ISSN: 1994-4217 (Print) 2518-5586(online)

Journal of College of Education

Available online at: https://eduj.uowasit.edu.iq

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Keywords:

Demographic Analysis, Median Age, Population, Population Geography, Iraq

Article info

Article history:

Received 30.Jun.2025

Accepted 12.Aug.2025

Published 10.Nov.2025

A Demographic Analysis of the Median Age Index of the Iraqi Population (1987-2022) A Study in Population Geography

A B S T R A C T

The study aims to analyze the median age index in Iraq based on population census data and estimates for the period (1987-2022). This indicator is important for demographic analysis of the population, understanding its age characteristics, and the implications of the youth or old age of society. A quantitative analytical approach was adopted, relying on specific statistical indicators, and determining the extent of its change during the period under study, using tables, figures, and maps documented for it. The study relied on statistics issued by the Central Statistical Organization in the Ministry of Planning / Republic of Iraq. The results showed a change in the median age, rising from (17.1) years in 1987 to (20.2) years in 2022. This represents a change from the youth stage to maturity in population societies, according to the criteria of the median age of the population.

DOI: https://doi.org/10.31185/eduj.Vol61.Iss1.4580

تحليل ديموغرافي لمؤشر العمر الوسيط لسكان العراق (١٩٨٧-٢٠٢٢)
دراسة في جغرافية السكان

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الخلاصة:

تهدف الدراسة إلى تحليل مؤشر العمر الوسيط في العراق وفق البيانات الخاصة بالتعدادات السكانية و التقديرات للمدة (١٩٨٧ – ٢٠٢٢) وما لهذا المؤشر من أهمية في التحليل الديموغرافي للسكان ومعرفة خصائصهم العمرية ودلالات فتوة أو كبر المجتمع ، حيث أتبع المنهج التحليلي الكمي المعتمد على المؤشرات الاحصائية الخاصة ومعرفة مدى التغير الحاصل له خلال المدة المدروسة وفق جداول واشكال وخرائط وثقت ذلك.

وقد اعتمدت الدراسة في بياناتها على الاحصاءات الصادرة من الجهاز المركزي للإحصاء في وزارة التخطيط / جمهورية العراق ، حيث بينت النتائج تغير العمر الوسيط وارتفاعه من (١٧,١) سنة عام ١٩٨٧ إلى (٢٠,٢) سنة عام ٢٠٢٢، وهو تغير من المرحلة الفتية إلى النضج في المجتمعات السكانية ، حسب معايير العمر الوسيط للسكان.

الكلمات المفتاحية : تحليل ديموغرافي ، العمر الوسيط ، السكان ، جغرافية السكان ، العراق

Introduction:

Studying age groups and understanding their characteristics is an important demographic study that provides the most important results regarding the relationship between the demographic phenomenon and the economic and social reality of society. It reveals the groups of groups capable of working and those who are not working due to their young age or old age. Of course, age classifications also affect social characteristics such as marital and educational status. However, the economic aspect is the most important result due to its relationship to optimal investment of human resources, especially as society approaches demographic transition.

Research Problem: What is the temporal evolution of the median age index of the Iraqi population over the census periods and population estimates from the 1987 census to the 2022 estimates?

Research Hypothesis: There is a change in the median age index of the Iraqi population toward demographic maturity and progress toward the demographic transition.

Study Objective: The study aims to identify and analyze the median age index of the population as one of the indicators of age structure and its temporal evolution over the thirty-five years extending from the results of the 1987 census to the results of the 2022 population estimates, including the results of the 1997 census and the 2007 and 2017 estimates.

Research Methodology: The study relied on **an analytical approach** to study and analyze the phenomenon in its spatial and temporal dimensions, and relied on **a quantitative approach** to present the results using techniques that ensure their robustness.

Research sources and method: The research relied on statistical data on the results of the population censuses for the years 1987 and 1997, and the results of population projections and estimates for the years 2007, 2017, and 2022, issued by the Central Bureau of Statistics and Information Technology in the Republic of Iraq and across (18) governorates. The study thus addressed:

- The temporal evolution of the median age index in Iraq

- The spatial variation of the median age in Iraq

- The determinants affecting the change in the median age in Iraq

- Results and conclusions

Study concepts and demographic analysis methods used:

- **Median age:** The age that divides the population into two equal groups, one below the median age and the other above it. This corresponds to the 50% point of the distribution.

$$\mathbf{Md}=\mathbf{1_{Md}}+\left(\frac{\frac{N}{2}-\sum fx}{fmd}\right)i$$

where 1_{Md} = the lower limit of the class containing the middle, or $N/2^{th}$item; N =the sum of all the frequencies; ∑fx =the sum of the frequencies in all the classes preceding the class containing the $N/2^{th}$ item; f_{Md} =frequency of the class containing the $N/2^{th}$ item; and i = size of the class interval containing the $N/2^{th}$ item. If there is a category of age not reported, N would exclude the frequencies of this class (S.Siegel & A.Swanson, 2004).

- **Absolute change in median age** = difference in median age between two census periods
- **Annual increase in median age** = (number of years of absolute change in median age x 12 months) ÷ total years of schooling. (Aladwan, 2017)
- **Standard score:** It is the measure that shows the extent of each value's distance from its arithmetic mean, but not absolutely, but rather as a percentage of the standard deviation. (M.Al-Hassan & A.H.Zaini, 1982)

$$Z=\frac{(x-\mu)}{\sigma}$$

Z =Z-Score

X = Raw Score

μ = the mean

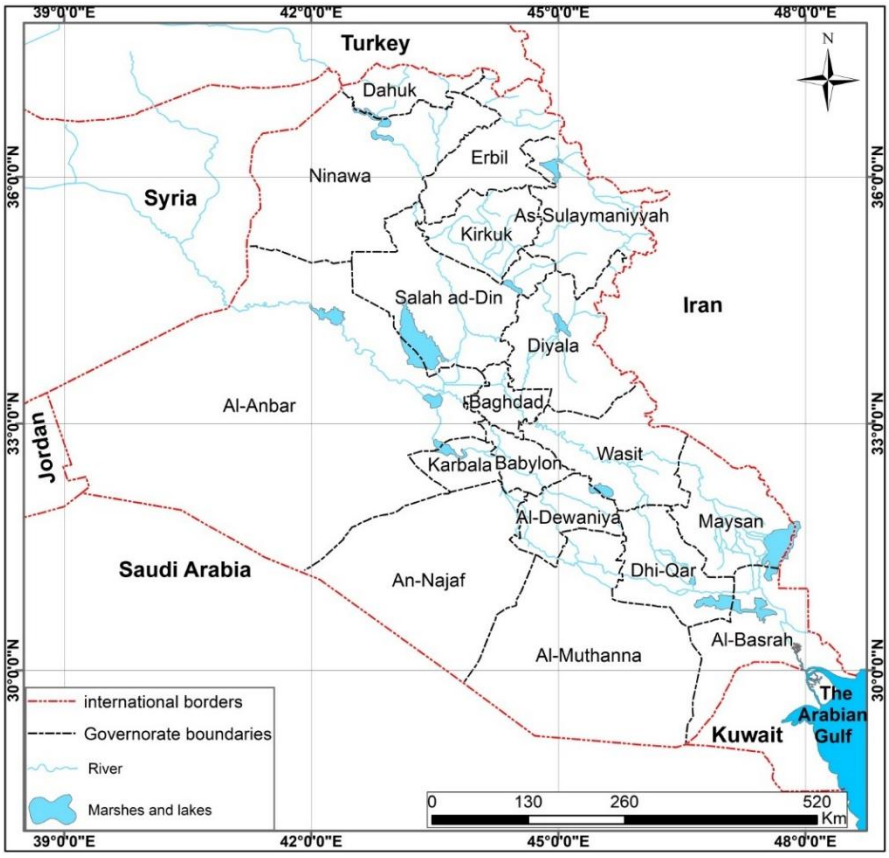
σ=Standard Score

- **Population diversity:** It is the mixing of more than one population group in one place. Their difference may be due to race or religion. Iraq is distinguished by the presence of this diversity in the different population nationalities such as (Arabs, Kurds, Turkmen, Shabak, Yazidis, etc.) and diversity in religions such as (Islam, Christianity with its different sects, Mandaeans, Shabak, Yazidis, etc.).

The spatial and temporal boundaries of the study:

are represented by the political borders of Iraq, as it is located in southwest Asia, and to the northeast of the Arab world, where it extends between latitudes (29°12′15) and (37°22′18") north, and between longitudes (38°45′10") and (48°50′44") east, extending over an area estimated at (434128) km2, and it is bordered to the north by Turkey, to the east by Iran, to the west by Syria, Jordan and Saudi Arabia, and to the south by the Arabian Gulf, Kuwait and Saudi Arabia, and it is administratively divided into (18) governorates (Map 1), while the temporal boundaries of the study are the period (1987-2022).

Map (1) Administrative Map of Iraq



1-The temporal development of the median age index in Iraq

By analyzing Table (1), we realize that the median age index in Iraq has been on the rise during the census periods and population estimates shown, and over a period of thirty-five years. After it represented (17.1) years according to the 1987 census, which is an age group that places it within young societies; In which the median age is less than 20 years (Al-Suryani, 1989) , we note that the index is on the rise according to data from 1997 and 2007, with ages reaching (17.7 and 18.2) years, respectively. Population estimates for 2017 highlight the Iraqi population entering the middle stage between young peoples and long-lived peoples, as the index reached (21.2) years, with the median age ranging between (20-29) years (S.Siegel & Jacob, 1976) .It is also called the maturity stage, which represents many developed and developing countries (Al-Othman & Al-Akeili, 2020) . Despite the decrease in the median age index according to 2022 estimates to (20.2 years), it remained within the same stage. It is well known that the ageing and aging of populations is linked to a set of determinants, including birth and death rates, population movements, migration, and changes in the size of broad age groups in society. These, in turn, are influenced by social, economic, political, and security factors in the region.

Table (1) the median age index in Iraq (1987 -2022)

Median Age				
1987	1997	2007	2017	2022
17.1	17.7	18.2	21.2	20.2

(Population Statistics Directorate, 1987) (Population Statistics Directorate, 1997)
(Directorate of Population and Labor Force Statistics, 2007;2017;2022)

1-1- Absolute Change and Annual Increase in the Median Age Index in Iraq

Table (2), highlight the extent of change in the median age index over the time periods studied. The period (1987-1997) witnessed an absolute change in the median age of less than a year (0.6), with a small annual increase of 0.7 (less than a month per year). This represents the difference between the two census periods, each of which is a ten-year census cycle. The second period (1997-2007) also witnessed an absolute change of 0.5 (less than a year), with an annual increase of 0.6 (less than a month per year). This kept the population within the youth stage. The big leap in the change in the median age was during the period (2007-2017), as the absolute change reached a difference of (3) years, with an annual change representing (3.6) months per year, then it decreased for the period (2017-2022) to (-1.2) years, and a negative annual increase rate reached (-2.4) months per year, with the median age indicator remaining within the middle stage (population maturity).

Table (2) Absolute Change and Annual Increase in the Median Age Index in Iraq

1987-1997		1997-2007		2007-2017		2017-2022	
Absolute Change	Annual Increase	Absolute Change	Annual Increase	Absolute Change	Annual Increase	Absolute Change	Annual Increase
0.6	0.7	0.5	0.6	3	3.6	-1.2	-2.4

2 -The Spatial Variation in Median Age in Iraq

From Table (3), we conclude the following facts:

1. According to the 1987 census, the median age of the Iraqi population in the adolescence stage was less than 20 years. Most governorates had a median age between 15 and 18 years, with the exception of Dohuk Governorate, which had a median age of 14 years.

2. According to the results of the 1997 census, the median age index rose in most governorates, reaching the upper limits of the adolescence stage (16 to 19 years), with the exception of Anbar and Salah al-Din Governorates, which recorded a median age of 15.6 years.

3- The census and numbering estimates for 2007 also showed an increase in the index, while it remained stable in Dohuk Governorate at an age of (18.4) years, and a decrease in Baghdad Governorate to (18.9) years compared to what it was in the 2007 estimates.

4- The results of the 2017 estimates represented Iraq's entry into the beginning of the middle stage (population maturity), as five governorates entered this stage with ages ranging between

(20 and 24) years, namely Sulaymaniyah, Kirkuk, Erbil, Diyala, and Baghdad, while the remaining governorates were limited to ages (18-19) years. 5- The 2022 estimates showed a decrease in the median age in Iraq, but it remained within the maturity stage, as decreases were recorded in the median age index for most governorates, as Diyala Governorate left the middle stage, and the governorates (Sulaymaniyah, Kirkuk, Erbil, Baghdad) remained within it, while the rest of the governorates remained within (18-19) years.

Table (3) Temporal and Spatial distribution of median age in Iraq

Governorate	Median Age									
	1987		1997		2007		2017		2022	
	Median Age	Z-Score	Median Age	Z-Score	Median Age	Z-Score	Median Age	Z-Score	Median Age	Z-Score
Duhouk	14.1	-1.668	18.4	1.298	18.4	0.918	18.6	-0.273	19.2	0.030
Nineveh	15.6	-0.366	16.1	-1.134	17.5	-1.147	18.3	-0.452	18.2	-0.647
Al Sulaimaniya	15.4	-0.540	17.1	-0.076	18.3	0.688	24.1	3.019	23.3	2.807
KirKuk	17.1	0.935	17.9	0.770	18.3	0.688	19.6	0.326	20.3	0.775
Erbil	15.3	-0.627	17.6	0.452	18.5	1.147	20.3	0.745	21.2	1.385
Diala	16.7	0.588	17.5	0.347	17.4	-1.376	20.1	0.625	19.8	0.436
Al-Anbar	15.3	-0.627	15.6	-1.663	17.7	-0.688	19.2	0.086	18.3	-0.579
Baghdad	19.8	3.278	19.4	2.356	18.9	2.065	22.1	1.822	21.4	1.520
Babylon	16.3	0.241	17.3	0.135	17.6	-0.918	18.3	-0.452	18.7	-0.309
Kerbela	16.4	0.328	17.6	0.452	18.1	0.229	19	-0.033	19.1	-0.038
Wasit	16.5	0.415	17.4	0.241	17.7	-0.688	18.5	-0.333	18.7	-0.309
Salah Al-Deen	15.4	-0.540	15.6	-1.663	17.5	-1.147	18	-0.632	17.7	-0.986
Al-Najaf	16.5	0.415	17.6	0.452	18.3	0.688	18.3	-0.452	18.7	-0.309
Al-Dewaniya	15.5	-0.453	17.2	0.029	17.7	-0.688	18	-0.632	18.3	-0.579
Al- Muthanna	15.3	-0.627	16.2	-1.028	17.5	-1.147	17.4	-0.991	17.9	-0.850
Thi-Qar	15.2	-0.713	16.5	-0.711	17.9	-0.229	17.5	-0.931	18.1	-0.715
Maysan	15.7	-0.280	16.4	-0.817	18.1	0.229	17.7	-0.811	17.5	-1.121
Basrah	16.3	0.241	17.7	0.558	18.6	1.376	18	-0.632	18.4	-0.512
AVERAGE	16.022		17.172		18		19.056		19.156	
STDEV.P	1.153		0.946		0.436		1.671		1.477	

(Population Statistics Directorate, 1987) (Population Statistics Directorate, 1997) (Directorate of Population and Labor Force Statistics, 2007;2017;2022)

2 – 1 - Place values of standardized median age scores

From the analysis of the spatial values of the standard median age scores in Table (3) and Maps (2, 3, 4, 5, 6), we conclude:

- The results of the 1987 census (Map 2) represented four levels of standard median age scores, with Duhok Governorate alone representing a level of (-1) and below. The second level (-0) was represented by nine governorates (Sulaymaniyah, Erbil, Nineveh, Anbar, Salah al-Din, Diwaniyah, Muthanna, Dhi Qar, Maysan). The third level (+0) included seven governorates (Kirkuk, Diyala, Babil, Karbala, Wasit, Najaf, Basra). The final level (+1) and above included Baghdad Governorate only.

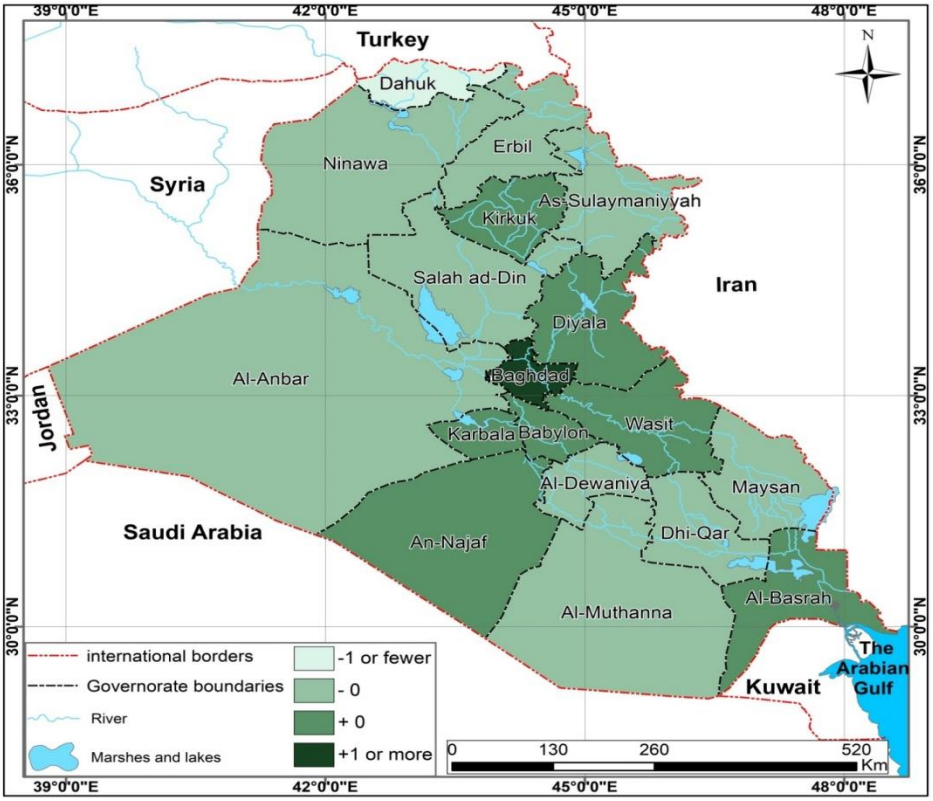
-According to the results of the 1997 census (Map 3), the spatial values of the standard median age scores were distributed into four levels, the first (-1) and less, included the governorates of Nineveh and Muthanna, the second level (-0) included five governorates (Sulaymaniyah, Salah al-Din, Anbar, Dhi Qar, Maysan), the third level (+0) included nine governorates (Kirkuk, Erbil, Diyala, Babil, Karbala ,Wasit, Najaf, Diwaniyah, Basra), the last level (+1) and more, represented the governorates of (Dohuk and Baghdad).

- The results of the 2007 estimates (Map 4) showed that the spatial values of the standard median age scores were distributed into the first level (-1) and less, the range was distributed to include four governorates (Nineveh, Salah al-Din, Diyala and Muthanna), the second level (-0) represented five governorates (Anbar, Babylon, Wasit, Diwaniyah, Dhi Qar), the third level (+0) included the range (Dohuk, Sulaymaniyah, Kirkuk, Karbala, Najaf, Maysan) and the last level (+1) represented (Erbil, Baghdad, Basra).

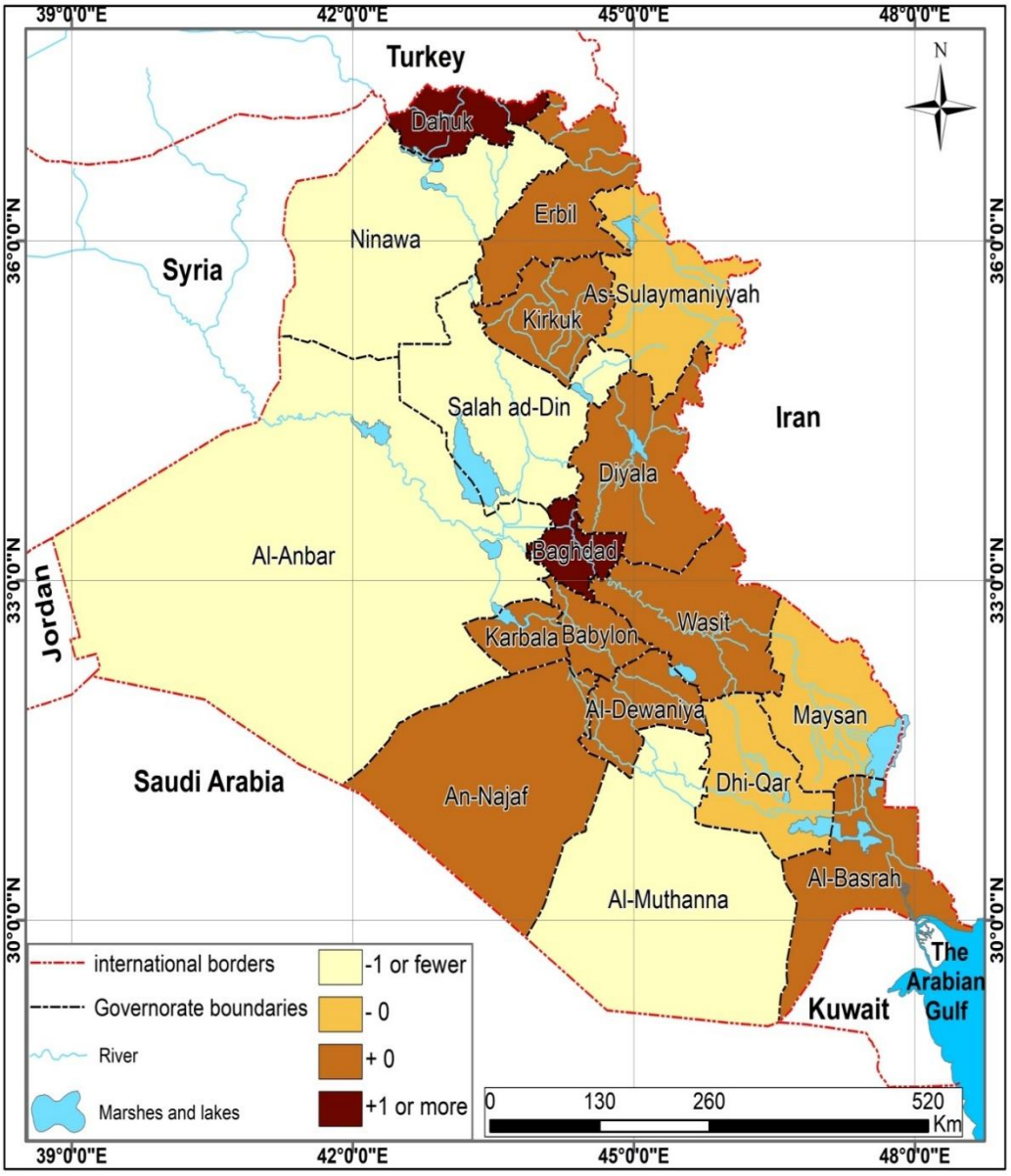
- According to the 2017 estimates (Map 5), the transition to maturity stages was represented, as the spatial values of the standard median age scores did not represent values less than (-1). The level (-0) represented twelve governorates (Dohuk, Nineveh, Salah al-Din, Wasit, Babil, Karbala, Najaf, Diwaniyah, Muthanna, Dhi Qar, Maysan, Basra), and the level (+0) represented (Erbil, Kirkuk, Anbar, Diyala), and the level (+1) and above represented the governorates of Baghdad and Sulaymaniyah.

- According to the 2022 estimates (Map 6), the spatial values were represented by four levels, the first level (-1) and less, represented Maysan Governorate only, the second level (-0) represented the governorates (Nineveh, Anbar, Salah al-Din, Karbala, Najaf, Babylon, Wasit, Diwaniyah, Muthanna, Dhi Qar, Basra), the third level (+0) represented the governorates (Dohuk, Kirkuk, Diyala), and the level (+1) and more, represented three governorates (Erbil, Baghdad, Sulaymaniyah).

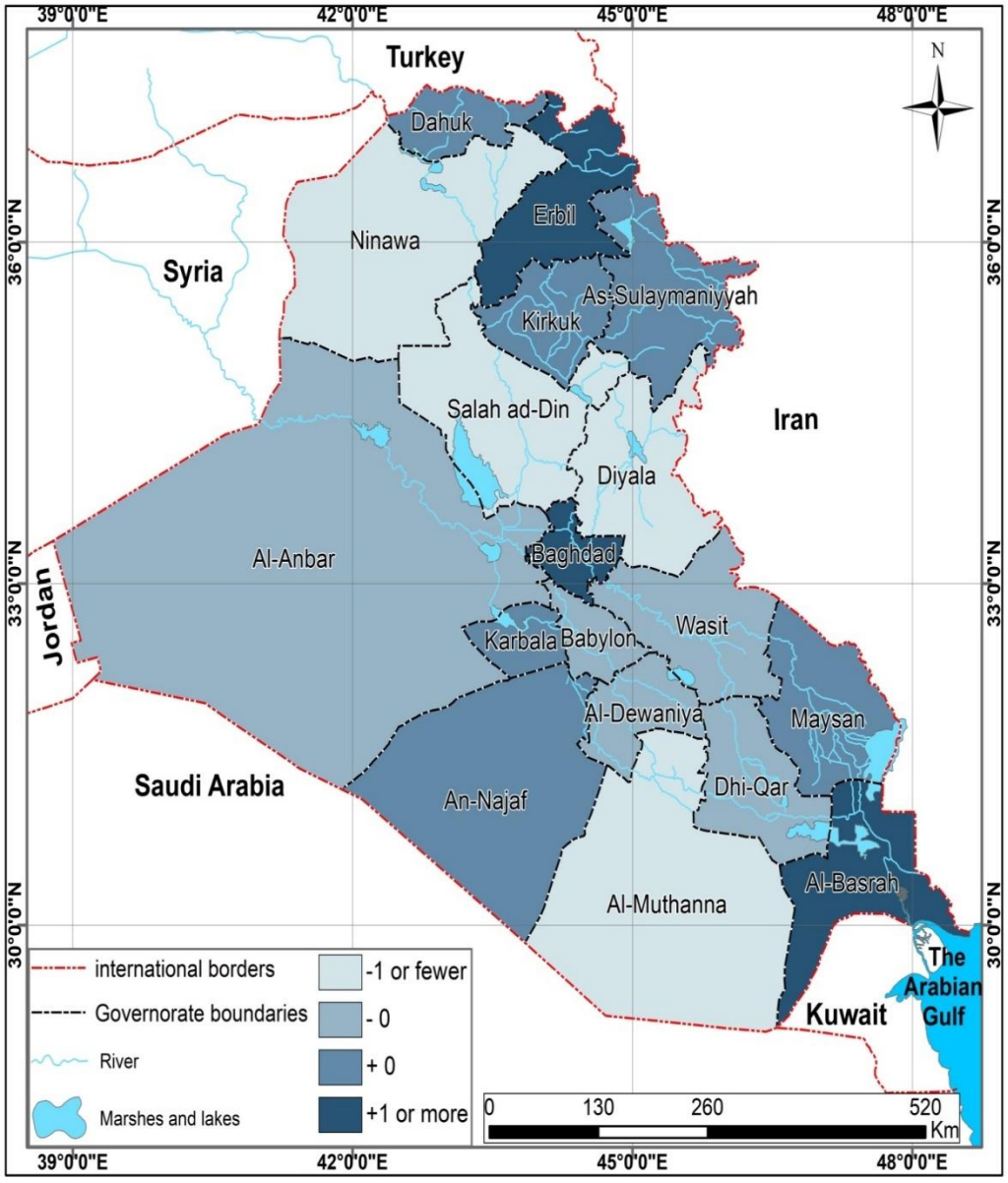
Map (2) Standard score for median age according to data (1987)



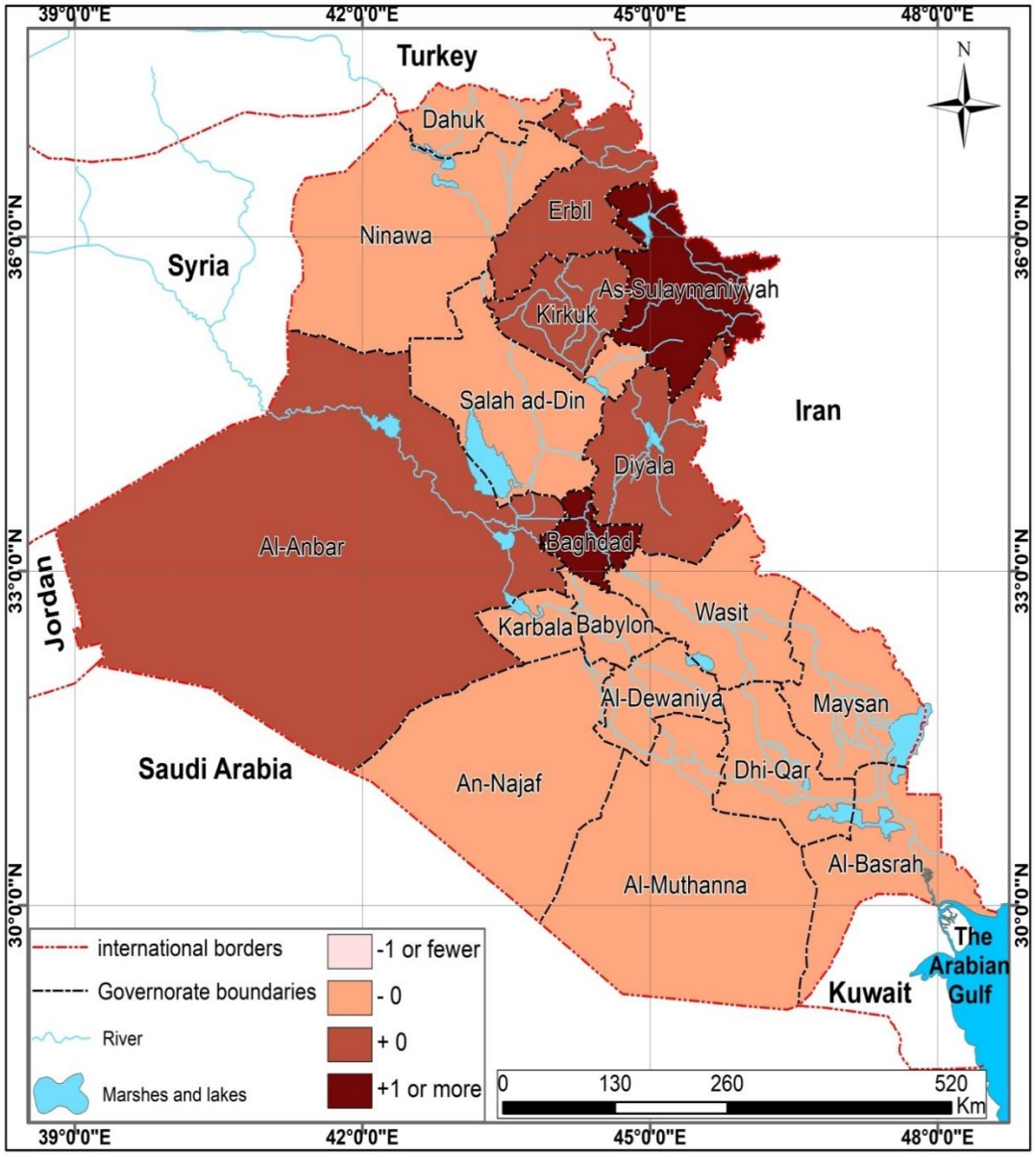
Map (3) Standard score for median age according to data (1997)



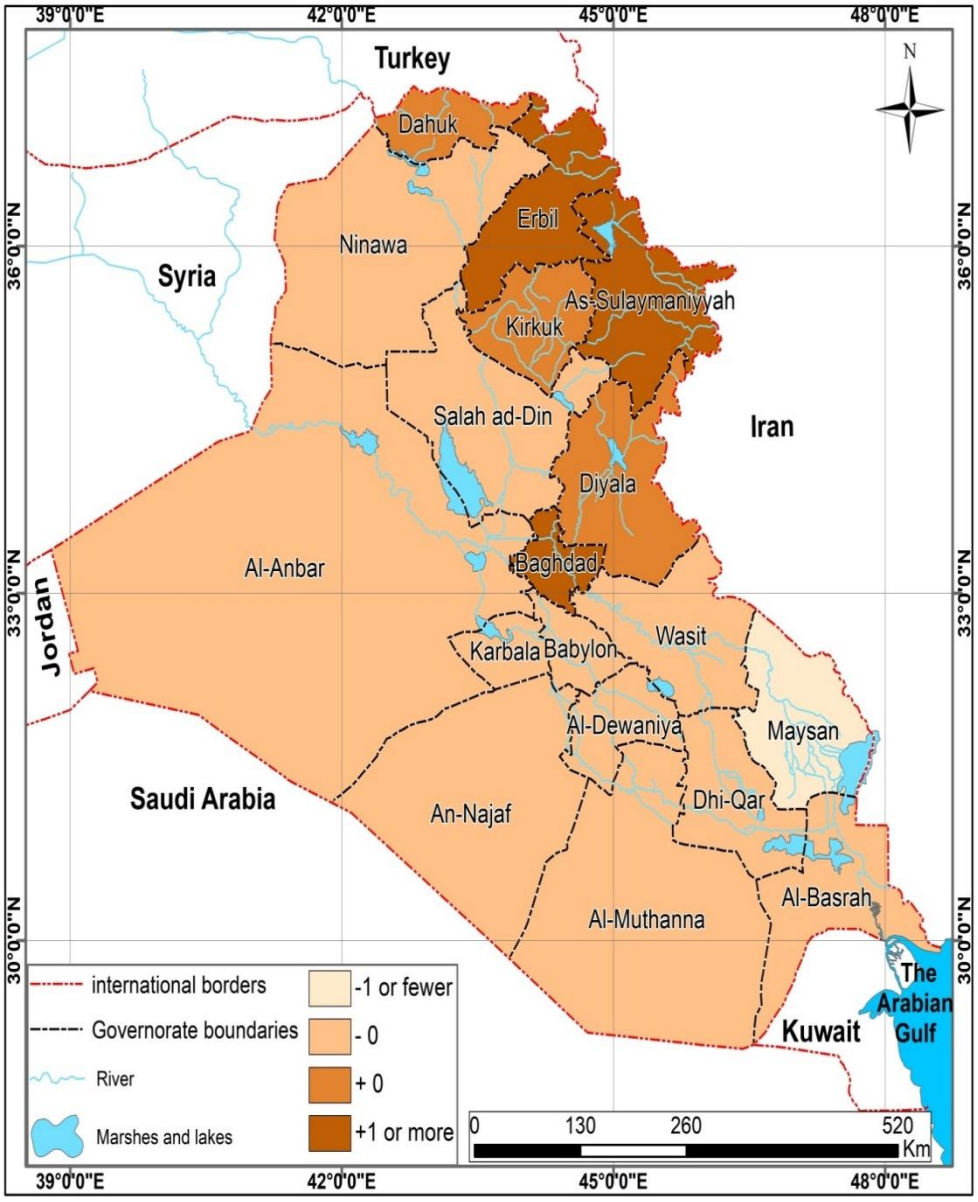
Map (4) Standard score for median age according to data (2007)



Map (5) Standard score for median age according to data(2017)



Map (6) Standard score for median age according to data (2022)



3 – The Determinants affecting the change in median age in Iraq

3 -1- Changing the age structure of the population

The change in the age characteristics of the population and its classification according to major groups affects the sizes of the young (under 15 years), the elderly (65 years and older), and the economically active (15-64 years). This change determines the path of society toward entering the stages of demographic transition and its proximity to the demographic dividend. The median age is one of the most important indicators of this change. From an analysis of Table (4), we conclude:

1- The proportions of the young (under 15 years) group constituted a high proportion of the population's age structure, higher than the Arab world (33%), according to United Nations statistics for 2023, and far from The global population (25%), North America (17%), Latin

America (23%), and the European Union (15%) (World Bank Group, 2023) , but it has been gradually declining from 45.9% in 1987 to 40.5% in 2022.

2- The middle age group (15-64 years) is one of the most important population groups, as it is responsible for the workforce and managing economic activities. Therefore, it represents high percentages in industrially and economically advanced countries such as European countries (66%), Australia (64%), the United States (68%), Japan (57%), and Russia (67%) (World Bank Group, 2023). This group increased in Iraq from 50.6% in 1987 to 55.0% in 2022.

3- The elderly group (65 years and older) represented a disparity in its percentages, which is due to the health situation and medical and social care for the elderly, as it increased from 3.5% in 2017. 1987 to 4.5% in 2022.

Table (4) The Main age groups in Iraq

Year	Less than 15 years		15-64 years		65 years and older		Total
	Number	%	Number	%	Number	%	
1987	7394524	45.9%	8156023	50.6%	570857	3.5%	16121404
1997	9766137	44.2%	11254190	51.0%	1025917	4.6%	22046244
2007	12798813	43.8%	16049638	54.9%	336308	1.15%	29184759
2017	15621098	40.2%	22002231	56.6%	1231234	3.1%	38854563
2022	17096605	40.5%	23257068	55.0%	1895210	4.5%	42248883

(Population Statistics Directorate, 1987) (Population Statistics Directorate, 1997)
(Directorate of Population and Labor Force Statistics, 2007;2017;2022)

3-2 Population fertility, births and deaths indicators in Iraq

When observing the chronological development of birth, fertility, and death rates for the period (1987-2022), Table (5) shows the following:

1. The severe impact of the security, political, economic, and health conditions in each period on the course of these rates and their fluctuations, which has resulted in their pattern of decline or increase being unstable.

2. The crude birth rate in 1987 was (24.2 per thousand), and the general fertility rate (6.1) registered births. These rates reflect the tendency of population policy in Iraq to encourage population growth at the time. During the 1970s and 1980s, the previous government's approach was toward population growth by adopting some programs and measures aimed at population growth (Al-Saad, 2022) to compensate for the human losses resulting from the Iran-Iraq War (1980-1988).

3. The birth rate, according to the 1997 census, reached (40.0 per thousand), and the fertility rate reached (5.7) registered births. Despite the poor economic conditions prevailing in the 1990s due to the economic sanctions that caused crises in various fields, this did not affect the high reproductive behavior.

4. A gradual decline in both rates is noted according to estimates for 2007, 2017, and 2022, with birth rates of (38.1 per thousand), (27.3 per thousand), and (25.1 per thousand), respectively, and general fertility rates of (4.3), (4.0), and (3.3) registered births, respectively.

5. As for mortality rates, the impact of wars, security and economic conditions, and instability on its course is clearly evident, from a rate of (8 per thousand) in 1987 to (10.9 per thousand) in 1997 and (11.4 per thousand) in 2007 to (4.2 per thousand) in 2017 and (3.7 per thousand) in 2022.

Table (5) Fertility, birth and death indicators in Iraq

Year	General Marital Fertility Rare	Crude Birth Rare	Crude Death Rare
1987	**6.1**	**24.2**	**8.0**
1997	**5.7**	**40.0**	**10.9**
2007	**4.3**	**38.1**	**11.4**
2017	**4.0**	**27.3**	**4.2**
2022	**3.3**	**25.1**	**3.7**

(Al-Shadidi, 2014) (National Committee for Population Policies, 2012) (National Committee for Population Policies, 2008) (Ministry of Health /Environment, 2017) (Ministry of Health / Environment, 2023)

4 - Results and conclusions

1. Studying the median age index is one of the most important indicators of the size of a population, highlighting the size of its main age groups and the degree of society's tendency toward any one of them. The results of the study demonstrated a tendency toward an increase in the age group (15-64) over a period of (35) years.

2. The median age in Iraq has progressed toward the stages of population maturity, evidenced by the movement of the median age from (17.1) years in 1987 to (20) years in 2022.

3. The spatial variation of the median age index in Iraq highlights the variation in reproductive behavior among different population segments, from north to south and from east to west. This is due to the different impact of these societies on the social, economic, and political determinants that influence reproductive behavior.

4. By tracking the median age index, we conclude that Iraq is advancing toward the threshold of the demographic gift and reaching the demographic transition stage, with the index moving from the stage of adolescence to the stage of maturity.

5. The social, economic and security reality of the country still affects reproductive behavior. Iraq has not adopted a programmed and specific population policy, but rather reproductive behavior is linked to reality and its determinants. Birth rates and general fertility have remained high despite their declines, and they record higher values than neighboring countries or countries of the world at various economic levels. After recording a birth rate of (25.1 per thousand), it is still higher than the Arab world countries (23 per thousand), South Asian countries (18 per thousand), European Union countries (8 per thousand), and North American countries (10 per thousand). (World Bank Group, 2023)

Recommendations

Most countries, especially economically developing countries, are concerned with reaching the demographic dividend stage, in order to achieve a balance between economic resources and human resources, achieving demographic and social well-being. Iraq is distinguished by its diverse economic resources, which qualify it to provide adequate economic support to its population. However, it requires:

1. Real development of educational, health, and social institutions, which will enhance the quality of educational, health, and social services, particularly those provided by the government sector.

2. Investing in and developing the age group (15-64) year, as this is the age group responsible for economic activity and its management, and which can drive economic development in the country، therefore, it is necessary to strengthen, sustainably develop and support this group.

3. Support family planning programs through introductory courses and seminars, explaining the concepts involved, educating families about the importance of family planning, determining appropriate times for childbearing, spacing between children, and determining the optimal number of children in line with the family's economic capabilities.

4. Supporting private investments (local and foreign) to reduce the burden placed on the government by requiring the recruitment and employment of new graduates. It is well known that these investments create good job opportunities and reduce unemployment rates, especially among young people.

5. Statistical data remains an obstacle to the preparation of population studies. The difficulty of obtaining them is a primary reason why researchers resort to questionnaires. Therefore, it is necessary to pay attention to population censuses, conduct them periodically, and officially issue their results so that they are available to all as a reliable document issued by government agencies.

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