Sustainable Housing Indicators and Improving the Quality of Life: The Case of Two Residential Areas in Baghdad City

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Abstract. Sustainable housing is one of the most important factors affecting the quality of life. This research focuses on (internal indicators), including (affordable housing, and the conditions of the dwelling unit to live, and (external indicators) including the social services, infrastructure, transport, identity, safety and security, and environmental pollution. This was done by studying two residential areas in the city of Baghdad, which differed in the social, economic, environmental, and urban aspects, which are (Al-Sadr neighborhood and Al-Muthanna neighborhood). The research has adopted the descriptive method, and comparative quantitative analysis, to indicate the degree of satisfaction of the residents by relying on the five-step Likert scale (strongly disagree - strongly agree). The Contingency Coefficient test was used to evaluating the levels of the responses of the observed frequencies of sustainable housing and the quality of urban life. The results of the research showed that most of the sub-indicators have made a significant difference for Al-Muthanna neighborhood. While the other indicators: commercial services, public transport services, safety and social security have made a significant difference for Al-Sadr neighborhood. The research reached to develop proposals towards improving and developing indicators that to achieve balance and justice in achieving sustainable housing and good quality of urban life.

1. Introduction:
The issue of improving the quality of urban life is an essential subject or its relationship with the concept of creating a livable environment and achieving the well-being of people. The effects of increasing urbanization considerably influenced living and housing conditions, consequently the quality of life in cities, especially for low-income inhabitants. Sustainable development goals are extremely associated with the concepts of quality of life, well-being, health, quality of place, and live ability [1].

The research problem has been determined in the disparity of sustainability of the residential environment, which was negatively reflected, in the quality of urban life.

The aim of the research is to evaluate the level of urban quality of life through sustainable housing indicators, based on subjective indicators [2]. This was done by defining the opposing spatial dimensions by electing two study areas, namely Al-Muthanna (neighborhood 714) and Al-Sadr (neighborhood 532) in city of Baghdad, as two different models in urban characteristics, to identifying housing indicators of relative importance in assessing the quality of urban life spatially by estimating the size of the gaps between them, in order to improve the quality of urban life in the future.
2. Methodology:
This paper adopted a comparative quantitative method and a descriptive analysis method as well as primary and secondary data sources in collecting the data. A questionnaire survey has been applied with face-to-face interviews with the residents as the main research instrument to collect primary data for practical preparations to investigate the satisfaction level of the residents by relying on the five-step Likert scale (strongly disagree - strongly agree). The questionnaire has been distributed to (100) respondents in a random sample for each study area.

The research uses a Contingency Coefficient (C.C.) test to investigate if there is a difference or not between the observed frequencies of the two samples, and the weighted means of frequencies by apply the Likert five-point scale that rating from (1=Strongly Disagree) to (5=Strongly Agree) to be able to reach specific quantifiable results. The literature for each main indicator paragraph has been briefly covered, followed by the tables for analyzing the observed results directly for each indicator.

3. Choosing the two study areas within the city of Baghdad:
To analyze the current situation and diagnose the sustainability in housing and the level of urban quality of life in the city of Baghdad, two district urban residential areas of Baghdad city were studied as a local model for measuring the proposed indicators, which are: Al-Muthanna (neighborhood 417), and Al-Sadr (neighborhood 532). Figure 1 shows the study areas.

Figure 1. Illustrates the study areas in Baghdad city [3].

4. Sustainable Housing Indicators:
Housing is considered a central issue of sustainable development as represented by the idea of sustainable housing due to its crucial influence on the daily lives of people, their health, and well-being with various dimensions including the environmental, social, cultural, and economic dimensions and on the present and future generations. Since housing is also considered part of the relationships between society and the environment. Housing serves main two interrelated functions [4]:

1. Housing as physical structure – residential buildings: (their design, size, construction, material qualities, their spatial organization within the physical environment), and consequently the environmental impacts on housing and vice versa [5].

2. Housing as a social structure – habitation: (based activities, social groups, lifestyle, socio-economic characteristics, and their interactions with local inhabitants and society).
According to the most common definition proposed by Brundtland Commission (1987) that views sustainable development in terms of fulfilling the human needs of present generation so that didn't hazard the ability of future generation to meet their own needs [6]. Therefore, housing satisfies one of the major personal needs thus affects the quality of life and can be considered associated with the guarantee of human rights. Based on the core of sustainable development, sustainable housing aims to guarantee a better quality of life for present and future generations.

The sustainable housing in the UN-HABITAT agenda (2012) [5, 4] has been defined as a residential environment that is:

1. Healthy place, robust, safe, and secure.
2. Affordable for the whole spectrum of incomes.
3. Provided with appropriate, affordable energy, water, sanitation, and recycling facilities.
4. Resilient to endure the impact of potential environmental hazards.
5. Using adequate, ecological low-energy, and cost-effective building materials.
6. Well preserved from various pollution types and insure well access to quality green space.
7. Linked with jobs, commercial facilities, health, and education services.
8. Supported the social, cultural values of the local communities in neighborhoods.
9. Using efficient renewable energy sources to maximize energy conservation.
10. Supported with sustainable transportation alternatives.
11. Protected from external pollution and not contributed to environmental pollution.

Sustainable Housing within a broad concept consist not only the dwelling unit but also the surrounding environment. Sustainable housing indicators can be beneficial decision-supporting tools in promoting a better urban quality of life and sustainable development by addressing the decision-making challenges about sustainability. There is no single adequate set of indicators to monitor or evaluate sustainable housing. It varies from place to place and according to the different purposes of studies. Sustainable Housing indicators should positively be integrating the social-cultural, economic, physical, and environmental dimensions of sustainability [7].

Sustainable Housing indicators can be classified into two types, the first type has to do with the indicators of the quality of housing (the internal environment), and the second type has to do with the indicators of the residential surrounding environment (the external environment).

### 4.1 Housing Quality Indicators (the internal environment):

The quality of housing and it’s social, economic, and environmental performance is critically important to sustainable development. The definition of housing quality differs widely based on researches trends and perceptions. The quality of housing can be defined as the provision of housing that should meet the needs and expectations of the resident with attaining a range of excellent criteria [8]. Housing quality may be a significant component in the public debate and research interest that showed associations with people's life satisfaction, well-being and happiness, and quality of life. Numerous studies have reported that the quality attributes are related to internal quality. Within this concept, housing quality attributes include aspects concern as interior design characteristics, for example, dwelling size, type, number of rooms per person, appropriate and efficient circulation between spaces, ventilation, adequate sunlight, and so on [9].

The housing quality indicators will be analyzed in according to the indicators that relate to the housing environment at the level of the dwelling unit, which will be discussed in this research from the results of the questionnaire, which include as below:

#### 4.1.1 Affordability:

The availability of affordable housing is one of the basic indicators of sustainable housing quality and it is directly related to household income level since it indicates the ability of different social groups or different spectrum of incomes in the city to bear housing expenses without affecting other basic living costs on a sustainable basis [10, 11].

The most common approach for evaluation and measurement of housing affordability is the house cost or price-to-income ratio or rent-to-income (less than 30% income rule) [12]. Numerous studies
have discussed the problem of the emergence of housing stress is a result of reduced housing affordability [10, 12], as the cost of purchasing or renting an adequate house consumes the largest portion of the household’s income, which affects its ability to insuring a better quality of housing, and then enjoying a better quality of life. Therefore, high housing costs could be a negative factor affecting a household’s welfare and its economic security, especially for low and moderate-income groups [13]. Table 1 shows the frequencies seen in Al-Muthanna and Al-Sadr neighborhoods.

**Table 1.** Availability of affordable housing indicators for the two research samples and their comparisons.

| Affordability Indicator | Neighborhood | Al-Sadr 532 | Al-Muthanna 714 | C.S. * P-value |
|-------------------------|--------------|-------------|-----------------|----------------|
| Adequate housing available within the financial capabilities (household income) | Strongly Disagree | 30 | 12 | CC=0.390 |
| | Don’t agree | 56 | 38 | |
| | Neutral | 13 | 30 | P=0.000 |
| | Agree | 1 | 20 | HS |
| | Strongly agree | 0 | 0 | |
| Weighted mean | 1.85 | 2.58 | |

* HS: Highly Sig. at P<0.01; Testing based on a Contingency Coefficient (C.C.) test.

The results in Table 1 indicate that there is a highly significant difference between the two places in Contingency Coefficient (C.C.) test and that the weighted mean in the Al-Muthanna neighborhoods is higher than the weighted mean in Al-Sadr neighborhood with relation to adequate housing available on the market within the financial capability.

4.1.2 Adequate housing for living (design, construction, and appearance):
Housing is not being appropriate for a living if it hasn’t guaranteed physical safety, protection from (cold, humidity, heat, rain, and wind) and other risks to health [14], and each country sets its building requirements and standards. For example, the U.S. Department of Housing and Urban Development has identified some structural conditions that must be met in each housing unit, to be counted as an adequate house, and included housing quality standards performance requirements for the ceilings, walls, windows, doors, and floors [15]. It’s about the physical attributes of the dwelling unit which helps fulfill the household’s needs to achieve a higher level of satisfactory living conditions.

Physical conditions related to housing design layout and construction such as house size, amount of usable space, construction materials, appearance, and finishes are considered important requirements to achieve livability [16]. Housing appearance and aesthetics have strong implications on housing quality and have an influence to occupants’ satisfaction, aspirations [17], and their quality of life. Table 2 shows the results of evaluating the adequate housing index in general considering the suggested scale in this research.

**Table 2.** Availability of Adequate Housing Index for the two research samples and their comparisons.

| Adequate Housing Index | Neighborhood | Al-Sadr 532 | Al-Muthanna 714 | C.S. * P-value |
|------------------------|--------------|-------------|-----------------|----------------|
| Appropriateness of interior design and availability of enough spaces in a housing unit | Strongly Disagree | 8 | 1 | CC=0.462 |
| | Don’t agree | 31 | 8 | P=0.000 |
| | Neutral | 27 | 13 | HS |
| | Agree | 32 | 44 | |
| | Strongly agree | 2 | 34 | |
The results in Table 2 indicate that the neighborhood of Al-Muthanna recorded a significant increase in the quality of the housing unit from the neighborhood of Al-Sadr.

4.2 Indicators of the neighborhood (the context):
A body of studies applied an expanded understanding of the quality of housing that moved to the attributes of external environments (neighborhoods), such as location, buildings appearance (aesthetic values) [18], the green coverage, and the layout of roads and walkways [8].

On the other hand, the quality of the living environment does not interpret only the physical features, but also the social and personal aspects, such as a sense of security, privacy, and sense of place. Furthermore, the environmental dimension of housing quality can influence public health and focused on indicators such as noise and air quality [19].

The indicators of the quality of the neighborhood will be analyzed in the light of satisfaction with the characteristics related to the urban environment, as results of the questionnaire, which include the following:
1. Social utility includes education, health, and commercial services.
2. Infrastructure, including clean drinking water supply and sanitation network efficiency.
3. Transport services.
4. Indicators of local identity and place personality.
5. Safety and Security.
6. Environmental pollution.

4.2.1 Social utility
The quality of social utility is a basic requirement for good urban communities. The most prominent of these services are education, health, and commercial services [5].

(a). Educational services:
Education at its various levels is the foundation to achieve sustainable development. It is a key tool for promoting social justice, equality, increase democratic participatory systems, and cultural identity [20].

The quality of primary and secondary education services and its accessibility (within walking distance from the dwelling unit) has been evaluated based on the Likert phased five-step scale (Strongly disagree - Strongly agree) as shown in Table 3.
Table 3. Frequencies and comparison of satisfaction indicators of educational services for the two research samples.

| Educational Services Index | Neighborhood Categories | Al-Sadr 532 No. | Al-Muthanna 714 No. | C.S. a P-value |
|----------------------------|------------------------|----------------|---------------------|---------------|
| Quality and adequacy of primary schools | Strongly Disagree | 18 | 0 | CC=0.464 |
| | Don’t agree | 55 | 30 | P=0.000 |
| | Neutral | 22 | 29 | |
| | Agree | 5 | 35 | |
| | Strongly agree | 0 | 6 | |
| Weighted mean | | 2.14 | 3.17 | |
| Quality and adequacy of secondary schools | Strongly Disagree | 7 | 0 | |
| | Don’t agree | 47 | 24 | CC=0.446 |
| | Neutral | 44 | 36 | P=0.000 |
| | Agree | 2 | 39 | |
| | Strongly agree | 0 | 1 | |
| Weighted mean | | 2.41 | 3.17 | |
| Accessibility to primary schools within walking distance. | Strongly Disagree | 0 | 0 | |
| | Don’t agree | 1 | 2 | |
| | Neutral | 7 | 6 | CC=0.055 |
| | Agree | 44 | 47 | P=0.895 |
| | Strongly agree | 48 | 45 | |
| Weighted mean | | 4.39 | 4.35 | |
| Accessibility to secondary schools within walking distance. | Strongly Disagree | 11 | 0 | |
| | Don’t agree | 28 | 6 | CC=0.418 |
| | Neutral | 34 | 35 | P=0.000 |
| | Agree | 24 | 37 | |
| | Strongly agree | 3 | 22 | |
| Weighted mean | | 2.8 | 3.75 | |

a HS: Highly Sig. at P<0.01; NS: Non-Sig. at P>0.05; Testing based on a Contingency Coefficient (C.C.) test.

The results of Table 3 show that there are significant differences between the two places in the sub-indicators that relate to the quality of primary and secondary schools, as well as the accessibility to the secondary school in favor of Al-Muthanna neighborhood, while no significant difference was made in the accessibility to primary schools sub-indicator.

(b) Health services:
Health services are an important indicator for measuring livability and urban quality of life in the city [21]. In this context, the research proceeds to evaluate the quality of health services available within the framework of the residential area, and their accessibility, see Table 4.
Table 4. Frequencies and comparison of satisfaction indicators of health services for the two research samples.

| Health Services Indicators | Neighborhood Categories | Al-Sadr 532 No. | Al-Muthanna 714 No. | C.S. a P-value |
|----------------------------|------------------------|-----------------|---------------------|----------------|
| Quality and adequacy of health services | Strongly Disagree | 8 | 0 | |
| | Don’t agree | 40 | 21 | |
| | Neutral | 49 | 41 | CC=0.427 |
| | Agree | 3 | 31 | P=0.000 |
| | Strongly agree | 0 | 7 | HS |
| Weighted mean | 2.47 | 3.24 | |
| Accessibility to health services | Strongly Disagree | 0 | 0 | |
| | Don’t agree | 11 | 6 | CC=0.177 |
| | Neutral | 32 | 20 | P=0.090 |
| | Agree | 43 | 57 | NS |
| | Strongly agree | 14 | 17 | |
| Weighted mean | 3.6 | 3.85 | |

a HS: Highly Sig. at P<0.01; NS: Non-Sig. at P>0.05; Testing based on a Contingency Coefficient (C.C.) test.

The results of Table 4 indicated that there are significant differences for the sub-indicators that relate to the quality of health services and the adequacy of their number in favor of Al-Muthanna district, and there are no significant differences in accessibility sub-indicator.

(c) Commercial services:
The importance of this indicator lies in being one of the necessities of contemporary daily life, and to meet the different material needs of daily food and non-food commodities, see Table 5.

Table 5. Frequencies and comparison of satisfaction indicators of the quality of commercial services for the two research samples.

| Commercial Services Indicators | Neighborhood Categories | Al-Sadr 532 No. | Al-Muthanna 714 No. | C.S. a P-value |
|-------------------------------|------------------------|-----------------|---------------------|----------------|
| Availability of commercial services | Strongly Disagree | 0 | 0 | |
| | Don’t agree | 1 | 0 | CC=0.235 |
| | Neutral | 11 | 25 | P=0.009 |
| | Agree | 66 | 45 | HS |
| | Strongly agree | 22 | 30 | |
| Weighted mean | 4.09 | 4.05 | |
| Accessibility | Strongly Disagree | 2 | 0 | CC=0.344 |
| | Don’t agree | 1 | 15 | P=0.000 |
| | Neutral | 11 | 26 | HS |
| | Agree | 58 | 34 | |
| | Strongly agree | 28 | 25 | |
| Weighted mean | 4.09 | 3.69 | |

a HS: Highly Sig. at P<0.01; Testing based on a Contingency Coefficient (C.C.) test.

The results showed that there are significant differences between the two places in the availability of marketing and commercial services as well as easy in easy access to them in favor of the Al-Sadr neighborhood.

4.2.2. Infrastructure Indicators:
The availability of adequate urban infrastructure and services (public water supply, sanitary sewer, transportation, public spaces, etc.) serve as a backbone for any residential improvements and are vital
for community health, safety, and quality of life [4]. Table 6 shows the frequencies, and the comparison between the infrastructure services in the two study areas, represented by the supply of clean drinking water and the efficiency of the sewage network.

**Table 6.** Frequencies and comparison of satisfaction with the indicators of infrastructure services for the two research samples.

| Infrastructure Services Indicators | Neighborhood Categories | Al-Sadr 532 No. | Al-Muthanna 714 No. | C.S. * | P-value |
|-----------------------------------|-------------------------|-----------------|---------------------|--------|---------|
| Availability of clean drinking water | Strongly Disagree | 8 | 2 | CC=0.212 | |
| | Don’t agree | 53 | 40 | P=0.024 | |
| | Neutral | 27 | 43 | |
| | Agree | 12 | 15 | S |
| | Strongly agree | 0 | 0 | |
| Weighted mean | 2.43 | 2.71 | |
| Efficiency of the sewage network | Strongly Disagree | 8 | 0 | CC=0.528 | |
| | Don’t agree | 40 | 4 | P=0.000 | |
| | Neutral | 29 | 16 | HS |
| | Agree | 22 | 56 | |
| | Strongly agree | 1 | 24 | |
| Weighted mean | 2.68 | 4 | |

* HS: Highly Sig. at P<0.01; S: Sig. at P<0.05; Testing based on a Contingency Coefficient (C.C.) test.

The results of Table 6 indicated that the sub-indicator of the Availability of clean drinking water for the Al-Sadr neighborhood has decreased significantly, compared to the Al-Muthanna neighborhood, and highly significant difference to Al-Muthanna in the sub-indicator of sewage network.

**4.2.3. Transport services:**

Table 7 shows the frequencies and the comparison between the indicators of the quality of the neighborhood, represented by the availability of public transport services, and the traffic intensity in the streets.

**Table 7.** Frequencies and comparison of satisfaction indicators of transportation services for the two research samples.

| Transportation Services Indicators | Neighborhood Categories | Al-Sadr 532 No. | Al-Muthanna 714 No. | C.S. * | P-value |
|------------------------------------|-------------------------|-----------------|---------------------|--------|---------|
| Availability of transportation services | Strongly Disagree | 0 | 2 | CC=0.593 | |
| | Don’t agree | 4 | 57 | P=0.000 | |
| | Neutral | 17 | 32 | HS |
| | Agree | 75 | 9 | |
| | Strongly agree | 4 | 0 | |
| Weighted mean | 3.79 | 2.48 | |
| Traffic intensity in the streets | Strongly Disagree | 3 | 9 | CC=0.143 | |
| | Don’t agree | 37 | 41 | P=0.242 | |
| | Neutral | 53 | 45 | NS |
| | Agree | 7 | 5 | |
| | Strongly agree | 0 | 0 | |
| Weighted mean | 2.64 | 2.46 | |

* HS: Highly Sig. at P<0.01; NS: Non-Sig. at P>0.05; Testing based on a Contingency Coefficient (C.C.) test.
The results of Table 7 indicated that the sub-indicator of the Availability of transportation services in the Al-Sadr neighborhood is favorable with highly significant difference, and there is no significant difference between the two places in the sub-indicator of traffic intensity in the streets.

4.2.4. Indicators of identity and personality of the place

The identity and personality of the place are among the most important elements that distinguish it from other places. It is about the urban design physical and visual characteristics of the built environment and the public realm.

Indicators of identity and personality of the place affect people's well-being and the process of people making a self-decision about the type of places they want to live in [22]. Lang refers to various types of place values (formal, symbolic) related to design characteristics, shapes, and spatial structures as well as the symbols and signs attached to the place [23].

For this research, the sub-indicators include space enclosure [24], streets network planning, design, and spatial organization of squares and open spaces, as well as overcrowding, see Table 8.

Table 8. Frequencies and comparison of indicators of satisfaction with the identity and personality of the place for the two research samples.

| Identity and Personality Indicators | Neighborhood Categories | Al-Sadr 532 No. | Al-Muthanna 714 No. | C.S. a |
|------------------------------------|-------------------------|----------------|---------------------|-------|
|                                    |                         | P-value        |                     |       |
| Satisfaction with the height of the buildings with their relationship to street width to achieve visual comfort (sense of space enclosure). | Strongly Disagree | 0               | 0                   |       |
|                                    | Don’t agree             | 3               | 20                  |       |
|                                    | Neutral                | 10              | 45                  | CC=0.483 |
|                                    | Agree                  | 72              | 34                  | P=0.000 |
|                                    | Strongly agree         | 15              | 1                   | HS     |
| Weighted mean                      |                         | 3.99            | 3.16                |       |
| Satisfaction with the streets network planning and accessibility | Strongly Disagree | 0               | 0                   |       |
|                                    | Don’t agree             | 3               | 0                   |       |
|                                    | Neutral                | 0               | 19                  | CC=0.347 |
|                                    | Agree                  | 53              | 56                  | P=0.000 |
|                                    | Strongly agree         | 44              | 25                  | HS     |
| Weighted mean                      |                         | 4.38            | 4.06                |       |
| Satisfaction with the design and spatial organization of open spaces and gardens. | Strongly Disagree | 22              | 4                   |       |
|                                    | Don’t agree             | 65              | 25                  | CC=0.517 |
|                                    | Neutral                | 13              | 49                  | P=0.000 |
|                                    | Agree                  | 0               | 21                  | HS     |
|                                    | Strongly agree         | 0               | 1                   |       |
| Weighted mean                      |                         | 1.91            | 2.9                 |       |
| Feeling crowded                    | Strongly Disagree | 0               | 5                   |       |
|                                    | Don’t agree             | 1               | 18                  | CC=0.591 |
|                                    | Neutral                | 2               | 39                  | P=0.000 |
|                                    | Agree                  | 32              | 34                  | HS     |
|                                    | Strongly agree         | 65              | 4                   |       |
| Weighted mean                      |                         | 4.61            | 3.14                |       |

a HS: Highly Sig. at P<0.01; Testing based on a Contingency Coefficient (C.C.) test.

It is clear from Table 8 that there are highly significant differences in satisfaction indicators with spatial enclosure and street network planning in favor of Al-Sadr neighborhood, and highly significant differences in satisfaction sub-indicators of design and spatial organization of the open spaces as well as with the sub-indicator of the feeling of overcrowding in favor of Al-Muthanna neighborhood.
4.2.5. Safety & Social Security Indicator:

Security and safety are considered one of the most important factors that explain satisfaction with life in urban communities [25]. It is one of the human basic needs and considered an important criterion for a good place. This indicator will be analyzed as in Table 9.

**Table 9.** Frequencies and comparison of indicators of safety and social security for the two research samples.

| Safety and Social Security Indicators | Neighborhood Categories | Al-Sadr 532 No. | Al-Muthanna 714 No. | C.S. *a* | P-value |
|---------------------------------------|-------------------------|-----------------|---------------------|----------|---------|
| Do you feel safe in the neighborhood?  | Strongly Disagree       | 2               | 5                   |          |         |
|                                       | Don’t agree             | 12              | 33                  | CC=0.294 |         |
|                                       | Neutral                 | 35              | 31                  | P=0.001  |         |
|                                       | Agree                   | 34              | 26                  |         | HS      |
|                                       | Strongly agree          | 17              | 5                   |          |         |
| Weighted mean                         |                         | 3.52            | 2.93                |          |         |
| Do you feel safe when walking at night?| Strongly Disagree       | 3               | 5                   |          |         |
|                                       | Don’t agree             | 22              | 41                  | CC=0.229 |         |
|                                       | Neutral                 | 31              | 28                  | P=0.026  |         |
|                                       | Agree                   | 36              | 22                  |         | S       |
|                                       | Strongly agree          | 8               | 4                   |          |         |
| Weighted mean                         |                         | 3.24            | 2.79                |          |         |

*HS: Highly Sig. at P<0.01; S: Sig. at P<0.05; Testing based on a Contingency Coefficient (C.C.) test.*

From Table 9, it was found that there was a highly significant difference when feeling safe in the neighborhood, and a significant difference when feeling safe when walking at night in favor of Al-Sadr neighborhood.

4.2.6. Environmental pollution indicator:

Environmental pollution is considered one of the priority indicators for assessing the urban quality of life and subjective well-being due to its crucial role in public health [26].

It was stated in the Rio de Janeiro Treaty that everyone has the right to a healthy life. Table 10 shows important environmental indicators.

**Table 10.** Frequencies of the environmental pollution indicators and comparison of the two research samples.

| Indicators Related to the Type of Pollution | Neighborhood Categories | Al-Sadr 532 No. | Al-Muthanna 714 No. | C.S. *a* | P-value |
|--------------------------------------------|-------------------------|-----------------|---------------------|----------|---------|
| Satisfaction with the solid waste collection| Strongly Disagree       | 9               | 2                   |          |         |
|                                            | Don’t agree             | 50              | 3                   | CC=0.589 |         |
|                                            | Neutral                 | 29              | 13                  | P=0.000  |         |
|                                            | Agree                   | 12              | 59                  |         | HS      |
|                                            | Strongly agree          | 0               | 23                  |          |         |
| Weighted mean                             |                         | 2.44            | 3.98                |          |         |
| Noise                                     | Strongly Disagree       | 28              | 9                   |          |         |
|                                            | Don’t agree             | 55              | 46                  | CC=0.325 |         |
|                                            | Neutral                 | 15              | 36                  | P=0.242  |         |
|                                            | Agree                   | 2               | 9                   |         | HS      |
|                                            | Strongly agree          | 0               | 0                   |          |         |
| Weighted mean                             |                         | 1.91            | 2.45                |          |         |
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The results of Table 10 indicated that the levels of dissatisfaction with the environmental pollution in Al-Sadr neighborhood are higher than that in Al-Muthanna neighborhood and with high and significant differences.

5. Results:
According to the in advance analyzed results, Table 11 shows the aggregated results as a summary of the descriptive statistics of sustainable housing and the quality of urban life for the two research samples (Al-Muthanna 714, and Al-Sadr 532) and their comparisons. For this research, the essential indicators analyzed were (9), and the secondary was (25).

**Table 11.** The main and secondary indicators of sustainable housing and the quality of urban life for the two research samples.

| Main Indicators       | Sub-indices of Sustainable Housing                                                                 | Al-Sadr 532 | Al-Muthanna 714 | P-value | C.S.  |
|-----------------------|--------------------------------------------------------------------------------------------------|-------------|-----------------|---------|-------|
|                      | No.                                                                                             | Weighted mean | Weighted mean |         |       |
| Affordability         | Adequate housing for living/affordability                                                      | 1.85        | 2.58            | 0.000   | HS    |
|                       | Adequate housing for living/appropriateness of interior design and enough spaces.              | 2.89        | 4.02            | 0.000   | HS    |
| Sustainable Housing   | Adequate housing for living/the external appearance.                                            | 2.42        | 3.76            | 0.000   | HS    |
|                       | Adequate housing for living/durability of building materials.                                  | 3.64        | 3.92            | 0.000   | HS    |
|                       | Quality of primary schools.                                                                    | 2.14        | 3.17            | 0.000   | HS    |
| Educational Services  | Quality of secondary schools.                                                                  | 2.41        | 3.17            | 0.000   | HS    |
|                       | Accessibility to primary schools.                                                               | 4.39        | 4.35            | 0.895   | NS    |
|                       | Accessibility to secondary schools.                                                             | 2.8         | 3.75            | 0.000   | HS    |
| Health                | Quality and of health services.                                                                | 2.47        | 3.24            | 0.000   | HS    |
|                       | Accessibility to health services.                                                               | 3.6         | 3.85            | 0.090   | NS    |
| Commercial            | Availability.                                                                                    | 4.09        | 4.05            | 0.009   | HS    |
|                       | Accessibility.                                                                                  | 4.09        | 3.69            | 0.000   | HS    |
| Infrastructure        | Availability of clean drinking water.                                                           | 2.43        | 2.71            | 0.024   | S     |
| Transportation        | Efficiency of the sewage network.                                                               | 2.68        | 4                | 0.000   | HS    |
|                       | Availability of transportation.                                                                | 3.79        | 2.48            | 0.000   | HS    |
|                       | Traffic intensity in the streets.                                                               | 2.64        | 2.46            | 0.242   | NS    |
|                       | Space enclosure.                                                                                | 3.99        | 3.16            | 0.000   | HS    |
|                       | Street network planning and accessibility.                                                      | 4.38        | 4.06            | 0.000   | HS    |
| Identity and Personality| Design and spatial organization of open spaces and gardens.                                      | 1.91        | 2.9              | 0.000   | HS    |
|                       | Crowded.                                                                                        | 1.39        | 2.86            | 0.000   | HS    |
| Safety                | Feel safe in the Neighborhood.                                                                 | 3.52        | 2.93            | 0.001   | HS    |
|                       | Feel safe when walking at night.                                                                | 3.24        | 2.79            | 0.026   | S     |
| Pollution             | Solid waste collection.                                                                        | 2.44        | 3.98            | 0.000   | HS    |

* HS: Highly Sig. at P<0.01; S: Sig. at P<0.05; Testing based on a Contingency Coefficient (C.C.) test.
6. Suggestions:

In this analysis phase, the analyzed outcomes offer a great opportunity to allow several alternative solutions and interventions to be proposed based on the framework of priorities between indicators. The analyzed comparison results of the weighted mean scores between the two study area samples obtained from Table 1 indicate different priorities of critical indicators and sub-indices that need response action plans. Table 12 shows the indicators that differ significantly in favor of Al-Muthanna 714, or in favor of Al-Sadr neighborhood 532, which requires improvement and development to achieve balance and justice in achieving sustainable housing and high levels of urban quality of life.

Table 12. The indicators, which require improvement and development to achieve balance and justice in achieving sustainable housing and high levels of urban quality of life.

| General Indicators     | Sub-indices of Sustainable Housing                                      | Al-Sadr 532 | Al-Muthanna 714 |
|------------------------|-------------------------------------------------------------------------|-------------|-----------------|
| Sustainable Housing    | Affordability                                                           | √√          | √               |
|                        | Adequate housing for living/                                           |             |                 |
|                        | appropriateness of interior design and                                 |             |                 |
|                        | enough spaces.                                                         |             |                 |
|                        | Adequate housing for living/the external                               | √√          | √               |
|                        | appearance.                                                            |             |                 |
|                        | Adequate housing for living/                                           | √√          | √               |
|                        | durability of building materials.                                       |             |                 |
|                        | Quality of primary schools.                                             | √√          | √               |
| Educational Services   | Quality of secondary schools.                                           | √√          | √               |
|                        | Accessibility to primary schools.                                       | √√          | √               |
|                        | Accessibility to secondary schools.                                     | √√          | √               |
| Health                 | Quality and of health services.                                         | √√          | √               |
|                        | Accessibility to health services.                                       | √√          | √               |
| Commercial             | Availability                                                            | √           | √√              |
|                        | Accessibility                                                            | √           | √√              |
| Infrastructure         | Availability of clean drinking water                                    | √√          | √               |
|                        | Efficiency of the sewage network                                        | √√          | √               |
| Transportation         | Availability of transportation.                                         | √           | √√              |
|                        | Traffic intensity in the streets.                                       | √           | √√              |
|                        | Space enclosure                                                         | √           | √√              |
| Identity and Personality| Street network planning and accessibility.                              | √           | √√              |
|                        | Design and spatial organization of open spaces and gardens.             | √√          | √               |
|                        | Crowded.                                                                | √           | √               |
|                        | Feel safe in the neighborhood.                                          | √           | √√              |
|                        | Feel safe when walking at night.                                        | √           | √√              |
|                        | Solid waste collection.                                                 | √           | √√              |
| Pollution              | Noise.                                                                  | √           | √               |
|                        | Air pollution.                                                          | √           | √               |
Major Priority (needs improvement) ✓
Minor Priority ✓
Inconsiderable

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