

The relationship between population growth and economic growth in Egypt: A geographical perspective

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ABSTRACT

The population is one of the most important factors of production, and its characteristics determine whether population growth is a blessing that enhances the state's competitiveness or a burden that strains resources and the environment. There are five perspectives regarding the relationship between population growth and economic growth, which are: Population growth does not contribute to economic growth, Population growth stimulates economic growth, The population effect is neutral, interrelationship, and The relationship changes over time. In Egypt, the correlation between population growth and economic growth is highly significant; the first rate reflects the increase in the size of the population, while the other rate reflects the economic aspect, as well as the growing concern regarding the dangers of population increase on economic growth in Egypt.

Purpose: The study intends to explore the correlation between population growth and economic growth in Egypt from 1993 to 2023, with a specific focus on the various governorates in 2023; Determining the impact of population growth on economic growth in Egypt during the period 1993-2023, And how have the rates of economic growth and population growth changed in Egypt, the optimal population size for Egypt, and the limits of the relationship between the annual population growth rate and the economic growth rate.

Research methods: The study followed an objective and historical approach, in addition to descriptive and cartographic methods, as well as statistical methods. The data used in this study's statistical analysis were obtained from the Egypt Demographic and Health Survey 2014 (EDHS), Egypt Family Health Survey 2021 (EFHS), the Ministry of Planning, Economic Development, and International Cooperation, and CAPMAS 2017. Every governorate in Egypt is covered under the current study.

Research results: The study revealed that the current population growth rate in Egypt is 1.90%, which requires an economic growth rate exceeding 5.7% annually for citizens to reap the benefits of development; however, the economic growth has not reached this level. The study revealed that there is a strong inverse correlation (-0.938*) between the population growth rate and the economic growth rate, especially Upper Egypt governorates are the most in need of care.

Recommendations: It recommended the necessity of working on three pillars. The first is the population, through supporting the national strategy for population and development in Egypt (2023 - 2030) and controlling the population growth rate. The second is to work on increasing the economic growth rate, especially in the underprivileged governorates that suffer from a high population growth rate and a low economic growth rate, such as the Red Sea Governorate, Marsa Matrouh Governorate, Assiut Governorate, Minya Governorate, and Fayoum Governorate. The third is to work on integrating the economic dimension with the population dimension.

Keywords: *Governorates of Egypt, population growth, economic growth, economic development, Optimal Population Size, population trap, Correlation coefficient, Dalton's Equation, High-Risk Governorates.*

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Introduction

The demographic factor plays a crucial role in the development of any country, largely determining the pace of economic growth and the level of well-being of the population, and has established it as a key driver of both social and economic development [1]. In Egypt, the demographic transition has passed through several distinct historical stages, reflecting changes in birth rates, death rates, and population growth. The first stage, from 1917 to 1946. The second stage was the beginning of the transition (between 1947 and 1986). 1990 marked the onset of the third stage of demographic transition (from the 1990s until now), and if family planning policies continue and education and health levels improve, Egypt is expected to enter the fifth stage (post-demographic transition), characterized by a clear

decline in birth rates to replacement level, stabilization or significant slowdown in population growth, an increase in the proportion of elderly people, and challenges in the labor market and social protection [2].

The study of the relationship between the population growth rate and the economic growth rate is an important issue. The first-rate reflects the increase in the size of the population in any country, while the other rate reflects the economic aspect of the country [3].

The main objective of any country is to achieve economic growth and improve the standard of living for its citizens. Economic growth is defined as an increase in a country's gross domestic product (GDP) or gross national income (GNI), which results in a rise in real per capita income over time [4].

The population is one of the most important factors of production, and its characteristics determine whether population growth is a blessing that enhances the competitiveness of the state or a burden that strains resources and the environment [5].

The historical progression of thought regarding the relationship between population growth and economic development shows that in the 1950s and 1960s, there was a prevailing belief that rapid population growth would negatively impact the economy. By the late 1970s, the perspective shifted to suggest that a surplus of labor in developing countries could actually impede economic growth. By the end of the 1980s, population growth was no longer seen as a direct cause of shortages in food or natural resources. Instead, it became recognized as a potential factor contributing to a slowdown in economic growth. Additionally, demographic changes began to be understood not only as a cause of economic changes but also as a consequence of them [6].

Study Objective: The study aims to determine the relationship between population growth and economic growth in Egypt during 1993 to 2023, and at the governorates in the year 2023.

Importance of the Study: The importance of the study lies in the impact that the population growth rate has on the economic growth rate in Egypt during 1993 to 2023, as well as the growing concern regarding the dangers of population increase on economic growth in Egypt.

Study Problem: Determining the impact of population growth on economic growth in Egypt during the period 1993-2023. From this, the study problem can be formulated into the following questions:

- How have the rates of economic growth and population growth changed in Egypt?
- What is the optimal population size for Egypt?
- What are the limits of the relationship between the annual population growth rate and the economic growth rate?

Study Hypothesis: The study is based on the hypothesis that population growth in Egypt during the study period has a significant impact on economic growth.

1. Main intellectual trends regarding the relationship between population growth and economic growth

The study of the relationship between population growth and economic growth has a rich historical record in the field of economics. However, there remains a disagreement regarding the forms of impact that population growth has on economic growth [7]. Studies have not reached definitive conclusions about whether population growth has positive, negative, or neutral effects on economic growth, as there

are five main intellectual trends regarding the relationship between population growth and economic growth;

The first is the traditional (Malthusian) view, which argues that high population growth leads to a decline in economic growth, as it creates pressures on natural resources, reduces private and public capital formation [8]. It also significantly increases the demand for goods and services among individuals, thereby reducing their savings intended for investment purposes, increasing government expenditures on essential services such as education, health, transportation, protection, security, and housing, and raising unemployment rates, particularly among the educated. This is accompanied by a noticeable decrease in wage levels in both the public and private sectors, rising housing prices due to the difficulty in meeting the needs of new families, urban encroachment on agricultural land and the resulting problems, in addition to the collapse of public utilities due to the pressure placed on them [9].

While some researchers mention that population growth negatively impacts economic growth, others point out that population growth positively contributes to economic growth [10]. This second viewpoint which suggests that a high population growth rate increases the stock of human capital, resulting in a larger workforce that boosts economic growth [11]. Additionally, population growth can stimulate technological development and innovation, enhance the benefits of large-scale economies, and increase the number of creative individuals and those with exceptional abilities who can drive transformative changes in the future.

While the third viewpoint supports the neutrality of population impact, it states that the effect of demographic factors on economic growth is unclear, due to reliance solely on the annual growth rate of the population without considering other more detailed demographic variables., such as the age Age-Sex population structure, particularly the group entering the labor market or expected to enter in the near future. The growth of the economically active population can contribute to increased economic growth [12].

The fourth viewpoint confirms that the relationship between these two variables is one of mutual influence, as there is no clear generalization regarding the impact of population growth on the economic growth of countries that vary in growth rates, densities, and income levels [8].

The fifth viewpoint states that the relationship between population growth and economic growth changes over time. Initially, demographic changes have a positive effect on economic growth; however, the magnitude of this effect diminishes over time and becomes negative by the end of the period. In

other words, the relationship between the variables takes the shape of an inverted U-curve. The authors explain this phenomenon through the three stages of demographic transitions: the first stage is characterized by high fertility with high mortality rates, the second stage features high fertility with declining mortality rates, and the third stage is characterized by low fertility with low mortality rates [7].

So there are five perspectives regarding the relationship between population growth and economic growth, which are: Population growth does not contribute to economic growth, Population growth stimulates economic growth, The population effect is neutral, interrelationship, and The relationship changes over time.

2. Literature Review

As stated in the Introduction, there is no consensus about the effects of population growth on economic growth. Empirical studies have found evidence in favor of negative, positive, and neutral effects as well as of no effects at all.

We find the study by Dodson [12] that examined the impact of population growth on the three pillars of sustainability, focusing on variables that represent the environmental, social, and economic dimensions. The results indicate that population growth in Egypt negatively affects the country's ability to achieve sustainable development, primarily due to its adverse impact on the environment. Although this study did not examine the relationship between population growth and economic growth in Egypt, However, it is important as it is one of studies to highlight the ways population growth directly and indirectly affects all pillars of sustainable development.

The study of Brida, J. G., [7] examined the relationship between population and economic growth in 111 countries from 1960 to 2019, revealing three patterns of the relationship between economic growth and population growth that vary from one group to another. These countries were classified based on this relationship into mature economies, transitional economies, and young economies. while it provides evidence of interdependence between economic growth and population, it does not allow conclusions to be drawn about causal relationships, nor about the sign or magnitude of possible effects.

The study by Awda [14] attempts to monitor the population issue and its various implications, including that population growth hinders the state's efforts in the sustainable development process aimed at improving the lives of Egyptian citizens. It also negatively affects job opportunities, unemployment, poverty, and the lack of an increase in household income. However, the research's reliance on a field study, typically conducted within a specific geographical area (Zagazig University) and over a

short period in 2023, limits its results from being generalized on a wider scale or across different time periods.

The study by Suluk, S., [10] aimed to explore the relationship between population growth and economic growth in Singapore from 1970 to 2020. The findings revealed a one-way causal relationship, indicating that the population growth had a positive impact on economic growth in Singapore. While the study spans a long period and provides stable results, it does not address the spatial variations in this relationship.

The study by Güney [15] aimed to analyze the impact of population growth on sustainable development. The study was conducted in 146 countries during the period from 1990 to 2012. It concluded that there is a negative impact of population growth rates on sustainable development in developing countries, while the impact is positive in developed countries. Despite the importance of the study, the findings were general and unclear.

The study by Peterson, E. W. F., [16] relied on historical data to determine the relationship between population growth and economic growth over the past two hundred years. It stated that the relationship between population growth and economic growth has multiple forms, as a decline in population growth in high-income countries may create social and economic problems, while an increase in population growth in low-income countries may slow their growth. But, this study was conducted in the world's major regions and selected no more than 23 countries, most of which are from the developed world, This leads to methodological problems affecting the credibility of the findings.

And the study by Sibe, J. P., [17] evaluated the relationship between population growth and per capita income in 30 of the most populous countries in the world over a period of 53 years. These countries represent 78% of the total global population, regardless of their levels of development. It was found that there is a long-term equilibrium relationship between population growth and economic growth, and that population growth and economic growth are positively linked, and population growth positively influences economic growth in the long term.

Although the topic is important, the selection of these countries was based solely on population size, without considering demographic characteristics that could yield different results.

A study by Zahan, I., [18] confirmed the existence of a long-term relationship between population growth and economic growth in Bangladesh, noting that population growth negatively impacts per capita GDP. In general, an increasing population raises the youth dependency ratio, which leads to a decrease in per capita GDP. Furthermore, the additional labor is

not utilized efficiently. But one of the most significant limitations of this study is the issue of causality present in econometric models, which makes it difficult to clearly establish the direction of the relationship between variables, and some important mediating factors, such as the quality of human capital and education levels, have not been sufficiently considered.

A study by Mohammed, [3] examined the relationship between the demographic growth rate and the economic growth rate in Algeria. The study confirmed that the developmental issues in Algeria have multiple causes, not just population growth, but rather stem from the lack of alignment between the increase in economic growth and the increase in demographic growth. It emphasized that there is no impact of the demographic growth rate on the economic growth rate during the period from 1970 to 2009. This finding is specific to Algeria and cannot be generalized to all countries.

However, the most prominent limitation lies in the difficulty of definitively determining the direction of causality between demographic and economic growth using econometric models. Moreover, the study did not sufficiently incorporate the role of institutional and political factors in shaping this relationship.

A study by Garza-Rodriguez, J., [6] analyzed the relationship between population growth and economic growth for the period 1960-2014. It showed a long-term equilibrium relationship between population and economic growth in Mexico, and found that economic growth has a negative impact on population growth in the long run. The main limitations lie in the difficulty of determining the direction of causality between population and economic growth in standard models, in addition to the focus on the total population rather than human capital.

A study by Niemets, L., [1] was addressed the nature and importance of demographic socio-economic factors development, based on European standards, and calculated demographic potentials of the regions of Ukraine and identified the place of Kharkiv region among them, which has significant demographic potential, a strong potential functions of academic, university and industry science, technical and production potential of many leading companies, including high-tech industries in the industrial complex that allows to produce and to deliver competitive products. It was also outlined the necessity of strategies and programs forming in view of the intraregional features. However, limitations arose from the specific nature of the study, which focuses on the case of the Kharkiv region in Ukraine, thus limiting the possibility of generalizing the results.

A study by Berry, C., [19] indicated that the relationship between population growth and economic growth in the United Kingdom has been variable and not consistent; for instance, the high population growth in the mid to late 1960s was accompanied by high economic growth, while the low population growth in the 1970s corresponded with lower economic growth. Similarly, the high population growth from the mid-1980s onward was matched by relatively high economic growth. Since the early 2000s, the population has continued to grow at a high rate, while the economy experienced a severe recession before beginning to recover in 2013. The main limitations lie in focusing on a single case (the United Kingdom), which reduces the potential for generalization and makes the results conditional on the post-financial crisis context.

The study by Atanda, A. A., [8] reviewed the determinants of population growth among developing countries (Bangladesh, Ethiopia, Indonesia, Mexico, and Nigeria) and developed countries (Germany and the United States). The study highlighted the need for a framework to manage population growth and provide infrastructure for rapidly growing populations in developing countries to enhance their well-being. The main limitations are the difficulty of generalisation due to the enormous variation among the selected developing countries.

A study by Tsen, W. H., [11] observed the relationship between population and economic growth in Asian economies. It showed that there is no long-term relationship between population and economic growth. Overall, the relationship between population and economic growth is not direct. Population growth can be either beneficial or harmful to economic growth, and economic growth may also have an impact on population growth. The main limitations include the diversity among various Asian economies and the fact that the results do not reflect the economic and political developments that have occurred since 2005.

A review of previous studies reveals that they have not addressed the relationship between population growth and economic growth in Egypt from the perspective of population geography. It also did not address the relationship at the governorates level, as what the study will attempt to do, which allows for accurate monitoring of spatial variations and provides realistic and applicable insights into formulating geographically targeted development policies.

3. Data and Methodology

The data used in this study's statistical analysis was obtained from the Egypt Demographic and Health Survey 2014 (EDHS), Egypt Family Health Survey 2021 (EFHS), The Ministry of Planning, Economic Development, and International Coopera-

tion, and CAPMAS 2017, Every governorate in Egypt is covered under the current study.

Methodology: The study followed the topical approach, the historical approach, in addition to the descriptive method, and the cartographic method represented by the Geographic Information Systems (GIS), as well as the statistical method using Excel and the Statistical Package for the Social Sciences (SPSS).

4. Results and Interpretation

4-1: The rate of economic growth and population growth in Egypt: Many research studies have confirmed that economic growth should be three times the rate of population growth in order to achieve a balance between population growth and economic growth, where the economy is capable of creating the necessary jobs for the new generation [20].

This means that the population growth rate in Egypt, which reached 1.90% during 2013 to 2023, as shown in Table (1), requires an economic growth rate exceeding 5.7% annually for citizens to feel the benefits of development. This is especially significant given that the population increased from 61.4 million people in 1993 to 112.7 million in 2023. However, economic growth has not reached this level and remains insufficient to keep pace with population growth. It is still far from the required percentage to accommodate the population increase, despite the government's significant efforts to achieve economic development that alleviates the burden on citizens. This is in light of the gradual decline in the annual population growth rate in Egypt from the beginning to the end of the period, while the economic growth rate is trending upward gradually.

Table 1

Size and Annual Growth Rate of the Population and Economic Growth Rate in Egypt from 1993 to 2023

Year	Population size	Population growth rate	Economic Growth Rate
2023	112.7	1.90	3.8
2013	93.4	2.08	3.3
2003	76.0	2.16	3.2
1993	61.4	2.62	2.9

Source:

indicator, Data, Population, total. (2025, April 1). Retrieved from World Bank Group: <https://data.albankaldawli.org/indicator/SP.POP.TOTL>

Real GDP growth, Annual percent change. (2025, April 1). Retrieved from International Monetary Fund: https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/OEMDC/ADVEC/WEOWORLD

Despite the enormous efforts made by the state and its institutions to control the annual population growth rate, there is still much work ahead for the state to implement further measures to regulate population growth. The reasons for the population increase are numerous, the most important of which are: natural increase (the rise in the number of births and the decline in death rates), an increase in life expectancy, and high fertility rates. This has resulted in a higher proportion of the population being under the age of 15, which expands the base of the population pyramid and consequently raises the dependency ratio, creating a significant burden on families and the state in meeting their needs for education, health, food, and other essential requirements. This situation poses an obstacle to achieving economic growth.

The improvement of medical services has contributed to a decrease in mortality rates. Additionally, early marriage has exacerbated the population problem, along with the migration from rural to urban areas and the influx of migrants and refugees,

estimated at around 9 million [21], which has increased pressure on all services. There is also the negative role of social customs, the adverse effects of which are evident in the decline of demographic characteristics such as education, health, and unemployment. Furthermore, there is an unequal distribution of the population across the land area in Egypt, leading to negative phenomena such as high poverty rates, a decrease in arable land, a reduction in water resources, and the spread of informal settlements.

By studying Table (2) and Figure (1), the governorates can be divided into three groups based on the population growth rate:

- Governorates with an annual population growth rate of 2.2% or higher, totaling 8 governorates, (29.6% of the total number of governorates in Egypt) include Ismailia and Matrouh governorates, and most of the Upper Egypt governorates. Matrouh has a growth rate of 4.5% annually, attributed to the high levels of fertility in this governorate (4.38 children per woman in 2021) and the low median number of months since preceding birth

(28.8 months) [22]. Additionally, the natural increase was recorded at 36.2 per thousand in 2021 (41.4 per thousand for births and 5.2 per thousand

for deaths) [23]. Following Matrouh, the governorates: Qena, Minya, Asyut, Sohag, Fayoum, Beni Suef, and Ismailia.

Table 2

Population Growth Rate and Economic Growth Rate in Egypt (2023)

Governorate	Population	Economy	Governorate	Population	Economy
Cairo	1.52	6.5	Beni Suef	2.45	3.9
Alexandria	1.24	5.5	Fayoum	2.60	3.8
Port Said	1.08	4.0	Menya	2.82	3.5
Suez	1.54	4.0	Assuit	2.82	3.4
Damietta	1.08	2.9	Souhag	2.80	4.6
Dakahlia	1.72	5.5	Qena	2.99	4.9
Sharkia	2.01	6.0	Aswan	2.11	4.0
Kalyubia	1.71	3.7	Luxor	1.24	4.5
Kafr El-Sheikh	1.87	5.6	Red Sea	2.19	1.8
Gharbia	1.6	3.3	New Valley	1.98	7.8
Menoufia	1.85	4.7	Matroh	4.50	2.7
Behera	2.04	4.4	North Sinai	0.73	3.2
Ismailia	2.41	0.4	South Sinai	1.60	2.4
Giza	2.03	5.6	Total	2.05	3.8

Source:

- Ministry of Planning, Economic Development & International Cooperation, United Nations Population Fund, (2020). *Localization of Sustainable Development Goals in Egypt-Governorates of Egypt, Sustainable Development Goals*, First Edition, Cairo.

- Central Agency for Public Mobilization and Statistics. (2017). *General Population, Housing and Establishments Census 2017*. Cairo: Central Agency for Public Mobilization and Statistics Press.

- Central Agency for Public Mobilization and Statistics (2023). *Annual Statistical Book*, Cairo: Central Agency for Public Mobilization and Statistics Press.

As it has been said, population growth resulting from high fertility rates, as in these provinces, can reduce overall well-being, unlike growth resulting from lower mortality rates, which encourages people to increase savings and improves economic growth (Peterson, E. W. F., 2017, p. 12).

- It was distributed in most governorates (14 governorates, accounting for 51.9% of the total number of governorates in the republic) with a growth rate ranging between 1.5% and less than 2.2% annually. These governorates are: Red Sea, Aswan, Beheira, Giza, Sharqia, New Valley, Kafr El Sheikh, Monufia, Dakahlia, Qalyubia, South Sinai, Gharbia, Suez, and Cairo.

- Five governorates (18.5% of the total number of governorates in the Egypt) achieved an annual growth rate of less than 1.5% per year. These governorates include Luxor, Alexandria, Port Said, Damietta, and North Sinai. This decline in population growth rate in these governorates is attributed to

changes in couples' attitudes towards regulating fertility levels and adopting a small family model, which is due to the ease of access to family planning methods and services provided by the state at various outlets [24]. These variations in population growth rates among the governorates reflect changes in the total fertility rate, as well as the population size resulting from natural increase and migration between governorates.

By studying Table (2) and Figure (2), the governorates can be divided based on the economic growth rate in the governorates of Egypt in 2023 into three groups:

- There are nine governorates with a growth rate of 4.7% or higher, which is 33.3% of the total number of Governorates in Egypt. These include Alexandria and the region comprising the governorates of North and East Delta, Cairo, Giza, New Valley, and Qena.
- In the most of governorates (16 governorates,

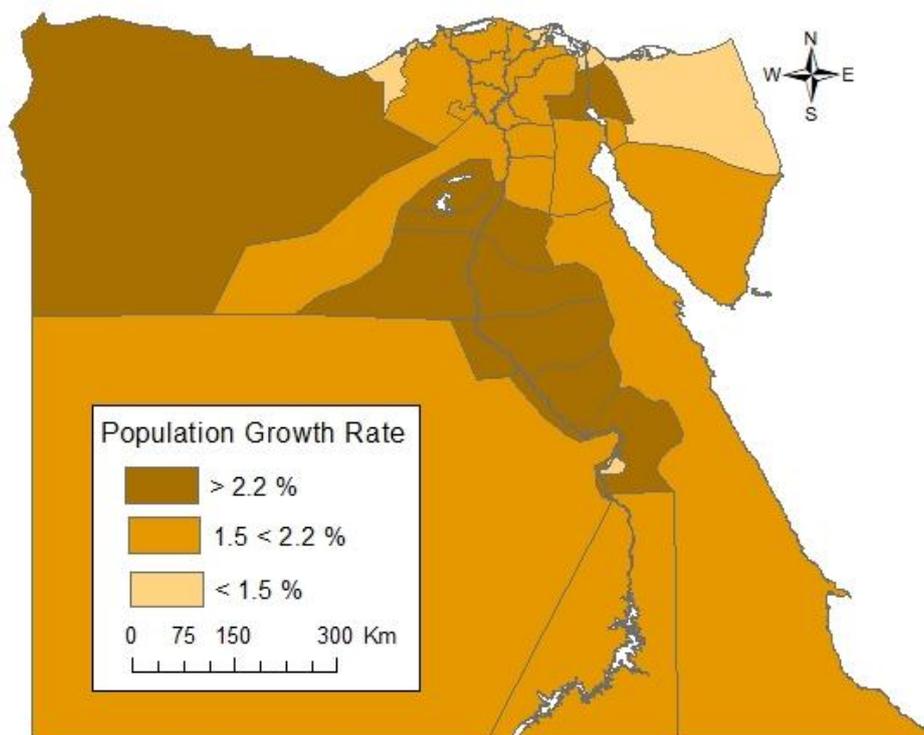


Fig. 1. Population growth rate in the governorates of Egypt (2017 – 2023)

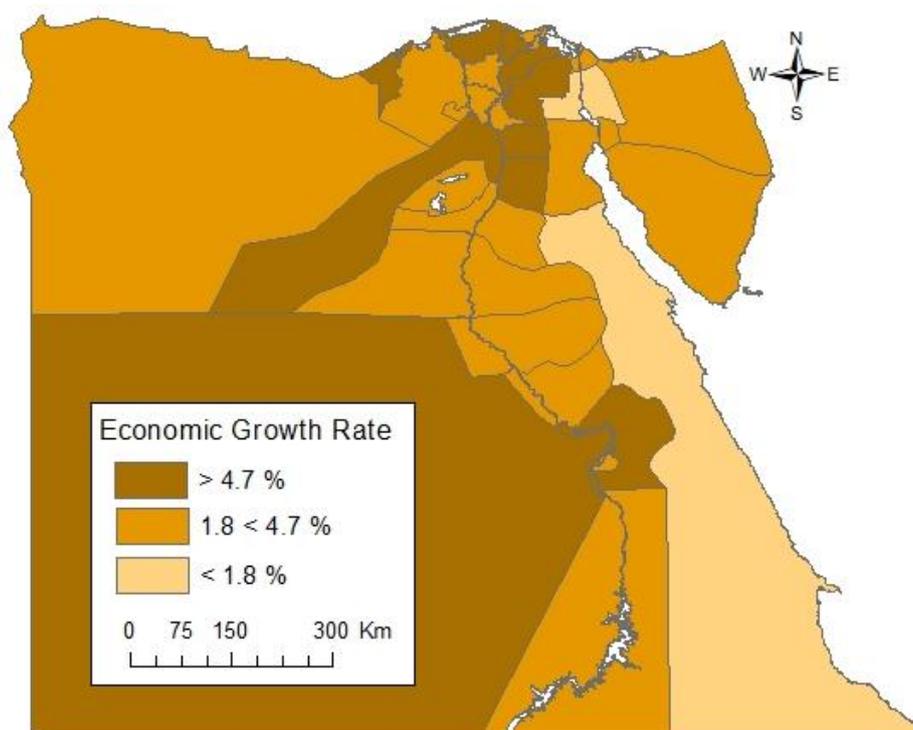


Fig. 2. Economic Growth Rate in Egypt's Governorates 2023

accounting for 59.3% of the total number of governorates in Egypt) the growth rate ranging between 1.8% and less than 4.7%, across several areas; the first in Port Said, and the governorates of Sinai and Suez, as well as in the northern and central Upper Egypt, in addition to Aswan governorate in southern Egypt, and area located in the central and western of the Nile Delta, in addition to Matrouh governorate.

- It represents a growth rate of less than 1.8% and is located in the governorates of Ismailia and Red Sea, accounting for 7.4% of the total number of governorates in Egypt.

The explanation for the decline in the economic growth rate in the second and third categories is largely attributed to the population distribution between rural and urban areas, which is one of the main obstacles to development. The high population

density in a specific area represents a significant pressure on infrastructure services [25].

Additionally, in low-income agricultural communities, population growth is low due to the limited income per capita caused by the low returns on labor, which increases the utilization of resources. This is evident in the rural governorates of Upper Egypt, particularly in Assiut, where the rural population constitutes 72.9%, in Fayoum 76.8%, in Sohag 78.6%, and in Minya 80.9% [26]. In contrast, population growth in high-income urban economies leads to greater income growth as a result of increased returns from greater specialization and growth in investments in human capital [16], especially in urban governorates such as Cairo, which has a 100% urban population, Port Said at the same percentage, and Alexandria at 98% [27].

Figure (3) shows notable observations:

- New Valley stands out with the highest economic growth rate (7.8%) despite moderate population growth which is required potential investment destination.

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- Matrouh has very high population growth (4.5%) but only moderate economic expansion, this indicates potential future service/infrastructure stress.
- Ismailia shows extremely low economic growth (0.4%), indicating urgent development support, although population growth is not extreme.
- The largest metropolitan centers (Cairo, Alexandria, Giza) show strong economic performance with controlled population growth, which supports more sustainable development balance.
- Outliers Values; New Valley (Very high economic rate), Matrouh (Very high population growth), Ismailia (low economic growth). These governorates require special policy attention and tailored regional planning strategies.

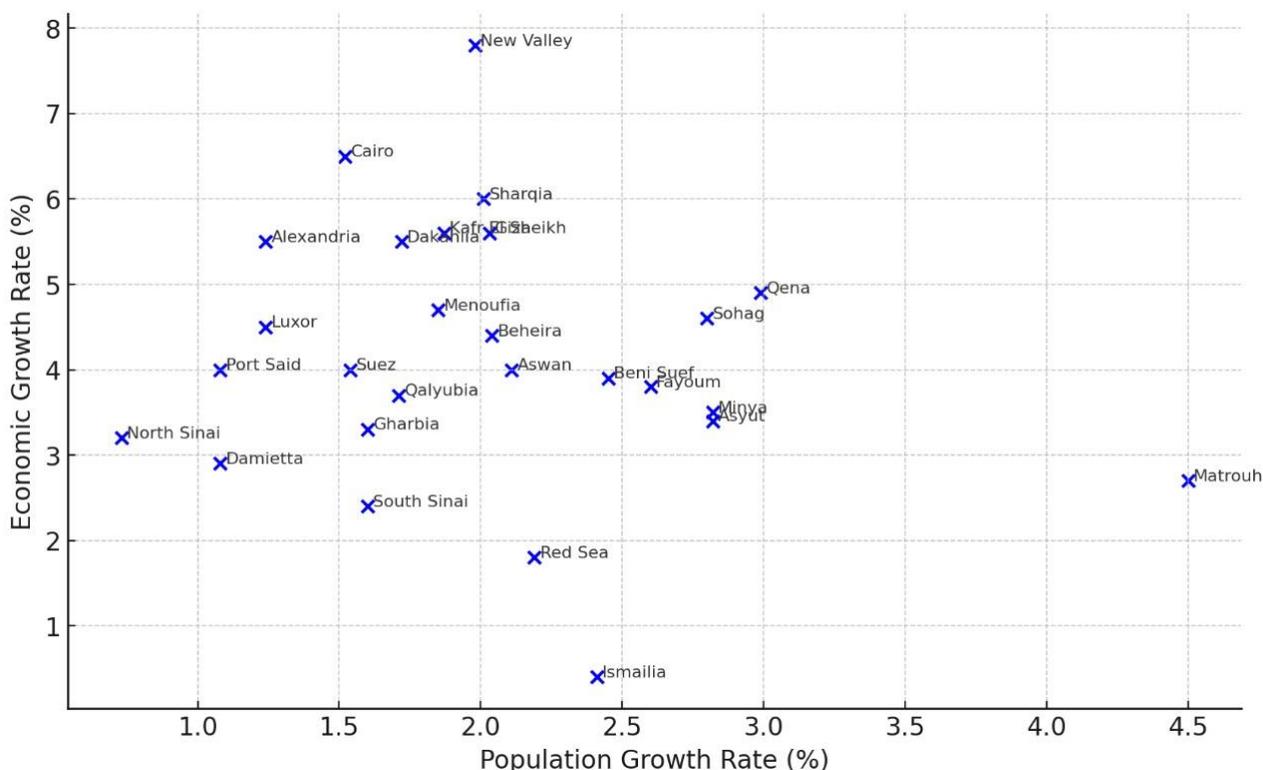


Fig. 3. Population Growth Rate and Economic Growth Rate across Egyptian Governorates

Optimal Population Size: The theory of optimal population size is one of the modern theories that connects the economic resources with the population size. This term is defined as the size at which the value of certain variables reaches their maximum limit, providing a happy life.

The average per capita income equivalent index - income adjusted for price levels¹ - is considered

one of the most important methods for determining the optimal population size, as well as a criterion for distinguishing between overpopulation and underpopulation in Egypt.

The population size in Egypt in 1990, which was 57.2 million people, is considered the optimal size for the population of Egypt. The extent to which the population in Egypt deviates from the optimal population size is measured using the Dal-

¹ The equivalent average income was obtained using the equation: Equivalent per capita income = Average per

capita national income in dollars ÷ Standard prices of consumer goods.

ton equation²., And as per Dalton's equation, the population size has diverged from the optimal size by a positive value of 1.0

4-2: The relationship between population growth rate and economic growth rate: The economic cost of population increase is reflected in the loss of human capital; as family size increases, parents have fewer opportunities to educate their children. At the national level, population growth puts pressure on the state budget, leading to a reduction in essential social services such as housing, health, security, and others. Additionally, there is a decline in household and national savings rates.

The negative impact does not stop there; it generates further negative effects. The decrease in income and decline in the standard of living which push poor families towards having more children as a source of cheap labor and social security for parents in old age. This leads to what is referred to as the "poverty cycle" or "population trap," as Figure 4. This means increased population growth and greater dependency burdens at both the family and national levels, resulting in a decline in human capital, reduced savings and investment, and consequently, a slowdown in economic growth, leading to poverty and high unemployment.

By studying Table 3, which illustrates the inverse correlation coefficient (-0.938*) between population growth rate and economic growth rate in Egypt.

However, when studying the relationship between population growth rates and economic growth rates in Egypt's governorates, it was found that there are several different trends, making it difficult to extract a direct relationship between them. This is due to the presence of other factors that have a greater and more significant impact on the economic growth rate in these governorates, the most important of which are: human resources and their ability for creativity, training, and learning; natural resources, whether above or below the ground, meaning the land with its geographical characteristics and the resources it contains; productive capital directly from facilities, buildings, and equipment; indirect capital represented by infrastructure; technological development; in addition to social factors

represented by customs, traditions, and others. These various relationships are as follows:

First: Low population growth rate and low economic growth rate: This relationship is represented by the governorates of Damietta, Suez, Gharbia, South Sinai, Qalyubia, and Menoufia, (22.2% of the total number of governorates and 17.7% of the total population in Egypt, 2023).

Second: Low population growth rate and high economic growth rate: This pattern is known for benefiting from the "demographic dividend." where this relationship is seen in the governorates of North Sinai, Port Said, Alexandria, Luxor, Cairo, and Dakahlia, (22.2% of the total number of governorates and 24.2% of the total population in Egypt, 2023).

Third: High population growth rate and high economic growth rate: This relationship is represented by the governorates of Kafr El Sheikh, New Valley, and Sharqia, (11.1% of the total number of governorates and 11.3% of the total population in Egypt, 2023).

Fourth: High population growth rate and low economic growth rate: This is often associated with closed economies, commonly referred to as the "poverty trap" [7], as seen in the governorates of Giza, Beheira, Aswan, Red Sea, Ismailia, Beni Suef, Fayoum, Sohag, Assiut, Minya, Qena, and Matrouh, (44.5% of the total number of governorates and 46.8% of the total population in Egypt, 2023).

4-3: Egypt governorates according to the relationship between population growth rate and economic growth rate: By conducting a cumulative ranking of this relationship and converting it into a map for monitoring and planning priorities, as shown in Table 4 and Figure 5. These governorates can be classified into:

First: Low-risk governorates, which include:

- A. *Leading Governorates:* This category is distributed across seven governorates; 25.9% of the total governorates in Egypt, inhabited by 26.2 million people, which represents 24.5% of the total population of Egypt in 2023. They are distributed across the governorates of New Valley, Luxor, Cairo, North Sinai, Port Said, Dakahlia, and Alexandria.
- B. *Balanced Governorates:* This category was found in only two governorates in the Delta; Sharqia and Kafr El-Sheikh, (7.4% of the total governorates in Egypt). They are inhabited by 11.8 million people, (11% of the total population in Egypt in 2023).

These two categories (A & B) exhibit strong economic dynamics while maintaining controlled population pressure and achieving a more sustainable development balance.

Second: Moderate-risk governorates: This category is spread across 13 governorates (48.2% of

² Dalton's Equation: $M = (A - O) \div O$

M = The deviation of the population size from the optimal size.

A = The current population size.

O = The optimal size.

If the result equals zero, the population has reached the optimal size.

If the result is positive, it indicates population explosion or overcrowding, while a negative result indicates a state of population deficiency.

the total governorates in Egypt, with a population of 52.2 million, 48.7% of the total population in Egypt in 2023). It has appeared in two main regions: the first in northern Egypt, which includes the governorates of Ismailia, South Sinai, Suez, Giza, Beni Suef, Qalyubia, Menoufia, Gharbia, Beheira, in addition to Damietta. The second region is in Upper

Egypt in Sohag, Qena, and Aswan, this category may require economic stimulation policies.

Third: High-Risk Governorates: This category is present in five governorates, 18.5% of all governorates in Egypt, with a population of 16.9 million, 15.8% of the total population of Egypt in 2023. They are distributed across Upper Egypt, including

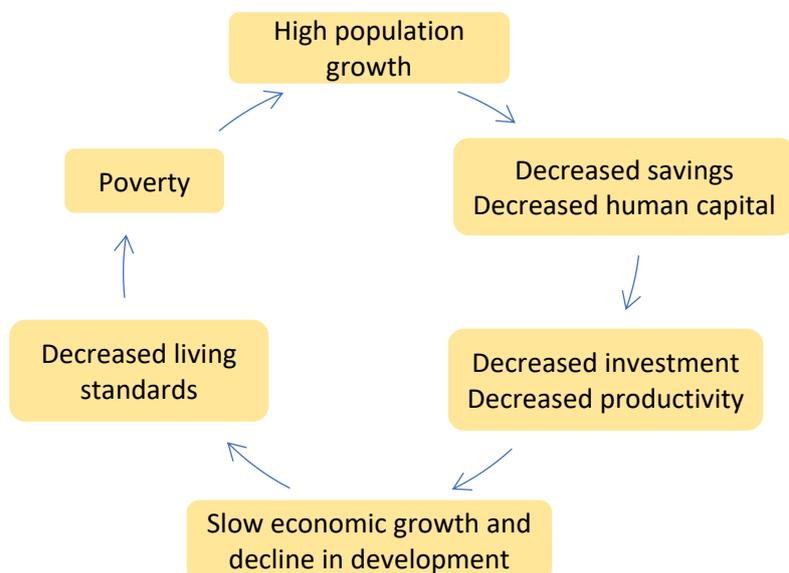


Fig. 4. Circle or cycle of poverty - population trap

Source: Saleh, Lorange Yahi (2012) The Economic Costs of Population Explosion in Developing Countries – China as a Case Study, Baghdad College of Economic Sciences University, Issue 31, Baghdad, Pages: 83-114, p. 94

Table 3

Correlation coefficients between population growth rate and economic growth rate in Egypt

		one	tow
one	Pearson Correlation	1	-.938*
	Sig. (2-tailed)		.018
	N	5	5
tow	Pearson Correlation	-.938*	1
	Sig. (2-tailed)	.018	
	N	5	5

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Statistical Package for the Social Sciences (SPSS)

Table 4

Cumulative Ranking of the Relationship Between Population Growth Rate and Economic Growth Rate in Egyptian Governorates

Classification		Governorates
Low risk	Leading Governorates	New Valley – Luxor – Cairo - North Sinai - Port Said – Dakahlia – Alexandria.
	Balanced	Sharqia - Kafr El-Sheikh.
Moderate risk		Suez - Damietta - Qalyubia - Gharbia - Menoufia - Beheira - Ismailia - Giza - Beni Suef - Sohag - Qena - Aswan - South Sinai.
High risk		Fayoum - Minya - Assiut - Red Sea - Marsa Matrou

Source: Based on the outputs of cluster analysis in SPSS

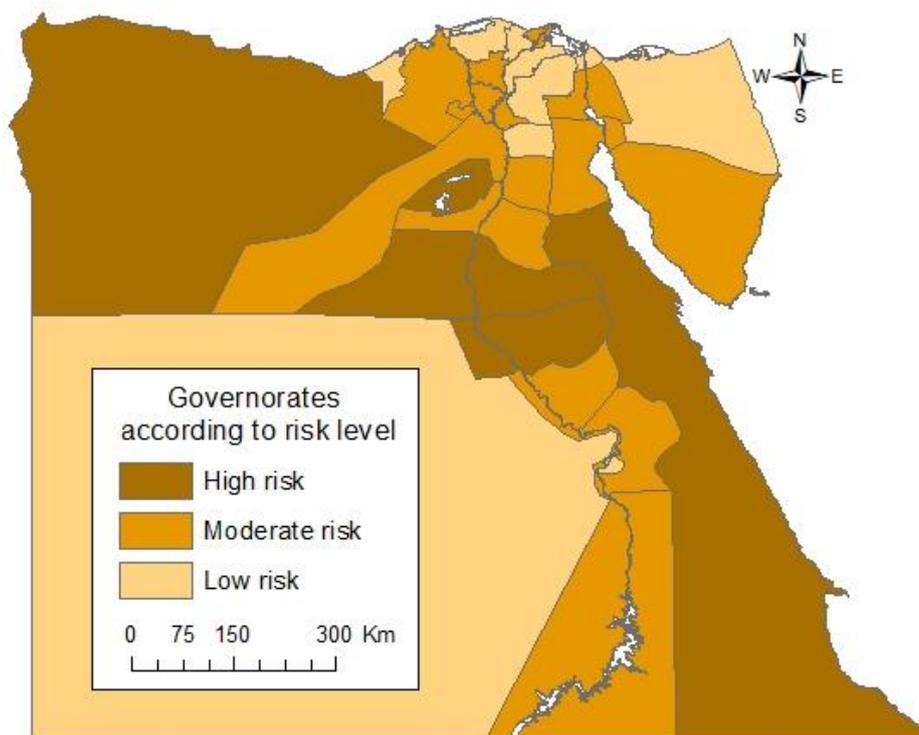


Fig. 5. The governorates of Egypt according to the relationship between the population growth rate and the economic growth rate in 2023

the governorates of Red Sea, Minya, Assiut, in addition to Fayoum and Matrouh in the northwest of Egypt, in this category Population is growing faster than the economy, which leads to higher pressure on services, jobs, and infrastructure.

The analysis of the previous figure clearly indicates that the Upper Egypt governorates are the most in need of care, with varying degrees of severity, starting from the worst situation in the governorates: Matrouh, Assiut, Minya, Sohag, and Faiyum.

Furthermore, the results reveal significant spatial variations among the governorates of Egypt, highlighting the differences in economic and social conditions.

Conclusion and Recommendations:

A. Conclusion:

- There are five perspectives regarding the relationship between population growth and economic growth, which are: Population growth does not contribute to economic growth, Population growth stimulates economic growth, The population effect is neutral, interrelationship, and The relationship changes over time.
- The study confirmed that population growth in Egypt has a significant impact on economic growth.
- The current population growth rate in Egypt is 1.90%, which requires an economic growth rate exceeding 5.7% annually for citizens to reap the benefits of development; however, the economic growth has not reached this level.

- Population growth resulting from high fertility rates can reduce well-being, as seen in the governorates of Matrouh, Qena, Minya, Assiut, Sohag, Faiyum, and Beni Suef.
- The maldistribution of population in rural and urban areas has led to a decline in the economic growth rate. The governorates with a rural character, particularly Assiut, Fayoum, Sohag, and Minya, have experienced a low economic growth rate, in contrast to urban economies, especially in Cairo, Port Said, and Alexandria.
- The population size in Egypt in 1990, which was 57.2 million, is considered the optimal size for Egypt's population, and it has been shown that Egypt's deviation from the optimal size reached +1.0.
- There is a strong inverse correlation (-0.938*) between the population growth rate and the economic growth rate.
- The study clarified that there are several trends in the relationship between population growth rates and economic growth rates across Egypt's governorates. These trends are categorized as follows:
 - Low population growth rate and low economic growth rate.
 - Low population growth rate and high economic growth rate.
 - High population growth rate and high economic growth rate.
 - High population growth rate and low economic growth rate.

- The study indicated that there are 18 governorates, 66.7% of the total governorates in Egypt, inhabited by 69.1 million people, which represents 64.5% of the total population in Egypt in 2023. These areas face moderate to high risks, based on the relationship between population growth rates and economic growth rates.
- The study revealed that the Upper Egypt governorates are the most in need of care, with varying percentages, starting from the worst conditions in the governorates of Matrouh, Assiut, Minya, Sohag, and Fayoum.

B. Recommendations:

The study has revealed a strong and significant correlation between the population growth rate and its influence on economic growth rate. This underscores the urgent need to adopt a comprehensive strategy built upon three essential pillars:

First: Population pillar:

- Supporting the National Population and Development Strategy in Egypt (2023 - 2030), which adopts on four key pillars: population growth and reproductive health, human capital development, regional development and balanced urbanisation, and social justice and inclusive development. This will be achieved by updating the institutional framework to implement the strategy, allocating necessary budgets for execution, and establishing a monitoring and evaluation mechanism in each governorate.
- Controlling the population growth rate through regulating population growth and enhancing demographic characteristics, to improve economic performance, by advancing family planning and reproductive health services, spreading reproductive health services for birth spacing, reducing the birth rate, and empowering women in a way that positively impacts women's reproductive health. This includes increasing awareness programs and improving religious discourse regarding family planning and reproductive health to disseminate the benefits and importance of family planning through awareness seminars and all available means, in coordination with the executive authorities in the governorates.

- Linking cash assistance to family planning compliance, activating literacy programs, and preventing child labour, in addition to reviewing the roles of the National Population Council, the National Council for Women, and the National Council for Childhood and Motherhood regarding population and development issues. Efforts should be made to change the prevailing customs, traditions, and culture in society concerning the concept of large families as a source of strength, wealth, and security, particularly in the governorates of: Marsa Matrouh, Qena, Minya, Assiut, Sohag, Fayoum, Beni Suef, Ismailia, Red Sea, Aswan, Beheira, Giza, Sharqia, New Valley, and Kafr El Sheikh, 55.6% of the total number of governorates and 58.1% of the total population in Egypt in 2023.

Second: Increasing the economic growth rate:

The economic performance of the governorates improves with better indicators in education, employment, and empowerment, especially in the governorates that are prioritized for care, which suffer from a high population growth rate and a low economic growth rate. These Governorate include: Red Sea, Marsa Matrouh, Assiut, Minya, and Fayoum.

Third: The integration of the economic dimension and the demographic dimension through:

- Increasing investments in the governorates that have a surplus of human capital to achieve a balance between population growth and economic growth, such as the governorates of Giza, Beheira, Aswan, Red Sea, Ismailia, Beni Suef, Faiyum, Sohag, Assiut, Minya, Qena, and Matrouh, 44.5% of the total number of governorates and 46.8% of the total population in Egypt in 2023.
- Increasing investments to develop human capital through capacity-building programs and transformative training to achieve a greater return on existing investments in provinces where the economic growth rate exceeds the population growth rate, such as the governorates of North Sinai, Port Said, Alexandria, Luxor, Cairo, and Dakahlia, 22.2% of the total number of provinces and 24.2% of the total population in Egypt in 2023.

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Зв'язок між зростанням населення та економічним зростанням в Єгипті: географічна перспектива

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В Єгипті кореляція між зростанням населення та економічним зростанням є дуже значущою; перший показник відображає збільшення чисельності населення, тоді як інший показник відображає економічний аспект, а також зростаючу стурбованість щодо небезпеки зростання населення для економічного зростання в Єгипті. Дослідження має на меті дослідити кореляцію між зростанням населення та економічним зростанням в Єгипті з 1993 по 2023 рік, з особливим акцентом на різні губернаторства у 2023 році; Визначення впливу зростання населення на економічне зростання в Єгипті протягом періоду 1993-2023 років, а також як змінилися темпи економічного зростання та приросту населення в Єгипті, оптимальний розмір населення для Єгипту та межі взаємозв'язку між річними темпами приросту населення та темпами економічного зростання. Дані, використані в статистичному аналізі цього дослідження, були отримані з Єгипетського демографічного та медичного обстеження 2014 року (EDHS), Єгипетського сімейного обстеження здоров'я 2021 року (EFHS), Міністерства планування, економічного розвитку та міжнародного співробітництва, а також CAPMAS 2017. Кожне губернаторство Єгипту охоплено цим дослідженням. Дослідження показало, що поточний темп приросту населення в Єгипті становить 1,90%, що вимагає темпів економічного зростання, що перевищують 5,7% щорічно, щоб громадяни могли скористатися перевагами розвитку; однак економічне зростання ще не досягло цього рівня. Дослідження показало, що існує сильна обернена кореляція (-0,938*) між темпами зростання населення та темпами економічного зростання, найбільше потребують уваги губернаторства Верхнього Єгипту. Рекомендовано провадити роботи над трьома напрямками. Перший – це населення, шляхом підтримки національної стратегії щодо народонаселення та розвитку Єгипту (2023–2030) та контролю темпів зростання населення. Другий – робота над збільшенням темпів економічного зростання, особливо в малозабезпечених губернаторах, які страждають від високих темпів зростання населення та низьких темпів економічного зростання, таких як губернаторство Червоне море, губернаторство Мерса-Матрух, губернаторство Асьют, губернаторство Мінья та губернаторство Файюм. Третій – робота над інтеграцією економічного та демографічного аспектів.

Ключові слова: *губнаторства Єгипту, зростання населення, економічне зростання, економічний розвиток, оптимальний розмір населення, популяційна пастка, коефіцієнт кореляції, рівняння Дальтона, губернаторства високого ризику.*

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