

The health indicators of housing in the rural areas of Kurdistan province, Iran

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ABSTRACT

Housing is considered as one of the components of sustainable development. Achieving sustainable development is not possible without having healthy people. The aim of this study was to investigate the healthy rural housing of Kurdistan province with a descriptive-analytical method. Total of 10 indicators that indicate the quantitative and qualitative dimensions of healthy housing were evaluated. In this study, rural housing in Kurdistan province have been compared with the regulations of the National Housing Regulation and also the average of rural housing indicators in the Country. Quantitative findings showed that 64% of the rural houses in Kurdistan province lack safe water, 55% had worn texture, and 65% had infrastructure area less than 100 meters. Kurdistan province villages are facing a shortage of 9560 housing units. Rural housing quality indicators were in poor condition in terms of lighting, materials used and tectonically. Therefore, in order to improve the indicators of healthy rural housing, it is necessary to provide a well-written and comprehensive plan by the Housing Foundation in which climatic comfort conditions and physical well-being of rural residents are guaranteed.

Keywords: Health indicators, Housing, Village, Kurdistan

Introduction

Housing is a key indicator of the sustainable development planning system in every country. According to the 2019 UN report, poor housing affects a population of larger than one billion across the world.¹ In Southeast Asia, one out of every four individuals has poor housing.² According to the Iranian statistics in 2011, more than 44% of households have poor housing conditions in this country.³ According to Le Corbusier, both the physical and mental needs of humans must be met in housing.⁴ On the same note, Dorsey *et al.* believes that housing is the most important provider of civilization, as well as the foremost preserver of social culture in the

community.⁵ The purpose of countries in housing plans is to provide healthy living conditions to all community members.⁶ Based on the World Health Organization (WHO) standards, healthy housing provides the conditions for the health, welfare, and privacy of the residents.⁷

According to Article 31 of the Islamic Republic's law, healthy housing is the right of every Iranian.⁸ The improved quality of housing and the related services increases social stability, environmental conditions, and the overall quality of life, while also motivating community participation. Moreover, the key role of housing in enhancing the uniformity of the community has been emphasized by UN experts.⁹ Housing could be studied both quantitatively and qualitatively. In the qualitative dimension, issues and phenomena arise in regards to poor housing and housing shortages.¹⁰

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Epidemiological findings have indicated a strong association between housing conditions and health.¹¹

Today, it has been proven that housing directly and indirectly affects the health of the residents, and healthy housing could reduce the risk of various physical diseases and injuries.¹² Experimental evidence also suggests that the environmental and social conditions within private housing and neighborhoods influence human relations and may positively or negatively affect the family and individual quality of life and wellbeing.¹³ According to the World Bank, housing improvement could save lives, prevent diseases, increase the quality of life, reduce poverty, help mitigate climate change, and help achieve the sustainable development and health goals to have sustainable cities.¹ In contrast, inadequate housing threatens human health in multiple physical, chemical, biological, and social dimensions. In fact, dilapidated settlements not only threaten health, but they also spread diseases and decrease the life expectancy of humans.

In a systematic review conducted by Jacobs *et al.*, the association of housing interventions and health were reported.¹⁴ In the mentioned study, the evidence on the effectiveness of specific housing interventions in health improvement was also reviewed. In another study in this regard, Baker *et al.*¹⁵ evaluated the bidirectional correlation between health and housing in Australia, suggesting that health may influence affordable housing outcomes, while housing affordability may also predict health outcomes.

Karimi *et al.* evaluated the status of healthy housing in various cities, reporting a direct and positive correlation between the

socioeconomic status of residents and healthy housing.¹⁶ In addition, Golpayegani *et al.* examined housing health and safety indices, observing a relative improvement in the status of rural housing plan indicators compared to traditional housing despite the significant difference with optimal housing conditions.¹⁷ The present study aimed to evaluate healthy housing in the rural areas of Kurdistan province in the west of Iran.

Materials and methods

This descriptive-analytical study was conducted to evaluate healthy housing in the rural areas of Kurdistan province, located in the west of Iran. Data were collected using a library method from the Statistics Center of Iran and the Housing Foundation of Kurdistan Province in 2013. The statistical population included the villages of Kurdistan province. The World Health Organization (WHO) expert committee has set standards for healthy housing to ensure human physical and mental health.⁷

In total, 10 standards WHO housing indicators were analyzed quantitatively and qualitatively. Statistical information related to the year 2013 in the field of quantitative and qualitative indicators has been prepared by the Housing Foundation of the Islamic Revolution of Kurdistan Province. In this study, two references have been used to evaluate the indicators: first, the National Building Regulation of Iran, and second, the use of the average rural housing indicators of the country, which has been prepared by the Statistics Center of Iran. Table 1 shows the quantitative and qualitative indicators of housing.

Table 1. Quantitative and qualitative housing indicators

Qualitative indicators	Quantitative indicators
1. Location of housing	1. Density index (individual density per room, infrastructure area, number of rooms per residential unit, household density index per residential unit, density index per residential unit)
2. Housing units based on materials used	2. Housing construction period
3. Cooling and heating system	3. Rural housing shortage
4. Sewage disposal method	4. Housing services (gas, electricity, telephone and safe water)
5. Waste disposal method	5. Housing shortage.

Housing Foundation of the Islamic Revolution of Kurdistan Province (2011)¹⁸

Results and discussion

Housing is an essential human need, as well as an important indicator of human health and wellbeing. The ultimate goal of all economic and social development sectors is to ensure human welfare, which is the fundamental prelude to community health. Today, rural housing is considered to be more important than a mere welfare space in terms of physical and mental security in most villages; rather, it is regarded as a space for survival, which is the bedrock of numerous physical and psychological ailments. The issues within this context fall under the category of rural housing poverty.

Qualitative indicators

Ecological location

According to the statistical data of 2011 provided by the Statistical Center of Iran, 87% of the rural settlements in Kurdistan province are located in mountainous regions (valleys/mid-mountain) and foothills, and 13% are located on flat areas (plains).¹⁹

Directions for the establishment of rural settlements

One of the dimensions of sustainability in the field of human health and wellbeing is the establishment and location of rural houses in order to benefit from natural bounties, such as sunlight. Sunlight plays a pivotal role in the regulation of the ecological ring. The placement of housing in diverse geographical directions based on the amount of sunlight results in the proper heating of the building in winter and reduced entry of intense sunlight in summer. In order to provide sufficient natural light in housing, a minimum of 10% and maximum of 20% of the floor area of the rooms should be allocated to exposed surfaces and windows.²⁰

Basically, the position of villages to the southwest is more than eight times that of the villages behind the sun (north position) in terms of benefiting from sunlight.²¹ The findings of the current research showed that 32% of the settlements in Kurdistan province are in the southern position, 26% are in the

eastern position, 22% are in the northern position, and 20% are in the western position. In terms of appearance, residential units could enjoy sunlight by creating the necessary conditions for air conditioning, and our findings in this regard indicated that 49% of the residential units had a façade, 33% had two facades, and 12% had three facades. In addition, 44% of the residential units in Baneh city have more than one façade, and less than 1% of the settlements have the lowest building facade direction in Sanandaj City.

Environmental indicators

Cooling sources

Our findings showed that 48% of the rural settlements had no resources to provide cooling facilities in summer, 35% used water coolers, and 26% used fans. In this regard, the highest number of the water and gas coolers in the households was observed in the rural areas of Baneh City (>91%), and the lowest number was denoted in Marivan City (6%).

Heating sources

One of the most important influential factors in the comfort of space is the availability of heating and cooling facilities in the building. Health engineers liken building facilities to the heart of the building. Building facilities provide comfort and tranquility for people in the work and living environment. The purpose of air conditioning is to create fresh air (oxygen) and prevent unpleasant air and dust particles, toilet odor, etc. in the home.

Regarding the availability of heating devices in winter, statistics suggest that more than 77% of the settlements in Kurdistan province use fossil fuels (e.g., oil and wood), while 23% use wood for fuel in residential homes. In addition, the field findings in Horaman Takht village in Sarvabad City, Horaman Jawrood in Sanandaj City, and Marivan central district have indicated that the settlements are located in the north and east, and the rate of fossil fuel consumption in winter has been estimated to be 15-17% higher than the settlements in the south and west of the region.

Sewage disposal method

According to the results of the present study, wastewater disposal method was mainly open in the investigated rural areas. Due to the location and foothills of the villages, breeze blows from the mountains to the valleys and the other way around at daytime and nighttime, thereby causing air pollution and the spread of germs in the cities. Furthermore, our findings demonstrated that 78% of the rural areas of Kurdistan province have public open sewerage networks. Sanandaj County with 92.2% and Dehgolan County with 54% has the most and the lowest rate of sanitary sewage network respectively. In general, the eastern cities of the province, including Bijar, Qorveh and Dehgolan, have less sewage canals due to the gentle slope, but in the western part of Kurdistan province, due to the high slope of the land, sewage disposal is easy. In the western regions of Kurdistan province where villages are located in mountainous and foothills, the sewerage network is open and located along the valleys. In this regard, our findings showed that 62% of the rural areas had toilets inside the building, while 38% of the rural buildings had outhouses.

Rural waste collection method

The findings of the current research demonstrated that garbage was collected in 18% of the rural towns in Kurdistan province, and 82% of the villages had a traditional landfill method (i.e., throwing garbage to the bottom of valleys). Due to the mountain breeze to the valley and the other way around at daytime and nighttime, the unpleasant smell of garbage causes the spread of germs and diseases in the village.

Livestock maintenance method

Human coexistence with livestock and poultry was another variable of the present study, which was evaluated in terms of healthy housing and environmental health. According to our findings, 88.5% of the rural housing units in Kurdistan province had no separate space for keeping livestock, and human-animal coexistence was relatively common in the rural

areas of Kurdistan province. Only 10.6% of the villages in Kurdistan province had an open space for livestock maintenance. In this regard, more than 95% of the villages in Baneh, Sanandaj, Qorveh, Kamyaran, Sarvabad, and Dehgolan had no separate shelters for livestock, while in the rural areas of Diwandara, Saqez, and Bijar, the figure increased to 81, 86, and 45%, respectively.

Residential units based on type of materials

A house is a physical environment, a human shelter, and a place to meet basic needs. Housing is a space that ensures the safety and health of humans. According to the results of the present study, 25% of the rural housing centers in Kurdistan province used durable materials, 29% utilized materials with low durability, and 46% used material with high durability for building houses. The most durable rural areas in terms of the type of the used materials in construction were Qorveh (54%), and the lowest level in this regard was confirmed in the rural areas of Baneh (31%). In terms of the type of structures, our findings demonstrated that more than 85% of the structures of residential units in the rural areas of Kurdistan province were masonry, while less than 10% had concrete structures.

According to the findings of the current research, 3.8% of the residential units in Kurdistan province were made of steel materials, 16.3% were made of concrete, 1.26% were made of stone, 2.5% were made of blocks, 38% were made of stone, wood, and bricks, and 2% were made of clay and wood. Compared to the national average, the rural housing in Kurdistan province has an unstable state. Furthermore, these constructions are rather weak in terms of resistance to natural hazards (e.g., earthquakes), and our findings demonstrated that approximately 10% of the rural settlements in the province had no concrete base, while 8% had a shaft base (clay with lime), 51% had a rock base, and less than 35% of the houses were made of concrete.

As for the type of structure, 95% of the rural structures were masonry, and the other structures were concrete. In terms of natural

hazards (e.g., earthquakes), 76% of the area in Baneh City, 45% of Sanandaj, and 52% of Kamyaran, Marivan, and Sarvabad villages are located on a fault. In total, 60 villages in Kurdistan province are located on extremely hazardous faults. If one of the faults in the province is activated, the local and financial

damages might be irreparable due to the low security factor of the rural houses in terms of durability (Table 2). According to the standard indicators of the National Building Regulations, most of the rural housing in Kurdistan Province is in unstable and in other words unstable conditions.²²

Table 2. Types of materials used in rural housing units in Kurdistan province (2013)

	Steel structure	Concrete materials	Stone	Concrete	Stone, Brick, Wood	Clay & wood
Dehgolan	8	25	25	0.5	38	1
Sarvabad	0.3	13	31	0.2	48	5
Kamyaran	0.5	17	30	0	40	0
Divandere	8	20	30	0	30	7
Marivan	4	14	8	0	43	0
Qorveh	7	24	34	4.4	26	1
Sanandaj	0.4	18	3	0	41	3
Saqez	0.3	9	16	19	29	0
Bijar	0.5	20	46	1	30	1
Banah	7	30	38	0	35	2
Province	7	18	27	3	42	2
Whole country	9.5	11	5	5.6	6.3	1.8
Status	Unstable	Unstable	Unstable	Unstable	Unstable	Unstable

Quantitative indicators

Residential units in terms of construction period

The findings of the current research indicated that the average period of housing construction in the rural areas of Kurdistan province was 20.4 years. On a general scale, more than 55% of the housing units in Kurdistan province are over 15 years old, and 45% are under 14 years old (worn-out); only 18% of the rural housing units are renovated. In terms of geographical distribution, the assessment of the housing construction in Kurdistan province indicated that in Bijar City, 74% of the villages are more than 15 years old, and approximately 60% of these villages have a construction period of more than 25 years. In Dehgolan City, 55% of the villages have a construction period of less than 14 years (see Table 3).

Housing infrastructure area

According to the results of the present study, the average area of the infrastructure of the residential units in the rural areas of Kurdistan province is less than 88.4 m², which is equivalent to 89.5 m² in Iran. In other words,

five cities in this area have less housing infrastructure than the national average. The highest level of infrastructure was observed in Marivan City (>98 m²), and the lowest level was observed in Saqez City (75 m²).

Table 3. Periods of rural housing construction in Kurdistan province and Iran (2013)

	Construction periods of rural housing			
	25	30	19.4	24.3
Dehgolan	23	32	17	29
Sarvabad	13	34	24	29
Kamyaran	20	30	21	30
Divandere	23	23	16	38
Marivan	17	29	22	31
Qorveh	26	26	14	33
Sanandaj	17	26	18	40
Saqez	15	29	13.3	43
Bijar	12	14	14.4	60
Banah	18	19	23	40
Province	18	26	18	37
Construction period	-5	5-14	15-24	+25
Status	Unstable			

Density index

Household density in the residential unit is a psychologically important indicator of the peace and comfort of homeowners. In fact, various dimensions of a household reflect the

degree of development and living conditions of the community.²³ The household density index is another indicator that is not used commonly in housing debates. This index indicates the sufficient space required for the residents of a household. According to the findings of the current research, the average household density in a residential unit in the rural areas of Kurdistan province in 2013 was 1.1%. The highest density was observed in Bijar City (1.18), and the lowest density was denoted in Sarvabad City (1.03).

Another quantitative indicator of housing is the number of the rooms per residential unit. The room density index in a residential unit in terms of recognizing the share of each

household or its individuals in housing spaces indicates the improvement of the biological wellbeing of the residents.²⁴ Our findings indicated that the density of the rooms in a rural housing unit in Kurdistan province was 1.9 in 2013. In addition, the highest density was reported in Baneh (2.4), and the lowest was observed in Bijar (1.3). Findings show that 40% of residential units have three rooms; 21% have two rooms; 16% have four rooms and 22% have 5 or more rooms. On the other hand, more than 63% of the residential units in the villages of Kurdistan province had an area of 40-99 m², and the area of 36% was more than 100 m² (see Table 4).

Table 4. Density index units in rural housing units of Kurdistan province (2011); source: research findings/statistical yearbook)

City	Individual density in the room	Household density in a residential unit	Number of rooms per residential unit	Density per person in a residential unit	Condition
Baneh	0.6	1.1	2.4	2.4	Unstable
Bihar	0.7	1.2	1.3	2.2	Unstable
Saqez	0.7	1.1	1.4	2.3	Unstable
Sanandaj	0.6	1.1	1.7	1.9	Unstable
Qorveh	0.6	1.1	1.6	2.1	Unstable
Marivan	0.6	1	2.2	2.1	Unstable
Devandarah	0.7	1.1	1.4	2.3	Unstable
Kamyaran	0.7	1.1	1.5	1.9	Unstable
Sarabad	0.4	1	2.3	1.9	Unstable
Dehgolan	0.7	1.1	1.4	2	Unstable
Medum	0.62	1.09	1.9	2.11	

Housing shortage

The estimation of housing shortage is considered to be an important indicator in the evaluation of rural housing units. According to our calculations, the rural areas of Kurdistan province lack a total of 9,560 residential units. The highest shortage of housing units was observed in Bijar City (1,721 housing units), and the lowest rate was denoted in Sarvabad City (196 housing units) (Table 5).

Housing service indicators

Electricity services, telephone, and gas

The results of the present study regarding gas piping services indicated that approximately 30% of the residential units in the villages of Kurdistan province had gas piping, while the national average is estimated at 80%. Qorveh villages had the highest amount of piped gas (62%), while the lowest

amount was observed in Divandere villages (10%). As for rural electricity services, the obtained data indicated that all the villages had electricity services. In addition, telecommunications were available in 89% of the rural housing units via telephones; this figure is equal to 86% in the entire country. The villages of Sarvabad City had the highest number of telephones, and Dehgolan City had the lowest telecommunication services (57%). Table 6 shows the status of rural housing services.

Index of safe and purified water

Access to safe drinking water is a basic need of the community and the foremost vital resource in the human life. Today, the provision of safe drinking water and water services to the public is a major concern in most cities and villages.¹⁶ The findings of the

current research demonstrated that approximately 29% of the rural areas in Kurdistan province had safe water; this figure is equivalent to 75% in the entire country. In terms of the spatial distribution of the rural areas, the highest rate of access to safe water was observed in the rural areas of Saqez City (55%), and the lowest rate was denoted in the rural areas of Kamyaran City (11%) (see Table 7).

Table 5. Estimates of rural housing shortage in Kurdistan province (2011)

City	Housing shortage	Number of households	Number of residential units
Kurdistan Province	-9560	130798	121238
Banah	-700	9304	8604
bijar	-1721	11126	9405
Saqez	-1213	16185	14972
Sanandaj	-1196	20686	19490
Gorvah	-1661	13708	12047
Marevan	-312	11371	11059
Devandarah	-1043	12720	11677
Kamyaran	-725	13544	12819
ServAbad	-196	12213	12017
Dehgolan	-793	9941	9148

Table 6. Status of rural housing facilities in Kurdistan province and Iran (2013)

	Type of materials		Total village
	Gas piping	Electricity	
Dehgolan	48	100	108
Banh	40	96	149
Bijar	18	98	235
Saqez	16	95	274
Sanandaj	15	96	240
Qorveh	62	100	133
Marivan	35	39	151
Divandareh	10	95	172
Kamyaran	25	69	151
Sarvabad	26	39	74
Country	80	99	
Condition	Unstable	Healthy	

In the present study, rural housing in Kurdistan province was compared with the average of the national housing indicators, and the obtained results indicated the unstable status of the settlements. The basic conditions for sustainable development require the provision of basic biological needs, including sustainable housing, safe water, availability of facilities and public services, and welfare, of

which most of the villages in Kurdistan province are deprived.

Table 7. Access to safe water in villages of Kurdistan province

City	Type of materials		Total village
	Water purification	Plumbing water	
Dehgolan	27	82	109
Banh	64	95	159
Bijar	13	93	106
Saqez	55	79	143
Sanandaj	38	38	121
Qorveh	59	93	152
Marivan	29	90	119
Divandareh	38	83	121
Kamyaran	11	86	97
Sarvabad	13	93	106
Country	75	97	
Condition	Unstable	Unstable	

In the current research, an average of 14 physical, biological, and service variables and 10 housing variables were considered unstable, while four variables were considered healthy. Ecologically, 48% of the rural housing units had no direct access to sunlight, 73% of the villages had no safe drinking water, 64% of the rural settlements in Kurdistan province had no cooling and heating facilities, and 82% had an open sewer network. Furthermore, more than 88% of the villages in Kurdistan province had no open space for keeping their livestock, and 48% of the residential units were made of materials with low durability or no durability.

In terms of environmental hazards, more than 60% of the villages in Kurdistan province are located on extremely high-risk faults.²⁵ Also, according to the findings, more than 63% of the area of residential units in the villages of Kurdistan province has an area between 40 to 99 meters and 36% above 100 m². Overall, Kurdistan province is faced with the shortage of 9,560 rural housing units. Comparing the results of our findings with the studies conducted in Iran and also outside of Iran demonstrated that the villages of Kurdistan province were not in a good condition in terms of health indicators, which is consistent with the studies conducted by Golpayegani *et al.*,¹⁷ Kermani *et al.*,²⁶ Ghadiri Masuom *et al.*,²⁷ and

Sheikhi *et al.*,²⁸ and also the studies by Thomson *et al.*,²⁹ Ige *et al.*,¹⁰ Wahowiak³⁰ and Swope and Hernández.³¹

Conclusion

One of the basic conditions for sustainable development is the provision of healthy housing. In healthy housing, attention is paid to indicators such as adequate light supply, safe water supply, suitable environment in terms of landfilling and transmission of sewage network and other infrastructure services such as proper communication.

The study of rural housing in Kurdistan province was examined in terms of 10 indicators based on the standards of the national building regulations and the average statistical level of the country's rural indicators. The results showed that the housing situation in rural areas of Kurdistan province is in an unstable condition. Since Kurdistan province is located on the Sanandaj-Sirjan fault zone, the existence of natural hazards such as relatively strong earthquakes can cause great financial and human losses. In terms of welfare indicators, the results show that rural housing in Kurdistan province lacks the minimum facilities and services. It can be concluded that part of the origin of rural migration goes back to the lack of healthy and sustainable housing. Therefore, one of the basic measures in rural planning in order to sustain rural settlements is to provide sustainable housing that provides comfort and tranquility for the villagers. Therefore, in order to improve the indicators of healthy rural housing, it is necessary to provide a well-written and comprehensive plan by the Housing Foundation in which climatic comfort conditions and physical well-being of rural residents are guaranteed.

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