

Spatial Analysis of Housing Indicators for Informal Settlements (Case Study, Informal Settlements In Tabriz Metropolis, 1996 and 2016)

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ABSTRACT

Informal settlement is the prominently dominating factor which contributes urbanization and provides the city's poor people with housing. In fact, these settlements are unreasonable and disorganized agglomeration places for low income people who live in deprived areas of the cities. Given the importance of housing, especially in informal settlements, the current research intends to outline the changes in housing indicators from margin to context and vice versa, especially in informal settlements of Tabriz metropolis. A descriptive-evaluative methodology was used together with a field- documentary method applied for data collection. Here, in order to analyze the data and weighting of housing indicators (data layers), ANP model was used with Super Decision software. Also, GIS software was applied for generating maps. Additionally, the statistical community of the research included informal settlements of Tabriz metropolis. The findings together with consideration of changes in housing conditions for the statistical blocks of the informal settlements indicated that , of 1318 blocks, 43/17% didn't change, 14/19% changed from deprived category to wealthy, 7/36% changed from medium to wealthy level, 15/85% changed from deprived to medium level, 5/16% changed from wealthy to medium level, 7/21% changed from medium to deprived level, and 7/06% changed from wealthy to deprived category. Generally speaking, the results showed that, of all blocks, 37/4% promoted, 19/43% plummeted while 43/17% remained unchanged. Therefore, it could be contended that the housing indicators for informal settlements promoted, especially with a shift toward urban contexts.

Key words: *Informal settlement, Housing, Urban poverty, Tabriz Metropolis.*

Introduction

Investigations have demonstrated that, by 2020, more than 60% of global population will live in cities more than half of whom include low income individuals residing in informal settlements (Neuwirth, 2006, 310). As the most concentrated living places for the poor, the informal settlements are considered as arisen from

governments' failure in terms of building houses matched with population growth and increased migrations from rural areas to cities (Mohammadi, 2007, 145). The informal settlements are considered as a kind of settlements inside or beside the cities. They appear unpleasant and unconventional as compared to

urban original context. So, they have been called as disordered textures, informal settlements, spontaneous, disorganized and unregulated settlements. Agglomeration of such settlements couldn't be only viewed as an urban or social problem, but they are also perceived as a major solution for living of the poor and low income individuals who take social actions for their shelters consistently(Piran, 2008; 17). Presumably, the main signs of such neighborhoods include unlawful construction, using unconventional materials, lack of infrastructural services and facilities, compressed textures, lack of good accessibility, lack of green and open spaces(Mohammadi, 2010;6). On the one hand, the informal settlements are created due to inequality and economic poverty. On the other hand, they emerge when the low income people are not considered in planning, especially for physical planning and urban housing which mostly reflect where the wealth is concentrated (Gharakhloo et al, 2011).

The notion of housing is one of the vital factors in terms of people's living. Also, it is the early unit of the society and the most important part of human beings' residence (Rangwala, 1998:62) which is beyond just a physical shelter and should involve all of the necessary public services and facilities for the wellbeing and health of the individuals(Pourmohammadi et al, 2013; 3). The policies on urban housing provision need sufficient data on the characteristics of housing demands so that they can remove the gap between demand and supplying of urban housing. In addition, the experimental evidences of preferences, households' requests for matching supply and demand together with estimating the required space and land- due to the conditions land and housing market- are vitally necessary(Ahmad and Choi, 2012; 1). However, what has significantly been spotted especially across the globe tells another narrative on informal settlements. They feature non-standard massive population which is recognized with

respect to its unpleasant appearance and houses in terms of global symbolization.

One of the most important symbols of recognizing the informal settlement is the structural features and indicators of housing (Hataminejad et al, 2006; 130). Given the fact that housing poverty emerged as informal settling (Athari, 2005; 113) the deficiencies in terms of housing plans contributes to low income and their tendency toward informal settlement (Athari, 2005; 123). This reflects dissatisfaction of the housing needs of low income individuals which hasn't been regarded within the formal and unplanned urban setting while also paving the way for establishing disorganized settlements across the margins and distant locations in order to ignore the legal limits.

Given the importance of housing and informal settlements, the current research intends to better understand housing conditions in informal settlements in Tabriz metropolis. As the national development started with industrialization since early 1960s, formation of informal settling in Iran and Tabriz occurred simultaneously. This form of settling speeded up overwhelmingly in Tabriz. The most important textures included northeastern, southern, southwestern parts of the metropolis which have yet been extended with their own unique mechanism. The areas covered by such settlements involved 400 acres with a population more than 450000 individuals. Physically, the settlements have been built with respect to personalized and unconventional methods which gave the city an unpleasant appearance. Currently, the settlements involve 70000 housing units which attracted newcomers. They account for 30% of the city population. These settlements now face many problems related with housing and this demands spatial analysis of housing indicators for them. With respect to the necessity of the current research and its objectives, it seeks to answer the following question:

Have the developments on physical indicators (housing indicators) in Tabriz's informal settlements

from margin to context improved by urban policies (in 1996 and 2016)?

Theoretical framework and research background:

The first aim of Millennium Development is to reduce poverty; the poor individuals suffer from various environmental issues like insufficient infrastructures, lack of services (drinking water and sewage), especially for housing (Astuti and A. Prasetyo, 2014; 549). Currently, housing and shelter significantly influence many aspects of living so that it costs a typical family more than 50% of its income (Maleki and Shekhi, 2009; 95). Therefore, housing emerge as a problem when it comes to low and medium income people. Also, in terms of quality and quantity, many people living in cities are deprived of having good housing which makes them burden heavy expenses for living (Aghasafari et al, 2010; 69). Thus, housing and its problems have been emerged as a global issue for which the planners and policy makers are devising

solutions across the world (Buckley and Jerry, 2005, 2237). With respect to importance of housing, achieving appropriate housing whether in urban areas or in rural areas is considered as one of the indicators for social- economic development in countries.

In Iran, development of housing notion as a social problem dates back to early growth of capitalism as a foreign factor and land reform as a domestic factor. It does hold that housing is currently suffering from heavy problems. Many households across the country haven't good housing or don't have any house (Roostaei et al, 2012; 81). The informal settlements are considered as collection centers for low income people who build illegally their houses with inappropriate materials in unconventional lands. Recently, the quality of housing has been critical and it seemed necessary to identify different aspects of this area and the changes in housing indicators. Also, it is inevitable to set a comprehensive plan for housing in order to reach desirable condition.

Table 1: Typology of housing for informal settlements

<i>Type of house</i>	<i>Features</i>
Slum	Normally located at a level lower than ground, dug at mountains. To build them, building materials are not used
Hut	Built with old materials like unusable automobile parts, home appliances, tins and nylons.
Shed	Residential place which basically built with wicker and, somewhere, it is built of wad and straw.
Tent	It is built with cloth and nylon
Room	It is built of mud and brick formed as unified blocks.
Mangy	It has normal walls with construction materials and wicker roof.
Tin room	Mostly built of tin pits.
Basement	Located beneath ground and built with building materials.

Many investigations have been carried out on informal settlements the most important of which include the following. Ward et al (2015) wrote an article titled as "renewing houses for merging informal settlements: new policy developed in third session of UN's human settlements 2016". The research indicates that the conference will be held in Quito, Ecuador in October 2016 and housing with sustainable

development will be discussed. The main objectives of 1976 conference included optimization and organization of informal settlements. With respect to changes in generation of these settlements and accessibility of children to self-built houses and the second and third generation residents together with continuing life in inappropriate houses, the conference in 2016 seeks to reach creative policies. Choguill

(2007) identified the policies for supporting sustainable housing. The research contended that removing awkward margins, protection of environment, boosting revenues are the basics of sustainability. With improvement in employment, opportunities, and incomes, it will be disheartening for reaching sustainability in housing. Flavio and Souza (2001) studied the future informal settlements with stressing on urban land conflicts in Recife, Brazil. Their research intended to solve housing problems and believed in establishing a reasonable and effective relationship between land use regulations, development of empowerment technique for sustainability of urban land market and movement toward economic and social sustainability

Shams and Gomar (2015) evaluated the qualitative and quantitative indicators of housing for low income people in Hamedan province. The results showed that the low income individuals had inappropriate housing. The functions and policies adopted by the government didn't influence appropriately on organization of housing for low income people. Even, it had some negative consequences for them. Pourmohammadi and Asadim (2014) evaluated the governmental policies on provision of houses for low income individuals in Zanjan city and concluded that those policies positively influenced on reducing informal settlements since 1996 to 2006 and for governmental projects on house provision, the patterns of land use and supplying housing needs were basically unsuccessful. Zadvali Khajeh (2012) investigated the changes in physical-social indicators of informal settlements in Tabriz metropolis since 1996 to 2006 and concluded that there has been a bit difference. Most of the places had

inappropriate conditions and the only difference was that those blocks closer to city context were more appropriate. Hakimi et al (2011) studied the quantitative and qualitative indicators of informal settlements in Jamshidabad, Khoy city. It was found that Jamshidabad has inappropriate condition as compared to Khoy, but it maintains a better condition when compared to developing countries.

Most of the previous researches regarded housing in terms of its current conditions and provided guidelines for improving it. However, the current research intended to determine the changes in housing for a period of 20 years. Effectiveness of private and public policies on providing good housing in informal settlements have been evaluated and solutions have been provided.

Methodology

An evaluative descriptive methodology was used. In order to collect data, documentary and field observations were applied. To do it, first housing indicators of informal settlements in Tabriz metropolis for 1996 were determined using documents and the respective statistics (statistical blocks of Tabriz metropolis). Next, according to questionnaires and field observations, those indicators were determined for 2016 and were prepared within the maps of informal settlements for measuring the changes. In order to analyze the data and weight housing indicators (data layers), ANP model with Super Decision software was used and for surveying maps, GIS software was applied. The housing indicators used here, in the current research, for measuring the changes in informal settlements of Tabriz metropolis are presented in the following table:

Table 2: Housing indicators used in current research

Research criteria
Household density in residential unit, density of individual in residential unit, density of room in residential unit, density of individual in room, average number of rooms for each household, average area in meter, quality of residential unit, age of residential unit, manner of acquisition, type of ownership and buying, urban facilities and infrastructures, size of household, land area of residential unit

Source: Zangeneh (2010), Roostaei et al (2011), Hakimi et al (2011), Zadvali Khajeh (2013)

The informal settlements in Tabriz metropolis mostly extend four zones including north(neighborhoods like Yousefabad, Seilab, Seilab Ghoshghaneh, Ahmadabad, Idehlo, Ismaeil Baghal, Louti Ebrahim, big and little Manba(reservoir), Chehel

Metri(40 meter), Ghorbani), south(Maralan, Taleghani), northwestern(Tabriz's big park), southwestern(Laleh and Akhmaghieh).

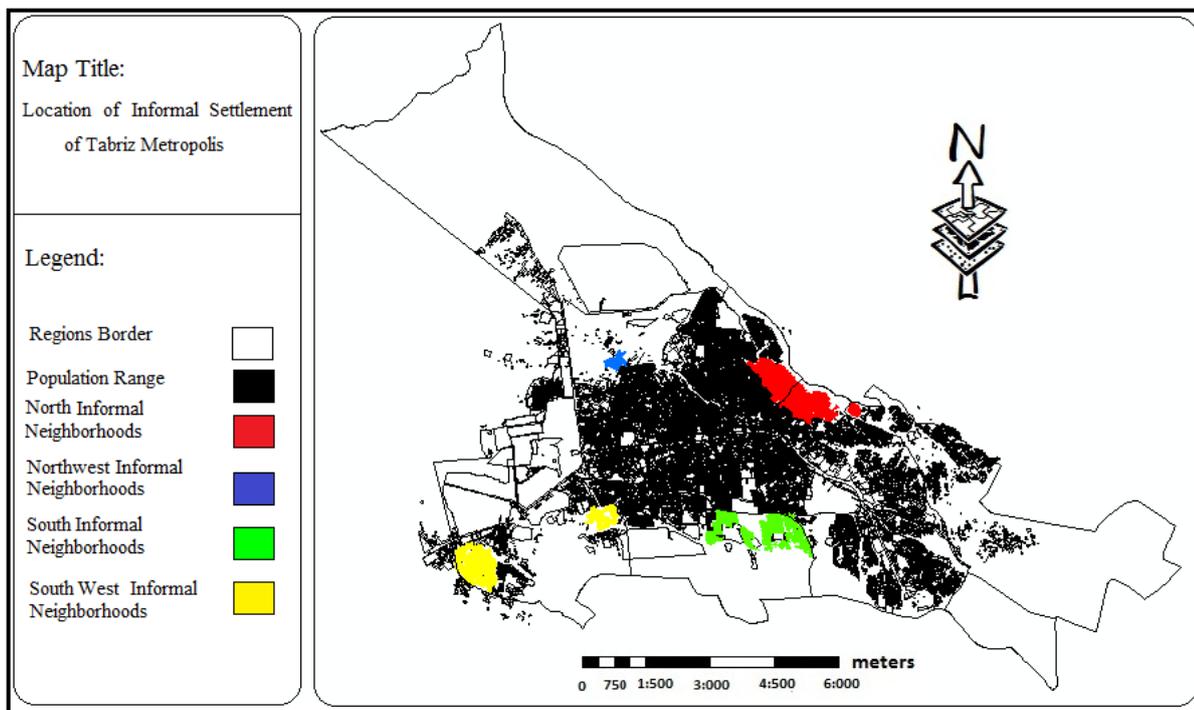


Figure 1: Maps for situations of informal settlements in Tabriz metropolis

Findings

Weighting data layers

The hierarchical and network analysis processes for analyzing different phenomena in human sciences and analysis of actors' behaviors are based on justifications which direct them toward performing and taking certain decisions among various options. In order to analyze complicated problems, a hierarchy or network of indicators and elements are considered which are related with research problems. Also, each of them has its own validity and value within the selection process. Next, according to the mathematical templates based on matrix operations, the preference and prioritization of the individual elements are determined in terms of research objective using paired comparison and with utilizing synthesized justifications, final analysis of the problem together with prediction of results based on

the priority of the elements (Mohammadi Lord, 2009:5). Additionally, network analysis process is one of the techniques for decision making used together with multiple indicator which is called as multi attribute decision making (MADM) (Ghodsipoor, 2013:85). This model was designed according to analytical hierarchal process (AHP) which replaced the hierarchal model with a nonlinear system or a feedback system (TUZKAYA, 2006:238). In this case, in order to calculate the weight of the elements, the network theory should be used (Heidari Chiane & et al., 2012, narrated from SAATY, 1986:106).

According to ANP model, the derived weights included: household density in residential unit (67%): individual density in residential unit (63%): density of room in residential unit (40%): density of individuals in room (59%): average number of rooms for

individual household (38%): average area (86%): quality of residential unit (0.145): age of the residential unit (0.122): unlawful acquisition of the residential unit and kind of ownership and house purchasing

(93%): utilization of urban facilities and infrastructures (0.119): household sizes (0.091): area of land for residence (0.075).

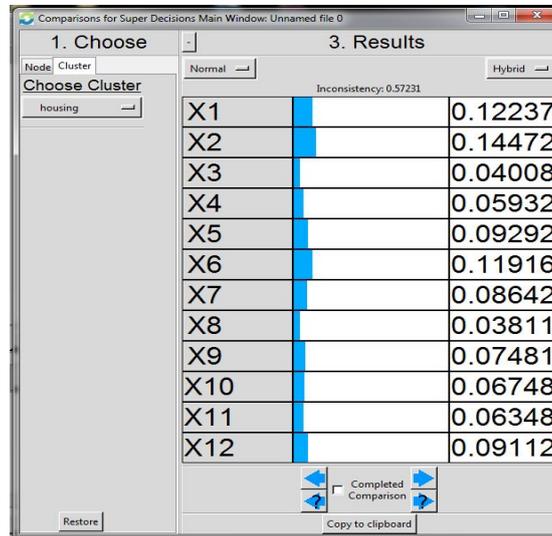


Figure 2: weighting of the data layers.

Investigation of housing in informal settlements (1996)

Investigation of housing indicators together with determining the indicators in informal settlements

according to statistics of 1996, showed that of 1318 blocks, 10.24% were much privileged, 14.11%, 17.30% medium, 25.80% deprived and 32.55% were much deprived.

Table 3: conditions of informal settlements according to housing indicators in 1996.

1996	Very privileged	Wealthy	Medium	Deprived	Very deprived	Total
Number of blocks	135	186	228	340	429	1318

The following figure shows the conditions of urban blocks in informal settlements based on the quality of housing indicators in 1996 with the zones of

informal settlements (northern, northwestern, southern and south western) in Tabriz metropolis being separated.

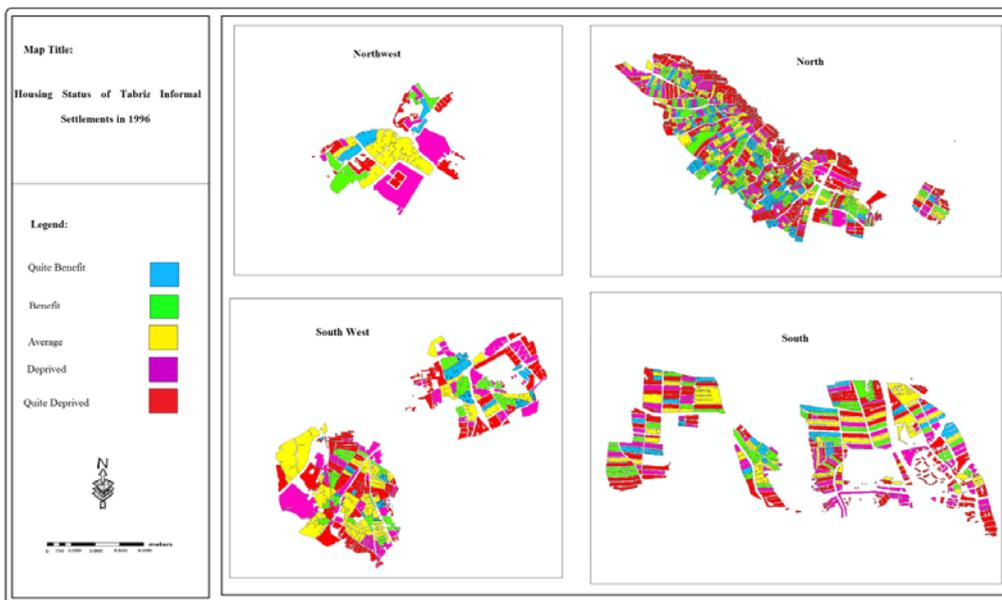


Figure 4: conditions of informal settlements according to housing indicators in 1996

Investigation of housing condition in formal settlements (2016)

Investigation of housing indicators together with measuring them in informal settlements based on the

statistics and observations together with questionnaires derived in 2016 indicated that, of 1318 blocks, 14.8% were very much privileged, 17.99% privileged, 25.95% medium, 22.38% deprived and 18.96% much deprived.

Table 4: condition of informal settlements based on housing indicators in 2016

2016	<i>Very privileged</i>	<i>Wealthy</i>	<i>Medium</i>	<i>Deprived</i>	<i>Very deprived</i>	<i>Total</i>
Number of blocks	195	236	342	295	250	1318

The following figure presents the condition of urban blocks in informal settlements based on the quality of housing indicators in 2016 with the zones of

informal settlements in the Tabriz metropolis being separated.

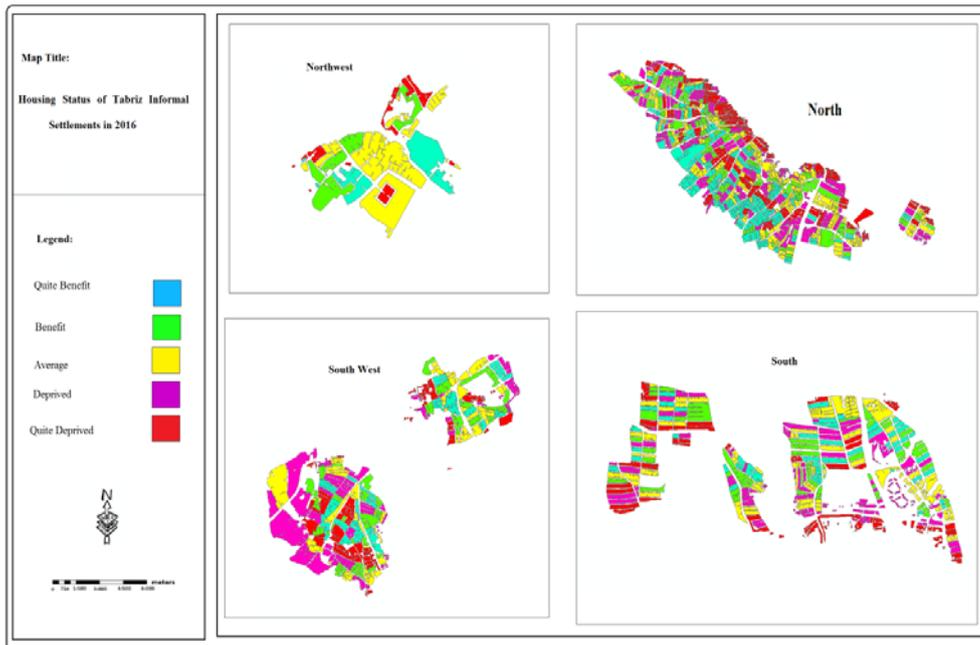


Figure 5: condition of informal settlements based on housing indicators in 2016

Changes in housing condition in informal settlements for the period 1996-2016

Investigation of the changes in housing condition in statistical blocks of informal settlements based on housing indicators indicated that, of 1318 statistical blocks, 43.17% didn't change, 14.19% changed from deprived to privileged category, 7.36% changed from

medium to privileged category, 15.85% changed from deprived to medium category, 5.16% changed from privileged to medium category, 7.21% changed from medium to deprived category and 7.06% changed from privileged to deprived category. Generally speaking, the results indicated that of all the blocks, 37.4% improved, 19. % plummeted and 43.17% remained unchanged.

Table 5: the changes in housing indicators for blocks since 1996 to 2016.

<i>Changes</i>	<i>No change</i>	<i>Deprived to wealthy</i>	<i>Medium to privileged</i>	<i>Deprived to medium</i>	<i>Privileged to medium</i>	<i>Medium to deprived</i>	<i>Privileged to deprived</i>	<i>Total</i>
Number of blocks	569	187	97	209	68	95	93	1318

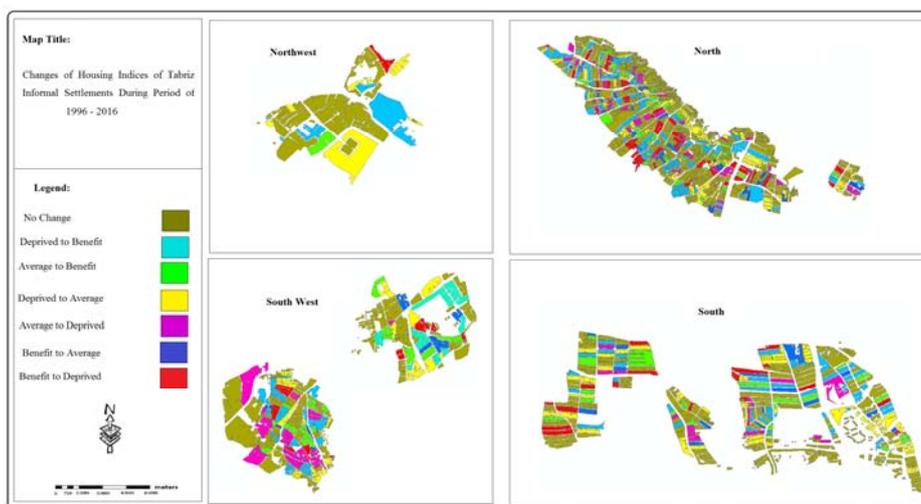


Figure 6: changes in housing indicators for blocks since 1996 to 2016

Also, the results from statistical data and findings of the research on housing indicators in 1996 and 2016 showed that the density of household in residential unit changed from 1.21 individual to 1.08 individual: the density of individual for residential unit changed from 5.9 individual to 5.2 individual: density of rooms for residential units changed from 1.9 rooms to 2.1 rooms: density of individuals for rooms changed from 2.76 individuals to 2.43 individuals. Average number of rooms for each household changed from 1.63 to 1.80: average area changed from 93 meters to 81 meters. For quality of residential units, increased demolished and modified residential units observed together with reduced rebuilt units: age of the buildings changed from 40 to 43 years: unlawful acquisition of lands changed from 53.47% to 68.32%: being

privileged of facilities and urban infrastructures changed partially: size of households changed from 5.2 individuals to 4.3 individuals. Area of the land for residential unit changed from 127 to 110 meters.

Therefore, it should be noted that the housing indicators for household density in terms of residential unit, density of individuals for residential unit, density of rooms for residential units, density of individuals in rooms, average number of rooms for each households, unlawful acquisition of land and size of households improved since 1996 to 2016. The privileged for average area, quality of residential unit, age of buildings and area of residential land reduced while being privileged of facilities and urban structures didn't change.

Table 6: data for housing and its infrastructures for 1996 and 2016

<i>Indicators</i>	<i>1996</i>	<i>2016</i>
Density of household in residential unit	1.21	1.08
Density of individuals in residential unit	5.9	5.2
Density of rooms in residential unit	1.9	2.1
Density of individuals in room	2.76	2.43
Average number of rooms for each household	1.63	1.80
Average area in meter	93	81
Size of household	5.2	4.3
Area of land for residential unit(meter)	127	110
Quality of residential unit (%)	Demolished, 37.12, repaired , 21.12, rebuilt 41.76	Demolished, 43.42, repaired ,31.20, rebuilt 25.38
Age of residential unit	40 years old	43 years old
Land unlawful acquisition (%)	53.47	68.32
Being privileged of urban facilities and infrastructures	Having water, electricity , telephone and gas branches and sewage system	Having water, electricity , telephone and gas branches and sewage system

Source: Iran's statistical center

Discussion and conclusion

In a society, housing has been considered as the most important part of development. Supplying acceptable and sufficient housing always appear as the most important challenge for increasing population in developing countries. In Iran, this problem has also been regarded as the most vital challenges for the governments. Given the fact that housing is one of the most important part of the cities, this issue needs recognition of elements and indicators in terms of qualitative and quantitative matters. In other words, consideration of housing issue and its improvement needs to be studied with respect to social needs, whether in cultural, social and economic fields or in other aspects. Therefore, studying the indicators of housing (qualitative and quantitative indicators) is one of the tools for recognizing the features of housing. This main tool provides housing with appropriate planning and policies together with effective valuation of results for plans and setting the regime as appropriate for building housing and providing analytical framework. In fact, the informal housing reflects the physical- special aspects of a society which are arisen from different aspects like increased population of the country and in consequence increased house demands, in equal distribution of facilities in biological faces of the country, lack of comprehensive urbanization plans, lack of integrated management policies, disregarding low income individuals when planning, especially plans for providing house. However, when studying the informal settlements not only it should be regarded as an effect but it should be considered as a cause. Also, in different sources of informal settlements, it should be considered as a critical problem together with reflecting poverty, miserableness, death of the infants, unclean alleys. In relation with the special logic of spatial distribution of housing poverty, cheapness of the accessible lands and houses for newcomers the cities who seek well-being in Tabriz metropolis could be regarded as a basic factor

contributing to problems across the margins of the cities, especially with lowest standards in terms of house prices. During the recent years, different policies on organizing settlement and reaching sustainable houses were planned including assigning urban lands, preparing urban lands, new cities, protective and social houses, participative houses, building houses in massive numbers especially for Mehr housing project with a 99 years old leading program. Due to concentration to governmental organization and disregarding the features of the residence at informal settlements and their demands together with these plans out of informal settlements, such policies have not been successful. Therefore, it has been observed that the indicators of housing mostly improved in terms of population and density which, in terms of changes in generations of immigrants in informal settlements with increased awareness on population control reduces while other indicators like quality of buildings, age of buildings and the current existing infrastructures didn't improve. In order to improve the quality of housing indicators in order to reach sustainability with respect to increased numbers of residents in informal settlements in Tabriz metropolis (300000 individuals in 1996 to 450000 individuals in 2016), the following strategies could be implemented:

- Correct and comprehensive recognition of housing condition and its facilities in informal settlements should be studied and the statistics and data on houses and lands should be updated together with creating data banks.
- Adopting changes and revision on organization structure and urban management tasks with shifting from concentrated approach, up-downstream, technocracy and traditional statistic programs toward unconcentrated approaches with regarding participative, local map and flexible strategic plans.

- Consideration of successful global experiences in terms of improving housing for informal settlements and adopt them to the native people.
- Empowering the residence of the settlements and help them to participate in housing plans.
- Monitoring new constructions in order to observe the required standards for building houses in such settlements.
- Giving low interest loans to low income individuals and residents of informal settlements in order to increase and enhance quality of houses.
- Locating social houses inside Tabriz metropolis and moving residents from informal settlements to these houses, especially those residents at northern part of the city who live across the fault.

References

- Athari, K. (2005). Housing poverty as a poverty of social policy in Iran, 18, 113-123.
- Aghasafari, A., Amiri, H., Danesh, J., Beheshtian M. (2010). Qualitative and quantitative features of housing in Yazd's historical texture (1976- 2006), journal of studies for Islamic Iranian Cities, 2, 67-82.
- Pourmohammadi, M. & Asadi, A. (2014). evaluation of governmental policies on supplying houses for low income urban population (Case Study, Zanjan city), journal of geographical space, 45, 111- 128.
- Pourmohammadi, M. (2013). Housing planning, Tehran, Samt publication.
- Piran, P. (2008). Informal settlement to invisible settlement: searching solution, Haft Shahr publication, 24, 14-29.
- Hataminejad, H., Seifoldini, F. & Mireh, M. (2006). Study of indicators for informal housing in Iran, case study: Sheihkabad neighborhood, Qom, journal of geographical researches, 58, 129- 145.
- Hoseinzadeh Dalir, K. (1993). Living in slums as searching for meaning and concept, article presented at first congress of Iran's geography, Tehran university, institute of geography, vol 1, Tehran.
- Hakimi, A. (2011). Study of the quantitative and qualitative indicators of informal settlements, case study, Jamshidabad, Khoy city, journal of geography and environmental planning, 44, 197-210.
- Heidari Chianeh, R., Tab, R., Azgami, S. K. & Motamed Mehr, A. (2012). Application of city development strategy (CDS) for improving informal settlement, case study, lands of Tabriz medical university, Ghazan Daghi neighborhood, journal of urban planning and research, 9, 35-56.
- Roostaei Shahrivar, A., Asghari Zamani, A. & Zangeneh A. (2012). Study of physical social indicators of housing for determining poor blocks using factor analysis model (Case Study, Kermanshah city), journal of human sciences researches, 81, 141-156.
- Zadvali Khajeh, Sh. (2012). Evaluation of cellular movement of social and physical indicators in slums at margins (Case Study, those living at northern margins in Tabriz), MA thesis for geography and urban planning, faculty of human sciences, Zanjan university.
- Zangeneh, A. (2010). Recognition of spatial pattern for extended urban poverty using GIS in Kermanshah city since 1996 to 2006, Zanjan University.
- Shams, M. & Gomar, M. (2015). Evaluation of the qualitative and quantitative indicators of housing for low income people in Hamedan province, stressing on low income people, journal of regional planning, 20, 55-68.
- Gharakhloo, M., Abdi Yengi Kond, N. & Zangeneh Shahraki, S. (2009). Analysis of urban sustainability in informal settlements (Case Study, Sanandaj City), journal of human geography research, 69, 1-16.

Ghodsipour, H. (2012). Analytical hierarchical process (AHP), Amirkabir Industrial University, Polytechnique publication, Tehran.

Mohammadi Lord, A. (2008). Analytical network process (ANP) and hierarchical analytical process (AHP) with introducing Super decision software, Tehran, Alborz Fardanesh publication.

Maleki S., Amanpour S. & Zadvali Khajeh, Sh. (2017). spatial organization and extension of

informal settlements in Tabriz metropolis, geography of urban planning, 1, 107-124.

Maleki, S. &Sheikhi H. (2009). Study of the effectiveness of housing's social indicators across Iran's provinces using combined indicators of human development, journal of housing and rural environment, 127, 94-115.