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Innholdsfortegnelse

Figure list

1. Introduction (including study area and research question/s)

This assignment has a focus on the interplay between demographic dynamics and economic indicators. As the world's largest and most populous continent, Asia is home to a diverse array of nations, each characterized by distinct socioeconomic landscapes, cultural nuances, and development trajectories. Within this dynamic context, understanding how the birth rate, considered as an independent variable, related to GDP per capita, a dependent variable reflecting economic prosperity, becomes a compelling and complex exploration. Birth rate, representing the number of live births per 1000 people in each population, stands as a pivotal demographic metric. This also reflects the social structures, cultural attitudes, and policy influences. There are a lot of factors that shape birth rates, including family planning policies, cultural norms, and socioeconomic conditions. Crucially, this analysis extends beyond a quantitative correlation. To get an overview of this, regional variations must be considered. The diversity among Asian countries is vast- from the rapidly industrializing powerhouses of East Asia to the emerging economies of Southeast Asia, and the diverse subcontinent. Regional nuances in governance, economic policies, and cultural attitudes toward family life contribute to a nuanced tapestry that requires unraveling. In this exploration, we will embark on statistics, employing methodologies such as correlation analysis, regression modeling, t-test, and more. We will use these methodologies to uncover patterns, and relationships and to compare. By delving into the specifics of Asia, we aim to contribute to a broader understanding of the intricate relationship between population dynamics and economic prosperity in one of the world's most captivating and diverse continents. My research question is, “How does the birth rate in Asia relate to their GDP per capita, taking into account regional variations?"

2. Methodology

My method was to perform a data analysis using RStudio as a tool to help with this. This study employed a quantitative research design to analyze and interpret the data that was collected. The primary cause of this assignment was to investigate the relationship between the independent variable and the dependent variable. I used a public dataset provided to us (2021, DOI: https://data.worldbank.org/indicator). There where indicators to cover aspects such as birth_rate, mortality rate, population growth, access to electricity, GDP, Agricultural land use, air pollution, and cereal yields. The data was organized by country, and with additional information about the country´s region and code. The dataset contained many

variables that I chose to focus on BIRTH_RATE and GDP_PPP(Gross Domestic Product per capita). From here I chose to focus on different countries in the East_Asian_Pacific region. The dataset includes information on various socio-economic indicators for different countries.

3. Results

3.1.1. Spatial visualization

In these two maps you can see a visualization over East Asia Pacific with the regions of our focus. The one on the right shows us the birth rate for these regions, while the one on the left shows us GDP per capita of these regions. The spatial visualization of GDP and Birth Rate in the East Asia Pacific region reveals a diverse landscape of economic and demographic dynamics. Covering a spectrum on nations, from economic powerhouses like China and Japan to smaller entities like Brunei and Tuvalu, the dataset captures unique socio-economic profiles. Within this diversity, distinct patterns emerge. Countries such as Singapore and Macao SAR, China, boast high GDP per capita, signaling robust economic prosperity. In contrast, nations like Timor-Leste and Solomon Islands display lower GDP figures, indicating varying stages of economic development. Countries like Singapore and Macao SAR, China, stand out with high GDP per capita values, reflecting significant economic prosperity. Others, such as Timor-Leste and Solomon Islands, display lower GDP per capita figures, indicating diverse economic development stages.

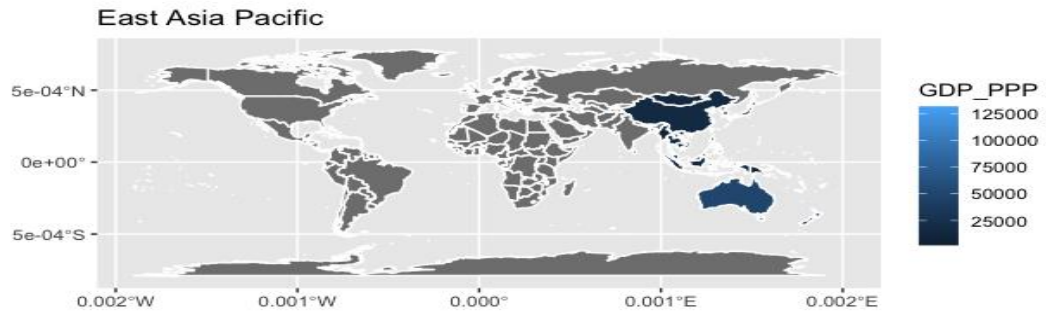

Figure 1. GDP per capita in East Asia

Birth rates across the region exhibit a wide range, from lower rates in countries like South Korea and Singapore to higher rates in Timor-Leste and Vanuatu. Notably, China showcases internal variations in birth rates, emphasizing the importance of considering regional disparities. Pacific island small states stand out with unique demographic and economic profiles, while larger nations like Indonesia and the Philippines present a mix of moderate birth rates and diverse economic landscapes. The dataset, while insightful, highlights data gaps, particularly in countries like North Korea, underscoring the need for comprehensive data collection. The spatial analysis suggests nuanced policy considerations, recognizing the heterogeneity in economic and demographic dynamics. Overall, this spatial visualization provides a dynamic perspective on the East Asia Pacific region, prompting further research into the intricate relationships shaping the socio-economic fabric of each country.

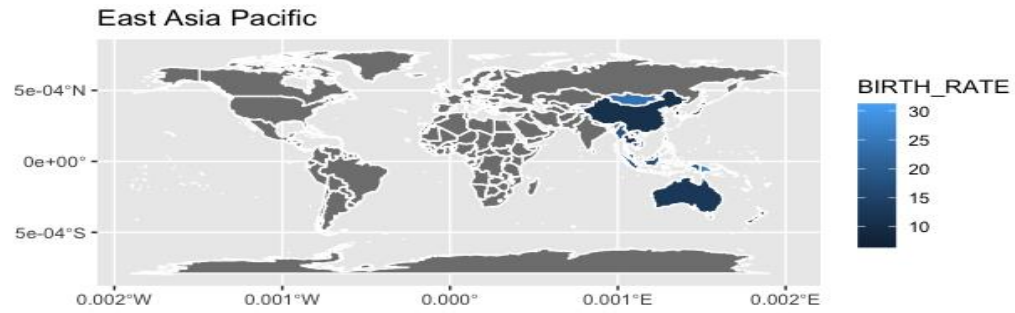

Figure 2. Birth Rate in East Asia.

3.1.2. T.test

In summary, both t.tests suggest that the means of birth rate and GDP in the samples are significantly different from 0, providing evidence for the presence of meaningful values for these variables (The R foundation). In Figure 2. You can see the difference in the two histograms between birth rate and GDP per capita.

3.1.3. Birth Rate

The one sample t.test for birth rate yields a t-value of 28.59 with 214 degrees of freedom and an extremely small p-value (< 2.2e-16). The null hypothesis for a one-sample t.test is typically that the true mean of the population is equal to a specified value (often 0). In this case, the

alternative hypothesis states that the true mean is not equal to 0. Given the very small p-value, we would reject the null hypothesis. This suggests that the mean birth rate in this sample is significantly different from 0. The 95 percent confidence interval for the mean birth rate is [18.01252, 20.68011]. This means that we are 95 percent confident that the true population meaning birth rate falls within this interval. The sample mean is 19.34631, which falls under the confidence interval, supporting the validity of the test.

3.1.4. GDP per capita

Te one-sample t.test for GDP produces a t-value of 13.397 with 193 degrees of freedom and a very small p-value (<2.2e-16). Like the birth rate test, the null hypothesis is that the true mean of GDP is equal to 0, and the alternative hypothesis is that the true mean is not equal to 0. The small p-value leads to the rejection of the null hypothesis, indicating that the mean GDP in this sample is significantly different from 0, just as the birth rate. The 95 percent interval for the mean GDP is [18904.87, 25432.52]. This tells us that we are 95 percent confident that the true population mean GDP falls within this interval. The sample mean is GDP is 22168.7, which is within the confidence interval, supporting the validity of the test.

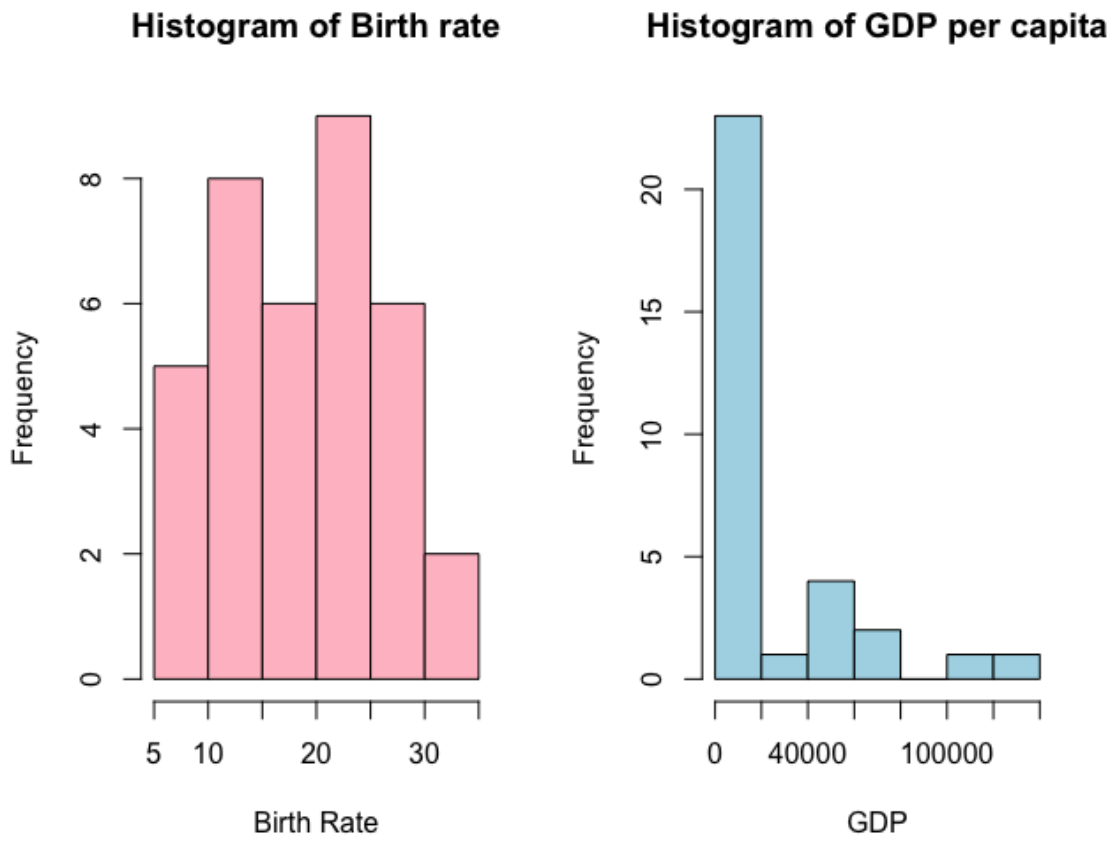

Figure 3. Histogram of Birth rate & GDP

3.1.5. Correlation

When performing a correlation, we get a result. A correlation coefficient of -0.6680673 indicates a moderately strong negative linear relation between two variables (birth rate and GDP per capita). The correlation coefficient ranges from -1 to 1, where -1 signifies a perfect negative correlation, 0 denotes no correlation, and 1 represents a perfect positive correlation. In this case, with the value of – 0.6680673 suggests that as one variable increases, the other tends to decrease, and vice versa, but not always so easily. The negative sign indicates the direction of the relationship, when one variable goes up, the other goes down. The magnitude of -0.6680673 suggests that the relationship is substantial but not completely absolute. The closer the correlation coefficient is to -1, the stronger the negative correlation. In Figure 3. We can see a scatterplot that visualizes this relationship between the two variables. Also, you can see the difference for each country in the graph. (Ezekiel, M., 1930).

The points on the graph tend to fall along a downward-sloping line. This line represents the negative correlation, and the steepness of the line corresponds to the strength of the relationship. In practical terms, understanding this negative correlation is crucial for predicting or interpreting changes in one variable based on the observed changes in the other. Additionally, it informs researchers about potential relationships between the variables, allowing for more informed strategies and interventions (Ezekiel, M., 1930).

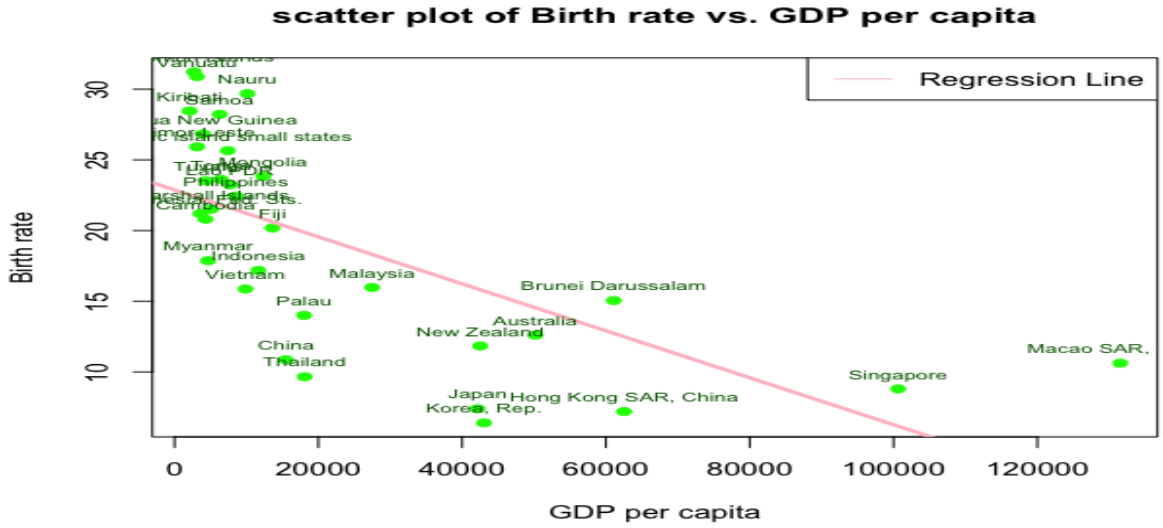

Figure 4. Scatterplot birth rate & GDP.

3.1.6. Linear regression model

Model summary:

The linear regression model is represented as follows:

BIRTH_RATE=22.88−0.0001661×GDP_PPPBIRTH_RATE=22.88−0.0001661×GDP_PPP

In summary, the model suggests a statistically significant relationship between GDP and Birth rate, with higher GDP associated with lower predicted values of Birth rate. The model explains a substantial proportion of the variance in Birth rate, as indicated by the 2R2 value (Sarstedt, M., Mooi, E., Sarstedt, M., & Mooi, E.,2019).

3.1.7. Coefficients and observations

The intercept is 22.88. This means the estimated value of the response variable (Birth rate) when the predictor variable (GDP) is zero. The coefficient for GDP is -0.0001661. This represents the estimated change in Birth rate for a one-unit increase in GDP, holding other variables constant. In this case, as GDP increases, the model predicts a decrease in Birth rate. There where six observations that was deleted due to missingness.

3.1.8. Residuals and model fit

The residuals represents the differences between the observed and predicted values og Birth rate. The summary statistics of residuals include the minimum, 1st quartile, median, 3rd quartile, and maximum values. The residual standard Error (RSE) is 5.7, which provides a measure of the typical size of the model residuals. It represents the standard deviation of the residuals. The 2R2 value is 0.4463, indicating that the.

4. Discussion

Understanding the relationship between birth rate and GDP per capita in Asia requires a nuanced examination, considering the continent's diversity and the various factors influencing demographic and economic dynamics. Asia, comprising regions such as South Asia, East Asia, and Southeast Asia, exhibits unique cultural, social, and economic characteristics that contribute to regional variations (Bloom, D. E., & Finlay, J. E., 2009).

Historically, regions undergo demographic transitions, marked by shifts in birth rates corresponding to economic development stages. Higher GDP per capita often accompanies improved education, healthcare, and access to family planning, leading to a decline in birth rates. However, the pace and nature of this transition can differ across regions.

Cultural and social factors play a significant role, in influencing attitudes toward family size, women's roles, and societal expectations. Government policies, including family planning initiatives, can shape birth rate trends. Urbanization, a consequence of economic growth, can

alter family structures and contribute to lower birth rates due to lifestyle changes and increased access to family planning services.

Government interventions, such as family planning programs and incentives, can shape birth rate trends. Understanding the policies in place and their effectiveness is crucial for assessing their impact on the relationship between birth rate and GDP per capita.

Improvements in healthcare, often associated with economic development, can lower infant mortality rates. As child survival rates increase, families may adjust their reproductive behavior, further impacting birth rates (Bloom, D. E., & Finlay, J. E., 2009).

Conducting a thorough statistical analysis, including regression models and correlation analyses, is recommended. It's also crucial to consider the qualitative aspects, such as cultural nuances and policy contexts, to provide a comprehensive understanding of the intricate relationship between birth rates and GDP per capita in different Asian regions.

Understanding the birth rate-GDP relationship in Asia requires a nuanced examination considering the continent's diversity. Regional variations influenced by cultural, social, and economic factors play a crucial role. Demographic transitions, government policies, cultural attitudes, and healthcare improvements contribute to the intricate relationship observed.

The study recommends a thorough statistical analysis, including regression models and correlation analyses, alongside a consideration of qualitative aspects such as cultural nuances and policy contexts. This holistic approach provides a comprehensive understanding of the complex relationship between birth rates and GDP per capita in different Asian regions, contributing to the broader discourse on population dynamics and economic development (Bloom, D. E., & Finlay, J. E., 2009).

5. Conclusion

This assignment explores the interplay between birth rates and GDP per capita in Asia, considering regional variations. The study employs quantitative methods, utilizing RStudio and a World Bank dataset. The focus is on East Asian and Pacific countries, acknowledging the continent's socio-economic diversity. Results include one-sample t-tests revealing significant differences in means for birth rate and GDP. Correlation analysis indicates a moderately strong negative linear relationship (-0.6680673) between birth rate and GDP. The linear regression model confirms a significant association, with higher GDP linked to lower birth rates. The discussion emphasizes the nuanced understanding required, considering

cultural, social, and economic factors in Asia's diverse regions. Recommendations include a comprehensive statistical and qualitative analysis for a thorough exploration of the complex relationship between demographic dynamics and economic indicators.

6. References

Bloom, D. E., & Finlay, J. E. (2009). Demographic change and economic growth in Asia. *Asian Economic Policy Review*, *4*(1), 45-64.

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