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TITLE OF RESEARCH ARTICLE

Estimating Internal Migration and Measuring Urbanization Indicators in the State of Sétif (Algeria)

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Abstract

This study aims to estimate internal migration in the Province of Sétif during the 1998 and 2008 censuses by using indirect methods. These methods are: the survival ratio method using the CSRMIG program, which revealed that 9,441 persons left the province. As for the growth rate method, 58,393 persons were recorded as having left the province during the same period. Meanwhile, according to the vital statistics method, 105,631 persons were recorded as having left the province during the same period. The study also aims to measure urbanization indicators, represented by: the Gini index for the year 2017 = 0.65, which indicates that more than half of the population of the Province of Sétif is concentrated in the main urban areas, and the Browning and Gibbs index, which showed that the cities of Sétif and El Eulma have achieved a size that exceeds the ideal size, indicating that they suffer from high population pressure. We also concluded that the city of Sétif is growing on the outskirts and in the main urban areas.

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I. Introduction

The phenomenon of migration is neither recent nor a characteristic exclusive to the Third World. Advanced societies experienced this phenomenon at the beginning of their renaissance and development. However, the historical and economic conditions experienced by the West at the beginning of its renaissance differ from those experienced today by Third World societies, including Algerian society, which currently suffers from internal migration from rural areas to cities, as well as from small cities to large cities. This has generated repercussions at all levels, creating clear effects on development and urbanization within the cities receiving migrants, which have become unable to perform the functions and roles they are supposed to fulfill in various fields. This has caused them to lose their balance within the urban fabric. The Province of Sétif is among the provinces experiencing an increasing rate of urbanization due to the remarkable expansion of existing urban centers and the dominance of the urban pattern over population.

In light of the above, the main research questions can be formulated as follows:

1. What is the size and type of internal migration in the Province of Sétif during the period from 1998 to 2008?
2. Where is the population of the Province of Sétif concentrated?
3. What is the relationship between urbanization and urban primacy in the Province of Sétif?

Research Hypotheses

To answer these questions, several hypotheses must be proposed in order to discuss them and verify their validity, summarized as follows:

- First hypothesis: During the period 1998–2008, the Province of Sétif was attractive to population.
- Second hypothesis: Most of the population of the Province of Sétif is concentrated in the main urban areas.
- Third hypothesis: The higher the rates of urbanization in the province, the higher the rates of urban primacy.

Methodology Adopted in the Study

To estimate the volume of internal migration in the Province of Sétif and to measure urbanization indicators, we relied on the quantitative analytical approach, as it is the most appropriate for such studies and research. This was based on the figures of the National Office of Statistics (ONS) from the national population and housing censuses of 1998 and 2008, for the Province of Sétif and for Algeria as a whole, as well as data from the Monograph of the Province of Sétif for the year 2017.

First: Concepts of Migration

The concept of migration is characterized by ambiguity and lack of clarity, as there is variation and difference in defining it compared to other similar concepts. The migrant differs from the mover and the traveler, because the migrant who changes his usual place of residence from one area to another differs from one who moves from one dwelling to another, even if this requires crossing the borders of his country. (Al-Qassir, 1992)

1. Concept of Migration

1-1 Migration: Ibn Khaldun believes that *“man is social by nature, meaning that he inevitably needs social organization, which is civilization, and that God Almighty created man and fashioned him in a form whose life and survival cannot be sound except through sustenance.”* Thus, humans always migrate to where the means of a prosperous livelihood and better life security are available. (Al-Issawi, 2005)

1-2 Definition in the Demographic Dictionary: Migration is the sum of movements that lead to a change in the residence of the person concerned from the place of origin or place of departure to the place of destination or place of arrival. This definition assumes that an individual's residence is the place where he usually lives. (D. Courgeau, 1980)

1-3 Definition of the League of Arab States (1983): Migration refers to the situation of changing the usual or permanent place of residence of an individual during the reference period. That is, migration is the transition of an individual from a place where he habitually (permanently) resides to another place in order to reside there habitually (permanently) during the reference period, such that the two places are separated by defined administrative or political boundaries.

Internal Migration

As for internal migration, which is the subject of the present study, we present some definitions that have addressed the concept. The United Nations defines internal migration as: *“a form of spatial movement between one geographical region and another for the purpose of permanent residence.”* (Sahouna, 2002)

Internal migration is also defined as:

- *“The movement of persons from one geographical area to another within the borders of the state for the purpose of permanent residence, whether for economic or social reasons.”* (Khawaja, 2005)
- *“Migration that takes place within the borders of a single state regardless of the distance traveled by the migrant; it may be a move from one dwelling to another within the same neighborhood, from one city to another, from rural to urban areas, or from inhabited areas to uninhabited areas in order to develop them.”* (Al-Siddiqi, 2001)

2. The Migrant

The migrant is the person who changes his place of residence from one administrative area to another during the reference period of the migration study. The United Nations defines him as *“a person who changes his usual place of residence at least once from one area to another during a specific period of time.”* (United Nations, 1971)

In Algerian censuses, this definition was addressed in the 1998 census, which defined the migrant as a person who resided in 1987 in the same place as his birthplace and whose place of residence differed in the 1998 census.

3. Definition of Urbanization

Urbanization is *“a complex historical process represented by the transition from a traditional rural society to a modern urban society, associated with the development of means of production, changes in economic structures, transformation of social composition, the spread of education and services, and increased reliance on technology.”* (Mohamed, 2019)

4. Definition of Urban Primacy

Urban primacy is the condition in which one main city (or a small number of cities) dominates at the national or regional level in terms of population size, economic, political, and cultural weight, making it significantly superior to the rest of the cities in the urban hierarchy, leading to distortion in the distribution of population and services. (El-Sayed, El-Sayed Abdel-Ati, 1986)

Second: Introduction to the Province of Sétif

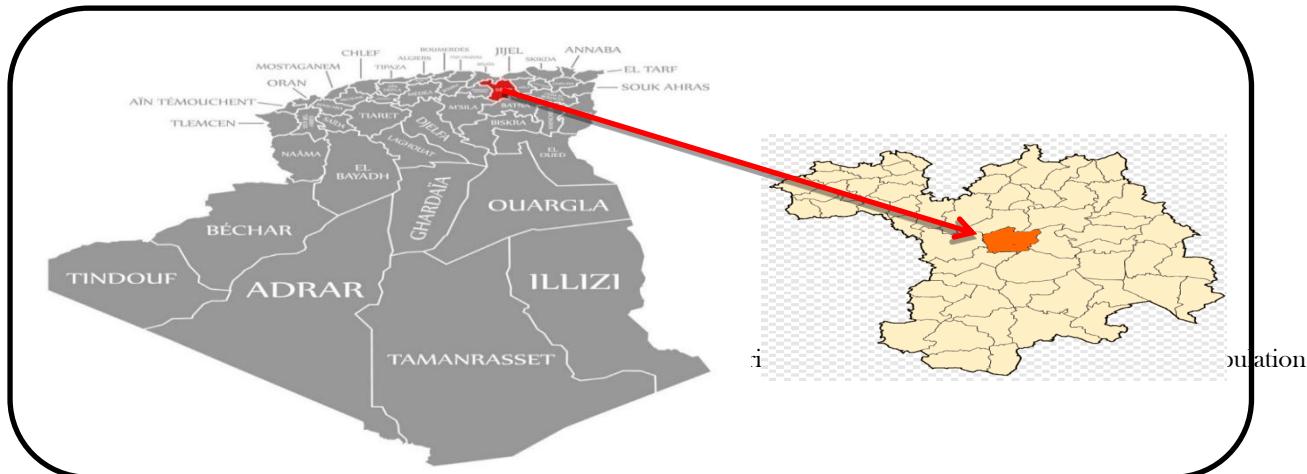
The city of Sétif is an Algerian province located in northeastern Algeria, whose capital bears the same name, Sétif City. The word *Sétif* in Arabic means “black soil.” It is one of the most important Algerian provinces, as it is a major economic center in the Algerian homeland. It is also considered one of the Algerian provinces distinguished by economic, intellectual, religious, and cultural dynamism. Moreover, it represents a crossroads of all Algerian regions and an indispensable economic and tourist passage. The province covers an area of 6,504 km². (Sétif, 2017)

Third: Geographical Location and Administrative Division

1. Geographical Location

The province is located in northern Algeria, within the northeastern northern region, specifically the High Plateaus region. It is crossed by the Tell Atlas mountain range to the north, represented by the Babor Mountains, and by the Saharan Atlas to the south, represented by the Boutaleb Mountains. Between the two ranges lie flat plains interspersed with some mountainous breaks, which are considered strategic transit areas. Several important roads pass through the province, such as National Road No. 05, which connects the capital with northern Algerian provinces, and roads No. 09, 28, and 78, which play a role in linking northern provinces such as Jijel and Béjaïa with southern provinces such as Batna and M'sila, in addition to the East-West Highway, which connects eastern Algeria to western Algeria. (Monograph of the Province of Sétif, 2017)

Figure No. (1): Location of the Province of Sétif on the Map of Algeria



| | | | |
|-------------|----------------|-----------------|---------------|
| Sétif | Beni Ourtilane | Hammam Guergour | Ain El Kebira |
| Beni Aziz | Bouandas | Salah Bey | Ain Oulmane |
| El Eulma | Bougaa | Amoucha | Maoklane |
| Bir El Arch | Djemila | Ain Azel | Guenzet |
| Babor | Hammam Sokhna | Ain Arnat | Guedjel |

Municipalities

| | | | |
|---------------|---------------|-----------------|----------------|
| Sétif | Ain El Kebira | Ain El Hedjar | Draa Kebila |
| Bouandas | Bousselam | Dehamcha | Ksar El Abtal |
| Guenzet | Ras El Ma | Hammam Guergour | Tashouda |
| Ouled Tebban | El Ouricia | Serdj El Ghoul | Bir Haddada |
| Ain Arnat | Ain Azel | Ain Laghradj | El Eulma |
| Bougaa | Boutaleb | Djemila | Ain Sebt |
| Guedjel | El Hamima | Harbil | El Oulja |
| Oum El Adjoul | Salah Bey | Ain Oulmane | Maouia |
| Tala Ifassen | El Ouricia | Ait Naoual | El Taya |
| Maoklane | Tella | Amoucha | Ouled Si Ahmed |
| Ait Tizi | Mezloug | El Guelta Zerka | Ain Roua |
| Khellal | Tizi N'Bechar | Oued El Bared | Ouled Adouane |
| Ouled Saber | Tizi N'Brahim | Babor | Bazer Sakhra |
| Beida Bordj | Blaa | Beni Aziz | Beni Chebana |
| Beni Fouda | Bir El Arch | Beni Ourtilane | Ain Abessa |

Source: Monograph of the State of Sétif, 2017

Third: Estimation of Internal Migration in the State of Sétif between 1998–2008

The city of Sétif is considered one of the most important Algerian cities in terms of area and population size. It is also among the most attractive states for population settlement, as it represents an economic and commercial hub linking the north and south as well as the east and west. Therefore, this section is devoted to studying internal migration movements in the State of Sétif during the period 1998–2008, using the CSRMIG calculation sheet, which belongs to the PAS population structure assessment sheets, whose function is to measure net migration between two consecutive censuses, with an interval of 5, 10, or 15 years.

1. Estimating Internal Migration in the State of Sétif (1998–2008) Based on the CSRMIG Calculation Sheet

Principle of operation of the calculation sheet

(Khawaja, *Internal Migration: Concepts and Measures*, 2005)

It is based on entering the data of the first census, represented by the age and sex distribution of the population of Algeria and the State of Sétif for the year 1998, as shown in Table No. (2), and entering the data of the second census, represented by the age and sex distribution of the population of Algeria and the State of Sétif for the year 2008, as shown in Table No. (3). The results obtained relate to net internal migration, where negative values indicate population out-migration from the state, while positive values indicate in-migration to the state.

By summing the negative and positive values, net migration is obtained. If it is positive, this indicates that the state attracted population; if it is negative, it indicates that population left the state.

Table No. (2): Age and Sex Distribution of the Population of the Country (Algeria) and the State of Sétif According to the 1998 Census

| Age | Male Algeria | Male Sétif | Female Algeria | Female Sétif |
|-------|--------------|------------|----------------|--------------|
| 0-4 | 1,627,670 | 76,094 | 1,552,105 | 73,009 |
| 5-9 | 1,820,858 | 88,992 | 1,753,339 | 85,698 |
| 10-14 | 1,918,833 | 93,878 | 1,849,852 | 90,289 |
| 15-19 | 1,782,614 | 83,102 | 1,716,677 | 80,389 |
| 20-24 | 1,472,255 | 67,126 | 1,442,581 | 65,457 |
| 25-29 | 1,259,989 | 52,839 | 1,242,625 | 51,601 |
| 30-34 | 1,056,110 | 43,292 | 1,044,683 | 42,570 |
| 35-39 | 841,768 | 38,407 | 825,603 | 37,322 |
| 40-44 | 691,275 | 29,659 | 686,994 | 29,931 |
| 45-49 | 565,289 | 24,382 | 543,581 | 23,228 |
| 50-54 | 371,843 | 13,598 | 390,816 | 14,871 |
| 55-59 | 345,318 | 12,346 | 353,181 | 13,868 |
| 60-64 | 301,247 | 12,297 | 320,912 | 13,617 |
| 65-69 | 252,003 | 10,703 | 258,614 | 10,876 |
| 70-74 | 163,292 | 6,561 | 168,869 | 7,111 |
| 75+ | 228,925 | 8,787 | 15,495 | 9,277 |

Source: Prepared by the researchers based on 1998 census data and outputs of the CSRMIG calculation sheet.

Table No. (3): Age and Sex Distribution of the Population of the Country (Algeria) and the State of Sétif According to the 2008 Census

| Age | Male Algeria | Male Sétif | Female Algeria | Female Sétif |
|-------|--------------|------------|----------------|--------------|
| 0-4 | 1,750,097 | 77,222 | 1,654,821 | 73,297 |
| 5-9 | 1,475,674 | 62,700 | 1,412,702 | 61,217 |
| 10-14 | 1,662,260 | 75,101 | 1,596,513 | 72,249 |
| 15-19 | 1,847,311 | 87,369 | 1,787,859 | 84,269 |
| 20-24 | 1,895,704 | 90,392 | 1,867,802 | 86,466 |
| 25-29 | 1,730,409 | 78,193 | 1,691,968 | 73,823 |
| 30-34 | 1,379,085 | 60,731 | 1,361,910 | 58,867 |
| 35-39 | 1,167,249 | 46,734 | 1,175,529 | 46,805 |
| 40-44 | 1,007,683 | 40,396 | 1,010,644 | 40,728 |
| 45-49 | 817,004 | 36,017 | 812,432 | 36,252 |
| 50-54 | 682,357 | 28,990 | 664,337 | 27,951 |
| 55-59 | 547,181 | 22,833 | 515,398 | 21,353 |
| 60-64 | 354,694 | 13,393 | 356,788 | 13,577 |
| 65-69 | 314,958 | 11,912 | 316,345 | 12,304 |
| 70-74 | 248,672 | 10,281 | 256,254 | 10,475 |
| 75+ | 352,408 | 13,930 | 365,982 | 13,420 |

Source: Prepared by the researchers based on 2008 census data and outputs of the CSRMIG calculation sheet.

Survival Rates and Estimated Population of the State of Sétif in 2008 Based on CSRMIG Results

Survival rates are calculated by dividing the total Algerian population of each age group in 2008 by the total Algerian population of the preceding age group in 1998. For example (males): the population aged 20-24 in 2008 (1,895,704) is divided by the population aged 10-14 in 1998 (1,918,833), yielding 0.98795, which represents the probability of survival to age 20. This is applied to the remaining age groups up to the last categories, as follows: Survival probability at age 75 = number of individuals aged 75+ (2008) / number of individuals aged 65-69, 70-74, 75+ (1998).

Expected Population of the State of Sétif for 2008

At this stage, the population of the State of Sétif in 1998 is multiplied by the calculated survival rates. The result represents the estimated population for 2008. For example: the number of males aged 0-4 in Sétif in 1998 is 76,094, multiplied by the survival probability to age 10 (1.02125), yielding 77,711, which represents the estimated expected number for the 10-14 age group of males in Sétif in 2008. The same procedure applies to all age groups. For the last age groups in 1998 (65-69, 70-74, 75+), their numbers are summed (10,703 + 6,561 + 8,787) and multiplied by the corresponding probability (0.5476), yielding 14,266.

Table No. (4): Survival Rates and Estimated Population of the State of Sétif in 2008 Based on CSRMIG Results

| Age in 2008 | Survival Rates Male | Survival Rates Female | Expected Population Male | Expected Population Female |
|-------------|---------------------|-----------------------|--------------------------|----------------------------|
| 0 | #N/A | #N/A | 0 | 0 |
| 5 | #N/A | #N/A | 0 | 0 |
| 10 | 1.02125 | 1.02861 | 77,711 | 75,098 |
| 15 | 1.01453 | 1.01969 | 90,285 | 87,385 |
| 20 | 0.98795 | 1.0097 | 92,746 | 91,165 |
| 25 | 0.97071 | 0.98561 | 80,668 | 79,232 |
| 30 | 0.98672 | 0.94408 | 62,878 | 61,797 |
| 35 | 0.9264 | 0.946 | 48,950 | 48,815 |
| 40 | 0.95415 | 0.96742 | 41,307 | 41,183 |
| 45 | 0.97058 | 0.98405 | 37,277 | 36,727 |
| 50 | 0.9871 | 0.96702 | 29,276 | 28,944 |
| 55 | 0.96797 | 0.94815 | 23,601 | 22,024 |
| 60 | 0.95388 | 0.91293 | 12,971 | 13,576 |
| 65 | 0.91208 | 0.8957 | 11,261 | 12,422 |
| 70 | 0.82548 | 0.79852 | 10,151 | 10,873 |
| 75 | 0.54763 | 0.82619 | 14,266 | 22,525 |

Source: Prepared by the researchers based on the outputs of the CSRMIG calculation sheet.

Estimation of Net Internal Migration in the State of Sétif (1998-2008) Based on CSRMIG Results

After calculating the estimated population numbers for the various age groups in 2008, the differences between the actual numbers and the estimated numbers are calculated. The result represents net internal migration.

For example, for males aged 10-14 in 2008:

$$75,101 \text{ (actual)} - 77,711 \text{ (estimated)} = -2,610.$$

For the last male age group 75+ in 2008:

$$13,930 \text{ (actual)} - 14,266 \text{ (estimated)} = -336, \text{ as shown in the following table.}$$

Table No. (5): Estimation of Net Internal Migration in the State of Sétif (1998-2008) Based on CSRMIG Results

| Age in 2008 | Both Sexes | Male | Female |
|-------------|------------|---------|---------|
| Total | -50,302 | -17,076 | -33,226 |
| 0-4 | #N/A | #N/A | #N/A |
| 5-9 | #N/A | #N/A | #N/A |
| 10-14 | -5,459 | -2,610 | -2,849 |
| 15-19 | -6,032 | -2,916 | -3,116 |
| 20-24 | -7,054 | -2,354 | -4,699 |
| 25-29 | -7,884 | -2,475 | -5,409 |
| 30-34 | -5,077 | -2,147 | -2,930 |
| 35-39 | -4,226 | -2,216 | -2,010 |

| Age in 2008 | Both Sexes | Male | Female |
|-------------|------------|--------|--------|
| 40-44 | -1,366 | -911 | -455 |
| 45-49 | -1,735 | -1,260 | -475 |
| 50-54 | -1,279 | -286 | -993 |
| 55-59 | -1,439 | -768 | -671 |
| 60-64 | 423 | 422 | 1 |
| 65-69 | 534 | 651 | -118 |
| 70-74 | -268 | 130 | -398 |
| 75+ | -9,441 | -336 | -9,105 |

Source: Prepared by the researchers based on the results of the CSRMIG calculation sheet.

Analysis of Results

From the previous results produced by the CSRMIG calculation sheet, we note some positive differences and others negative. The negative sign indicates that the state is expelling population, while the positive sign indicates population attraction and in-migration.

Considering the total for both sexes estimated at -50,302, males -17,076, and females -33,226, we find that the State of Sétif is not attractive to population, especially for the age group between 15 and 29 years, representing the youth category for both males and females. It is also noted that the female category exceeds the male category, which may be due to marriage, whether outside the state or outside the country. It is also observed that the 60-69 age group is attractive, possibly due to return after retirement from work outside the state or the country.

2. Growth Rate Method

This is one of the effective and commonly used methods to identify the size and direction of migration to and from a given governorate, region, or territory. It provides a quick and simple indicator of population movements to and from regions by calculating the growth rate at the regional level and comparing it with the growth rate of the entire country, both of which rely on population numbers from two censuses at the governorate level. (Ghalil & Hamza Cherif, 2018)

This method is based on comparing the growth rate of the state with the growth rate of a specific geographical area within the same state during a given time period.(Al-Kharif, 2010)

It can be applied to the State of Sétif as follows:

- P1998 Algeria, P2008 Algeria: Population of Algeria in the first and second censuses, respectively.
- P1998 Sétif: Population of the State of Sétif in the first census.
- P2008 Sétif: Population of the State of Sétif in the second census.
- M: Net migration rate.

Accordingly:

Where K represents % or %o (Shryock, 1976).

- If the growth rate of the State of Sétif is greater than the growth rate of Algeria as a whole, this indicates positive net internal migration, i.e., migration into the region.
- If the growth rate of the State of Sétif is lower than the growth rate of Algeria, this indicates negative net internal migration, i.e., migration out of the region.

Table (6): Results of Estimating Migration in the State of Sétif for the Period 1998-2008 According to the Growth Rate Method

| Year | Population 1998 | Population 2008 | Change in Number | Growth Rate | Net Migration Rate | Net Migration Volume |
|---------------------------|-----------------|-----------------|------------------|-------------|--------------------|----------------------|
| Algeria Population | 28,864,516 | 34,080,030 | 5,215,514 | 18.07% | / | / |
| State of Sétif Population | 1,311,413 | 1,489,979 | 178,566 | 13.62% | -4.45% | -58,357 |

Source: Prepared by the researchers based on the 1998 and 2008 censuses.

- Column 4 = Column 3 – Column 2
- Column 5 = Column 4 / Column 2
- Column 6 = Column 5 – national growth rate (0.18068)
- Column 7 = Column 6 × Column 2

From Table (7), it can be stated that the population of the State of Sétif changed and increased by 178,566 inhabitants during the period 1998-2008, with a change rate estimated at 0.13616305. According to the growth rate method, the growth rate of the State of Sétif is lower than that of Algeria, meaning that net migration in the State of Sétif was negative during this period, indicating out-migration, amounting to 58,357 migrants, with a net migration rate of -0.0445 (-44.5%).

3. Vital Statistics Method

This method relies on vital registration data at the administrative unit level or at the national level, as well as data from at least two censuses. It is sometimes called the Residual Method (Al-Kharif, 2010).

The following equation can be used to determine net migration:

$$P_2 = P_1 + N - D + I - E$$

Where:

- $P_2 = P2008$: Population of the State of Sétif in 2008
- $P_1 = P1998$: Population of the State of Sétif in 1998
- N : Number of registered births between 1998–2008
- D : Number of registered deaths between 1998–2008
- I : Number of incoming migrants between 1998–2008
- E : Number of outgoing migrants between 1998–2008
- $I - E$: Net migration

Table (7): Results of Estimating Migration in the State of Sétif for the Period 1998–2008 According to the Vital Statistics Method

| Deaths during the period 1998–2008** | Population 2008* | Population 1998* | State |
|--------------------------------------|------------------|------------------|-------|
| 341,289 | 1,489,979 | 1,311,413 | Sétif |

Source: (ONS, 2008), (ONS, 1998); * Khalil Hejira, Hamza Cherif Ali, 2018, p. 1407

Using the equation (balancing equation), the following substitution can be made:

$$\begin{aligned} P2008 = P1998 + N - D + I - EP_{\{2008\}} &= P_{\{1998\}} + N - D + I - EP_{2008} = P1998 + N - D + I - E \\ 1,311,413 + 341,289 - 57,092 + I - E &= 1,489,9791,311,413 + 341,289 - 57,092 + I - E = \\ 1,489,9791,311,413 + 341,289 - 57,092 + I - E &= 1,489,9791,311,413 + 341,289 - 105,631I - E = -105,631I - E = -105,631 \end{aligned}$$

Thus, net migration in the State of Sétif during the period 1998-2008 is: -105,631.

Using the equation, the rate of net internal migration in the State of Sétif during this period can be calculated as follows:

Net migration rate=Net migration/Average population \text{Net migration rate} = \frac{\text{Net migration}}{\text{Average population}} Net migration rate=Average populationNet migration I-EAverage population=(M)\frac{I - E}{\text{Average population}} = (M)Average populationI-E=(M) 100\times(I-E)(P2+P1)/2=(M)100 \times \frac{(I - E)}{(P_2 + P_1)/2} = (M)100\times(P2+P1)/2(I-E)=(M) 100\times-105,6311,400,696=(M)100 \times \frac{-105,631}{1,400,696} = (M)100\times1,400,696-105,631=(M) (M)=-0.075413=-75.4\text{permil}(M) = -0.075413 = -75.4\text{permil}(M)

75.4\permil(M)=-0.075413=-75.4\permil
 From Table (7), during the period 1998–2008, it can be stated that the population of the State of Sétif changed and increased by 157,002 inhabitants. According to the vital statistics method, net migration in the State of Sétif was negative during this period, meaning that there was out-migration, amounting to 105,631 migrants, with a net migration rate of -0.075413 (-75.4%).

Fourth: Measures of Population Concentration in the State of Sétif

Fourth. Me Cini Index

It is calculated according to the following formula:

It is calculated according to the following formula:

$$G = 1 - \frac{1}{10,000} \sum (Y_i + Y_{i-1}) N_i G = 1 - \frac{1}{10,000} \sum (Y_i + Y_{i-1}) N_i$$

$$(AtMakhlof, 2013)$$

(Al-MdK)

- G: Gini coefficient
- Y_i : Percentage of cities
- N_i : Percentage of the urban population

The Gini Index ranges between 0 and 1. The higher its value and the farther it is from 0, the greater the population concentration, reaching 1 when the population is concentrated at a single point.

Table (8): Gini Coefficient for the Population of the State of Sétif, 2017

| (Y _i + Y _{i-1})Ni | Y _i + Y _{i-1} | Cumulative Y _i | Percentage | Number | Ni (%) | Total* | Classification of Urban Population |
|--|-----------------------------------|---------------------------|------------|--------|----------|-----------|------------------------------------|
| 160.03939 | 3.33333 | 3.3333 | 3.3333 | 2 | 48.01182 | 529,965 | 500,000-200,000 |
| 51.7172757 | 8.33333 | 5 | 1.6667 | 1 | 6.206073 | 68,504 | 200,000-50,000 |
| 275.492788 | 18.3333 | 13.333 | 8.3333 | 5 | 15.02688 | 165,870 | 50,000-20,000 |
| 619.955029 | 46.6667 | 33.333 | 20 | 12 | 13.28475 | 146,640 | 20,000-10,000 |
| 2329.39731 | 133.333 | 100 | 66.667 | 40 | 17.47048 | 192,843 | Less than 10,000 |
| 3436.6018 | | | 100 | 60 | 100 | 1,103,822 | Total |

$$\mathbf{G} = 0.65633982$$

Source: Prepared by the researchers based on data from the Monograph of Sétif, 2017.

The Gini Index for the State of Sétif in 2017 = 0.65.

Using the Gini method, the coefficient reached 0.65, which is far from 0 and close to 1. This indicates that more than half of the population of the State of Sétif is concentrated in the main urban areas, i.e., cities. This concentration is mainly due to migration from rural areas, primarily for economic reasons.

Browning and Gibbs Index « Browning et Gibbs »

This method aims to reduce pressure on urban areas experiencing population growth and to create urban balance. It is based on studying the relationship between rank and size of urban centers within the region, summarized as follows (*Habib, 1985*):

- Ranking urban centers by population size in descending order
- Assigning each center a rank
- Calculating the reciprocal of each rank
- Calculating the total population of centers
- Dividing the total population by the sum of reciprocals of ranks to obtain the ideal size of the first center
- Dividing the ideal size of the first center by 2, then 3, then 4, etc., to obtain ideal sizes for subsequent centers
- Calculating the difference between the actual size and the ideal size

Table (9): Browning and Gibbs Index for the Redistribution of Urban Population in the State of Sétif, 2017

| Rank | City | Population | Reciprocal of Rank | Ideal Population | Difference |
|------|---------------|------------|--------------------|------------------|------------|
| 1 | Sétif | 325,330 | 1 | 235,866 | 89,464 |
| 2 | El Eulma | 204,635 | 0.5 | 117,933 | 86,702 |
| 3 | Ain Oulmane | 68,504 | 0.333333333 | 78,622 | -10,118 |
| 4 | Ain Azel | 48,039 | 0.25 | 58,966 | -10,927 |
| 5 | Ain Arnat | 34,028 | 0.2 | 47,173 | -13,145 |
| 6 | Ain El Kebira | 31,156 | 0.166666667 | 39,311 | -8,155 |
| 7 | Bougaa | 28,864 | 0.14285714 | 33,695 | -4,831 |
| 8 | Salah Bey | 23,783 | 0.125 | 29,483 | -5,700 |
| ... | ... | ... | ... | ... | ... |
| 60 | Oued El Bared | 0 | 0.016666667 | 3,931 | -3,931 |
| | Total | 1,103,822 | | 4,67987041 | |

Source: Prepared by the researchers based on data from the *Monograph of Sétif*, 2017.

From the table, it is observed that the cities of Sétif and El Eulma exceed their ideal population sizes, indicating severe population pressure, as they represent industrial and commercial poles attracting migrants from surrounding municipalities and neighboring states.

In contrast, the remaining cities of Sétif recorded populations below their ideal sizes, which requires redistribution of the urban population of the State of Sétif according to the Browning and Gibbs method.

Fifth: Study of Urban Areas in the State of Sétif (2017) Using the URBINDEX Spreadsheet

To study urban centers and track their development in the study area, the URBINDEX spreadsheet, which belongs to the PAS (Population Analysis Spreadsheets) group and is dedicated to measuring urbanization indicators, was used (*Aayech, 2009*).

Table (10): Population of the State of Sétif by Municipality (Main Urban Centers)

COUNTRY: Sétif 2017

Estimation of Indices of City Population

A. Total and Urban Population

| Indicator | Value |
|------------------|------------|
| Total population | 32,458,760 |
| Urban population | 25,000,000 |

B. City Populations Ranked by Size

| Rank | City | Population | Rank | City | Population |
|------|-------------|------------|------|---------------|------------|
| 1 | Sétif | 325,330 | 31 | Ouled Tebba | 6,731 |
| 2 | El Eulma | 204,635 | 32 | Bouandas | 6,532 |
| 3 | Ain Oulmane | 68,504 | 33 | Ouled Adouane | 6,415 |
| 4 | Ain Azel | 48,039 | 34 | Beni Mouhli | 6,208 |
| ... | ... | ... | ... | ... | ... |
| 59 | Ait Tizi | 738 | 60 | Oued El Bared | 0 |

Source: Monograph of Sétif, 2017.

Table (11): Results Generated by the URBINDEX Spreadsheet

| Index | Value |
|------------------|------------|
| Total population | 32,458,760 |

| Index | Value |
|---------------------|-------------|
| Urban population | 25,000,000 |
| Rural population | 7,458,760 |
| Percent urban | 77.02081041 |
| Urban/rural ratio | 3.351763564 |
| City population | 1,103,822 |
| Non-city population | 31,354,938 |
| Number of cities | 59 |

Primacy Indices

| Indicator | Value |
|------------------------------------|--------------|
| First 4 cities | 1.012927411 |
| First 11 cities | 1.33577498 |
| Index of city distribution | 1.203852617 |
| City concentration ratio | 0.691310215 |
| Index of mean city population size | 4,968.494329 |
| Index of city concentration | 0.000153071 |

Source: Prepared by the researcher based on URBINDEX spreadsheet results.

From these results, it is shown that the urbanization rate (Percent Urban) in the State of Sétif is estimated at 77.02%, and that the urban dominance index (first four cities index) is 1.01, while the city concentration ratio is 0.69 (69%). This indicates that the city of Sétif is growing along its peripheries and in major urban areas, which explains the concentration rate in urban areas not exceeding 65% compared to previous years.

Sixth: Testing the Hypotheses

Based on the previous study, all hypotheses can be evaluated as follows:

- The first hypothesis is not confirmed, since reliance on the CSRMIG spreadsheet shows that the State of Sétif is repellent rather than attractive to population during the period 1998–2008.
- The second hypothesis is confirmed, as according to the Gini Index (estimated at 0.56), most of the population of the State of Sétif is concentrated in the main urban areas.
- The third hypothesis is confirmed, as according to the URBINDEX program, the urbanization rate (Percent Urban) in the State of Sétif is 77.02%, and the urban dominance index (first four cities index) is 1.01, indicating urban dominance in the State of Sétif.

Seventh: Results of the Study

This work concluded, through the study of estimating migration and measuring urbanization indicators in the State of Sétif, with the following results:

- The results of the CSRMIG calculation sheet showed that the city of Sétif is a population-expelling city.
- Based on the Gini result for 2017 = 0.56, it was concluded that the population of the city of Sétif is concentrated in the main urban areas (cities), due to migration from rural areas.
- According to the data of the United Nations-approved program URBINDEX, the urbanization rate is estimated at 77.02%, the Urban Development Index (four-city index) is estimated at 1.01, and the concentration ratio is estimated at 0.69, i.e., 69%. This means that there is a high concentration of the population of the state in urban areas, indicating an uneven distribution of the state's population.
- The four indicators proved that the population of Sétif, according to the 2017 statistics, is unevenly distributed and largely concentrated in urban areas, which may cause significant demographic pressure on the destination areas.
- In order to study the possibility of alleviating pressure on areas experiencing high population growth and achieving urban balance, the Browning and Gibbs method for population redistribution was addressed. It was observed that the cities of Sétif and El Eulma achieved sizes exceeding their ideal sizes, which indicates that they suffer from high population pressure due to in-migration from municipalities and neighboring states, while the rest of the cities recorded sizes below their ideal sizes. This requires adopting a new policy to redistribute the population across the municipalities of the state in a way that reduces pressure on the cities of Sétif and El Eulma.

Regardless of whether urbanization is driven by economic development or demographic transformations, it is often viewed as a real opportunity to achieve economic development, due to the advantages enjoyed by cities. However, these characteristics do not occur spontaneously; rather, they require planning and a guiding process led by governments, which are required to formulate appropriate urbanization policies that help harness capacities and prepare for further growth of the urban population.

Conclusion

Migration, in all its forms and types, is considered one of the most important elements controlling population growth rates after natural increase. It also affects and is affected by the social and economic characteristics of the population. It has an impact on population growth and population structure, as it creates concentration and population density in major cities,

thereby leading to new pressure on various social, health, educational, and recreational services, and increasing the demand for employment. Internal migration has been a fundamental factor in urban growth and urbanization, which is usually accompanied by population growth in urban areas.

Algeria experienced, before, during, and after independence, radical transformations in the spatial distribution of its population, which had a profound impact on the rapid growth of the urban population at the expense of rural areas, leading to an imbalance between rural and urban areas due to migration and displacement.

This phenomenon, resulting from the interaction of many factors discussed through its various characteristics, leads us to envisage the future of the urban society of Sétif, which will extend its influence over all patterns of living and the capacities of the state in developing and growing its cities in accordance with the needs of its society. Therefore, the greatest challenge facing the contemporary State of Sétif lies in how to control the process of urbanization and manage urban centers in light of the problems of spontaneous urbanization, its spread, the proliferation of informal settlements, and the problem of social integration within urban environments.

The strategic location occupied by the city of Sétif, as a transit point between the coast and the high plains, has qualified it to become one of the major Algerian cities.

In the State of Sétif, urbanization has led to a significant concentration of the population in cities, especially in the main urban centers, increasing their expansion and size. The state has also witnessed population transformation and migration from rural areas to urban areas, which has led to an increase in the proportion of the population living in urban areas.

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