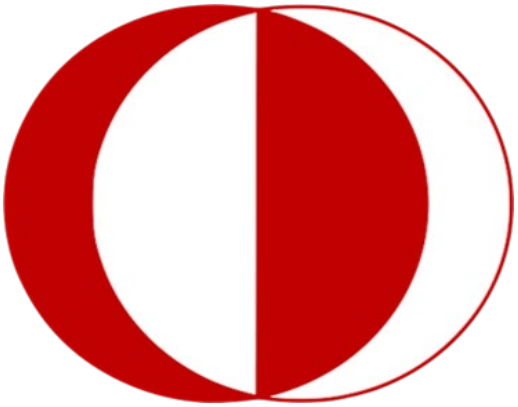


Middle East Technical University
Department of Statistics

APPLIED STATISTICS TERM PROJECT

City-Based Analysis of Education Level, Intelligence and Socio-Cultural dynamics in Türkiye

By

SELİN EVRAN 2426468

TUBA AYRIÇ 2358489

İSMET EREN 2561249

January 2024

ABSTRACT

This report focuses to how different socio-cultural factors relate to education levels across various cities in Türkiye. We specifically looked at connections between IQ levels, the rate of consanguineous marriages, the percentages of educated and uneducated individuals, and the number of children using city libraries. By analyzing data from multiple sources, we aimed to understand how these factors interact and impact society. The factors we found can help government officials and educators make decisions. Our goal is to ensure equal levels of awareness and education across all regions.

1. Introduction

Türkiye is a country which has different states with their every side. To west to east, there are many sociological, cultural differences between regions. We started to work to examine how education levels, socio-cultural situation, and intelligence change across different cities. We used TÜİK's, MEB's, and Zeka Testi Merkezi's data to support this difference idea.

The purpose of the study is a major change in Türkiye actually. There is a significant difference between regions, especially with education levels being so low in eastern regions, indicating a lack of awareness among the population that needs to be addressed. To address these issues, we searched this data and used many methods to show their relationships. These are statistical methods, and they show how the difference is huge directly.

The low education levels in one part of the country are making sociological problems worse. We believe that this inequality needs to be fixed.Therefore, we believe municipalities and educators should make extra efforts to balance the situation with other regions of the country.

1.1. Data description

This research utilized data obtained from various online sources. For IQ levels, we relied on data from the Zeka Testi Merkezi. It is based on research from 2017 which is conducted with 1214505 participants. To determine education levels, we extracted data from TÜİK (Turkish Statistical Institute) regarding the education levels of individuals aged 15 and above. We classified the proportion of individuals with undergraduate, graduate, and doctoral degrees in

the population as "educated" individuals. Conversely, the proportion of individuals who never attended school was classified as "uneducated" individuals. We used the sum of the number of not-educated people and the number of people who are literate but never enrolled in school for this variable.

Similarly, the rate of consanguineous marriages was also obtained from TÜİK. Using data from the Ministry of National Education (MEB), we created a variable representing the quality of education by calculating the ratio of students to teachers at the primary, secondary, and high school levels in each city. Additionally, for a cultural analysis, we created a variable representing the rate of children visiting libraries in each city by dividing the number of children registered at libraries (sourced from TÜİK child statistics data) by the total number of children in each city (also sourced from TÜİK). All data, except for IQ, are from the year 2021.

1.2. Research questions

1.2.1 What is the correlation between the proportion of consanguineous marriages and the proportion of individuals with undergraduate and above education in Türkiye?

1.2.2. What is the relationship between the rate of children going to the library and literacy rates?

1.2.3 What is the relationship between IQ levels and education level?

1.2.4 Is there a difference in the relationship between teacher-student ratios and literacy rates among regions with high teacher-student ratios compared to regions with low teacher-student ratios?

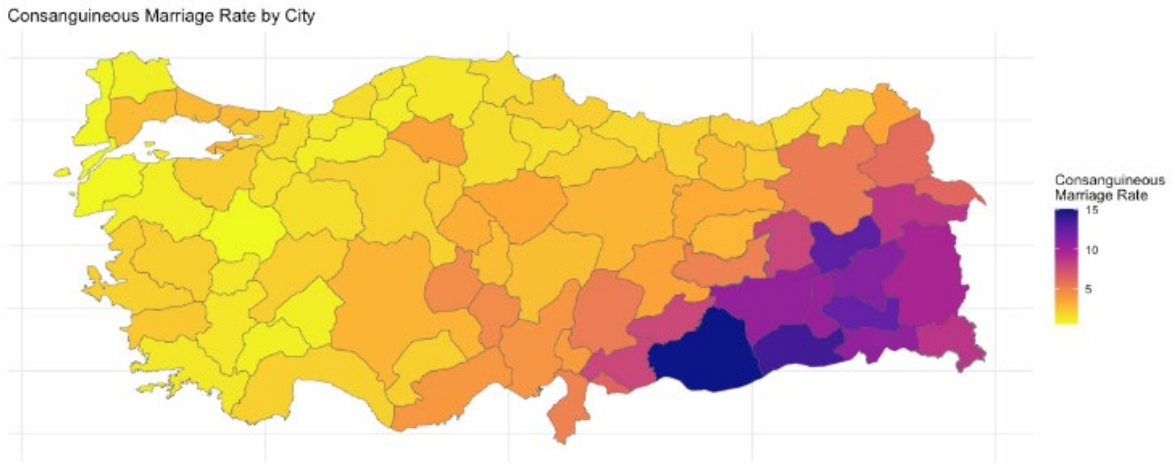
1.2.5 Are there significant differences in literacy rates among the various regions of Turkey?

1.3. Aim of the study

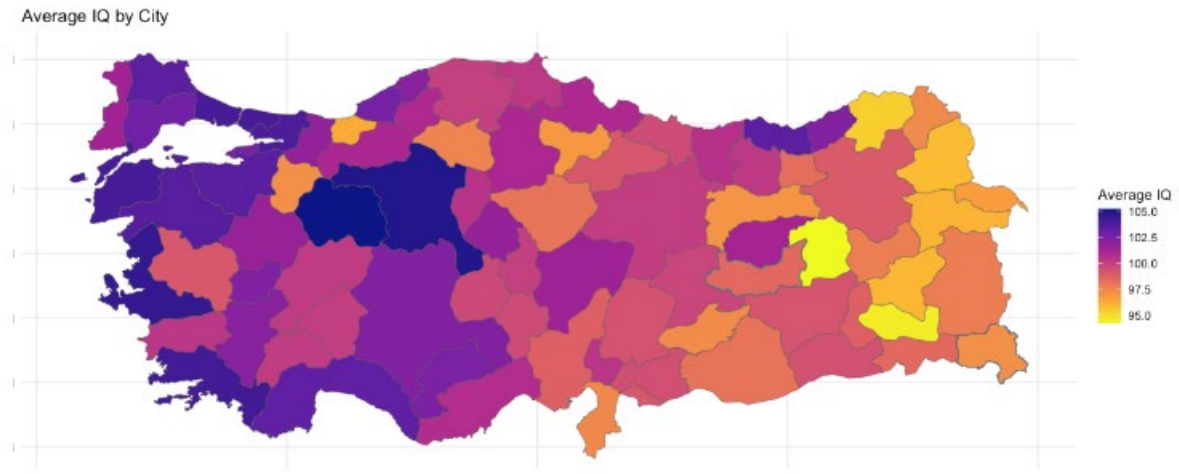
The goal of this research is to analyze sociocultural dynamics, IQ, and educational attainment across Türkiye from a city-based perspective. We seek to identify important patterns and associations by looking at important factors like mean IQ, the percentage of kids who visit libraries, teacher-student ratios, consanguineous marriage rates, well-educated, and not-educated rates across different regions.

2. Results and Findings

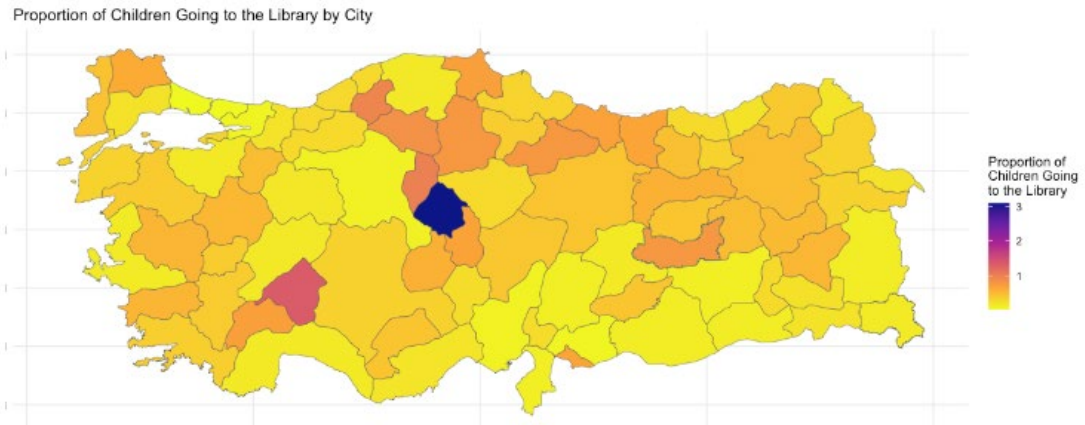
2.1 Exploratory Data Analysis



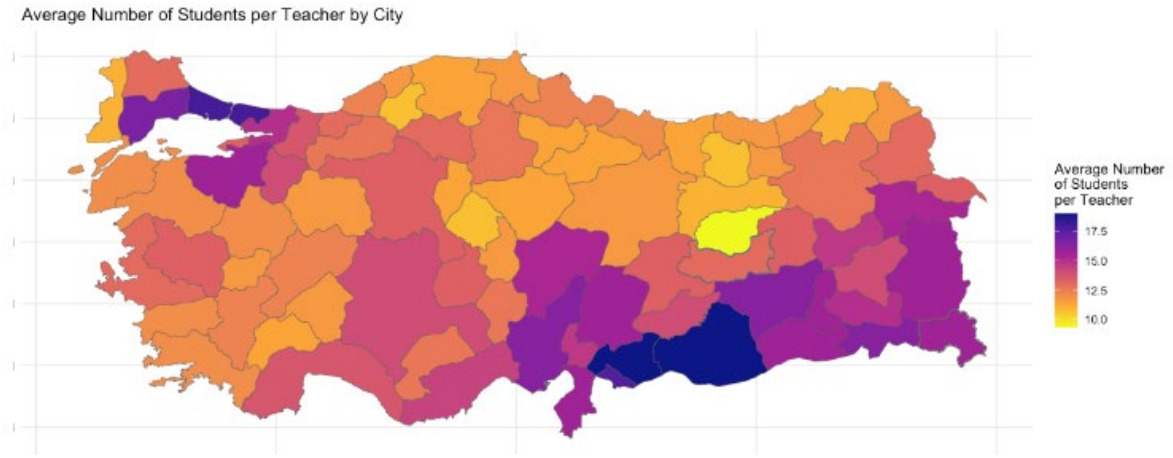
There is a considerable amount of variance in the rates of consanguineous marriage in Türkiye's various towns and regions. As you move from left to right, we see that the graph darkens, indicating a notable rise in consanguineous marriages.With a consanguineous marriage rate of 15.07051, Şanlıurfa has the highest rate, while Kütahya has the lowest rate, at 0.4869565. The Southeastern Anatolia region has the highest average consanguineous marriage rate (10.482839), which suggests a high incidence of such marriages in this area, according to an examination of the regional averages. With an average rate of 6.951682, Eastern Anatolia comes in second, indicating a similarly high frequency. The average rate in the Aegean region, however, is 1.512293 consanguineous marriages are less common in the Black Sea region (1.610822) and the Marmara region (1.631054), both of which have much lower numbers. The regions of Central Anatolia and the Mediterranean have modest rates, 2.885234 and 3.221720, respectively.This analysis emphasizes how crucial it is to comprehend how regional variations affect consanguineous marriages.



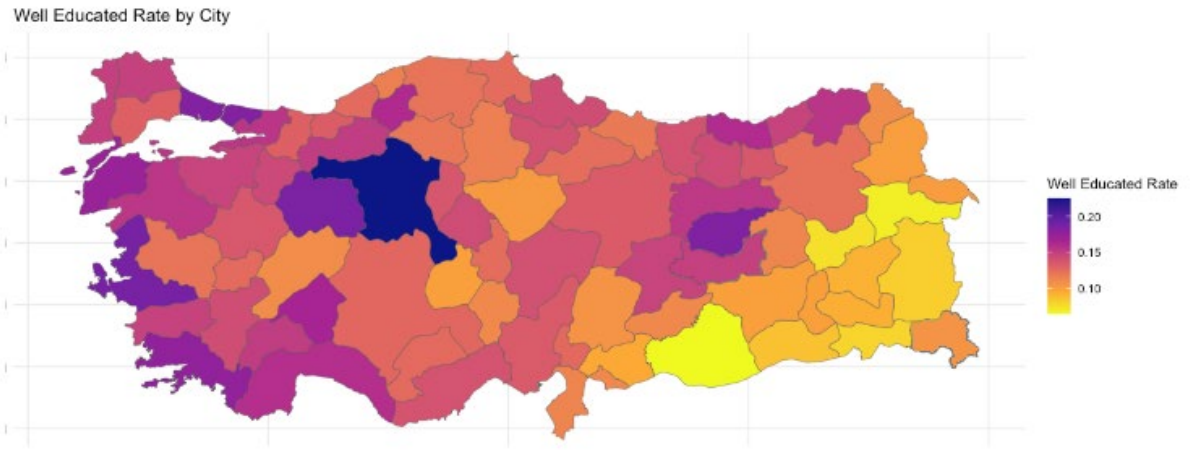
There is a considerable difference in the mean IQ scores between Türkiye's cities and regions. The graph shows that the color lightens from left to right, which indicates that IQ levels are generally higher in the western region.With a mean IQ of 105.2, Eskişehir is the city with the highest mean IQ, while Tokat has the lowest mean IQ (104.19). After analyzing the regional averages, we discover that, with 102.53909, the Marmara area has the highest average mean IQ. The Aegean region has the highest average mean IQ at 101.79500, followed by Central Anatolia at 101.04000. Both regions have relatively high average IQ values. On the other hand, the average mean IQ of Eastern Anatolia is the lowest, at 97.36333. The Mediterranean region, at 100.00000, and the Black Sea region, at 100.03833, have higher average mean IQs than the Southeastern Anatolia region, which is 98.21000. We examined from a variety of the greater mean IQ levels found in areas such as Marmara, Aegean, and Central Anatolia and the lower levels found in areas such as Eastern and Southeastern Anatolia.



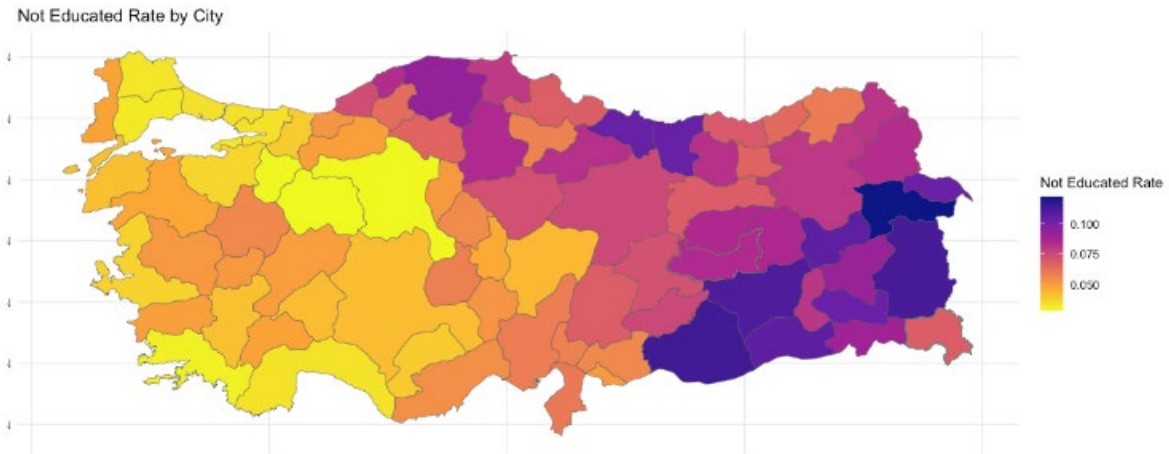
With a proportion of 3.091177, Kırşehir has the largest percentage of youngsters visiting the library, while İstanbul has the lowest percentage at 0.02835145. After looking at the regional averages, we see that, with 0.6515984, the Central Anatolia region has the greatest average percentage of kids who visit the library. The Aegean region has an average proportion of 0.3671522, whereas the Black Sea region has an average of 0.4449245. With an average proportion of 0.2420336, the Southeast region of Anatolia has the lowest value. At 0.2867605, the Marmara region has a lower average share than the Mediterranean region (0.3605633), Eastern Anatolia (0.3554182), and the Mediterranean region. In general, we can observe that the data all over the country are low and very close to each other.



There is a noticeable variance when comparing the average student-teacher ratio in Türkiye's various cities and regions. This time, we note that the interior Marmara and southeast Anatolia regions on our map are often darker.Gaziantep and Şanlıurfa, with an average of 19 students per teacher, are the cities with the greatest average number of students per teacher. On the other hand, Tunceli has the lowest average student-teacher ratio of any city, with 9.33 students for every instructor. After examining the regional averages, we see that, at 16.54250 students per instructor on average, the Southeastern Anatolia region has the highest average. The Mediterranean region (average: 14.16750) and the Marmara region (average: 14.03091) come next ,both displaying comparatively high teacher-to-student ratios. The Black Sea area, on the other hand, has the lowest average student-teacher ratio at 11.72278. At 12.33250, the Aegean area has the lowest average student-teacher ratio, followed by Central Anatolia (12.51308) and Eastern Anatolia (13.46600).

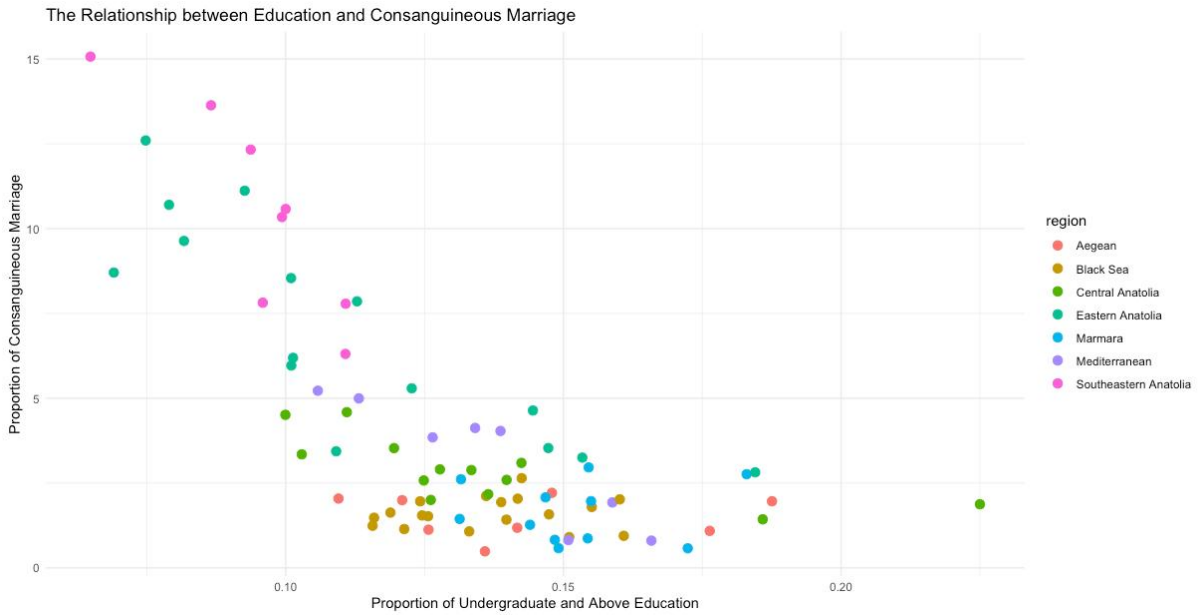


based on a study of the percentage of educated people in Turkish cities and regions.The graph shows that the color lightens from left to right, indicating that the rate of well-educated people is generally higher in the western region. With 0.06485551, the lowest well-educated rate ever recorded, Şanlıurfa stands apart. However, with a rate of 0.2249927, Ankara has the highest rate of well-educated citizens among cities. The Aegean, Black Sea, and Central Anatolian regions exhibit comparatively similar well-educated rates, ranging from roughly 0.136 to 0.144, when well-educated rates are broken down by region. With a rate of roughly 0.152, the Marmara region has a slightly higher well-educated population. The Mediterranean area displays approximately 0.137 as well. In contrast, the Eastern Anatolia region reports one of the lowest regional well-educated rates at approximately 0.112. The Southeastern Anatolia region follows closely with a well-educated rate of about 0.095.

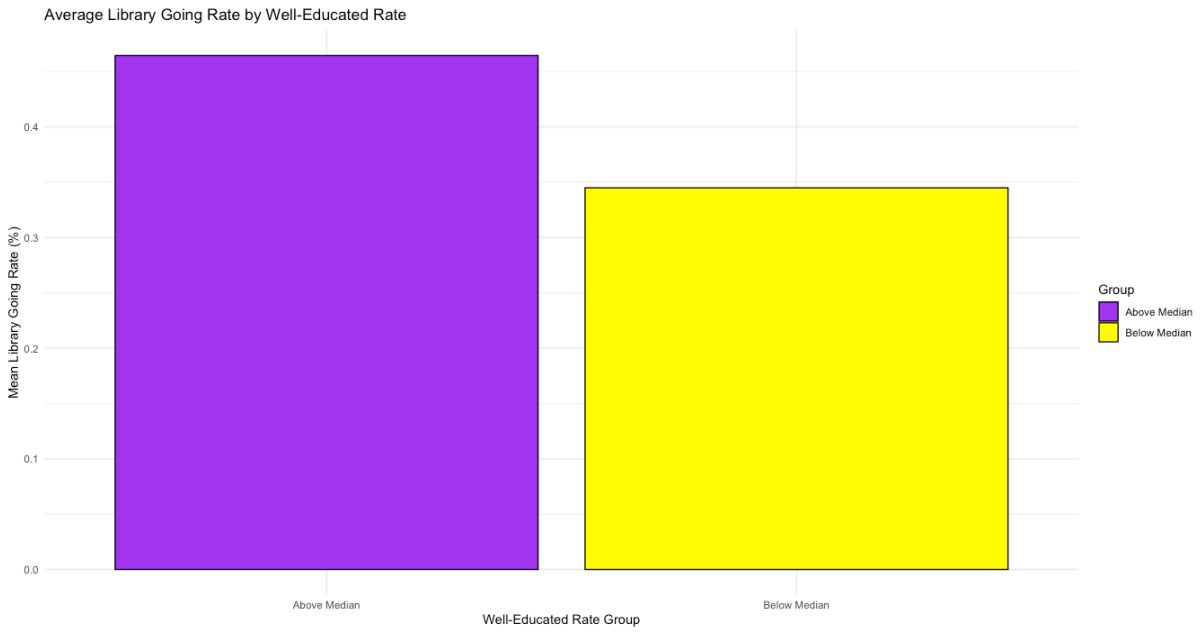


It appears to be the opposite of the expected well-educated rate graph at first glance. At 0.1218, Ağrı has the highest reported rate of ignorance. With a score of 2.84, Eskişehir has the lowest percentage of illiteracy among cities. The Aegean area has a comparatively low not-educated rate of roughly 0.455 when not-educated rates are broken down by region.The rate of not-educated individuals in the Black Sea region is marginally higher, at roughly 0.741. Like the Aegean area, Central Anatolia shows a relatively low rate of uninstructed individuals, at roughly 0.504. The rates of not-educated people in Eastern Anatolia and Southeastern Anatolia are higher, at roughly 0.887 and 0.867, respectively, indicating serious educational issues in these eastern regions. The rates of unschooling are comparatively lower in the Marmara and Mediterranean areas, with roughly 0.369 and 0.526, respectively indicating better educational outcomes compared to the eastern regions.

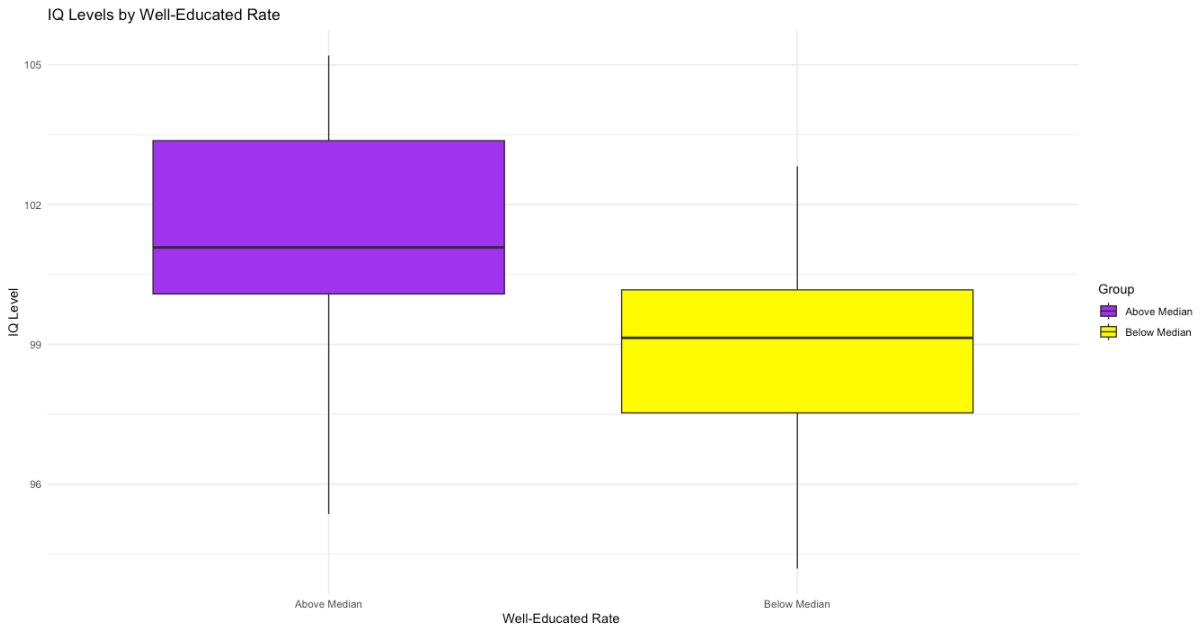
2.2 Confirmatory Data Analysis



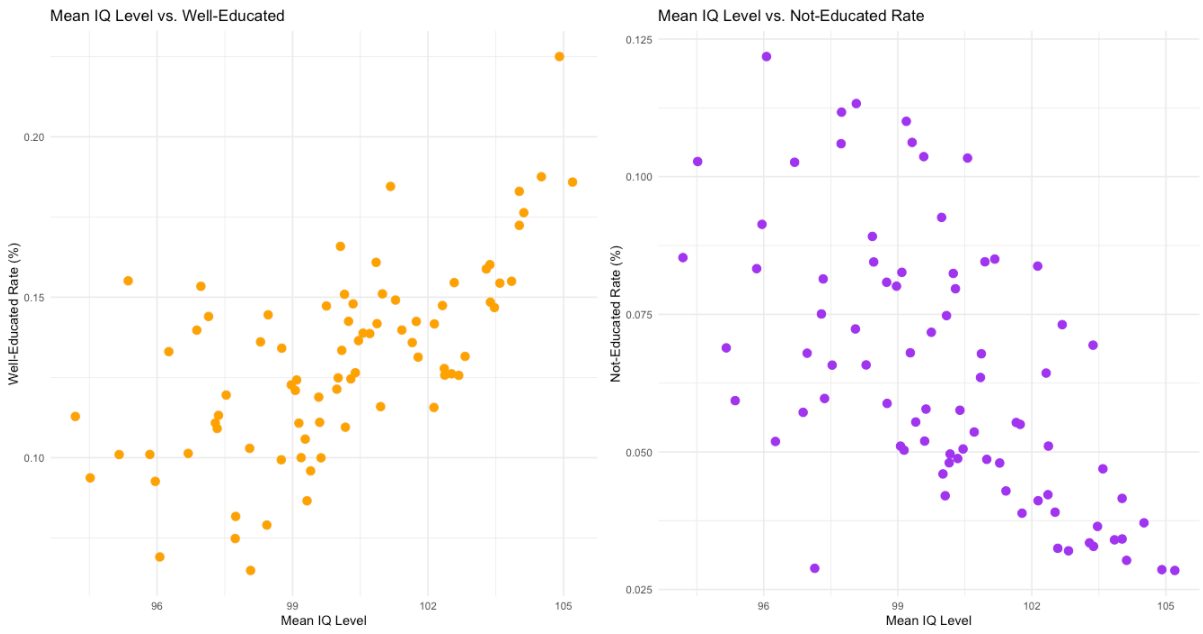
The graph reflects the correlation between the proportion of consanguineous marriages to the proportion of undergraduate and above education where we can observe the higher percentage of the prior resulting in a lower percentage of the latter, vice versa. From our research we were able to deduct the correlation coefficient as -0.72.



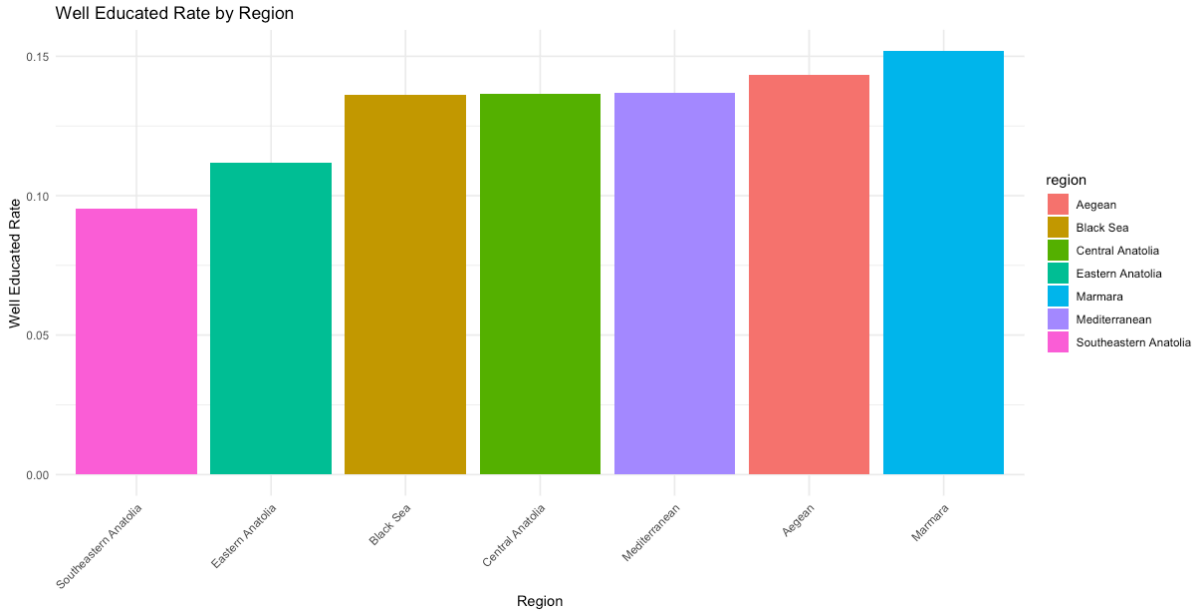
The max value of the well educated ratio is 0.2249927, the min value is 0.06485551. Our median value is 0.1315619. When we divide those above and below the median into two groups, we see that those above the median are more likely to go to the library. Our p-value is 1.575e-08. The t-test result, 1.575e-08, provides strong evidence that there is a significant difference in library attendance rates between regions with well-educated rates above the median and below the median. In this graph, we looked at the IQ levels of educated people as above.



In this chart, we looked at the IQ levels of educated people in the above figure. According to the figure the left result is above median in contrast the right result is below median. As we can see here, there is a strong connection between IQ level and education level. The p value of 2.2e-16 indicates that there is a considerable variation in the average IQ levels of individuals with higher education degrees. It seems that people with above-average levels of education have higher IQs, whereas people with below-average levels of education seem to have lower IQs.

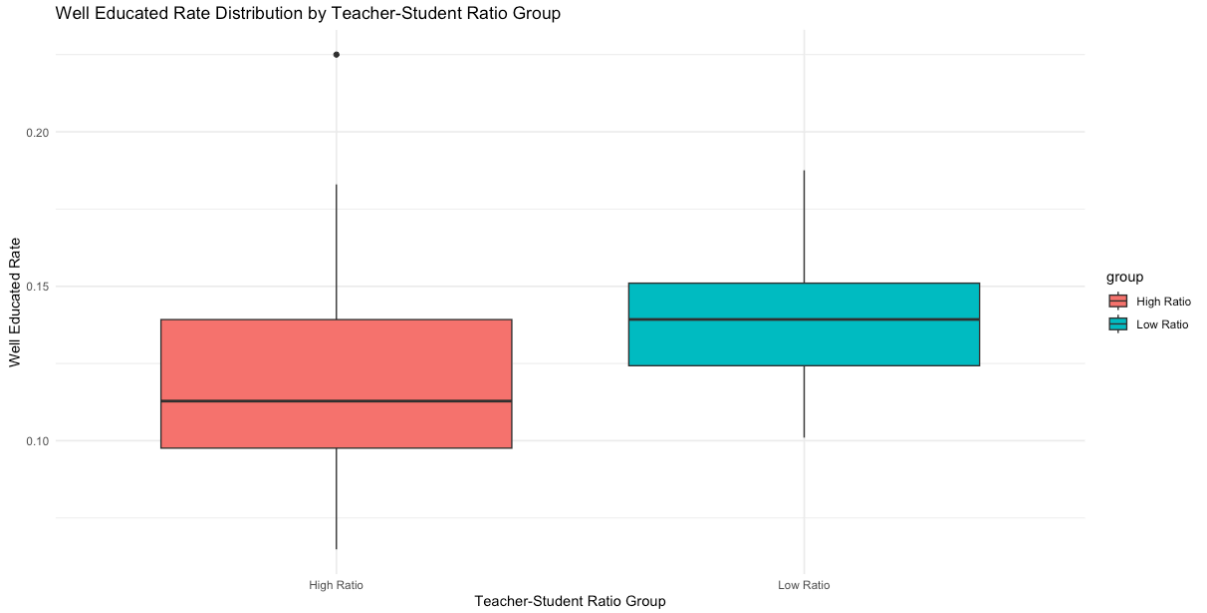


In this scatter plot, we observe more clearly the relationship between the ratio of people who are well-educated and those who are not-educated and the mean IQ level. While the mean iq level correlation coefficient of educated people was 0.652241, we measured the mean iq level correlation with uneducated people as -0.5956602. A correlation value of 0.652241 indicates a positive relationship between IQ and education level. This means that higher IQ levels are generally associated with higher degrees of education. Conversely, there is a negative correlation (correlation coefficient = -0.5956602) between IQ and education level in the uneducated; This shows that lower levels of education are generally associated with lower IQ levels.



To determine whether there are statistically significant regional variations in the rates of well-education, we performed an Anova test. The test result shows that the region has a substantial impact on the well-educated rate ($F(6, 74) = 6.258$, $p < 0.001$). We employed the Tukey HSD Post-Hoc Test to determine which regions vary from one another. Our research revealed a marginally significant difference ($p = 0.068$) between Eastern Anatolia and Aegean (diff = -0.031541). This suggests that Eastern Anatolia has slightly lower rates of well-educated people than Aegean. Furthermore, there is a significant difference ($p = 0.004$) between Southeastern Anatolia and Aegean (diff = -0.047961) regarding the percentage of well-educated people in Southeastern Anatolia. There is a substantial difference ($p = 0.002$) between Marmara and Eastern Anatolia (diff = 0.040209) in terms of well-educated rates. Black Sea vs. Southeast Anatolia (diff = -0.041024). There is a significant difference ($p = 0.004$) between the well-

educated rates in Black Sea and Southeast Anatolia. There was a significant difference (p = 0.007) between Southeastern and Central Anatolia (diff = -0.041311) in terms of the percentage of well-educated people. There was a significant difference (p < 0.001) between Southeastern Anatolia and Marmara in terms of well-educated rates (diff = -0.056629). There was a significant difference (p = 0.020) between Southeastern Anatolia and the Mediterranean region in terms of well-educated rates (diff = -0.041483).



Two groups, one with a high teacher-student ratio and the other with a low ratio, were compared using the 2-sample test for equality of proportions with the well-educated rates. There is less than a 2.2e-16 p-value. This indicates that the rates of well-educated individuals in the two groups differ statistically significantly from one another. The proportional difference has a 95% confidence interval of -0.02534402 to -0.01601707. This interval shows that there is a significant difference between the two proportions because it does not include zero. In the group with a high teacher-student ratio, the predicted well-educated rate is 11.88%. In the group with a poor teacher-student ratio, the predicted well-educated rate is 13.95%. Therefore we can say that regions with a lower teacher-student ratio have significantly higher well-educated rates compared to regions with a higher teacher-student ratio.

4. Discussion or Conclusion

Our research provides various new insights into the connection between IQ, education, and regional differences in the percentage of the population that is well-educated in Türkiye. First, there is a substantial negative link between consanguineous marriage rates and educational attainment, according to the correlation study. This suggests that lower proportions of people with college and above education are typically found in places with higher rates of consanguineous marriage, and vice versa. Second, there is a lot of diversity in the distribution of well-educated rates among the different regions. In contrast to regions like Aegean and Marmara, areas like Eastern and Southeastern Anatolia continuously show lower rates of well-educated people. In addition, the association between IQ and education level is investigated, revealing a positive correlation for those with higher education and a negative correlation for those with lower education. It follows that whereas lower education levels are linked to lower IQ levels, greater education levels are linked to higher IQ levels. Finally, there is a considerable variation in the well-educated rates across locations with high and low teacher-student ratios, with the regions with lower ratios exhibiting greater rates of well-educated people. To sum up, these results emphasize the intricate relationship that exists between socio-cultural elements, educational possibilities, and intellectual growth in various parts of Türkiye. These findings are critical to improving Türkiye's social development and general well-being.

References

Milli Eğitim Bakanlığı. (2023). Örgün eğitim istatistikleri. https://istatistik.meb.gov.tr/

Türkiye İstatistik Kurumu. (2022). İstatistiklerle Çocuk. https://data.tuik.gov.tr/Bulten/Index?p=Istatistiklerle-Cocuk-2022-49674

Türkiye İstatistik Kurumu. (2022). Ulusal Eğitim İstatistikleri. https://data.tuik.gov.tr/Bulten/Index?p=National-Education-Statistics-2022-49756

Türkiye İstatistik Kurumu. (2023). Evlenme ve boşanma istatistikleri. https://data.tuik.gov.tr/Bulten/Index?p=Evlenme-ve-Bosanma-Istatistikleri-2023-53707

Türkiye İstatistik Kurumu (2024). Çocuk İstatistikleri- Kültür ve Spor, Halk Kütüphanelerinde Kayıtlı Çocuk sayısı. https://biruni.tuik.gov.tr/medas/?kn=95&locale=tr

Zeka Testi Merkezi. (2017). İl bazında IQ ortalamaları. https://www.zekatestimerkezi.com/istatistikler.php