problems, and standard housing indices have taken an important place in urban planning to provide good conditions for better urban planning. Region 6 of Tehran municipality is home to a large portion of upper-middle social class people for whom owning a house is more than merely a place to live. The aim of the research was to analyze qualitative and quantitative indices for Region 6 of Tehran municipality. The study is based on analytical and descriptive methods. The secondary data collected from the latest Iran census report in 2016 and composite methods used to measure the special effects of changes in population size, growth rate, and indices of quantitative and qualitative assessment are wide-ranging housing which was analyzed based on the t-test, correlation test and regression with SPSS and GIS software. GIS software is used as an effective tool for generating maps to better understanding the behaviors of residents in a neighborhood. The result shows that Region 6 of Tehran is among the areas of serious urban decline and neighborhoods in the neighboring regions are influenced by the activities of other bordering neighborhoods.

Key words: a*nalysis, qualitative, quantitative, housing indices, neighborhood leveling*.

JEL Classification: *C00, C15, R14, R39, L85, R20, R31*.

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1. Introduction

Housing is one of the most important human needs (Mojtahedzadeh, 2003). The right to adequate housing was first was recognized by the Universal Declaration of Human Rights in 1948 (OHCHR Office of the High Commissioner for Human Rights, 2002). If the first human needs are biological, economic, and social, then a place to live - house - can play a vital role in attaining them (Pourmohammadi, 2011). Therefore, a house is an important human need and respects the quality of human living and human well-being. Due to some economic changes in Iran, housing has become a dependable sector and it has evolved dramatically, leaving many social and environmental impacts on the neighborhood (Kraji et al., 2016). Many studies show that building a house alone cannot solve the residents' problems. Recently, in Canada, the Housing First (HF) program was set up as a means of ending homelessness for over 30,000 people who spend their lives in shelters (Tsemberis, 2011; Hasford et al., 2019). Yet, Canadians could not achieve an appropriate housing standard to help this group of people. In addition, in Bankside in London (Leccis, 2019), urban land holds the highest value and the government is looking to make empty areas into vibrant and attractive places. While governments are promoting urban regeneration, property owners and ex-residents seek maximum interests to earn more money from lands and change the process in their neighborhoods to gentrification. Therefore, the identification of qualitative and quantitative criteria for neighborhood quality is becoming very detailed (Rolling et al., 2017). Rolling et al. (2017), with a combination of indoor and outdoor conditions, identified that assessing standardized instruments in housing quality (structural, clutter/cleanliness, indoor climate, hazards, crowding/privacy) and neighborhood quality (street connectivity, density, land use mix; proximate building/sidewalk conditions; neighborhood stability; proximity to nature/amenities) are two critical components of child development 1) psychological health and 2) helplessness. In the Rosen-Roback neighborhood of the United States, rent plays an important role in the quality level of a neighborhood (Anenberg & Kung, 2018). Anenberg and Kung (2018), in their research, found a strong co-relationship between house rent affordability and the level of the neighborhood, and the quality of livability in neighborhoods. Their study estimated that the number of households choosing each neighborhood is equal to the number of housing units in each neighborhood. Their research showed that over 30% of total household income is spent on rent. Shokouhi et al., 2014, in Sarshor and Chahno Neighborhood of Mashhad, assessed that four main dimensions, i.e. functional, empirical-perceptual, socio-demographic and economic and environmental priorities, respectively, have a significant impact on the stability of residential texture. Hierarchical analysis showed that multiple land use criteria and balance between jobs and housing in a functional dimension, sustainability coefficient and controllable cost of housing in socio-demographic-economic dimension, the lack of pollutants in an environmental dimension and two criteria of citizen satisfaction and environmental safety in the perceptual-empirical dimension are among the most important criteria affecting the quality of the environment in the Sarshor and Chahno neighborhoods.

Providing houses for residents in terms of quantity, like some examples of mass housing construction, simply answers market demand; without giving consideration of the quality of the dwelling, residents would live in bad housing (Meshkini, 2012). Residential satisfaction and perceptions of the community regarding the place they live in and understanding what place is provided for residents deals with an understanding of physical foundations of urban planning (Stanislav & Chin, 2019) by "residents place attachment". Therefore, a successful neighborhood design requires the capability and competence to develop, to the highest degree of livability and vitality, creating a sense of community for its residents, by identifying the effective factors that other neighborhoods can use and apply (Mueller et al., 2018). Nikpour et al. (2017), in a study on Babolsar City, pointed out that the previous indices of qualitative and quantitative factors of housing in different neighborhoods have changed over time. They found that qualitative and quantitative indices in decayed texture leveled less than new urban developments, and that the distance from "sea and city center" shows a meaningful correlation between different neighborhoods. Housing and housing planning have been analyzed from different points of view. In the development theory and growth pole, serious housing problems are temporary and need to be taken into account in development plans (Shafaat, 2006). In contrast, in the theory of dependency and escaping urbanization, the deterioration of housing is considered as a product of inequality and the one-way flow of facilities from the margin to the center (Athari, 2004). According to the market economy perspective, housing

issues should be assigned to a market mechanism or function (Dzhkam, 1996). Housing needs must be provided through the private sector market system (Saif al-Dini, 1996). In the economically planned perspective of the housing market, profitability is excluded as a driver and purpose of housing activities. The housing sector is an integral part of the general system of economic planning and management and falls within the overall goals of economic and social development. The other economic housing perspective for low-income people introduces three major plans, consisting of 1- Programs that provide direct rent subsidies for single homes or residential complexes, 2- Programs that provide tax credits that result in the creation of low rent housing units, and 3- Support programs for housing construction for lower-income people. This policy comes with tools, such as tax breaks, long-term loans, insurance, and other similar sanctioning policies.

Inappropriate and off-standard housing has direct and indirect consequences in addition to the harmful effects of psychological and social consequences, such as delinquency, crime, and violations of laws and regulations, seeing as how dilapidated homes, crowded and substandard housing, and low-income neighborhoods are among the factors contributing to crime (Ziari et al., 2010). Finally, according to the definitions of housing in different dimensions, suitable and efficient housing can be defined as suitable housing in suitable residential space with comfortable access, affordability, security, structural stability and durability, adequate lighting, ventilation and infrastructure. Appropriate basics, such as water supply, health and education, a healthy environment, suitable and accessible workplaces, and basic facilities, as well as the development and strengthening of relationships between family members, horizontal communication (and neighborhood relations), vertical communication (providing its residential livability) should be ensured by housing and, most importantly, it should be commensurate with the household financial situation (Akbari et al., 2013).

The remainder of this paper is organized as follows: section two reviews the literature on urban housing neighborhoods with special consideration of current and future needs. Section three introduces the conceptual framework by highlighting fine points, followed by section four, which draws the case study area and neighborhoods. Section five elucidates the application of approaches and methods for urban neighborhood housing at the regional level. The last section concludes the work, listing the recommendations and acknowledging the current situation and future needs.

2. Literature review-urban housing neighborhood

2.1. Effective indices identification for neighborhood housing

Today, the quality of urban living and improving the quality of urban life is one of the most important parts of urban planning studies in geography. Urban housing quality plays a vital role in fulfilling the quality of neighborhoods, as urban housing is tied to broad economic, social, cultural, environmental, and physical dimensions of the city, with an effective influence on the quality of life and urban sustainability goals (Ebrahimzadeh & Ghaderi, 2015; Abbasi & Saeednia, 2017). The quality of life has been built on quality public space, and includes how a group of people, as neighborhood residents, become adapted to these spaces and how these spaces are adapted to them (Iñigo & Mace, 2019). It does not really matter whether this is in the Global South countries or in Northern countries, these physical spaces shape the quality of the neighborhood (Paddison, 2012). In the last two decades and with new urban policies in Europe (e.g. the United Kingdom), there have been attempts to improve the quality of housing with new urban regeneration policies and community-based urban development (e.g. gentrification or affordable housing) in the neighborhood context. Urban housing in neighborhoods forms by housing size in high-density urban housing neighborhoods. In fact, urban regeneration policies are on three different levels, urban land-use with a site scale, statutory plan with a floor area ratio (FAR), and a detailed plan and design with an urban structure (Wang & Shaw, 2018). The physical form of neighborhoods has been always neglected in urban studies. Urban neighborhood housing and housing in city-scale missed the fact of how physical space involves shaping the quality of public spaces and, as a result, improves the quality of living in the neighborhood.

Urban neighborhood improvement without consideration of housing is impossible. The housing quality and quality of urban neighborhoods becomes very important and coexists in the urban planning system in developed countries. Solow, in 1946, published a paper entitled “Measuring the Quality of Urban Housing Environment: A New Appraisal Technique”, in which he criticized the planning system and housing policies inside and outside of cities in the U.S. After that (Solow & Copperman, 1948), health issues become the first priority in their study when it comes to improving

the quality of housing in neighborhoods. In fact, the most significant part of the author's work was the identification of concepts in the quality of urban housing in neighborhoods. However, what criteria he found during the time of doing research due to changing national and international systems have changed dramatically. After that, many types of research showed that housing quality could increase the risk of some kinds of disease (e.g., asthma) in certain vulnerable groups or communities in terms of age (Northridge et al., 2010). Improving the quality of housing and, in particular, public housing in Boston, improved the living conditions (Krieger et al., 2000). Furthermore, residents' psychological conditions are related to housing quality in the neighborhood. The supportive housing approach suggests that a consumer perspective to neighborhood and community can reduce feeling lonely, isolated, and abstracted from the other people and places when it comes to the residents' mental health. The appropriate neighborhood housing design is very necessary to improve the quality of mental health in the neighborhood and housing quality is key to increasing standards of well-being in the urban community (Fossey et al., 2019). Housing is not just about a place to sleep or a shelter, it has a deeper meaning, and housing design, color, perspective, size, natural light, the surrounding area, and city-escape make up the residents' psychological condition.

Urban housing, through planned and orderly urbanization, can reduce the impact of hazards and improve urban sustainability policies with the creation of safe urban spaces (Taş et al., 2014). Housing quality shows that the quality of the housing system in urban areas is connected with human well-being (Aliu & Adebayo, 2010) and takes into account the physical condition of the housing system, socioeconomic conditions, and the housing environment. There are some potential hazards in residential housing choice in a multilevel hazard neighborhood, where the residents are not aware of them, such as spatial-temporal hazards, earthquakes or air quality (Zhang, 2010). Depending on the type of hazards and their occurrence, the quality of housing in the neighborhood changes and may sometimes attempt to distance itself from the center of hazards. In the neighborhood with affluent residents, inhabitants either leave or restructure their houses with the best materials and technologies following the occurrence of a hazard; in poor communities, however, their restructuring takes longer, is connected with poor quality of live, with most of their inhabitants not being able to afford to live in better house or neighborhoods. In addition, poor neighborhoods reduce the quality of the house and neighborhood housing after each hazard, whereas in rich neighborhoods the quality of housing system and materials significantly improve. In the Global South, in countries where there is not an appropriate foundation and capacity for middle income or poor people, the adaptive capacity of neighborhood takes an important place in environmental risk reduction by the government. Adoption policies, however, might fail due to social-spatial limitations. Neighborhood understanding of natural hazards and an appropriate and timely response improves the implementation of adaptation (Bott et al., 2019), reduces the current and future impacts of environmental hazards on a neighborhood scale, and forms a sustainable community. Most of the catastrophic hazards have a localized source; home seekers looking for a new place to stay in their alternative places seek more space and accessibility to different kinds of land use and neighborhoods which provide their primary needs (Fujita, 1989). Most of the residents do not have a clear understanding of the natural hazards and think an earthquake is more dangerous than air pollution, continuing to live in neighborhoods which are highly-polluted by greenhouse gases or high concentrations of particulates.

In general, the issue of the urban quality of life at the neighborhood level goes beyond the neighborhood, urban, regional and national boundaries, and this hierarchical relationship is vital to achieving successful urban planning when is dealing with the general welfare, well-being, and public interests (Myers, 1988). Ecological indicators coordinate both human activities and environmental resources and take into account the balance in human and environmental aspects. Neighborhood environment and physical conditions provide a better situation for interaction between neighborhoods and increase residential satisfaction at the neighborhood level (Orhan & Kahraman, 2017) with effective social support. Neighborhood ecological conditions are important in housing quality; as mentioned repeatedly in Millennium Assessment, these services consist of provisioning, regulating, cultural, and supporting.

> "The MA deals with the full range of ecosystems—from those relatively undisturbed, such as natural forests, to landscapes with mixed patterns of human use and to ecosystems intensively managed and modified by humans, such as agricultural land and urban areas. Ecosystem services are the benefits people obtain from ecosystems. These include **provisioning services**

such as food, water, timber, and fiber; **regulating services** that affect the climate, floods, disease, wastes, and water quality; **cultural services** that provide recreational, aesthetic, and spiritual benefits; and **supporting services,** such as soil formation, photosynthesis, and nutrient cycling. The human species, while buffered against environmental changes by culture and technology, is fundamentally dependent on the flow of ecosystem services." (Capistrano et al., 2005)

Social support improves quality in both poor and rich neighborhoods (Palardy et al., 2018), with a strong sense of identity and place attachment. Social cohesion and social integration in the neighborhood improve the quality of living for elderly people; social cohesion provision of quality of physical and social live in neighborhood reduces physical difficulties for certain age groups (Kawachi & Berkman, 2000) and people with mental and physical disabilities. Social support in quality of health and for those people who live alone, social interaction in the neighborhood and in deprived areas slows the development depression and anxiety. A good society provides the most important residential needs, while bad social conditions might discriminate by race, religion, and skin color (Thompson et al., 2016) and introduces a different quality of housing in the same neighborhood. This is how people understand place and place shapes in their mind with negative or positive dimensions (Movahed & Jafarpour Ghalehteimouri, 2019). A neighborhood's social condition can be the reason for "place attachment "and quality of housing.

Previous studies (Ebrahimzadeh & Ghaderi, 2015; Abbasi & Saeednia, 2017) focused on economic, sociocultural, and physical dimensions and, recently, a paper by Huang et al., 2020 focused on only the physical dimensions, with a sustainable approach, never framing other important dimensions of a neighborhood and the level of their involvement in the quality of housing in the neighborhood in their work (Table 1).

Table 1

Qualitative and quantitative and quantitative indices in neighborhood

Theme	Dimension	Indicator nature	Country/reg	Source
Neighborhood housing in physical	Land use Planning FAR	Qualitative Quantitative	Iran Iran Spain China	Ebrahimzadeh & Ghaderi, 2015; Abbasi & Saeednia, 2017; Iñigo & Mace, 2019; Wang & Shaw, 2018
Psychological and physical conditions of neighborhood	Color Size Lightening Design	Qualitative	US Australia	Solow & Copperman, 1948; Fossey et al., 2019
Neighborhood Housing in current and future hazard	Vulnerability Ecosystem services	Quantitative	Nigeria Indonesia Global assessment	Aliu & Adebayo, 2010; Bott et al., 2019; Fujita, 1989
Neighborhood ecological and environmental capacity	Environmental capacity	Quantitative	Turkey Global assessment	Orhan & Kahraman, 2017 Capistrano et al., 2005
Social value of housing in neighborhood	Health Human-wellbeing	Qualitative Quantitative	US	Thompson et al., 2016

Source: own study.

3. Conceptual framework

This study proposed a framework based on qualitative and quantitative urban neighborhood housing indicators. The literature review of this study provides a clear understanding of what important the principals in urban neighborhood housing are (e.g. physical, environmental, and sustainability). Therefore, other indices on qualitative and quantitative housing factors that exist (e.g. health, psychological, social, environment with an emphasis on hazards and ecology) have been neglected. The current quantitative indices of urban housing on the map for different neighborhoods show how the quality of urban neighborhood housing shapes the current and future behavior of residents when choosing different neighborhoods as a place to live. Data analysis and the application of the collected data on the map illustrate that the quality of housing varies in different neighborhoods. Therefore, we propose a framework (Figure 1) based on detailed qualitative indices of housing or residential interests to live in different neighborhoods and forecast the future demands in different neighborhoods.

4. Case study

4.1. Study area

Region 6 of Tehran is located in the area of the center of Tehran's capital city in terms of location and proximity to the old part of the city (Region 12), is influenced by the big Bazaar in Tehran. The area with a population of 229,341 people and an area of 2141.5 hectares in the west, the east, the north, and the south respectively are surround by Chamran Highway, Modares highway, Hemmat Expressway, and the Enghebal-Azadi street urban axis. In early 1960, Region 6 become among the important areas for new urban development, with the Abbas Abbad neighborhood intended to be a place for government buildings; however, due to the revolution in Iran, this plan was implemented. After that, the concentrated activities in the central part of Tehran moved to the north and the northwest. The area, with 3% of the area Tehran and 2.9% of the Tehran population as a whole, now comprises more than 31% of government buildings, public and private institutions and banks, and holds many of the main organizations. Region 6 has six zones and 18 neighborhoods. In this paper, the role of quantitative and qualitative indices of housing in region 6 of Tehran was investigated and analyzed (Fig. 2, Table 2).

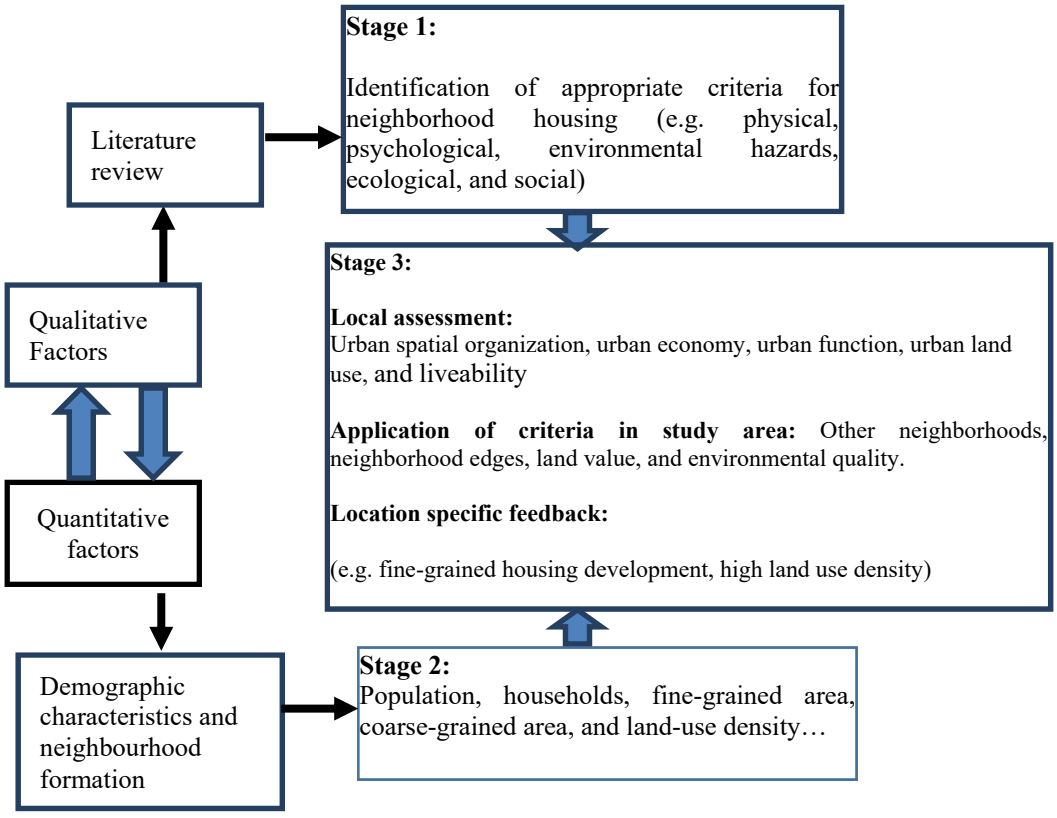


Fig. 1. The proposed framework for urban neighborhood housing. *Source:* own study.

The population of Region 6 of Tehran was 259,000 in 1986. This number declined to 253,246 and 232,000 in the years 1991, 1996 and 2001, respectively. In all these periods, the population of region 6 has a negative growth rate, and its lowest growth rate was in the period of 75-85, with a growth rate of -0.57. According to the 2016 census, the total population of the region has declined to 229,340, representing a decline of 3,923 with an annual growth rate of -0.36 percent in comparison to the year 2006. This may be attributed to the steady decline in population in the region due to the elimination of settlements in favor of expanding services, commercial, educational and high-level management activities that have gradually decreased the population of Region 6. On the other hand, the expansion of the use of transport and passageways in the form of urban highways has exacerbated the trend of population decline in recent years (Table 2).

Table 2

Region 6 population changes in 1986 and 2016

Area of study	Population					Annual growth ratio %				
	1986	1991	1996	2006	2016	86-91	91-96	86-96	96-06	06-16
Region 6	258838	252777	246182	235617	229340	-47/0	-0.53	-0.5	-0.57	-36/0

Source: Tehran Statistic Center 2016

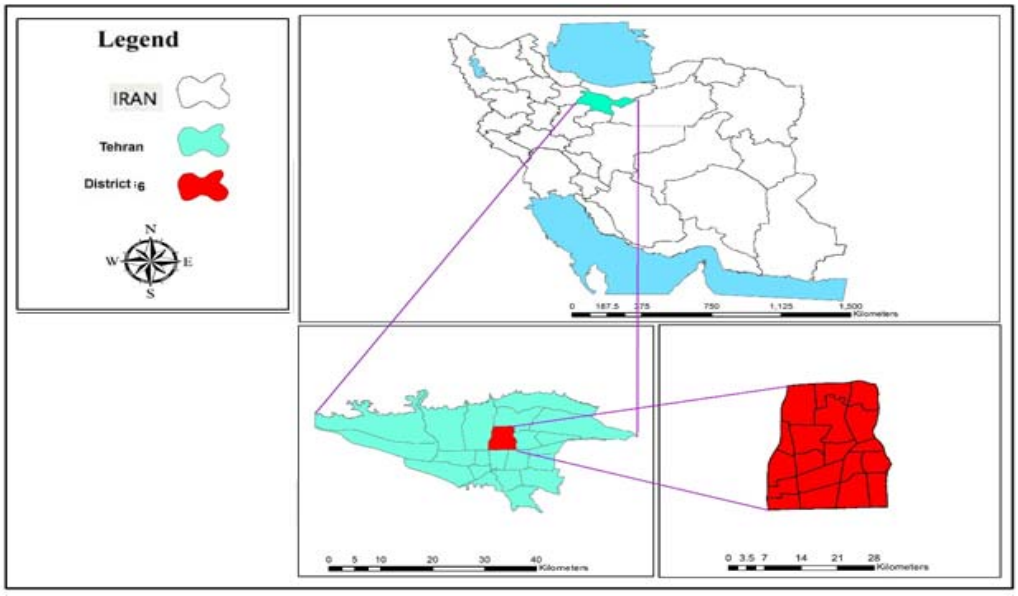


Fig. 2. Geographical location of the region 6 of Tehran. *Source:* own study.

5. Urban quantitative neighborhood housing indices (mapping & descriptive statistics)

5.1. Family size and household density

The household density and family size index in one housing unit in residential areas of Region 6 in 2016 shows (Table 3) that, based on the available data and maps from neighborhoods, this point can be well illustrated (Fig. 2). While neighborhoods (Ghezel Ghaleh and Yusef Abad) in the center of Region 6 have a higher household density than the northern regions, they also have a greater percentage of family level than the north, because they are the oldest neighborhoods in Region 6 and still follow traditions, such as living together in big families. In addition, in the southern neighborhoods to Region 11, where the middle class and lower classes live, made those neighborhoods (Nosrat, Daneshagh Tehran, Meydan Valiasr, and Iranshahr) similar to the middle-class families with more children in terms of the standards of living. When it comes to family size, the northwest neighborhoods (Shahrak Valiasr and Arjantin) of Region 6 are characterized by much

higher numbers than other neighborhoods. Shahrak Valiasr is a government housing development in the neighborhood of Arjantin and close to Region 2 with a higher quality of the environment and suitable access to highways; in terms of the spatial organization of the city of Tehran, it is located in a very good area, with the best access and road connections.

5.2 Housing shortage

The housing shortage in the Region 6 neighborhoods in 2016 (appendix 1) indicates that the Shiraz 57.74 and Arjantine 58.21 neighborhoods in the east part of the region and in the south part have a serious housing shortage. The housing shortage in those neighborhoods (e.g. Shiraz, Gandi, Fatemi, Meydan Jahad, Behjat Abad, and Daneshgah Tehran) is not a serious issue in comparison to neighborhoods with more residential land-use.

5.3 Land use density

When looking into per capita gross residential area in Region 6 in 2016 (Appendix 1), neighborhoods besides the western neighborhoods in Region 6, have the highest residential land-use intensity. The western neighborhoods (e.g. Shahrak Valiasr, Jannat, Gandi, and Shariati), due to commercialized land and governmental residencies, have rated as having the lowest land use intensity.

5.4 Number of residential units per thousand inhabitants:

The number of residential units per thousand inhabitants in Region 6 in 2016 (Appendix 1) shows that the number of housing units in the northeast neighborhoods is higher than in other neighborhoods of the region. Shahrak Valfajr and Jannat neighborhoods in the northwest were characterized by very low numbers of units per 1,000 inhabitants, whereas Meydan Valiasr, Park Laleh, Daneshagh Tehran, and charity were characterized by the highest density.

5.5 Fine-grained houses:

(Appendix 1; Fig. 3) shows that the northern neighborhoods (Shiraz and Gandi) of Region 6 rated the highest in terms of the number of fine-grained houses. On the other hand, the other neighborhoods in the central part of Region 6 can be identified as the most coarse-grained houses - neighborhoods that could become a problem for plans. As fine-grained area interpolation shows (Fig. 4), some neighborhoods in Region 6 faced serious urban decline issues.

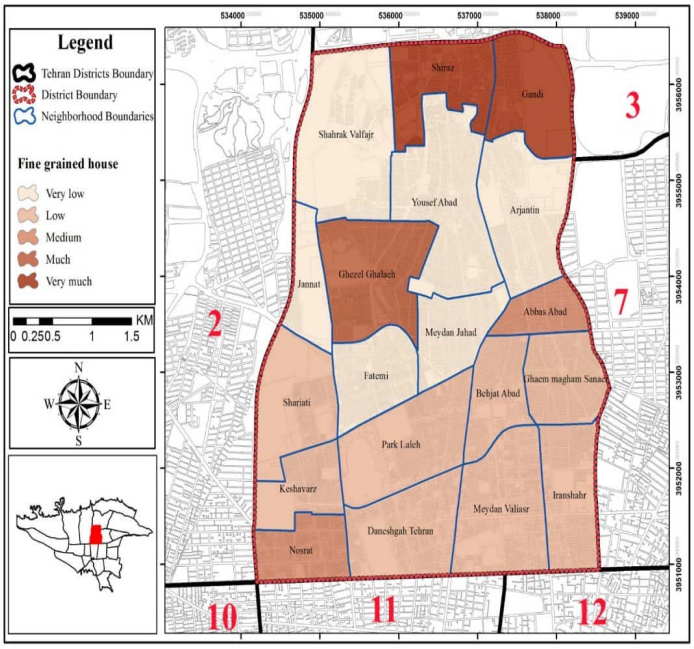


Fig. 3. Map of coarse-grained area interpolation. *Source:* own study.

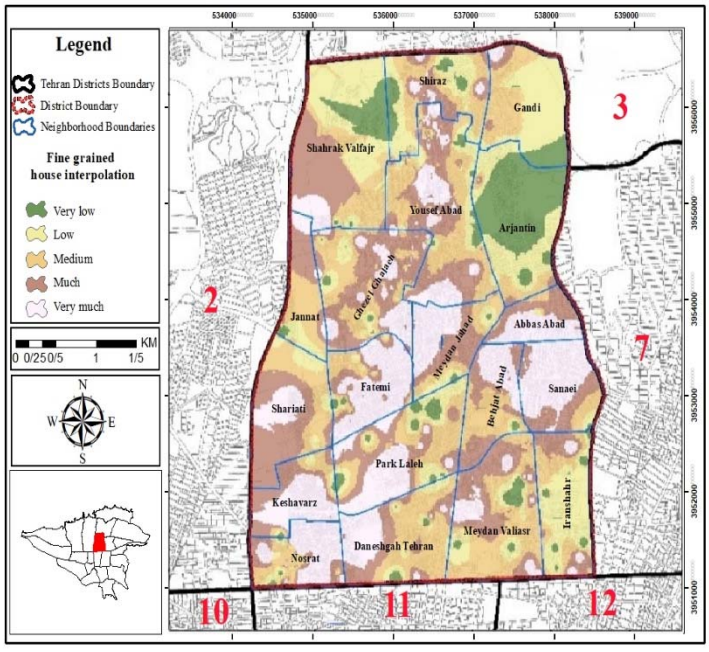


Fig. 4. Map of coarse-grained areas. *Source*: own study.

4. Methodology

The present study is based on an applied and descriptive-analytical nature. This study consists of two steps. The first part was more connected with qualitative collection of data which is available in the literature review, and the second part of the methodology is purely statistical data from the population in the Tehran Region 6. This study shows how a land-use in Region 6 can change due to urban decay and, as a result, lead to changes in the quality of living, and urban neighborhood quality. The method of data collection was obtained through published annual census reports and by contacting the relevant departments and sections through the Statistical Centre of Iran. Housing status is one of the vital issues of development. Therefore, based on the effective assessment of the quantitative index, the criteria which are assessed in this study are followed by indicators of housing, household size, household density in the housing unit, population density in the housing unit, housing per capita, net population density etc. Then, using these indices, descriptive, relational, and comparative statistical tests were calculated. These tests included the correlation test, one-sample t-test, and a regression test. In this study, we obtain a composite model for forecasting the number of future housing required up to the 2021 horizon. In this way, the population is projected for the year 2021 (divided by the average household dimension of the predicted household).

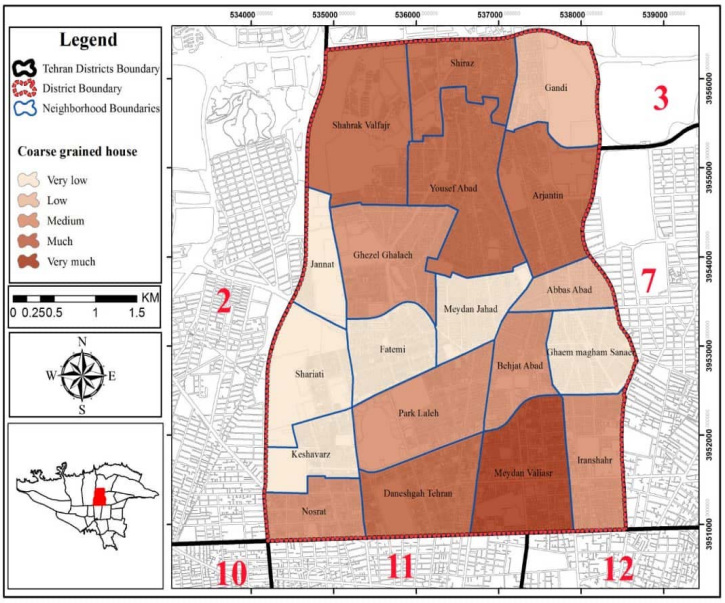


Fig. 5. Map of coarse-grained area *Source:* own study.

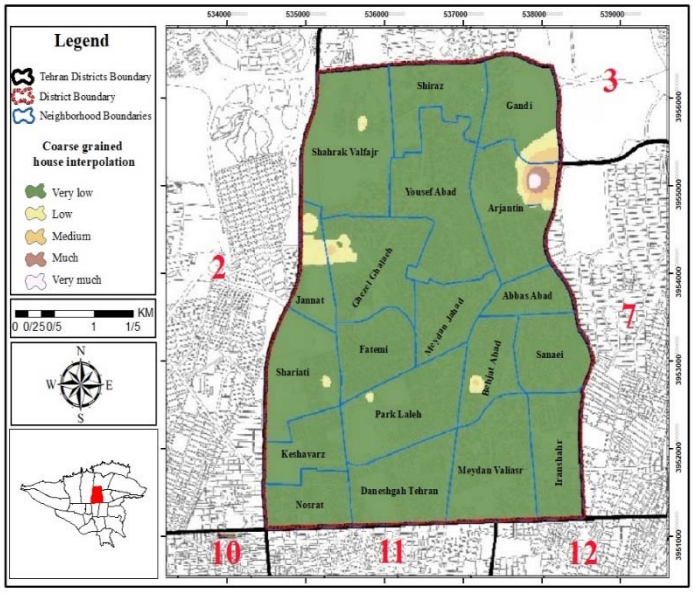


Fig. 6. Map of coarse-grained areas *Source:* own study.

The composite method applied to find the number units need in 2021 horizon
P = forecasted population
S = family size
H= number of forecasted families
K = family ratio $H = \frac{P}{S}\ E = \frac{P}{K(S)}$

$$H_{2018} = \frac{250000}{3.4(1.03)} = 71428$$

Correlation coefficient (population and mean residential area)

H_1 ⇒ $r \neq 0$
H_0 ⇒ $r = 0$

Correlations

		Mean residential area	Population
Mean residential area	Pearson Correlation	1	-0.305
	Sig. (2-tailed)		0.204

	N	19	19
Population	Pearson Correlation	-0.305	1
	Sig. (2-tailed)	0.204	
	N	19	19

Analysis: number 1 is equal to Correlation and 0 hypothesis is not equal to correlation, and we obtain an answer using two different approaches:

1- In the first stage, if the sig is bigger than 0.05, the null hypothesis is accepted, as seen in the t-test

2- In the second stage, if sig is less than 0.5, there are significant and meaningful correlations, which are bigger than 0.5, and the null hypothesis is accepted.

t-test sample (family size)

H_1 $\mu \neq 3$

H_0 $\mu = 3$

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
FAMILY SIZE	19	3.9238	1.15558	.26511

One-Sample Test

Test Value = 3

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Family size	3.485	18	0.003	0.92382	0.3668	1.4808

Analysis: in this study, we choose 3 as family size, and the results are obtained after two steps:
1- In one, basic statistics can show that the mean result is bigger than our aim and is approximately 3.9, for which the null hypotheses are rejected.
2- In the second stage, the output in the bar chart is between -1.98 and +1.98 as a crisis region; we cannot reject the null hypotheses, but since the number exceeded zero, we once again reject the null hypothesis.

1- Regression Test (population and residential area)

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Population[b]	.	Enter

a. Dependent Variable: Residential_area
b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.716[a]	0.513	0.484	146963.193	2.270

a. Predictors: (Constant), population
b. Dependent Variable: Residential_area

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	386679857123.239	1	386679857123.239	17.903	0.001[b]
	Residual	367169062203.919	17	21598180129.642		
	Total	753848919327.158	18			

a. Dependent Variable: Residential_area

b. Predictors: (Constant), Population

Coefficients[a]

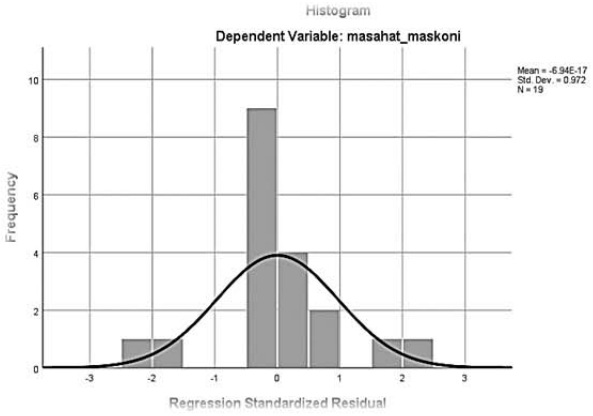
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	53466.442	82536.841		0.648	0.526
	Population	23.621	5.582	0.716	4.231	0.001

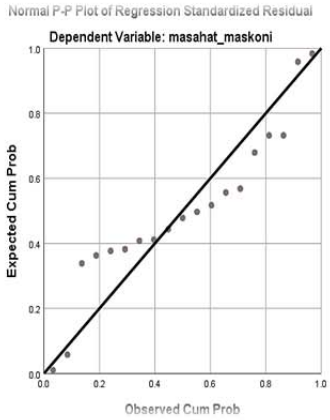
a. Dependent Variable: Residential_area

Residuals Statistics [a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	190773.58	800494.75	372232.79	146568.122	19
Residual	-339482.844	313653.188	0.000	142822.552	19
Std. Predicted Value	-1.238	2.922	0.000	1.000	19
Std. Residual	-2.310	2.134	0.000	0.972	19

a. Dependent Variable: Residential_area





Therefore, the coefficient of determination shows that 51% of the population changes are influenced by the area. The large F statistic shows the effect of the area of the population, and it is clear in the bar chart that the total size of residential areas and residential land-use is growing.

7. Conclusion

Identification of appropriate quantitative and qualitative indicators of neighborhood housing in terms of the main fundamental factors in the future planning of the city (especially in terms of housing plans) is very important. In the analysis of housing shortages and the low quality of housing indicators, the results show that Region 6 has demographically specific characteristics that should be taken into account in future plan strategies for operational action. One of the most important demographic characteristics of Region 6 has been its steadily declining growth rate across different census periods, which could undermine the cohesion and social structure of neighborhoods. Despite the population decline, the number of households has increased due to the high percentage of young married people in the region and the formation of new households. Although many of these families have moved out of the regions, modernization policies and increased construction density have led to an increase in their numbers. In 2016, the average household size declined, which is due to the increase in the number of households. The household density index at the neighborhood level reached 1.03 in 1990, indicating a decline in the number of households living in a housing unit, which is more favorable than the national average. Overall, this index has an inverse relationship with income level, and the level and density of the population per unit is between 3 and 4 people, indicating that there is a low population in the region, which is less than the average for Tehran city. The stability of the net density index in the neighborhoods of the area indicates that part of the residential uses of the area have been upgraded and are experiencing an increase in density, while the decrease in gross density

in neighborhoods of the area is due to a population decline and non-residential (business /office) users.

The presence of more than 30% of government buildings, public and private institutions, as well as banks and major state agencies have made the residents of the area in good standing, and the shortage of residential units at the neighborhood level as well as the findings show that the status of quantitative indices in the neighborhoods of Region 6 has been increasing. The most important point in Region 6 concerns the housing policy and neighboring regions; it seems that the center of Region 6 has less influence on its own neighborhoods due to rapid and immense land-use changes. The residents' behaviors at on the borders of Region 6 are more influence by other regions and neighborhoods. In the last 2 decades, Region 6 has been altered by huge national and transnational changes; the occupation of the lands by the newly-built high building and offices have made this region extremely crowded and polluted during the weekdays and very empty and boring on weekends. In addition, land commercialization in Region 6 influenced the Tehran spatial organization and made this region so divided by intersecting highways and main roads that make Region 6 noisy, crowded, and polluted.

8. References

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Neighborhoods	Household	Family size	Household density in a house unit	Individual density in a house unit	Net per capita Housing	Gross per capita Housing	Housing shortage	Housing land use density
Shahrak Valfajr	2760	4.59	1.00	4.59	0.07	90.72	13.83	12
Shiraz	3096	3.48	1.10	3.81	0.02	102.49	57.74	59
Gandi	1734	3.36	1.05	3.52	0.04	51.08	26.91	13
Arjantin	2595	3.43	1.03	3.52	0.02	60.49	58.21	35
Yosef Abad	9085	3.48	1.01	3.50	0.04	169.12	28.19	49
Ghezel Ghaleh	6997	3.44	1.03	3.52	0.03	161.48	29.62	47
Jannat	1895	4.67	1.01	4.79	0.25	242.32	3.95	9
Shariati	1790	3.84	1.01	3.89	0.04	57.30	26.61	15
Fatemi	4701	3.47	1.04	3.59	0.04	187.39	28.45	52
Meydan Jahad	4155	3.40	1.04	3.55	0.03	176.39	28.88	50
Abbas Abad	1624	3.58	1.01	3.62	0.03	116.26	31.45	35
Ghaem magham sanaei	3800	3.33	1.02	3.41	0.03	142.21	33.25	47
Behjat abad	3251	3.42	1.03	3.54	0.04	144.56	28.32	40
Park-e-Laleh	4118	3.78	1.01	3.81	0.04	106.60	24.09	25
Keshavarz	2889	3.46	1.03	3.55	0.04	140.59	23.82	33
Nosrat	3677	3.46	1.03	3.55	0.04	174.29	26.19	45
Daneshgah Tehran	3199	3.94	1.05	4.14	0.04	100.80	23.00	23
Valiasr	3626	3.83	1.02	3.90	0.04	91.41	27.93	31
Iranshahr	3010	3.61	1.02	38	0.04	106.62	24.48	25

units for each 1,000 population	Number of fine grained houses	Informal units for each 1,000 population	Fine grained area m2	Number of coarse grained houses	Coarse grained area	Informal units for each 1,000 population	Population	Mean area km2
151	9	0.73	677	15	45464	0.73	18143	15.0
262	207	1.42	8957	16	28943	1.42	10761	2.0
284	231	3.02	14453	5	5655	3.02	5823	5.2
284	5	4.35	292	17	24408	4.35	8892	4.3
285	14	2.77	394	14	154727	2.77	31626	3.0
283	136	0.44	10116	9	75146	0.44	24061	6.7

128	3	1.07	124	1	18618	1.07	14539	2.2
257	46	1.13	3902	0	0	1.13	6876	32.0
278	5	0.88	401	1	1099	0.88	16303	5.0
281	9	0.25	582	2	17870	0.25	14146	24.0
276	94	2.49	7974	5	6951	2.49	5813	44.0
293	29	1.61	2397	2	4678	1.61	12657	42.0
282	23	0.64	1763	7	39233	0.64	11131	5.0
262	29	0.24	1739	7	17368	0.24	15563	6.5
281	37	0.71	3061	1	1390	0.71	9982	3.7
281	76	0.56	6068	7	10142	0.56	12723	3.4
241	25	0.33	1825	16	2732	0.33	12600	8.6
256	29	1.40	1798	21	35626	1.40	13895	5.0
271	23	1.02	1099	9	18948	1.02	10875	5.9