Egyptian Educational Research

Exploring the Socio-Economic Determinants of Educational Performance: A Study of Thanaweya Amma Exams in Egypt (2022-2023)

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Abstract

Education plays a vital role in the development of societies, shaping the future of individuals and communities. In Egypt, the Thanaweya Amma exams serve as a crucial metric for evaluating high school students' academic performance and determining their professional futures. This study aims to analyze the factors influencing educational outcomes, with a focus on the Thanaweya Amma exams for the years 2022 and 2023. Data were collected from publicly available sources, including datasets on educational performance metrics, socio-economic indicators, and demographic characteristics. Key variables of interest include students' grades, governorate GDP, sectoral GDP, GDP per capita, and economic sector contributions to GDP. Statistical analyses, including correlation analyses and hypothesis testing, were conducted to examine the relationships between these variables and educational outcomes. The results provide insights into the complex interplay between socio-economic factors and academic achievement in Egypt.

1. Introduction

EDUCATION is a the most important aspect any development-seeking society should focus on, as it plays a crucial role in shaping the future of individuals and communities. In Egypt, one important metric of education is *Thanaweya Amma*, the national high school examination. The *Thanaweya Amma* exams gain their significance from being the key factor in determining the professional future of high-school students.

1.1. Objective

The primary objective of this study is to analyze the extent to which factors such as governorate, economic indicators, and educational resources influence educational outcomes, specifically focusing on the *Thanaweya Amma* exams for the years 2022 and 2023.

2. Methodology

2.1. Data Collection

Data for this study were collected from multiple datasets obtained from publicly available sources. Each dataset provides specific information related to socio-economic indicators, educational performance metrics, and demographic characteristics.

The datasets used in this study include:

1. **Thanaweya Amma public results 2022** [1]
2. **Thanaweya Amma public results 2023** [2]
3. **GDP by Governorate** [3]

2.2. Variables and Measures

Key variables of interest include:

1. **Dependent Variable:** Educational outcomes, measured by students' grades in the Thanaweya Amma exams for the years 2022 and 2023.
2. **Independent Variables:**
   (a) Mean Governorate students' Thanaweya Amma Grade.
   (b) Governorates Total GDP.
   (c) Governorates GDP by Economic Sector
   (d) Governorates GDP per Capita
   (e) Economic Sector contribution to GDP

[1] google.com
[2] google.com
[3] https://mped.gov.eg/Governorate?lang=en

3. Data Pre-processing

To prepare the datasets for analysis, multiple steps were taken:

1. Arabic column names were converted to English
2. Non-useful columns were dropped (e.g. student name).
3. Governorate names were standardized.
4. Datasets were merged.

4. Thanaweya Amma Results Analysis

In this section, we analyze the Thanaweya Amma results for 2022 and 2023. **Statistical Overview**

1. Mean Percentage in 2022: 63.13
2. Mean Percentage in 2023: 65.47
3. Grades Percentage Standard Deviation in 2022: 14.88
4. Grades Percentage Standard Deviation in 2022: 13.6

4.1. Distribution

Figure 1 shows the distribution of students' grades in 2022 and 2023. The figure illustrates that the grades in both years follow a bell-shaped curve, indicating an almost normal distribution. Notably, the distribution of grades in 2023 is shifted slightly to the right compared to 2022. This shift suggests an overall increase in average grades.

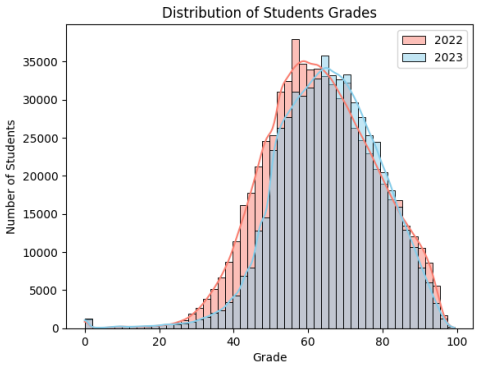


Figure 1. Distribution of students' grades in 2022 and 2023. The grades follow an almost normal distribution in both years, with a slight rightward shift in 2023 indicating an overall increase in grades.

4.2. Average Grades by Governorate

Figure 2 shows the average grades by governorate in 2022 and 2023. The figure indicates a similarity in the overall behavior of average

grades across governorates in both years, with some differences observed in specific governorates. This suggests that while the general trends in educational performance remain consistent, there are variations that could be influenced by regional factors.

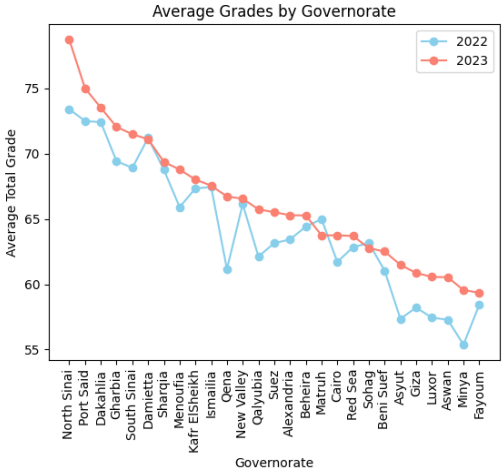
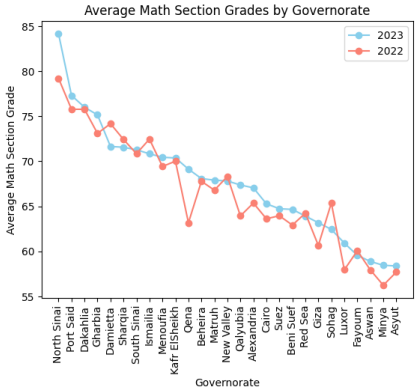
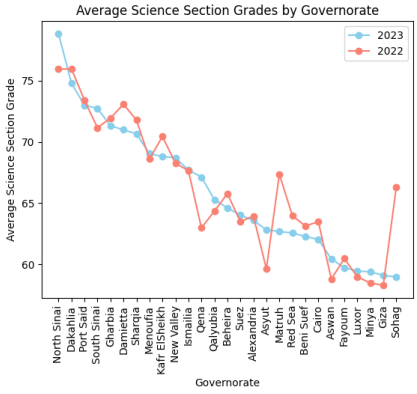


Figure 2. Average grades by governorate in 2022 and 2023. The overall behavior of average grades is similar in both years, with differences in some governorates.

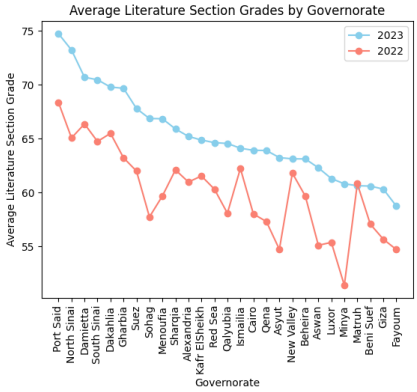
Figure 3 shows the average grades in Math, Science, and Literature by governorate in 2022 and 2023. This arrangement allows for a side-by-side comparison of subject-specific performance trends across governorates.



(a) Math Grades



(b) Science Grades

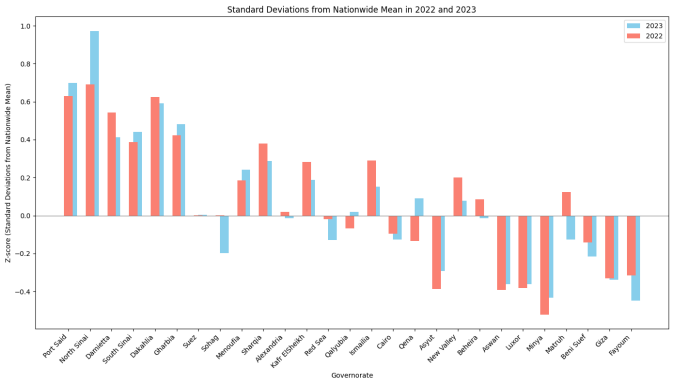


(c) Literature Grades

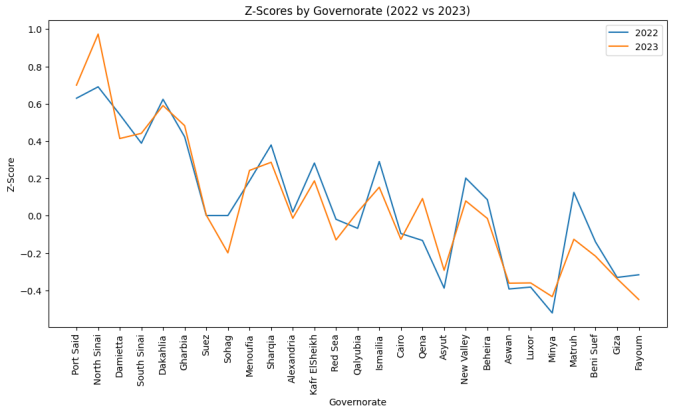
Figure 3. Average grades by governorate in 2022 and 2023 for Math, Science, and Literature. The figures show section-specific trends and variations in performance across governorates.

4.3. Z-Score Grades by Governorate

Figure 4 presents the z-score grades for each governorate in both 2022 and 2023. The z-score, or standard score, indicates how many standard deviations an element is from the mean. This helps in understanding the relative performance of students in each governorate compared to the nationwide average, highlighting areas with significantly higher or lower performance.



(a) Z-Score Grades for 2022 and 2023



(b) Alternative Representation of Z-Scores

Figure 4. Combined z-score grades by governorate for 2022 and 2023. The z-score indicates how many standard deviations an element is from the mean, highlighting relative performance compared to the nationwide average. Most governorates show similar z-scores in both years, with some exceptions. The alternative representation provides additional insights into z-score trends.

5. Governorates GDP Analysis

The Gross Domestic Product (GDP) of a region is a key indicator of its economic health and overall development. It encompasses the total monetary value of all goods and services produced within the region over a specific period, typically a year. In the context of educational performance, GDP can serve as a proxy for the socio-economic status and resources available in each governorate. Higher GDP often correlates with better infrastructure, healthcare, and educational facilities, which may influence academic outcomes.

Statistics Overview:

- Mean GDP: 242,009,515,669 EGP
- Maximum GDP (Cairo): 1,876,650,000,000 EGP
- Minimum GDP (New Valley): 16,963,303,560 EGP
- Mean GDP per Capita: 90,872 EGP/Person
- Maximum GDP per Capita (South Sinai): 501,254 EGP/Person
- Minimum GDP per Capita (Sohag): 18,814 EGP/Person

Figure 5 illustrates the Gross Domestic Product (GDP) of each governorate in Egypt. This visualization provides insights into the economic output of each region, highlighting variations in economic activity across the country.

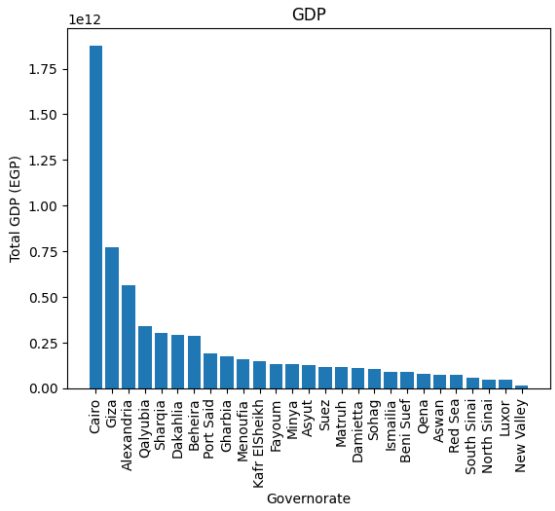


Figure 5. Gross Domestic Product (GDP) of each governorate in Egypt.

Figure 6 displays the GDP per capita of each governorate in Egypt. GDP per capita is calculated by dividing the GDP of a region by its population, providing a measure of economic prosperity on a per-person basis.

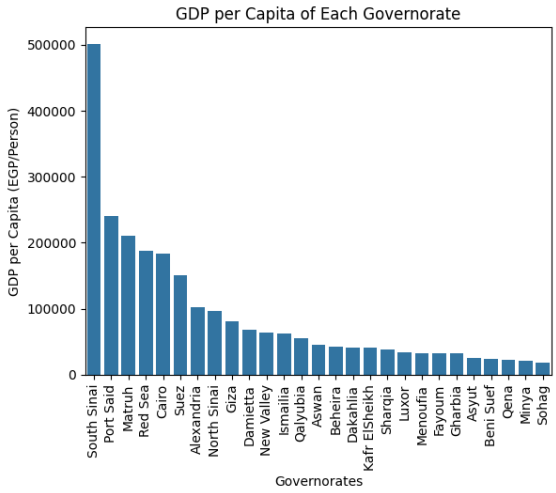


Figure 6. Gross Domestic Product (GDP) per capita of each governorate in Egypt.

6. Correlations between Sectoral GDP Dependencies and Educational Performance

This section explores the correlations between the dependency of governorates on specific economic sectors and the z-scores of grades. The dependency of a governorate on a particular sector is calculated as the ratio of the sector's GDP to the total GDP of the governorate. By examining these dependencies, we aim to understand how the economic structure of a governorate influences educational outcomes.

6.1. Positive Correlation with Petroleum Sector

Figure 7 illustrates the positive correlation (0.47) between the dependency on the petroleum sector and the z-scores of grades. This indicates that governorates with a higher dependency on petroleum tend to have higher z-scores, suggesting a potential link between economic wealth generated from petroleum and better educational performance.

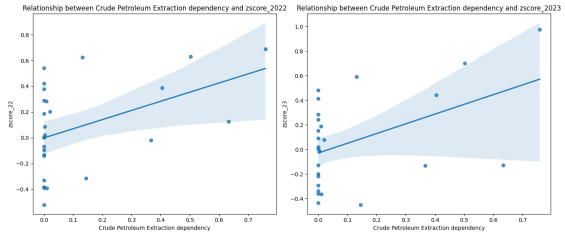


Figure 7. Positive correlation (0.47) between governorate GDP dependency on the petroleum sector and z-scores of grades.

6.2. Negative Correlation with Construction Sector

Figure 8 shows the negative correlation (-0.52) between the dependency on the construction sector and the z-scores of grades. This indicates that governorates with a higher dependency on construction tend to have lower z-scores, which could be attributed to various socio-economic factors affecting educational outcomes.

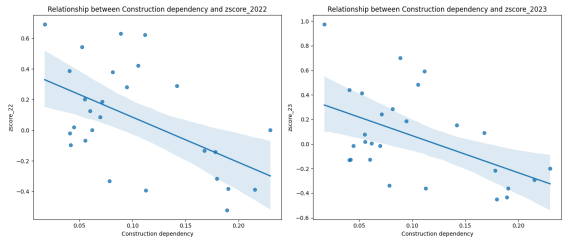


Figure 8. Negative correlation (-0.52) between governorate GDP dependency on the construction sector and z-scores of grades.

6.3. No Correlation with Agricultural Sector

Figure 9 highlights the lack of correlation (-0.099) between the dependency on the agricultural sector and the z-scores of grades. This suggests that the economic dependency on agriculture does not significantly impact the educational performance in governorates.

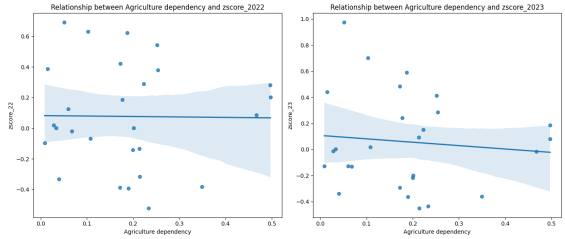


Figure 9. No significant correlation (-0.099) between governorate GDP dependency on the agricultural sector and z-scores of grades.

7. Correlations between Sectoral GDP per Capita and Educational Performance

This section explores the correlations between the GDP per capita of specific economic sectors and the z-scores of grades. By examining these correlations, we aim to understand how the economic performance of particular sectors influences educational outcomes in each governorate.

Figure 10 presents a heatmap showing the relationships between GDP per capita from the construction, agriculture, and petroleum sectors and the z-scores of grades for each governorate. The heatmap reveals correlations of 0.38 for petroleum, 0.3 for agriculture, and 0.2 for construction, indicating varying degrees of association between sectoral economic performance and educational outcomes. The positive correlations suggest that higher economic output per capita in these sectors is associated with better educational performance, although the strength of these relationships varies.

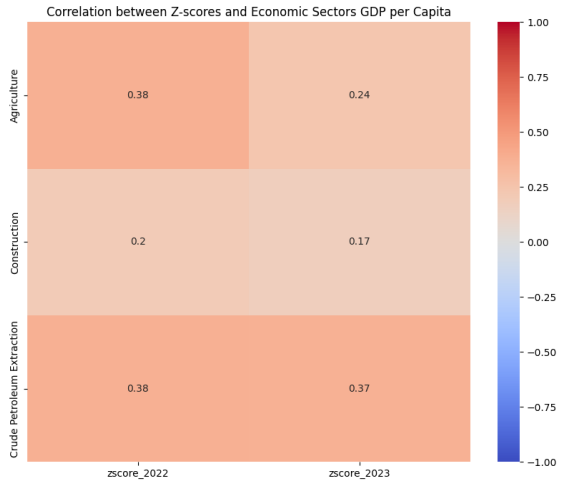


Figure 10. Heatmap of correlations between GDP per capita from construction, agriculture, and petroleum sectors and z-scores of grades. Correlations are 0.38 for petroleum, 0.3 for agriculture, and 0.2 for construction.

The heatmap highlights that most governorates exhibit a similar pattern in terms of the correlation between sectoral GDP per capita and educational performance. This suggests that economic resources generated from these sectors can play a role in enhancing educational outcomes. However, the strength of these correlations also points to the existence of other factors influencing educational performance that are not solely dependent on economic wealth.

8. Hypothesis Testing

In this section, we conduct hypothesis testing to examine the relationship between governorates and average students' results. The null hypothesis (H_0) states that there is no significant relationship between governorates and average students' results, while the alternative hypothesis (H_a) suggests that such a relationship exists. We utilize z-scores of average grades and examine the correlation between the z-scores from 2022 and 2023 to test these hypotheses.

8.1. Formulation of Hypotheses

The null and alternative hypotheses for this analysis are formulated as follows:

H_0: There is no significant relationship between governorates and average students' results.

H_a: There is a significant relationship between governorates and average students' results.

8.2. Correlation of Z-Scores between 2022 and 2023

Figure 11 shows the correlation between the z-scores of average grades in 2022 and 2023 across different governorates. The correlation coefficient of 0.94 indicates a very strong positive relationship, suggesting that the relative performance of governorates remained consistent across these two years. This high correlation provides evidence against the null hypothesis (H_0) and supports the alternative hypothesis (H_a).

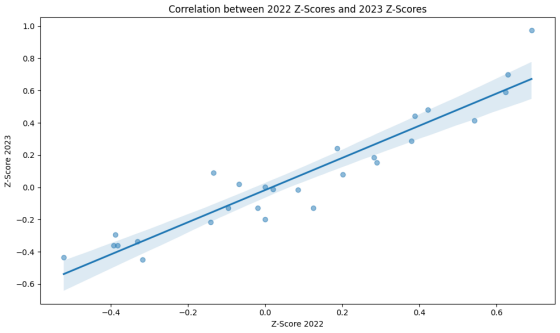


Figure 11. Correlation between z-scores of average grades in 2022 and 2023 across different governorates. The correlation coefficient is 0.94, indicating a very strong positive relationship.

8.3. Interpretation of Results

The high correlation between the z-scores of 2022 and 2023 provides strong evidence against the null hypothesis (H_0), indicating that there is indeed a significant relationship between governorates and average students' results.

9. Conclusion

This study investigated the relationship between various socio-economic factors and educational outcomes in Egypt, focusing on the Thanaweya Amma exams for the years 2022 and 2023. Through statistical analyses, we found significant correlations between governorate GDP dependencies on specific economic sectors and students' academic performance, as measured by z-scores of average grades. Notably, positive correlations were observed between the petroleum sector's GDP dependency and educational performance, while negative correlations were found with the construction sector. Additionally, the study revealed strong correlations between z-scores of average grades in 2022 and 2023, indicating consistent performance across governorates over time. These findings highlight the importance of socio-economic factors in shaping educational outcomes and emphasize the need for targeted interventions to address disparities in educational achievement across regions. Further research is warranted to explore the underlying mechanisms driving these relationships and inform evidence-based policies aimed at improving educational equity and quality in Egypt.