Impact of Women's Education Levels on Wages and Birth Rates

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Introduction

In the US, education is widely regarded as a pathway to higher socioeconomic status, offering improved quality of life and increased wages. However, the precise impact of education on key metrics such as birth rates and income remains unclear. This relationship is crucial for policymakers and businesses, as variations across states and time complicate decisions about educational investments and workforce development.

Educational policy discussions occur at all levels of government, highlighting the need to understand how education influences opportunities in life. Income and birth rates significantly shape the US socioeconomic landscape, and uncovering the link between education and these factors can inform policies in both public and private sectors. Governments can use this knowledge to design equitable education policies, while businesses can create programs that enhance workforce development through educational benefits.

This project explores the relationship between education levels and socioeconomic factors in the US by modeling historical data on birth rates and wages and performing predictive analyses. Using historical data, it identifies trends and forecasts how

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education levels influence birth rates and income disparities. The study seeks to answer: *How do varying levels of education impact birth rates and wage trends across the US over time?*

The findings are relevant to a wide range of stakeholders. Policymakers at the Department of Education, Department of Labor, and local and state governments could gain insights into how educational policies affect people's lives, incorporating these into decision-making processes. Educational institutions might use these outcomes to justify investments, improve outcomes, and advocate for targeted funding. Public health and family planning organizations could better understand the influence of education on birth rates, especially in regions with shifting patterns due to educational factors. Businesses could use these insights to evaluate the benefits of offering educational programs to employees, potentially fostering a more skilled and loyal workforce.

By examining how education levels affect birth rates and wages over time, this project aims to provide insights into personal well-being in the US. The findings could drive policy changes that address wage inequalities, enhance economic mobility, and support family planning initiatives.

Methods

This project used several models, including linear regression, time series analysis, and random forests, each serving a distinct role in the analysis.

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Linear Regression

Linear regression examined the relationship between education levels, wages, and birth rates. It quantified how education levels influenced variations in these outcomes over time and identified trends for future prediction.

Time Series Analysis

Time series analysis forecasted future trends in birth rates and wages. It uncovered temporal patterns such as trends and seasonality, aiding in accurate predictions.

Random Forest Model

The random forest model captured non-linear relationships in the data and reduced overfitting risks.

Results

Trends Over Time

Trends in wages and age at childbirth aligned with education levels. Women with higher education levels earned higher wages and had children later, while those with lower education levels had children earlier and earned less. Women with less education generally had more children, whereas those pursuing higher education had fewer.

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Linear Regression Models

The linear regression model predicting wages was highly accurate, with an R^2 or 0.997 and a low MSE of 0.334. Conversely, the model predicting the number of births was less precise, with a high MSE of 8.46e8, despite explaining 98.87% of the variance in births. The disparity suggested significant errors due to the scale of the data.

Random Forest Models

The random forest model predicting wages achieved an R^2 of 99.67% and an MSE of 0.3447, showing a negligible decline in accuracy compared to linear regression. For predicting births, the model had an R^2 of 97.1% but a much higher MSE of 2.18e9, mirroring the challenges seen in linear regression.

Time Series Analyses

Time series analyses were affected by anomalies from the 2020 COVID-19 pandemic, limiting their reliability due to a narrow data range. Forecasted wages were lower than expected due to the economic downturn, and an observed stagnation in the earning potential of college degree holders contrasted with wage growth for those without degrees. Birth trends revealed unexpected growth, possibly due to increased focus on family planning during the pandemic.

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Conclusion

Future analyses should include post-pandemic data to capture the effects of economic recovery and workforce transitions.

Before 2020, the data indicated that higher education levels correlated with higher wages, older maternal age, and fewer overall births. Higher wages are often associated with improved quality of life, enhancing access to better housing, food, recreation, and education. However, the relationship between birth rates and quality of life is more complex.

While having children is a deeply personal choice, having children at a younger age may limit opportunities for career and personal growth due to caregiving responsibilities. Conversely, waiting to have children can allow for greater life experience and financial stability, potentially benefiting both the mother and child.

These findings underscore the importance of prioritizing education at all levels of government and society. Education not only contributes to higher wages and improved quality of life but also fosters a more well-rounded and equitable society.

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