Impact of physical expansion on community services

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Abstract. Community services are considering as the basic services for society, that the population increasing generates great pressure on those services. So, the research problem was represented, by increasing the population, the accompanying changes in land use, and physical expansion, which lead to an increase in the demand for community services. The research aims to study the reality of the community services and extent of their compliance with physical expansion and their conformity for planning criteria. The theoretical side deals with a number of concepts, including and physical expansion in the city, as well as the concept of community services and their types and planning criteria. While the practical side included presented the reality of the community services in the study area (Al-Shu’ala city), and measuring and analyzing the impact of physical expansion on those services. Finally, the research is reached to a number of conclusions, the most important one, which is study area, is satisfied clear deficit, and the actual need for community services. The research recommended, need to adopt approaches to sustainable urban planning, changing some land uses, and moving them in and outside the city.

Keyword: Physical expansion, Community services, Sustainable urban planning, GIS.

1. Introduction
Community services are one of the basic services for the community, and they reflect the state of development that that community has reached, so, in the case of population increasing, and then physical expansion, will generate great pressure on those services. Hence the importance of this research is to studying the effects of physical expansion on those community services. While the research problem is summarized in: The increases in population size, population density, and physical expansion, as well as the change in land use, have led to an increase in the demand for community services spatially (educational, health and recreation).

The research also adopted a hypothesis that: The low level of community services in light of physical expansion and high population density, which negatively affected the planning criteria for these services.

The aim of the research was to study and analyze the impact of physical expansion on community services, and the extent to which they correspond to that expansion and planning criteria's. It was adopted the descriptive and quantitative analytical method, as well as using the geographic information systems (GIS). The spatial and temporal boundaries of the research were "Shu’ala City: It is one of the regions in the city of Baghdad" in the year 2020.

For the purpose of verifying the hypothesis and reaching the goal of the research, it was covered in two main sections: The first of them included: Identifying some of the concepts related to physical expansion, the way it takes place, and its effects on the overall life in the city, as well as studying the concept of community services and their main types. The second sections comes to deal with the study...
area (the city of al-Shuala, which is one of the districts of the city of Baghdad), and analysis of physical expansion in the study area, and then measuring and analyzing the impact of that expansion in the main studied community services (education, health and entertainment), by comparing the status of these services have reached as a result of physical expansion, with the planning criteria. The study concludes with a set of conclusions and recommendations.

2. Physical expansion and community services (the theoretical side)

2.1 Physical expansion

Physical expansion is defined as the crafting of abstract material elements in a social and cultural tone into configurations of durability and functional utility. The term expansion indicates to increase the dimensions of the built field in the vertical and horizontal direction (Hamza, Maryam Baghloul, 2010, p.7).

Physical expansion is also defined as the continuous increase in the number of regular and irregular housing, and this leads to an increase in the demand for agricultural lands adjacent to the built-up area, and in turn affects the ecological balance (Al-Azzawi, 2005, p. 59).

Thus, it can be said that physical expansion expresses the increase in the urban structure within the city, and its outskirts, and that process is accompanied by a change in the use of the land.

Patterns of physical expansion:
The city takes different patterns of expansion over time, including the following (Al-Dulaimi, 2015, p. 133):

A- Horizontal expansion: cities expand horizontally towards the surrounding suburbs and towns. When land is available and its value decreases, then low-rise houses are often built.

B- Expansion vertically: When less plots of land in the city with high prices, the population tends to Heightening their buildings, so that, the largest number of homes and offices, and sometimes with the demolition of old buildings, and established a modern buildings instead.

C- Establishing new neighborhoods around the city to relieve pressure on it. The choice of any pattern for the expansion of the city must to be in harmony with the structure of the urban city, and solve its problems, it is required studying the potential and limitations within the master plan, and outside of the city, to meet the environmental, economic and social challenges.

In addition to the above, physical expansion can happen through increasing the building density, by a process called (Urban Infill).

The physical expansion in cities takes different forms, and they are divided into two main parts, namely:

Planned physical expansion

In this type of physical expansion, government agencies directly intervene in planning and directing urban growth in the city, organizing it and equipping it with public facilities, in order to prevent the chaos that results from poor planning and the emergence of informal areas, so the government seeks to find new housing, or residential land for citizens (Atwi, 2003, p. 125). This type of expansion takes the legal status, and it is carried out by the local authorities themselves, through their specialists from planners, or by seeking the expertise of consultants and companies, whether local or foreign.

Unplanned physical expansion

This form of expansion has several forms, but there are two main forms of it:

A - Cumulative physical expansion: It is considered the simplest type of physical expansion, by filling empty spaces inside the city or on its surroundings, it is often spread outside the city master plan in the form of simple housing that lacks community services and infrastructure, this is due to the high prices of Residential lands inside the city (Ibrahim, 2009, p. 228).

B- Multi-core physical expansion: It is the opposite of cumulative expansion, and it means appearing a new city near the old city, in the desire to separate or the existence of low-cost housing, that provides comfort and privacy, and sometimes such cities arise self-emergence and take a special form, but they are linked to various relationships With the original city (Wahiba, 1972, p. 151).
The motives of physical expansion

There are various factors act as motives of the physical expansion process (OCED, 2018, p11-12):

A- Political factors: Decisions issued by government agencies to create residential neighborhoods near agricultural areas, and equipping other residential areas with various services, that help cities expand, create urban centers, increase the demand for neighboring properties, and filling the vacant pockets within the urban fabric of the city.

B- Economic factors: the abundance of economic activities, market movement within the city, and the availability of various job opportunities, making them the interest of rural residents and displacement towards the city, so when the level of per capita income improves, the demand for buying plots of land and housing increases, and in turn contributes to the physical expansion process.

C- Social factors: population growth, and individual preferences for more space, comfort and privacy, as well as luxury options and technological advancement, all that facilitate the process of physical expansion, especially at the outskirts of the city.

D- Technological factors: One of the most important factors that helped in physical expansion is the development of transportation and road construction, which encouraged expansion on the outskirts of the city.

Results of physical expansion

The positive and negative aspects resulting from the physical expansion process for each city differ according to its peculiarities, these aspects are represented by the following (Angel, and others, 2005, p6-7):

1- Positive aspects:

A- Less land consumption when vertical physical expansion, and easy mobility in the city, as neighborhoods converge together.

B - Physical expansion contributes to increasing job opportunities.

C - Homes on the outskirts of the city have a large area, and there is more comfort and privacy for their residents.

D- The decrease in the deprivation level of housing, in other words, the increase in personal real estate ownership.

2- Negative aspects:

A - Consumption of green and agricultural areas located on the outskirts of cities.

B - Long business or shopping trips between the center and the city sides.

C - Increasing levels of pollution and high consumption of energy and services.

D- Horizontal physical expansion requires long supplies of infrastructure networks, which constitutes added costs.

E- The lifestyle is less exciting, and increases social fragmentation when separate housing units appear.

F - The negative impact of a decrease in the services index provided to citizens.

It is evident from the foregoing that physical expansion is an inevitable process, which is occurring for every urban center over time, brings with it what is desired and what is not. This requires focusing on its positive aspects and developing them, while developing appropriate plans, and procedures to avoid or reduce the undesirable aspects in it, especially the quality of life in the city.

2.2 Community Services

Community services are defined as activities that the public and private sectors provide to the population in a city, for the purpose of providing decent livelihoods and improving living standards (Ghoneim, 2013, p. 121). Community services are based on allocating a diversity of land uses where some or all of the city's residents meet, to meet their social needs that cannot be dispensed with. The community services include education, health and entertainment services, which human settlements need without exception (Al-Taif and other. 2009, p. 110). Community services also include cultural
and religious services, but the research will address the first three types, for their importance in the life of the population in the city.

**Educational services**

Educational services are among the most important community services that the city provides through its main and necessary functions to its residents in various ways and forms, and it seems to have a great impact on the life of the city and society because education is an effective tool of civilization, social, cultural and economic construction, in addition to its role in the development and advancement of societies (Al-Hayti, 2013, p.95). Educational services can be classified according to the stages of education as follows (UNESCO, 2006, P16-39):

A- Pre-primary education (kindergarten): It is an introductory phase for regular education, and young children from 4-5 years old are accustomed to the school environment. The duration of education may be two years.

B - Primary education: the period of study is six years, during which children are enrolled from the age of six years, and the regular learning of reading-writing book, and arithmetic, as well as history, geography, social sciences, and arts, which is the first stage of basic education.

C - Intermediate education: It starts after the completion of the primary stage, and continues for a period of three years, which is the second stage of basic education.

D - Secondary education: It includes the education stage from the fourth to the sixth secondary, and it continues for a period of three years after the intermediate education stage, and it is sometimes called the intermediate education.

E - Vocational education: This includes education in technical and vocational specializations, which begins after the intermediate education stage, and continues for a period of three years, in order to obtain a qualification suitable for the labor market. In addition to the eligibility of outstanding students to continue their university studies.

E - Technical and university education: This represents the final stage of education. The student acquires scientific and practical skills. The technical education for a period of two years, and the student gets a diploma, either the study of the university shall be four years or five, and the student gets a bachelor’s degree, as well as Postgraduate studies.

**Health services**

Health services Defined as all activities provided to take care of members of society and maintain their safety. The governments should provide this service to all residents, and maintain acceptable levels of service and develop it continuously (Mcnaugh, 1991, p17). Health services can be classified according to the nature of the service as follows (Bin Ghadban, 2015, pp. 116-118).

A- Hospitals: They are the largest health institutions, all types of treatment, operating theaters, and analysis laboratories are available in them, and include a number of general and subtle specialties. The hospitals are usually concentrated in major and central cities.

B- Health centers: They are the most widespread health institution, as it is found in urban and rural areas.

C- Health care centers: Their role is limited to providing periodic vaccinations, medicines for chronic diseases, and following up on health affairs in the city.

D- Motherhood, Childhood and Family Centers: It specializes in caring for mothers and children, family health, and providing them with vaccines and medicines.

E- Environmental health: This type of modern institution whose mission is limited to monitoring the cleanliness of the city, in terms of waste and pollution of water, air, soil and others.

F- School health: They are health institutions for school students to provide a healthy environment suitable for study.

G- Military medical institutions: These institutions are assigned to members of the army, police and others.

H- Quarantine: Every country works to establish quarantine places for fear of disease transmission and spread among the population, to preserve the health of others, and it is often set up at the border entrances between one country and another inside the country.
I- Mental health clinics: Specializes for people with mental illness to provide them with treatment and care.

Recreational services
Recreation is an important part of a person’s life, and its forms differ according to individual human interests and the surrounding social structure. Recreation is defined as the activity that takes place at leisure for purposes of pleasure and entertainment, whether individually or collectively (ASCE, 1986, P333). There are several types of entertainment services according to the individual's need and the developments taking place in the cities of the world. Among the most important areas for recreational services are the following (Bin Ghadban, Op.Cit, pp.136-138):

A- Parks: It is considered one of the important areas that residents visit to spend time in it, and it is often found within neighborhoods, and at the city level, and it is found in multiple forms such as public gardens, playgrounds, green belts, and animal parks.

B- Sports clubs and stadiums: Sports activities are among the recreational services that most young people of all ages visit to practice their hobbies, such as football fields and swimming pools.

C- Social clubs: They are located at the city level, as professional clubs specialized in one profession are held, such as the Engineers Club, the Teachers Club and others.

D- Public Cafes: There are public cafes in the neighborhoods and cities where entertainment is available.

E- Internet Cafes: Internet cafes appeared in the last decade of the last century, as the individual spends his spare time browsing various scientific, cultural and entertainment Internet sites.

F- Public libraries: Some cities include public libraries that contain various books in all fields, frequented by students of science and culture to learn about, and the desire to develop their skills and knowledge.

G- Archaeological and Heritage Areas: Some cities contain archaeological sites, and heritage buildings with a distinctive architectural art, that attract residents to spend their leisure time.

H- Cinema and theater: It is considered one of the important recreational activities, especially in large cities, as the cinema displays various films, while the theater presents theatrical works that are watched by the audience.

3. The impact of physical expansion on community services for Al-Shuala City

3.1 Study area (Al-Shuala city)
The study area is the city of Al-Shuala, which is located in the northwestern side of Baghdad city, with an area of (1389 hectares) and a population of (302,983) people, and it consists of four residential quarters which are (Al-Shuala, Rahmaniyah, Al-Jawadin, and Al-Khatib) in addition to the Umm Najm area. These neighborhoods consist of ten residential neighborhoods, as shown in the Figure 1, and the study area is limited to the north by the Al-Dwanim agricultural area, and the Baghdad-Ramadi railway, from the south and southwest by the Al-Ghazaliya quater, and from the east by the Al-Dulai quater, as they are separated by the Salahuddin Al-Ayoubi highway. Shuala City represents a residential sector in Baghdad city.

3.2 Population and population density in Al Shuala City
The population in the Shuala city is densely distributed over most of the area, and the population increase occurring in the city as a result of the increase in immigration to it from some of the governorates, and the displacement of residents of other areas after violence that took place in the country in 2006. And the area’s remained constant without change that led to an increase in population density. Table (1) indicates the population and population density in Shuala city.

3.3 Physical expansion in Al-Shuala City
The stages of the construction and expansion of Al-Shuala City can be divided into three phases, starting with the formation of the first residential quarter, which are as
follows (Baghdad Governorate, Al-Shuala District Directorate, 2020 - Baghdad Amanah, Al-Shuala Municipality Department, 2020):

1- The first phase (1960-1973): This was the establishment stage, that the al-Shuala quarter is the first nucleus for the construction of the city of al-Shuala. In 1960 the Iraqi government developed the master plan of the al-Noor quarter (currently al-Shuala quarter), within the district (22) al-Sabiyat. The screening process and building of the Rahmaniyah quarter was began in the same period, it is located to the south of the Shuala quarter, and is separated by the project channel.

2- The second phase (1974-1985): the first expansion phase was began in the year 1974, with the implementation of sorting and construction works to establish the Al-Jawadin quarter, it is located next to the Al-Rahmaniayah quarter, and is separated by Al-Jawadin Street. Also the sorting and construction work to establish the Al-Khateeb quarter was began in the same period, which is located south of the Al-Jawadin quarter, and Rahmaniyah Street separates them.

Figure 1. The residential quarter and neighborhoods in the Shuala city
Source: It was prepared based on the data of the Municipality of Al-Shuala city and the program ARC GIS 10.4
Table 1. The population and population density in Shuala city

| s   | Residential Quarters | Neighborhood number | population | Area (hectares) | Population density |
|-----|----------------------|---------------------|------------|-----------------|--------------------|
| 1   | Al-Shuala district   | 454                 | 71248      | 76.6            | 636                |
|     |                      | 458                 | 52772      | 83.25           | 634                |
|     |                      | 460                 | 60248      | 94.14           | 640                |
|     |                      | 462                 | 37283      | 58.43           | 638                |
| 2   | Rahmaniyah neighborhood | 452              | 19404      | 107.8           | 180                |
|     |                      | 456                 | 17464      | 59.8            | 292                |
| 3   | Al-Jawadin district  | 450                 | 42691      | 145.1           | 294                |
|     |                      | 446                 | 1165       | 10.5            | 111                |
| 4   | Al-Khatib neighborhood | 448              | 11643      | 51.6            | 226                |
| 5   | Umm Najm area        | 464                 | 11601      | 85.3            | 136                |

Source: The table preparing based on (- Ministry of Trade/ Muhammad Rasool allah Supply Branch, 2020. - Baghdad Amanah, Shuala Municipality Department, 2020).

3- The third phase (2000-2010): This phase is explained the second sage of physical expansion in the city of al-Shuala in the year 2000, when the process of sorting and construction began to establish the Umm Najm area, it includes the locality numbered (464), with area of (85.3) hectares. The area is located north of the Shuala quarter. It is bounded on the eastern side by the Saladin Al-Ayoubi highway, and on the north by the Baghdad-Ramadi railway. In the same period of time, the municipality of Al-Shuala carried out the work of filling the project channel between Al-Shuala quarter and Al-Rahmaniyyah quarter, after laying pipes under the ground in its place, and taking advantage of this area by creating a large car park for transportation, al-Shuala quarter park, and a number of football field. Figure 2 shows the stages of physical expansion in Al Shuala City.
Figure 2. Stages of physical expansion in the Al-Shuala city
Source: It was prepared by relying on (- Baghdad Municipality, Al-Shuala Municipality Department,— Program ARC GIS 10.4)

3.4 The environmental reality in Al-Shuala City
The environment is defined as all the physical, chemical and biological effects that surround the human being, as well as the social influences on human health and social activity, that is, we can consider the environment as a set of natural and new factors that live People in it, and leave an impact on their health, activity and production (Al-Kinani, 2005, p. 224). The city of Al-Shuala is undergoing difficult environmental conditions as a result of the high population density, especially in Al-Shuala quarter, in addition to the impact of climate changes, including the unprecedented rise in temperatures and dust storms. The environmental reality and the pollution sources in the study area can be summarized as follows:
A- The increase in the number of cars and small vehicles (teck-teck) in the streets of residential neighborhoods, which led to traffic congestion, and the spread of pollutant gases emitted from vehicles, such as carbon monoxide, nitrogen oxides and other pollutants.
B- The presence of governmental and private electrical generators in residential neighborhoods, which caused air pollution, in addition to the resulting noise, and some generators are adjacent to the walls of schools and health centers.
C- There are car repair workshops inside Al-Shuala residential quarter, extend with Al-Shuala Street, and some of them are distributed randomly, causing congestion in the street, in addition to the blacksmith workshops in the Rahmaniyah quarter causing noise to the residents.
D- There is a market for selling fruits and vegetables called (Al Saha Market), in the middle of the two residential neighborhood (460,458) in the Shuala quarter, with an area of (4 hectares), and another market in the Rahmaniyah quarter, they are caused a source of pollution, as market remnants of damaged goods and waste. In addition to the large number of cars and small vehicles causes noise and congestion.
E- The decrease in green areas in the city of Al-Shuala due to residential excesses (informal housing), as these lands played an important role in softening the city's atmosphere.
F- The residential environment in Al-Shuala City suffers from illegal splits in the housing units, as it splits the housing unit into two parts, that are not suitable for resident in terms of lighting, ventilation and flexibility.

Based on the foregoing, the areas with high population density are more affected by diseases and epidemics, and the best witness to this is the Corona pandemic that swept through the countries of the world, including Iraq. The areas of Baghdad with high population density such as Al-Shuala, Al-Huriya and Sadr City were the most affected by this disease, according to Ministry data Health, which requires the search for solutions to treat these cases, and confront the threat to human health and his residential environment.

3.5 Community Services in Al-Shuala City

The community services in the city of Al Shuala that will be studied in this research include educational, health and entertainment services, as follows:

Educational services in Al-Shuala City

The total number of schools in the Al-Shuala city reached (96) schools for the year 2020, distributed in residential quarter according to the stages of education as shown in Table (2). As it is noticed in the table, there are no kindergartens except in the quarter of Al-Shuala, and the quarter of Rahmaniyah, as well as the absence of schools for intermediate and secondary education in the Umm Najm area, which makes the residents of that area depend on the schools of Shuala quarter. And there is a clear deficit in the number of school building which reached (29) building. So the phenomenon of double and triple duplication appeared in the schools of the area, and this affects the flow of the educational process Correctly, such as reducing the time of lesson, and its insufficiency to complete the educational curriculum, as well as delete some educational and recreational subjects such as sports and art education. This in turn leads to fatigue students and staff education in the school. Table (2) explain Distribution of the schools and school buildings in the Al-Shuala city according to stages of education in 2020.

In order to know the adequacy of educational services in all educational stages, provided to residents of Al-Shuala city for the academic year 2019-2020, the reality of the status of these services was compared with the standards of educational services, so the comparison was according to the two criteria (student / school), and (Student / class), to find the actual need of schools, and then the buildings for all educational levels, as shown in Table (3). It should be noted here, that the quarters of Al-Jawadin, Al-Khatib, and Umm Najm area are devoid of kindergartens, that the total number of children's reached (3571). When compared with the standard of kindergarten (216 children / kindergarten), with a capacity of (6 classrooms), the

| Community (quarter) | Education | Kindergarten | Elementary | intermediate | Preparatory | Secondary | Vocational | commercial | Total |
|---------------------|-----------|--------------|------------|--------------|-------------|-----------|------------|------------|-------|
| Al-Shuala Schools   | 2         | 32           | 9          | 3            | 2           | 1         | —          | —          | 49    |
| Buildings           | 2         | 22           | 7          | 3            | 1           | 1         | —          | —          | 36    |
| Al-Rahmaniyah Schools | 1       | 12           | 2          | 2            | 2           | —         | 1          | —          | 20    |
| Buildings           | 1         | 8            | 1          | 2            | 1           | —         | 1          | —          | 14    |
Table 3. The actual need for schools and buildings for all educational levels in Al-Shuala City

| Education stage | Actual number of schools | Number of buildings | schools required according to the criteria | deficit amount of schools | actual need of school buildings |
|-----------------|--------------------------|---------------------|--------------------------------------------|--------------------------|---------------------------------|
| Kindergarten    | 3                        | 3                   | 23                                          | 20                       | 20                              |
| Elementary      | 59                       | 41                  | 71                                          | 12                       | 30                              |
| intermediate    | 16                       | 11                  | 26                                          | 10                       | 15                              |
| Preparatory     | 9                        | 8                   | 12                                          | 3                        | 4                               |
| secondary       | 7                        | 2                   | 8                                           | 1                        | 6                               |
| vocational      | 1                        | 1                   | 1                                           | —                        | —                               |
| commercial      | 1                        | 1                   | 1                                           | —                        | —                               |
| Total           | 96                       | 67                  | 142                                         | 46                       | 75                              |

Source: It was prepared depending on (Ministry of Education, Third General Directorate of Education in Baghdad/ Al-Karkh, Planning Department, 2020.)

Deficit is (17) kindergartens, then the total deficit is (23) kindergartens in the Al-Shuala city. And also when comparing the total actual number of schools (96 schools) with a total schools required according to the standards (142 schools), the amount of total schools deficit was (46) schools. There are some schools involved in a single building (double dual).

For the purpose of determining the zone of the educational service, for the residential area is relying on a standard distance access (radius of the area served), according to the educational stage. With the help of the program (GIS) has been drawing the zone of service for each school site, for all educational stage. It is noted that the primary schools convergent, and overlapping with each other, as shown in the Figure 3.
As for the intermediate schools, we notice that their service areas are close and overlapping with each other, as shown in the Figure 4. While the service area for the preparatory schools is far apart, so the secondary schools have a regular distribution area that covers most area of the city.

To determining the distribution pattern of educational services, relied on the method of the closest neighbor's coefficient, according to the following (Dawood, 2012, p.52):

1. The distribution pattern is convergent (aggregate) when the value of the closest neighbor is less than (1).
2. The pattern of distribution is random when the value of the closest neighbor is equal to (1).
3. The distribution pattern is regular (divergent) when the value of the neighbor coefficient is closest from (1) to (2).
4. The pattern of distribution is regular when the value of the nearest neighbor coefficient is greater than (2).
Table 4 indicates the area of coverage for each educational stage, the percentage of coverage and the pattern of distribution of educational services sites in the study area. As it is noticed that the study area lacks kindergarten, that only 0.03% of the study area was covered, while the intermediate education stage recorded the largest coverage rate As it reached (79.3%) of the study area. There are areas that are not covered by educational services, especially neighborhood number (446) in Al-Khatib quarter, because of the most its lands are agricultural, and the people overtake them by building random housing.

3.6 Health services in the (Al-Shuala city)

The Health services are among the necessary services provided to the residents of Al-Shuala city, as there are several health centers distributed in the residential quarter of the city, to treat and diagnose primary disease cases, in addition to providing vaccinations for mother and child care, and school health services, there are (6) health centers distributed in the study area. Also the Al-Shuala city contains a general hospital, with a capacity of (200) beds, and an area of (21700 square meters).

In order to know the level of efficiency of health services provided to residents of the Al-Shuala city, the reality of the status of those services was compared with the standards of health services. The comparison was according to the criterion (health center / person), to find the amount of actual need from health centers, and the zone of service, to know the coverage area for health services.

| Education stage | Coverage area (Hectare) | space of study area (hectares) | Coverage ratio | Nearest neighbor coefficient | Distribution pattern |
|-----------------|-------------------------|-------------------------------|----------------|-----------------------------|---------------------|
Source: It was prepared depending on the program of ARC GIS 10.4.

A- Criterion (health center / person).
There are (6) health centers in the Al-Shuala city, to serve residents of (302983) people, according to the estimates of the Ministry of Planning / Central Statistical Organization for the year 2020. But there is a main health center for each (12,000 residents) according to the criterion. When Comparing that criterion with the reality of the health services situation, it became clear that there is a deficit of (19) major health centers, as shown in Table 5.

| Health center | Served Persons | Health Criteria (center/person) | current number of health centers | required number according to the standard | deficit |
|---------------|----------------|--------------------------------|----------------------------------|--------------------------------------------|--------|
| Major health center | 302983 | 1/12000 | 6 | 25 | 19 |

Source: It was prepared depending on: The Ministry of Health / Baghdad Al-Karkh Health Department / Al -Kadhimiya Sector 2020.

The existing hospital in the Al-Shuala city with a capacity of (200) beds, covers the study area in terms of health services, that is according to hospital criteria, and the planning controls in the Iraqi Ministry of Health, stipulated that the number of people served shall not be less than (50,000) people, to establish a general hospital with a capacity of (100 beds) as a minimum, and the important condition is that the distance from the nearest hospital is not less than (20) km.

B- The Zone of Health Service:
For the purpose of determining the zone of service for the location of each health center in the study area, a map was prepared showing the real locations of the health centers, and the service zone for each one, according to the approved criteria with the help of the program (GIS), As shown in the Figure 5. It was found that the service range of the six health centers covers (71.4%) of the study area, equivalent to (991.15) hectares, while the distribution pattern of the health center’s sites was random and spaced out, depending on the approach of the closest neighbor’s coefficient as shown In Table (6). We must point out that the western part of neighborhood (446) in the Al-Khatib quarter is not covered by health services, and its area is estimated at (69 hectares). These are empty plots of land belonging to the Ministry of Finance, some of them are agricultural, and some of them are overlooked by the people by building random housing.
Figure 5. Zone of health services sites in Al-Shuala City.
Source: It was prepared depending on the program of ARC GIS 10.4

Table 6. Coverage area and the pattern of distribution of health services sites in the Al-Shuala City

| Number of health centers | Coverage area (Hectares) | space of study area (hectares) | Coverage ratio | Nearest neighbor coefficient | Distribution pattern |
|--------------------------|--------------------------|-------------------------------|----------------|-----------------------------|---------------------|
| 6                        | 991.15                   | 1389                          | 71.4%          | 1.18                        | Far & random        |

Source: It was prepared depending on the program of ARC GIS 10.

3.7 Entertainment services in Al-Shuala City
The entertainment services is important part of the urban activities in the city of the Al-Shuala, the population is practiced that activity at leisure times in recreational places, as children playgrounds, parks, and playgrounds football. The study area includes of (113) site entertainment distributed in the city on the form of playgrounds children, squares play, sports arenas, and parks. To find out the level of efficiency of the entertainment services has been compared the reality of these services with the services criteria. The comparison was according to the criteria of people served by each type of entertainment services. The space of sites criteria for entertainment service. Which is clear that the study area suffers from a deficit in the number of entertainment services sites of all kinds mentioned, especially children's playgrounds, the deficit reached (276) children's playgrounds, (61) sports, (19) playgrounds, And (15) parks distributed in the study area according to the number of inhabitants, for each residential quarter and neighborhood as shown in Table 7.
Table 7. The actual need for entertainment services sites in Al-Shuala City

| type of entertainment services | Served Persons/entertainment Site | number of entertainment services sites | The deficit in the number of services sites |
|-------------------------------|-----------------------------------|---------------------------------------|------------------------------------------|
| Children playground 1-5 Years | Actual criteria 2609 160         | Actual 18 criteria 294                 | 276                                      |
| Playgrounds 6-11 years        | 729 550                           | 58 77                                 | 19                                       |
| Sports arenas 12-18 years     | 1417 480                          | 31 92                                 | 61                                       |
| Park - all ages               | 50497 14400                       | 6 21                                  | 15                                       |
| Total                         | 113 484                           | 371                                   |

Source: It was prepared depending on (- Baghdad Amanah, Al-Shuala Municipality Department 2020, and - Baghdad Governorate, Al-Shuala District Directorate, 2020).

The actual area of any single site of the entertainment services of all kinds was greater than the approved area criteria, but when compute all the areas of all sites we has shown only the playgrounds recorded a surplus of (55922) square meters, while the rest of the recreational services recorded a deficit of (12096) square meters in the children's playgrounds, (31112) square meters in the sports fields, and (432750) square meters in the parks, so the actual need area is (420036) square meters in the study are, as shown in table (8).

Table 8. The actual need of entertainment services areas in the Al-Shuala City.

| type of entertainment services | number of entertainment services sites | area of one site for the entertainment services | total area of each entertainment services | Area (m²) |
|-------------------------------|---------------------------------------|-----------------------------------------------|-----------------------------------------|-----------|
|                               | Actual criteria Actual criteria Actual criteria Actual criteria |                              | Actual criteria Actual criteria Actual criteria Actual criteria | Actual criteria Actual criteria |
| Children playground 1-5 years | 18 294                                | 3003 225                                     | 54054 66150                             | 12096     |
| Playgrounds 6-11 years        | 58 77                                 | 2159 900                                     | 125222 69300                            | 55922     |
| Sports fields 18-12 years     | 31 92                                 | 3448 1500                                    | 106888 138000                           | 31112     |
| Park - all ages               | 6 21                                  | 41275 32400                                  | 247650 680400                           | 432750    |
| Total                         |                                       |                                               |                                         | 420036    |

Source: It was prepared depending on (- Baghdad Amanah, Al-Shuala Municipality Department, 2020, and - Baghdad Governorate, Al-Shuala District Directorate, 2020).

It is clear from the foregoing, that the study area suffers from the spatial distribution of entertainment services, It was not meets its need according to the required geographical locations in the city, so we find an excess of space, but it is concentrated in specific places without others, corresponding to a decrease in their number according to the need for them in places Specified in the study area.
For the purpose of determining the service zone for each recreational site in the Al-Shuala City, a map was prepared showing the real locations of the entertainment services, and a drawing of the service zone for each one of them, according to the criteria adopted, by taking advantage of the (GIS) program as shown in the Figure 6. As it was found that the zone of children's playgrounds It covers (9.2%) of the study area, equivalent to (127.2) hectares, and the playgrounds covers (58.6%) of the study area, as well as parks (51.8%), while the percentage of sports fields is (85.5%) of the study area, which is the highest percentage compared to the rest of the recreational services, as shown in Table (9). Either the distribution pattern for recreational services sites was regular, but far apart in distances to children's playgrounds, parks, and playgrounds, while it was converging towards randomness to sports areas. We point out that the neighborhood (446) in the Al-Khatib quarter is only about half covered with entertainment services.

![Figure 6. Services zone for entertainment sites in Al Shuala City.](image)

Source: It was prepared depending on the program of ARC GIS 10.4

### 3.8 The proposed spaces for using in community services

After identifying the reality of community services and analyzing them according to the approved criteria, it became clear that there is deficit for these services. In addition to the high population density in the city of Al-Shuala, which requires searching for empty lands inside or near the study area, to be used to fill the need of educational, health and entertainment services. There are empty plots of land, owned by the Ministry of financial and Others are Private property, as shown in Figure 7, which are as follows:

1. A plot of land in the Rahmaniayah quarter of (3.2) hectares in the neighborhood (456), which can be used to serve the residents of the Rahmaniayah quarter and the nearby Shuala quarter.
Table 9. Coverage area and distribution pattern for entertainment services in Al-Shuala City

| type of recreational service | Coverage area (Hectare) | Space of study area (hectares) | Coverage ratio | Nearest neighbor coefficient | Distribution pattern |
|-----------------------------|-------------------------|--------------------------------|----------------|-----------------------------|----------------------|
| Children playground          | 127.2                   | 1389                           | 9.2%           | 1.27                        | far in distances     |
| Playgrounds                 | 814.62                  |                                 | 58.6%          | 1.19                        | far in distances     |
| Sports fields Park          | 1187.65                 |                                 | 85.5%          | 0.76                        | Convergent           |
|                             | 719.2                   |                                 | 51.8%          | 2.01                        | regular              |

Source: It was prepared depending on the program of ARC GIS 10.4

Figure 7. The empty space of lands in the Al-Shuala city
Source: It was prepared depending on the program of ARC GIS 10.4

2- Plots of lands in Al-Khatib quarter They are located in neighborhood (446), some of them are agricultural, and the largest part of these lands belong to the Ministry of Finance and Ministry of housing, its total area is (79.7) hectares, it can be used to meet the actual need for large part of educational, health and recreational services in Study area There is another plot of land located in neighborhood (448) adjacent to the Salah al-Din al-Ayoubi highway, and extends to al-Jawadin quarter, and al-Rahmaniyah Street divides it to two parts, with a total area of (15.43) hectares, and the bulk of its ownership belongs to people, and the other part belongs to the Ministry of Finance and Amanat Baghdad.,

3- Plot of land in the Al-Shuala quarter, there is a strip of land at the site of the old project channel, which was filled in 2005, with an area of (20.7) hectares and its width ranges between (80-120) m, which mediates the two residential neighborhoods (460,458) in the Shuala quarter, and occupies an area of (4) hectares .It can be used to establish schools and health centers, and to transfer some uses
within the city, such as the Market Saha, and take advantage of the location of that market to establish kindergartens, children's playgrounds and gardens, which leads to a gentle atmosphere residents of that site, and get rid of the environmental pollution drop by the market.

There is a plot of land on the northern side of Al-Shualah city near Umm Najm area, with area off (6.11) hectares, owned by the Ministry of Finance, and it contains old buildings that used to the headquarters Emergency Regiment of the Shualah before 2003, and now the people used it to live in it.

4- There are plots adjacent to the Umm Najm area from its northern side, Its area is (34.7) hectares, owned by the Ministry of Finance and the Shiei Endowment Office, that government agencies can acquire, for the purposes of establishment educational services for the aforementioned area, because it lacks intermediate education schools and kindergartens.

4. Conclusions
1- The study area is characterized by high population density, and scarcity of lands designated for education, health and entertainment purposes.
2- The study area suffers from a large deficit in the buildings of educational services, reached (75) schools.
3- The study area’s need for (19) health centers, after applying the criteria and comparing them with the reality of health services.
4- The study showed the poor distribution of the provided entertainment services, and concentrated in some areas without others, although the actual area of one site is greater than the area according to the standard, but there is a large deficit in its number according to the sites required for it, which is reached (371) sites, the largest percentage was Included children's playgrounds.
5- The results of the application of the closest neighbor coefficient method demonstrated the weakness of the spatial distribution of educational, health and entertainment services in the study area, as their distribution was close, clustered, and random- divergent at times, with the exception of the spatial distribution of secondary schools, which had a regular distribution, and intermediate schools and parks, their distribution was regular but far apart in Distances.
6- The results of the analysis of the zone service according to the radius criterion for the served area, showed that there are large areas are not covered by educational, health and entertainment services, especially the neighborhood (462) in the Al-Shuala quarter, and the neighborhood (446) in the Al-Khatib quarter due to the poor spatial distribution, the overlap and congestion of service ranges with each other.
7- The existence of empty lands in the study area, that is reached (159,84) hectares distributed in the quarters of Al-Shuala, Al-Rahmaniyah, Al-Khatib and al-Jawadin , which can be used to establish educational, health and entertainment services.
8- Weak municipal performance in controlling the use of land in the study area, which led to an increase in informal housing in agricultural areas and state real estate, whit establishment of private electricity generators in parks, children's playgrounds and adjacent to schools and health centers.

5. Recommendations
1- Work to meet the need for community services (educational, health and entertainment) in accordance with approved local criteria, by establish and build new of them in the available sites, or that are expandable.
2- In the processes of sorting and building housing units in the new expansion areas, it is necessity of establishment community services, and infrastructure, to encourage the owners of plots to build their land, and reduce the pressure on the services of neighboring areas.
3- Forming a joint committee of urban planners, representatives of the Baghdad Amanah/ Al-Shualah Municipality Department, the Ministry of Education and the Ministry of Health, to look into the reality of community services for the study area at the present time and in the long term, as well as looking into the empty plots of land, that the research identified to benefit from them in providing Community services.
4- The necessity of controlling land uses in the study area, by using zoning and parceling methods to control land uses, especially empty lands, and identifying new sites for educational, health and entertainment services.

5- The study recommends restricting the extension of slum dwellings into agricultural lands and state real estate, because they cause great pressure on community services and infrastructure, distort the fabric of the city, and occupy large areas that are used to create various services.

6- The necessity of transferring the environmental polluting uses, such as (Al Saha Market) in the Al-Shuula quarter to more suitable place, as being the site of the (old project’s canal), and to make use of its place to establish sites for services.

7- Reliance on modern technologies such as geographic information systems technology (GIS) in the spatial distribution of new community services, and preparing modern maps to reduce effort and cost.

8- Adopting one or more of sustainable method for establish a required building of services, such as the urban filling method, or the method of uses change, or transferring the uses of land within the city.

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