

Appraisal Criteria-Space in some Residential Urban Areas for Al-Kut City

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ABSTRACT

In this paper, appraisal for residential environment type in Al-Kut city has been done by regular process for evaluation of 198 random samples from dwelling units have been selected in four districts: Al-Kafa'at (57 samples), Hay Al-Rabee (57 samples), Al-Hoboken (65 samples) and Al-Shown (19 samples) to represent the factual residential environment for all the city. Questionnaire form has been prepared consists of (26) questions for environmental aspects for dwelling units to ensure getting all information (quantity and quality) required for environmental appraisal method approved by (APHA). Another one prepared for outdoor environment that surround the dwelling units areas, consists of (21) questions.

Results had been indicated that residential environment for Al-Kut city suffers from many problems like overcrowding which appears in some dwelling units. All then coming from increasing in number of families and total habitants which cause reducing the require areas for residents and led to reduce the privacy. Also some of the dwelling units had toilet and bathroom located outside its structure, additionally lack to some basic environmental requires. As result the shutdowns of public electricity for a long duration per day generate lack in adaptation, light.....etc. Surrounding environment of some districts has other important factors like neglecting or poor pavement of its streets and sidewalks. In addition to lack in sewage and storm systems, public parking, open areas, public playgrounds and public playfields.

Keywords: Environmental Appraisal, APHA, Al-Kut City, Urban Planning.

تقييم معيار الفضاء في بعض الاحياء السكنية الحضرية لمدينة الكوت

الخلاصة

لغرض تقييم نوعية البيئة السكنية في مدينة الكوت تم اخذ عينات عشوائية من الوحدات السكنية بمقدار (198 عينة) لأربع أحياء سكنية وكما يلي: (57 عينة) لحي الكفاءات ومثلها لحي الربيع و(65 عينة) لحي الحقوقيين و(19 عينة) لحي الشؤون لتمثيل الواقع البيئي السكني للمدينة عموماً. حيث

تم إعداد وتوزيع استمارة استبيان تتضمن 26 سؤالاً لكافة نواحي بيئة الوحدة السكنية وبما يضمن الحصول على المعلومات الكمية والنوعية المطلوبة والمعتمدة من قبل منظمة الصحة العالمية (APHA). بالإضافة إلى إعداد وتوزيع استمارة استبيان أخرى تتضمن 21 سؤالاً لكافة نواحي البيئة المحيطة بالوحدات السكنية.

بعد التحليل الشامل للنتائج المستنبطة من الدراسة نستنتج: أن البيئة السكنية لمدينة الكوت تعاني من مشاكل متعددة كالازدحام الظاهر في بعض وحداتها السكنية نتيجة زيادة عدد الأسر ومجموع أفرادها كما في حي الحقوقيين (49.2% من الوحدات السكنية مشغولة بأكثر من عائلة بمعدل عدد قاطنين 8.1 شخص) مما سبب في عدم وجود مساحات كافية لمعيشة الأفراد وبالتالي نقل الخصوصية. بالإضافة إلى 73.7% من الوحدات السكنية في حي الشؤون تحتوي على فضاءات سكنية دون المعايير. كذلك وقوع الحمام والمرافق الصحية خارج هيكل عدد منها وافتقارها إلى بعض المتطلبات البيئية الأساسية كما في حي الشؤون (84.2% من المرافق الصحية و73.7% من الحمامات لا تتوفر فيها جميع المتطلبات) وانقطاع الكهرباء الوطنية لفترة طويلة باليوم سبب عوز بالتكليف والإضاءة... الخ (حيث أظهرت نتائج الاستبيان أن 100% من الوحدات السكنية في حي الربيع والشؤون تحتوي على مولدات كهربائية).

بالإضافة إلى إهمال البيئة المحيطة لبعض الأحياء السكنية بسبب رداءة أكساء الشوارع أو رصف الأرصفة والمماشي في عدد منها كذلك افتقارها إلى أنظمة تصريف المياه الثقيلة ومياه الأمطار (حيث أظهرت نتائج الاستبيان أن 8% من الوحدات السكنية في حي الحقوقيين مرتبطة بشبكة المجاري) و الحدائق والمنتزهات والفضاءات المفتوحة والمساحات وملاعب الأطفال والملاعب الرياضية.

INTRODUCTION

Environment space available perception for suitable dimensions, volumes and areas for different human activities within building or surrounding or area that the building exist in, these environment contain what the building include from furniture and apparatuses, and what is their result from relationships between them like dimensions, volumes and areas that occupied.

RESIDENTIAL DENSITY

Residential density defines as "the degree of convergence of the dwelling units' arrangement with each other ". Its indicator for measurement the degree of land occupancy, and consider one of the main indicators that use in study the behaviorism and sociability relationship for residences, because there is strong relation between the living conditions and residential density and between the last one and environmental level in residential areas [1].

These two types generate different development intensities of residential density [2].

- Person density: person / km²
- Dwelling density: dwelling / km²

The Iraqi criterion mentioned in [3] advice person density of (8600-21400) person/ km², and dwelling density of (2400-4200) dwellings/ km² for row houses in the modern residential areas and (2800-4800) dwellings/ km² for courtyard houses in the old residential areas.

The same reference governs the availability. Which defined as the open spans, comfortable places for youth and children playgrounds necessary in the residential areas as well as available amusing services it's reduce the residential density for both the modern and traditional areas. Land use balance for the row and courtyard houses between (0.55-0.7), and may be reach to 0.75 in the some traditional residential areas (courtyard houses).

PLOT AREA OF THE HOUSES

Many different studies made to limit the criteria of the best area can occupy by dwelling unit to satisfy wish aim, these criteria varied depended on the country, economic status and social concept.

The Iraqi criteria based on [3] abide by area between (200-350) m² for newer residential units that distributed in raw form and between (150-300) m² for traditional units (courtyard).

OCCUPANCY RATE

Occupancy rate means "number of persons inhabitant in one room from dwelling unit" or "average person shares (person / room) from the area of the room", occupancy ratio depend on local conditions, it can express by [1]:

1. Criterion (person / room).
2. Criterion (area /person).
3. Criterion (number of rooms in dwelling unit).
4. Criterion (number of rooms according to family size).

In one-family housing two living rooms in a dwelling are recommended, one anticipated for family life and the second for guest reception [3]. Without the residence of the dwelling unit by more than one family, and don't use the nonresidential spaces like bathroom, toilet and corridors for residence or sleeping. The American Public Health Association (APHA) advice when the dwelling unit occupancy by two persons must consist at least from living room, bedroom and kitchen. In America the average number of persons per housing unit was 3.14 in 1970 and 2.62 in 1989 [4].

CRITERIA OF THE SPACES

Bedroom

[5] Says that the measuring bed spaces is an accurate guide to the number of people any particular development can house. Such policies were coupled with rules about occupancy and use of bedrooms—intended to discourage all cultural practices except those that permitted no more than two persons to share a bedroom and prohibited older children of the opposite sex to share rooms [6]. [7] Mentioned in calculating numbers allowed, the following should be taken into consideration:

- No account taken of a child under 1 year of age and
- A child between 1 and 10 years of age represents half a unit.

The item depending on criteria:

A. Person / bedroom.

1. Each bedroom should be occupied by not more than two grown up persons and one child not more than ten years old [3].
2. In Iraq the minimum acceptable value 2.3 persons / bedroom [3].
3. APHA consider over 1.5 persons / room the room crowding [4].
4. APHA consider the room crowding when: [4].

$$(\text{Number of occupants} \geq 2 * \text{Sleeping room} + 2) \quad \dots (1)$$

B. Person floor area / bedroom.

1. The floor area of the bedroom should not be less than 12 m², as minimum floor area of a master bedroom 15 m² is recommended. Increase of floor area of such

a room to not less than 21m^2 is obligatory to permit its future partition into two cubicles [3].

2. The minimum area of first bedroom 12.5 m^2 other double bedrooms 10.2 m^2 and single bedroom 6.5 m^2 [5].
3. In Iraq the minimum acceptable value 5.6 m^2 for person / bedroom [3].

Table (1) shows the proper criteria for bedroom occupancy to prevent crowding [1].

The study depends on criterion that gives little occupancy for rooms. If the dwelling unit contains five rooms with areas (14, 11, 9, 8, 6) m^2 , will observe in Table (1) in item depended on rooms area the allowable occupancy number ($2+2+1.5+1+0.5=7$ persons) but in item depended on No. of rooms the allowable occupancy number equal (10 persons) so the allowable occupancy number in this case is (7 persons), because it gives little occupancy for rooms.

Bathroom, Toilet Room and Kitchen

Existence toilet in every dwelling unit considers obligatory [4]. According to [3], in small dwelling unit placing of a W.C. in a bathroom is allowed. However, in medium and larger dwelling unit separate toilet room is obligatory. The obligatory minimum floor area of a main bathroom is 3.5 m^2 and that of a second bathroom is 3 m^2 . The minimum floor area of toilet is 1.5 m^2 . Recommended floor area of a bathroom combined with a W.C. should be 4.5m^2 .

The minimum area of the kitchen is not less than 9 m^2 [3]. Kitchen area equal 8 ft^2 / person [8].

Living and Visiting Room

The Iraqi standard advice in the state of found one living room in the house must be the area between (18-24) m^2 and if there are two living rooms, the area must be between (12-15) m^2 [3].

The unit shall have a living room not less than (20.4 m^2) in floor area. An additional (9.3 m^2) in floor area shall be provided for each occupant of such unit in excess of two [9].

Residential Room Height

[9] Recommended, occupied spaces, habitable spaces and corridors shall have a ceiling height of not less than (2286 mm). Bathrooms, toilet rooms, kitchens, storage rooms and laundry rooms shall be permitted to have a ceiling height of not less than (2134 mm).

[3] Obligated height of 3 m in all habitable rooms, kitchens and bathrooms, taken from floor to ceiling is obligatory. Reduction of this height to not less than 2.25 m is acceptable in toilets, storage spaces, closets.

CITY SURVEY

The total area for AL-Kut city still now 40 km^2 to be divided on both river's sides, with total population of 344,960 persons, occupy 40,430 dwelling units

Districts are chosen to represent actual residential environmental for Al-Kut city, it is located in different places from the city (observe in basically master plan for AL-Kut city) as shown in Figure (1), and selection of these districts depend on difference in period of construction, which belong to different decades, difference in (income level, welfare and education), as well as some districts included by reconstruction programs. These districts cover largest area of the city. Table(2) shows some important statistical information.

- **AL-Kafa'at:** This district constructed in 1990 and it represents one of the high-class districts; lay in the north-west beside the river and almost the habitants live in welfare.
- **AL-Hokokeen:** This district constructed in 1978 lay in the north-east of the city; it has uniform dwelling unit's area (375) m². Habitants are of the middle-class of the city community.
- **Hay AL-Rabee:** This district constructed in 1965 lay approximately in the center of the city beside the river, divided in four blocks with uniform areas (120, 200, 300, and 600) m². Habitants of high-class live in the block (600) m² and mix (low and middle)-class live in the rest blocks.
- **AL-Shown:** This district constructed in 1956 lay in the west of the city between Tigris and Al-Digili Rivers; habitants live in of limit income.

DATA COLLECTION

According to [11], study dependence on sample size equal to (5%) from dwelling units in AL-Kut city so as to get acceptable results, and its equal to (four) districts. [12] Denoted that chosen samples (dwelling units) from these districts equal to (10%) of total dwelling units in every district.

To do the field survey as one of the study requirement questionnaire form have been prepared and it consists of (26) questions contain all environmental aspects for dwelling units to ensure getting all information (quantity and quality) that required for environmental appraisal as shown in appendix.

Data collected from the dwelling units as a random samples method to get (fast, easy, accurate and unbiased) results. The samples equal to (10%) of the total dwelling units in every district, so the total samples that selected and approved in this study are (198) samples (dwelling units) distributed in Al-Shown district (19) samples , Hay Al-Rabee district (57) samples, Al-Hokokeen district (65) samples and Al-Kafa'at district (57) samples.

RESULTS AND DISSECTION

Residential Density

A) Population Density: The overall population density for Al-Kut city center is 8,624^[10] person/ km², and recommended by [3] Iraqi acceptable criteria (8,600-21,400) person/km². Table (2) shows that Al-Shown and Hay Al-Rabee districts give less than the lower limit for the Iraqi criterion, Al-Hokokeen and Al-Kafa'at districts lay with the limit. The upper ratio lay in Al-Hokokeen district because the people have limited-income enhance to increase number of families inside dwelling units.

B) Dwelling Unit Density: The overall residential density for Al-Kut center is 1,011^[10] dwelling unit/km² and it doesn't exceed the Iraqi acceptable criteria (2,400-4,200) dwelling/ km² for row houses in the modern residential areas as mention in [3]. Table (2) shows that all districts present less than the lower limit for the Iraqi criteria.

Plot Area for Dwelling Unit

Depend on the lower accepted area of dwelling unit in Iraqi and world criterion that equal to (150) m². Figure (2) Shows that Hay Al-Rabee district has the upper ratio with area less than 150 m² and Al-Hokokeen has the lower ratio in this range. And cause back to participate the original plot area to small areas which don't satisfy the standards. The field survey shows that the plot areas for Al-Shown district

between (141-400) m², for Hay Al-Rabee district between (100-600) m², for Al-Hokokeen district between (100-375) m² and for Al-Kafa'at district between (90-600) m².

Occupancy Rate

- 1. Number of Spans inside Dwelling Unit Criterion:** The Iraqi criterion obligate with three spans except (kitchen, toilet and bathroom) in the dwelling unit [3], and the Figure (3) shows that this criterion applied in all samples of districts. Figure (4) shows the average number of rooms in dwelling unit.
- 2. Bedrooms:** The dwelling units in Al-Kafa'at district had the high average bedroom number (3.4) per dwelling unit, in Hay Al-Rabee district (3) per dwelling unit, in Al-Hokokeen district (2.9) per dwelling unit, and in Al-Shown district (2.7) per dwelling unit as shown in Figure (4). All districts satisfy the lower bedroom number required that equal to (2) bedrooms per dwelling unit as in Iraqi criterion. Nevertheless there are some dwelling units in the districts (samples from areas of study) had one bedroom with ratio percent (3%), (5%), (6%) and (11%) for Al-Kafa'at, Hay Al-Rabee, Al-Hokokeen, Al-Shown districts respectively, see Figure (5).

- **Person Floor Area/ Bedroom Criterion**

The lower limits of number of person's occupant per bedroom are depended on age and sex. They shall not exceed two persons and child (less than 10 years) or parent and baby. Figure (6) shows that Al-Kafa'at district has the lower average person number per bedroom (1.9) person, in Hay Al-Rabee district (2.8) person, in Al-Hokokeen district (2.9) person, and in Al-Shown district (3.1) person.

- **Person Floor Area/ Bedroom Criterion**

There are many criteria for this item, and the study depends on the Iraqi criterion (5.6) m²/person [13].Figure (7) shows that criterion was satisfy in all samples of study, when the average occupancy rate for all district areas calculates. Al-Shown district has the upper percent of unfit ratio (36.8%) and Al-Kafa'at district have the lower percent of unfit ratio (8.8%).

- **Persons per sleeping room**

Bedroom become crowded when bedroom's residences $\geq (2 * \text{number of bedrooms} + 2)$. These criteria exceed extent in Al-Kafa'at district with ratio (19.3%), Al-Shown district with ratio (47.4%), Hay Al-Rabee district with ratio (45.6%) and AL-Hokokeen district with ratio (50.8%).

CONCLUSIONS

- Some dwelling units in the study areas contain substandard spans areas with ratio (73.7%) in Al-Shown district, (57.9%) in Hay Al-Rabee district, (66.2%) in AL-Hokokeen district, and (36.8%) in Al-Kafa'at district. The ratio shows that Hay Al-Rabee and AL-Hokokeen districts have the highest value and that reduce the privacy and cause uncomfortable ambient.
- Field survey shows that number of families per dwelling unit between (1-2) in Al-Shown district with ratio (31.6%), (1-4) in Hay Al-Rabee district with ratio (42%), (1-5) in AL-Hokokeen district with ratio (49.2%), and (1-5) in Al-Kafa'at district with ratio (19.3%).
- Sleeping area per person vary between(1.7-15.2) m²/person in Al-Shown district,(2.5-20) m²/person in Hay Al-Rabee district,(2-28)m²/person in AL-Hokokeen district , (3.1-40) m²/person in Al-Kafa'at district, and depended

on APHA criteria (3.7) m²/person [4] dwelling units in districts doesn't satisfy the lower criteria limit with ratio (10.5%), (7%), (4.6%), (3.5%) consecutively.

- Area specified for not sleeping in every dwelling unit includes (living room, visiting room, kitchen, and passage ways). Depending on 5 m²/ person a lower limit for this criterion [13] and depending on exceed criteria value, dwelling units in districts doesn't satisfy the lower criteria limit with ratio(0%) in Al-Showwn district, (5.3%) in Hay Al-Rabee district,(4.6%) in AL-Hokokeen district (0.86), and (0%) in Al-Kafa'at district.

REFERENCES

- [1]. "Housing Technical Standards and Codes of Practice-for Iraq", 1983. Ministry of Housing and Construction, State Organization for Housing, Baghdad.
- [2]. Goodin, F. G., and Downing, J., 1959. "Domestic Sanitation", Published by Estates Gazette Ltd., London.
- [3]. Walters, D., and Brown, L.L., 2004."Design First: Design-based planning for communities", published by Architectural Press, UK.
- [4]. Nemerow, N. L., Agardy, F.J., Sullivan, P., and Salvato, J.A., 2009."Environmental Health and Safety for Municipal Infrastructure, Land Use and Planning, and Industry", Published by John Wiley & Sons, Inc., USA.
- [5]. Towers, G., 2005."An Introduction to Urban Housing Design at Home in the city", Published by Elsevier, UK.
- [6]. Ben-Joseph, E., and Szold, T.S., 2005."Regulating Place: Standards and the Shaping of Urban America", published by Taylor & Francis Group, UK.
- [7]. Stewart, J., 2001."Environmental Health and Housing", published by Spon Press, USA.
- [8]. Salvato, J. A., Nemerow, N.L. and Franklin, J. A., 2003."Environmental engineering", Fifth Edition, published by John Wiley & Sons, Inc., USA.
- [9]. "International Building Code", 2006. A Member of the International Code Family published by International Code Council, Inc., USA.
- [10]. Wasit census directorate.
- [11]. DeCoursey, W.J., 2003, "Statistics and Probability for Engineering Applications", published by Elsevier Science, USA.
- [12]. Ryan, T.P., 2007,"Modern Engineering Statistics", published by John Wiley & Sons, Inc., USA.
- [13] صاحب, احمد طالب, 2002, "التقييم البيئي للأحياء السكنية في مدينة الحلة", رسالة ماجستير مقدمة إلى قسم الهندسة المدنية - جامعة بابل.

Table (1) Criteria occupancy ratio for bedrooms [1].

Depended on No. of rooms			Depended on rooms area		
No.	No. of Room	No. of Person	No.	Room Area m ²	No. of Person
1	1	2	1	10.22 or more	2
2	2	3	2	8.36 - 10.22	1.5
3	3	5	3	6.5 - 8.36	1
4	4	7.5	4	4.65 - 6.5	0.5
5	5 or more	10	5	Less 4.65	Zero

Table (2) Details density and number (persons and dwelling units) for some districts in Al-Kut city.

No.	district name	number of people ¹	number of dwelling units ¹	number of families ¹	number of buildings ^{1,2}	total residential area (km ²) ³	Population density (person/km ²)	dwelling units density (house/km ²)	average number of persons in dwelling unit	average number of families in dwelling unit
1	Al-Showwn	1267	172	226	197	0.279	4541	616	7.37	1.31
2	Hay Al-Rabee	5370	642	678	695	0.925	5805	694	8.36	1.06
3	Al-Hokeen	5549	699	959	728	0.345	16084	2026	7.94	1.37
4	Al-Kafa'at	3811	600	779	630	0.273	13960	2198	6.35	1.3

- 1- Source: Wasit census directorate.
- 2- Represent residential and non-residential building.
- 3- Areas calculate by use Arc GIS program.

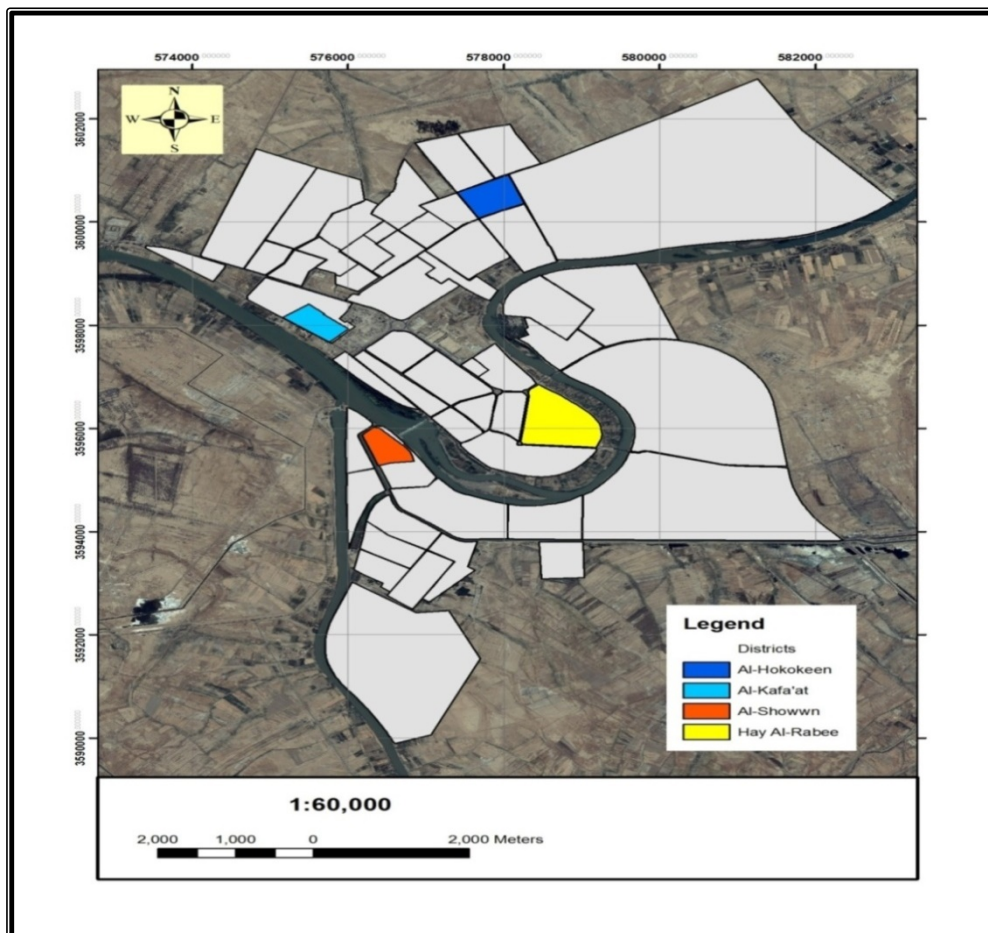


Figure (1) Digital map basically master plan for Al-Kut city showing areas of study.

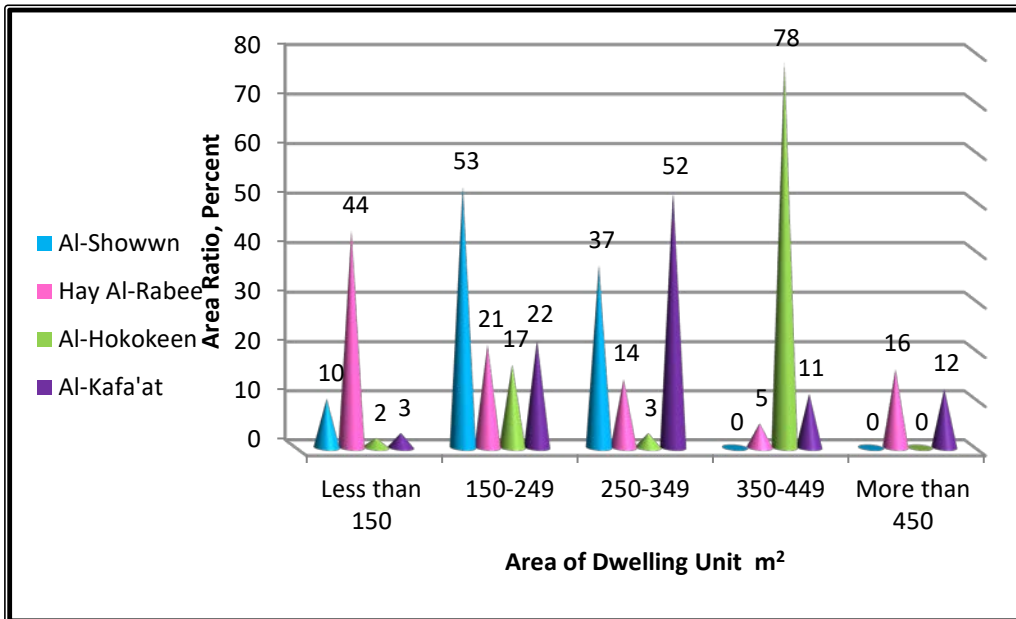


Figure (2) Ratio percent for dwelling units' areas in districts (Samples from areas of study).

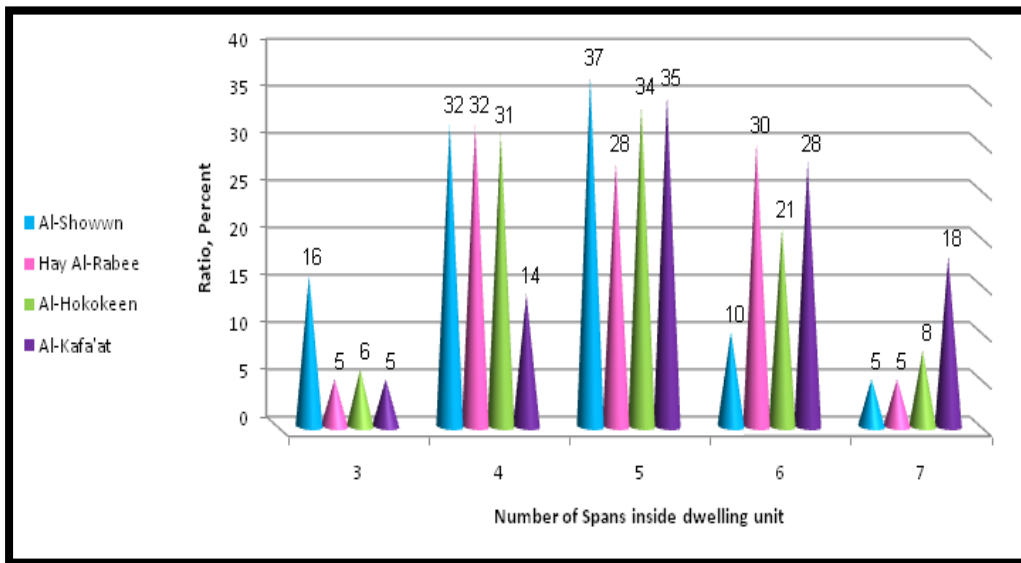


Figure (3) Ratio, percent for number of spans inside dwelling unit includes (visiting, living, and bed) room.

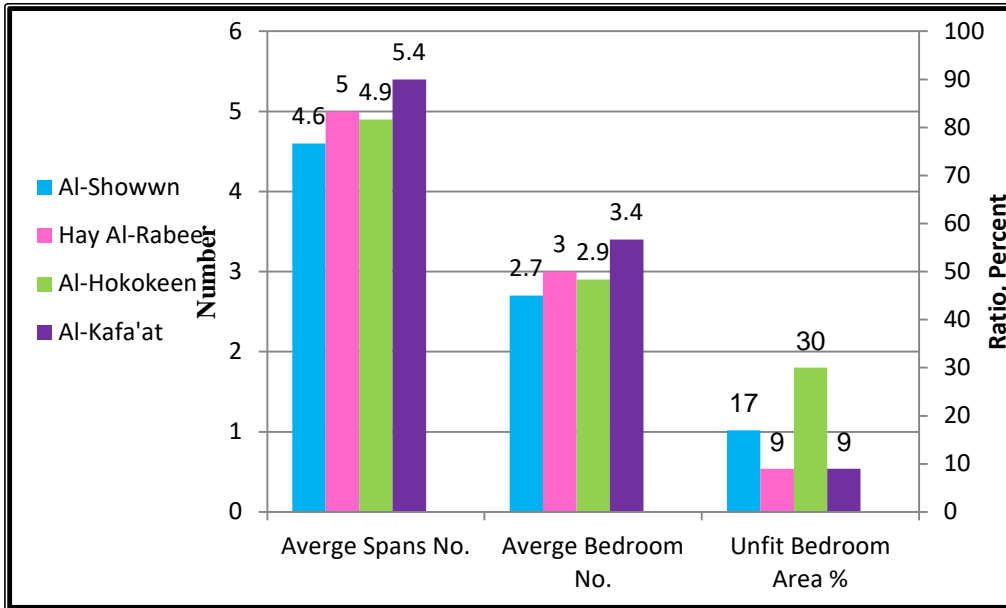


Figure (4) (Average spans number, average bedrooms number, and ratio, percent for unfit bedrooms area) for dwelling units in districts.

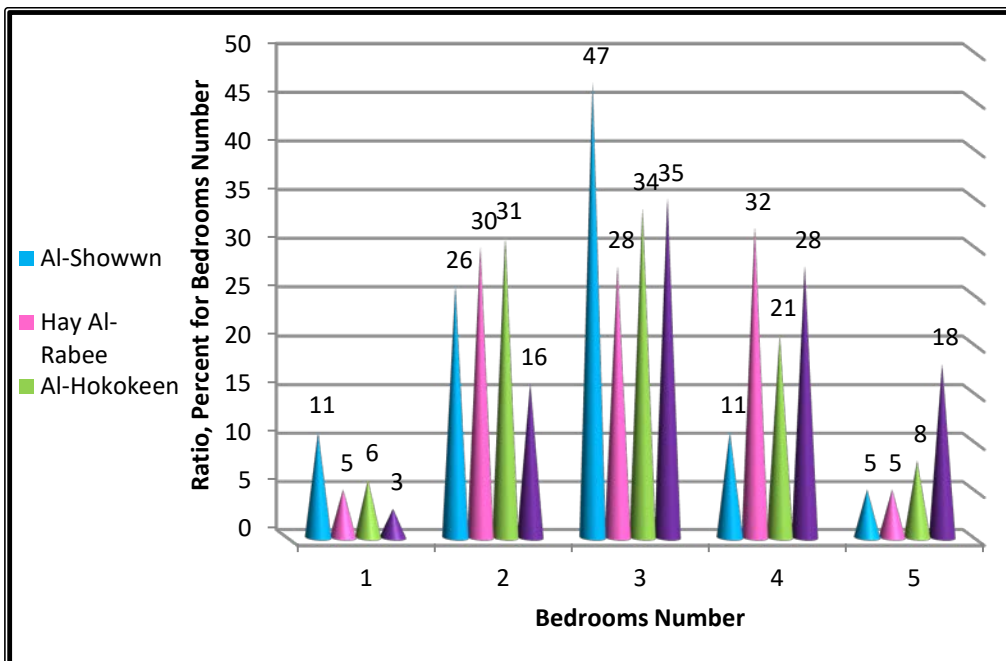


Figure (5) Ratio, percent for bedrooms number inside dwelling units in districts.

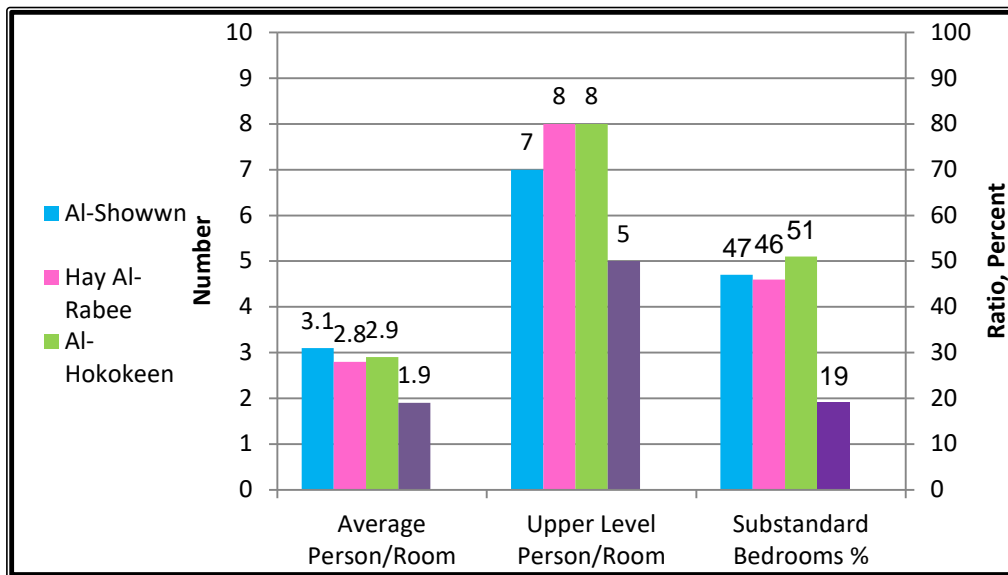


Figure (6) edrooms crowded (person/bedroom) in dwelling units in districts.

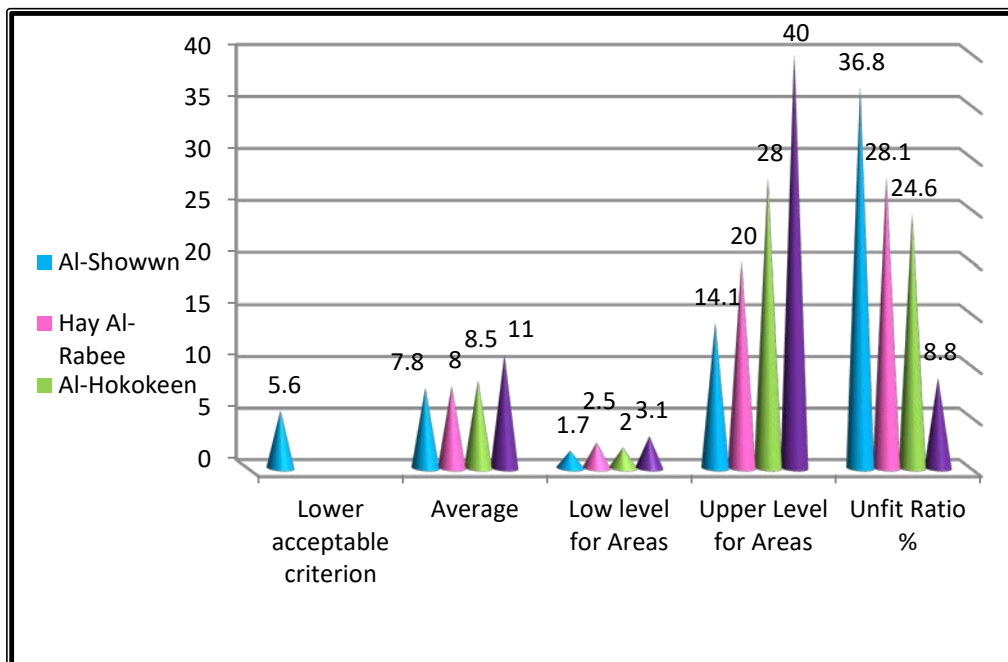


Figure (7) Area crowded (person floor area/ bedroom) in dwelling units in districts.

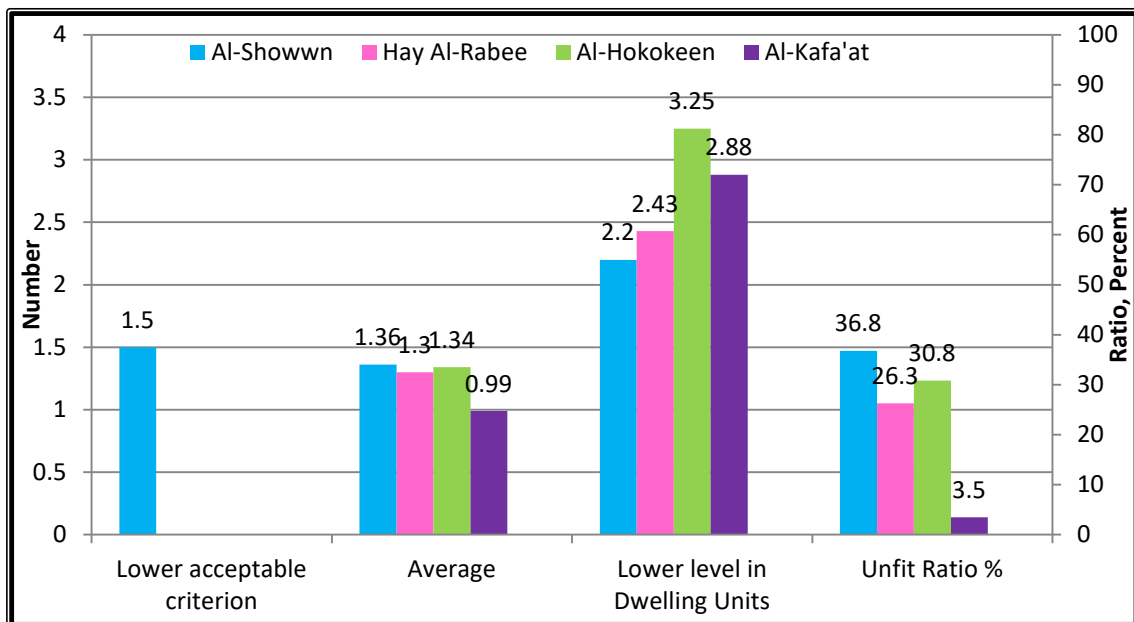


Figure (8) Rooms crowded (person/room) in dwelling units in districts.

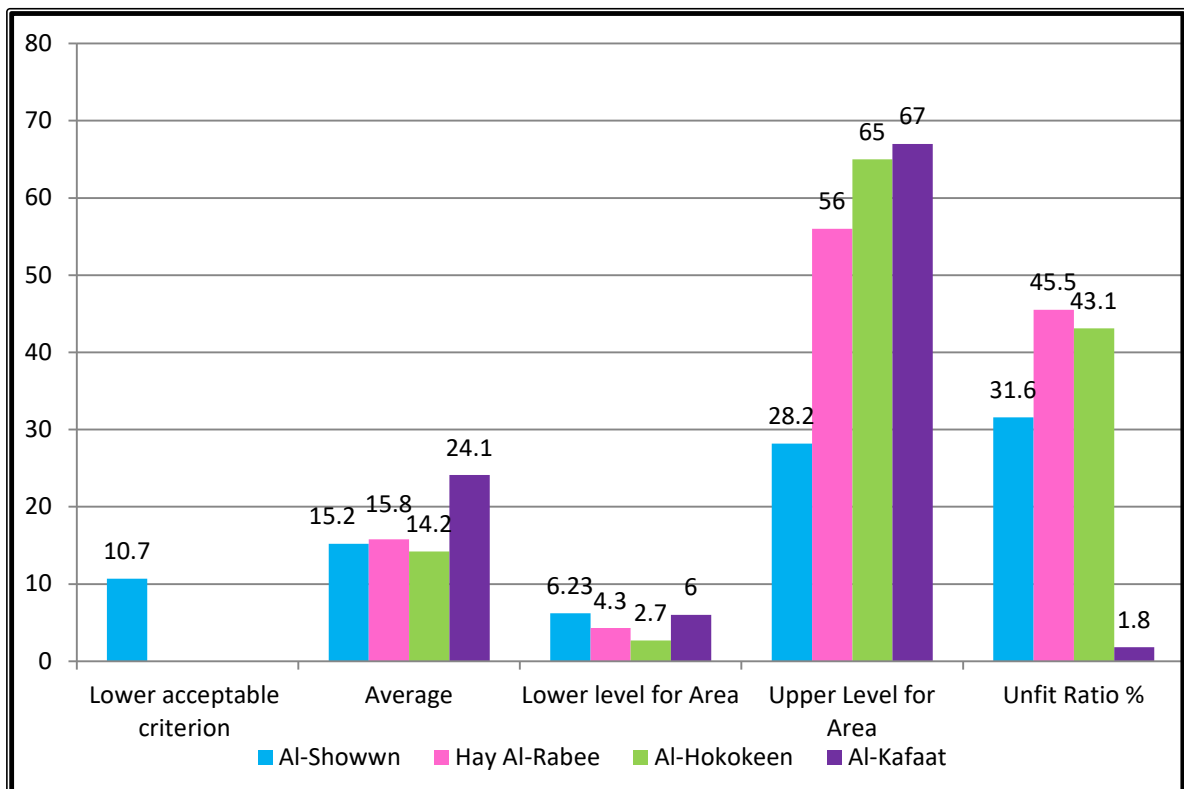


Figure (9) Area crowded (Floor Area /person) in dwelling units in districts.