
Indian Statistical Institute, Kolkata

Project for 'Statistical Methods -III'

Bachelors of Statistics (Hons.), 2023-26

# Exploring the Impact of Income and Educational Disparities on Divorce Rates

**Deep Jayesh Hariya**
BS2324

*Advisor/Instructor*
**DR. Ayanendranath Basu**
Professor, Interdisciplinary Statistical Research Unit

Saturday 9th November, 2024

# Contents

## Abstract

In recent times, we have seen a significant rise in divorce rates. This project examines the potential driving variables for divorce in couples, using data from the Michigan Panel Study of Income Dynamics. The project will investigate factors such as the education levels of the wife and husband, and the annual incomes of the wife and husband, which may impact divorces in couples. We use chi-square test for independence to test for any association between the possible factors and marital stability.

## 1 Introduction

This project aims to deepen our understanding of why divorce rates have shifted over the past century. Over time, household dynamics have evolved significantly. Men are no longer always the primary breadwinners, and it is now rare for women to stay at home solely to maintain the household and raise children. Today, both partners typically work to support the family, and, in some cases, the woman may even be the primary earner. Additionally, a growing number of women are attending college, whereas decades ago, higher education was mostly pursued by men. This shift raises the question: has such a dramatic change in family structure influenced the relationship between partners, and if so, to what extent? Moreover, could this be a factor in explaining changes in divorce rates?

This project builds on the framework of economic models that explore marital stability, particularly in relation to income dynamics and educational attainment. Instead of following models with extensive controls, such as those used by Liu and Vikat (2004), our approach is streamlined to focus specifically on the association between marital stability and two key factors: the education level of the wife and the wife's share of household income. Unlike earlier models that included numerous demographic and familial controls, our analysis uses a Chi-square test for independence to examine whether these variables have a statistically significant association with marital stability. Our dependent variable is a binary indicator for divorce, enabling a more direct interpretation of the factors influencing marital dissolution. By concentrating on income distribution within the household and educational attainment, this study aims to provide insights into the socioeconomic dimensions of marital stability.

## 2 Data

The data has been taken from Michigan University's Panel Study of Income Dynamics for the year 2013 in the United States. There are over 9,000 observations considered in our study. The variables of the data are as follows:

- **"Head marital status"** / `is_divorce` – Marital status of the head of the house.A value of 0 indicates married and 1 indicates divorce.
- **"Wages/ Salary-Head"** / `headsalary`: Total wages earned altogether from 2012 before any deductions such as taxes are made (in USD).
- **"Wages/ Salary of Wife"** / `wifesalary`: Total wages earned altogether from 2012 before any deductions such as taxes are made (in USD).
- **"Completed ED Wife"**/ `wifeedu`: Wife's level of highest education attained; in the range 1-17; e.g., a value of 8 indicates that the wife completed the eighth grade.
- **"Age of Wife "** / `wifeage`: Age of the Wife in the household.

## 3 Exploration

Starting with basic summary statistics for Age/Salary/Education of Wife and Husband, as presented in the tables below. For each, we report important statistical measures like: mean, median and count. These descriptive statistics provide an initial understanding of performance patterns across spouses and the factors, highlighting differences in central tendency and spread.

| Group | Mean | Median | Count |
|---|---|---|---|
| Divorced | 42.92 | 41.0 | 145 |
| Married | 46.48 | 46.0 | 4023 |

Table 1: Age Of Wife

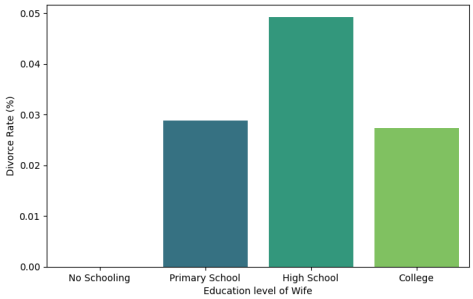
| Group | Mean | Median | Count |
|---|---|---|---|
| Divorced | 709960.39 | 18000.0 | 145 |
| Married | 316905.72 | 20000.0 | 4023 |

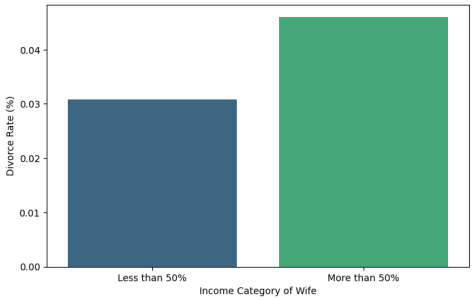
Table 2: Salary Of Wife (in USD)

| Group | Mean | Median | Count |
|---|---|---|---|
| Divorced | 925154.0 | 30000.0 | 145 |
| Married | 402844.62 | 40000.0 | 4023 |

Table 3: Salary Of Husband (in USD)

The visuals below provide a comprehensive view of marital status distribution and its potential links to income and education. The bar plots illustrate divorce rates in relation to the wife's income and education level. These visualizations provide insight into how factors like income and educational attainment of the wife might be associated with marital stability.




(b)

The bar plot reveals that divorce rates tend to be higher among wives who earn more than average and among those whose highest level of education is high school. These observations motivate a deeper investigation into the relationships between a wife's income, her education level, and her share of the total household income with divorce rates. Understanding these associations may shed light on potential socioeconomic factors influencing marital stability.

# 4 $\chi^2$ - Analysis

We applied the $\chi^2$ test for independence to examine our hypotheses.

## 4.1 Test for Association of Education Level

For the first test, we aim to determine whether a higher education level is associated with marital stability.

$H_0$: There is no association between higher education level and marital stability.

$H_1$: There is an association with higher education level and marital stability.

The following summarizes the $\chi^2$ test performed for null hypothesis, executed using Python.

| Statistic | Value |
|---|---|
| $\chi^2$ Statistic | 13.12 |
| Degrees of Freedom | 3 |
| p-value | **0.0044** |

| Education Level | Married | Divorced |
|---|---|---|
| College | 2597 | 73 |
| High School | 1256 | 65 |
| No Schooling | 8 | 0 |
| Primary School | 101 | 3 |

The results yield a p-value of 0.0044. This statistically significant result (at the $\alpha = 0.05$ level) allows us to reject the null hypothesis, indicating that there is indeed an association between a person's education level and their likelihood of being married or divorced. The findings suggest that education level may play a role in marital stability, aligning with previous literature that has explored similar relationships.

This result aligns with Isen and Stevenson (2010) [1] that economic stability, often tied to higher education levels, can serve as a buffer against marital dissolution. The observed relationship in my analysis thus supports their findings that educational attainment is intertwined with marital outcomes, further underscoring the importance of education as a factor in marital stability

## 4.2 Test for Association of Income Share

For the next factor we find wife's household share contributed by her, calculated by

$$wifeshare = \frac{wifesalary}{wifesalary + headsalary}$$

We then divide this into two groups: those where the wife's income share is more than 50% and those where it is less than 50%. This allows us to test our hypothesis regarding income distribution using a $\chi^2$ test with null hypothesis being:

$H_0$: There is no association between wife's household income share and marital stability.

$H_1$: There is an association with wife's household income share and marital stability.

The following summarizes the $\chi^2$ test performed for null hypothesis, executed using Python.

| Statistic | Value |
|---|---|
| $\chi^2$ Statistic | 2.25 |
| Degrees of Freedom | 2 |
| p-value | **0.134** |

| Wife's share | Married | Divorced |
|---|---|---|
| More than 50% | 913 | 44 |
| Less than 50% | 3049 | 97 |

In analyzing the association between a wife's income share and marital status (married or divorced) using a $\chi^2$ test for independence, the test yields a p-value of 0.134. This high p-value indicates that we do not have sufficient evidence to reject the null hypothesis, suggesting no statistically significant association between a wife's income share and the likelihood of being divorced or married. Thus, based on these results, income share does not appear to be a determining factor in marital stability in this dataset.

This finding contrasts with the conclusions of Liu and Vikat (2004) [2], who observed that marriages where the wife earns a larger share of the household income tend to be at a higher risk of divorce. They proposed the **"independence effect"**, where a wife's financial independence, especially when she earns more than her husband, may contribute to marital instability. In our analysis, however, this effect was not evident, suggesting that other factors beyond income share might play a more significant role in marital stability for this population. This difference may be due to variations in sample characteristics or cultural factors affecting the relationship between income dynamics and marital outcomes.

## 5 Conclusion

From this study, we conclude that factors such as education level and income share within households may influence marital stability, though their effects vary across populations. The analysis revealed a significant association between education levels and marital stability, suggesting that higher educational attainment might contribute to stronger marriages. However, the $\chi^2$ test found no significant link between a wife's share of household income and divorce rates, challenging the "independence effect" observed in other studies.

In India, where family dynamics and cultural expectations are evolving, particularly in urban areas, this study offers important insights. Education has become increasingly accessible to women, and more households now rely on dual incomes. However, traditional gender roles still shape marital expectations in many parts of India. The study's findings suggest that, as in US, educational attainment may be more critical to marital stability than income contributions alone, indicating that policies focused on educational advancement could positively impact marriage stability. As more women enter higher education and contribute financially to households, these findings may support shifts toward more equitable and resilient family structures.

## References

[1] Adam Isen and Betsey Stevenson. "Women's Education and Family Behavior: Trends in Marriage, Divorce and Fertility". In: *Demography and the Economy* (Feb. 2010). DOI: 10.2139/ssrn.1553628.

[2] Guiping Liu and Andres Vikat. "Does divorce risk depend on spouses' relative income? - A register-based study of first marriages in Sweden, 1981-1998". In: (Mar. 2004). DOI: 10.4054/MPIDR-WP-2004-010.