

Tentative Research on the Causes of the Declining Birthrate

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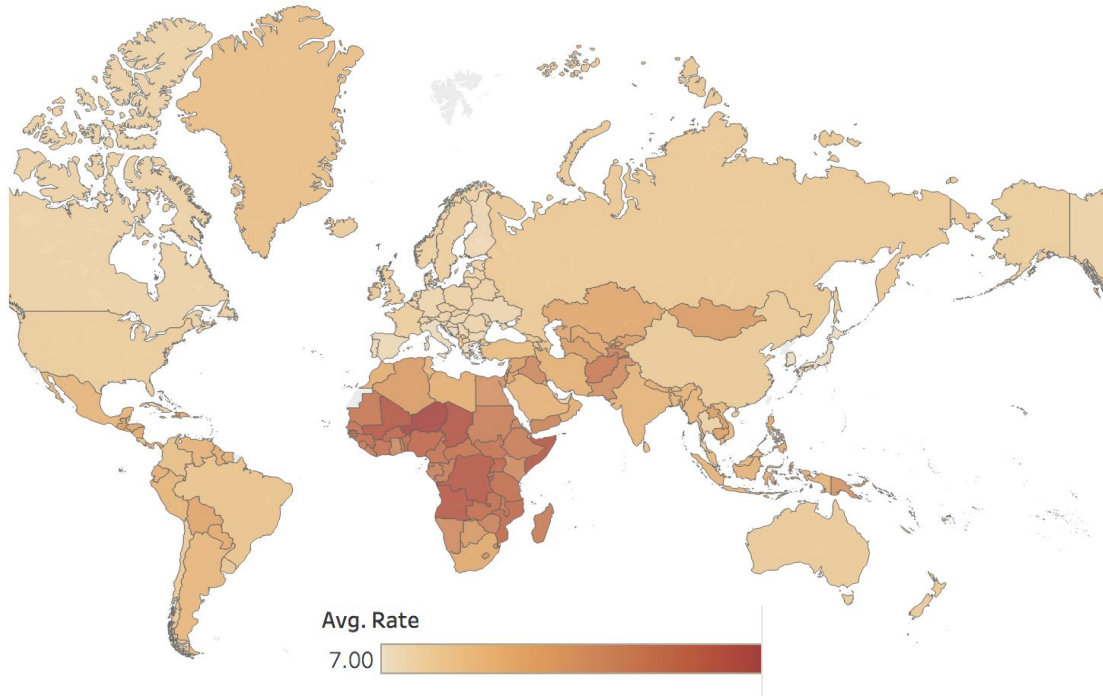




PART I: INTRODUCTION

Global Birth Rate

birth rate 2017

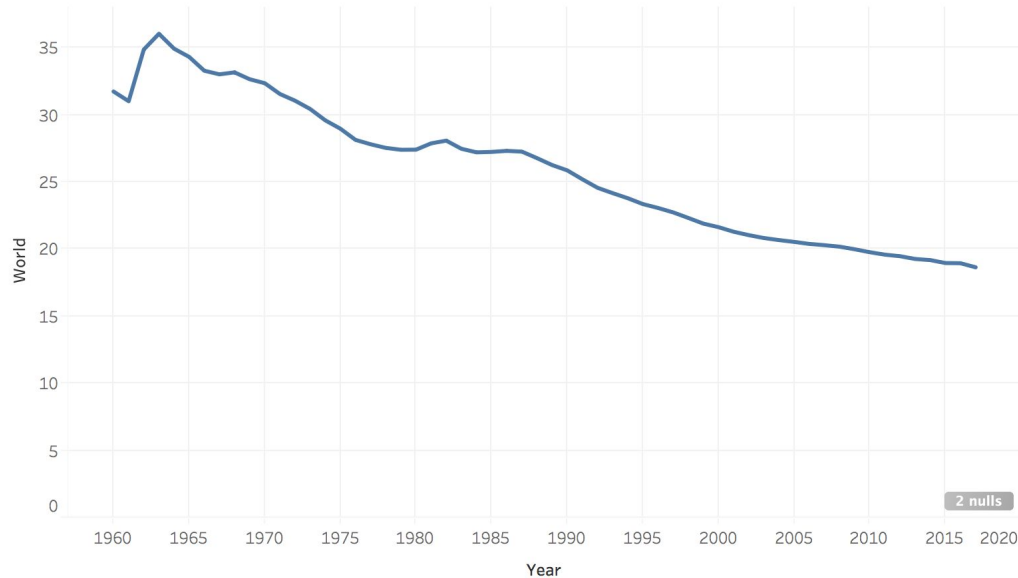


Lowest in EU and
North America

Highest in Africa and
Middle East

Declining birth rate

Time series global birth rate trend



Birth rate declined dramatically in recent 50 years.

Research Motivation and Target Audiences

- Problems of Declining Birth Rate: Aging Problem
 - Decline in Working-Age Population
 - Increase in Health Care Costs
- Audiences of Our Dashboard
 - Policy Makers
 - Researchers: Sociologists

Study Objects

- Three countries

China, India and US (3 countries with largest population)

- Three factors

Economy, Gender Equality and Healthcare

Dataset and Methodology



THE WORLD BANK
IBRD • IDA

Data

- Datasets (from 1960-2017)
 - Economy: 1) GDP, 2) Inflation
 - Gender Equality: 1) Wage Gender Gap Ratio, 2) Female Education Rate (Secondary Enrollment Rate)
 - Healthcare: 1) Contraceptive Prevalence, 2) Mortality Rate of Infant
- Tools
 - Tableau
 - Python(Matplotlib, Seaborn)



PART II

Three potential factors:

Economy, Gender Equality, Health Care



Two Features in Economy

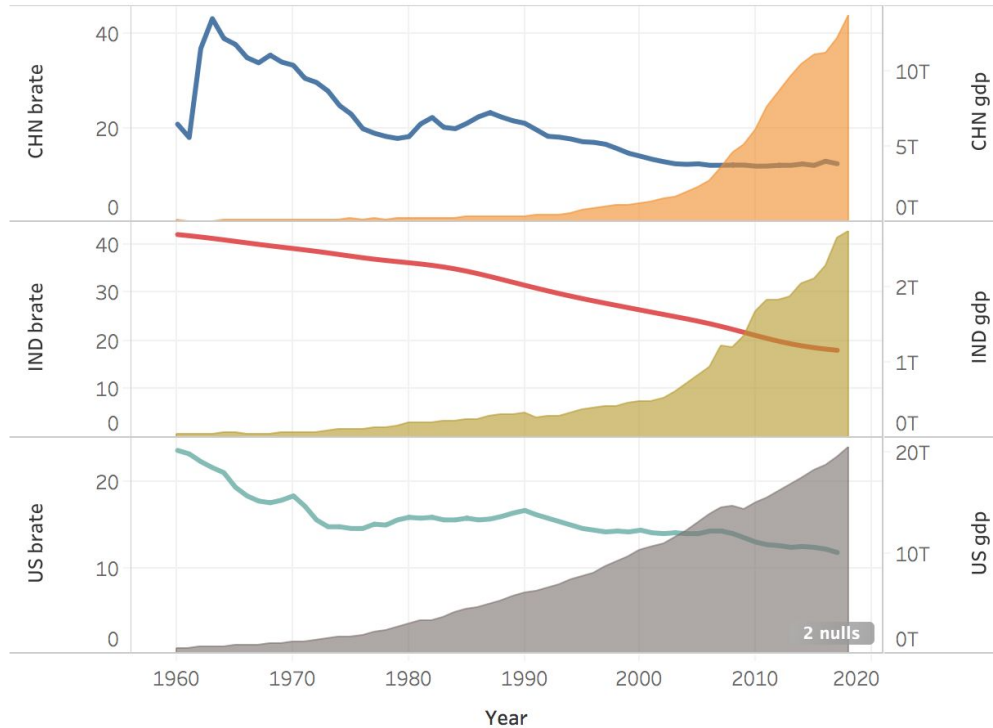
#1 GDP -- [Tableau]

The development of economy

#2 Inflation-- [Matplotlib]

The annual percentage change in the price level
Represent the economic pressure

Compare GDP and Birth Rate



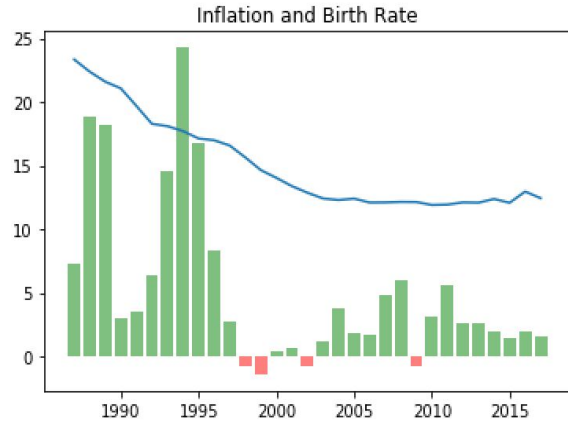
Correlation:

- China: -0.622
- India: -0.874
- US: -0.747

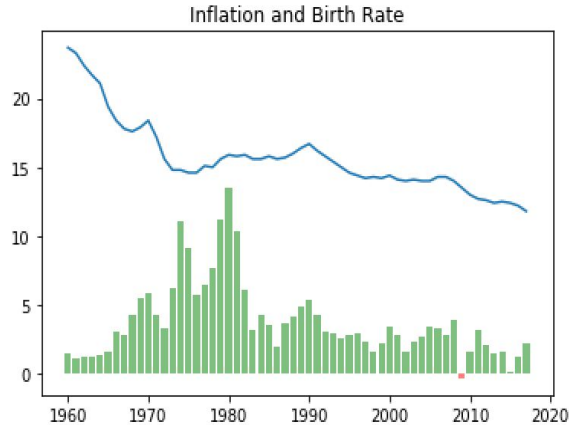
As economy becomes developed, birth rate decreases.

Neither inflation nor deflation affects birth rate

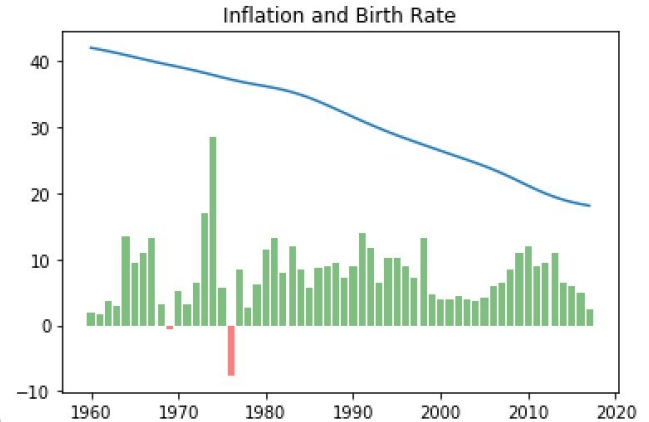
Compare Inflation and Birth Rate



China



US



India

- Green bars indicate inflation
- Red bars indicate deflation

Two Features in Gender Equality

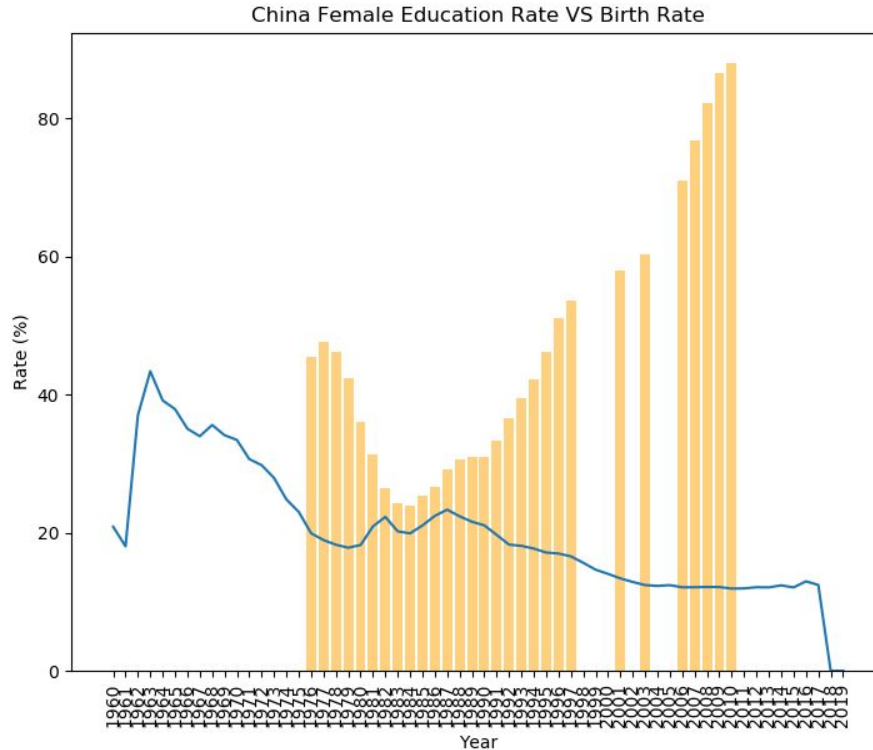
#1 Education Indicator -- [Matplotlib]

School enrollment, secondary, female (% gross)

#2 Gender Wage Gap Indicator -- [Tableau]

Wage and salaried workers, female (% of female employment) (modeled ILO estimate)

#1 Education Indicators - School enrollment, secondary, female (% gross)

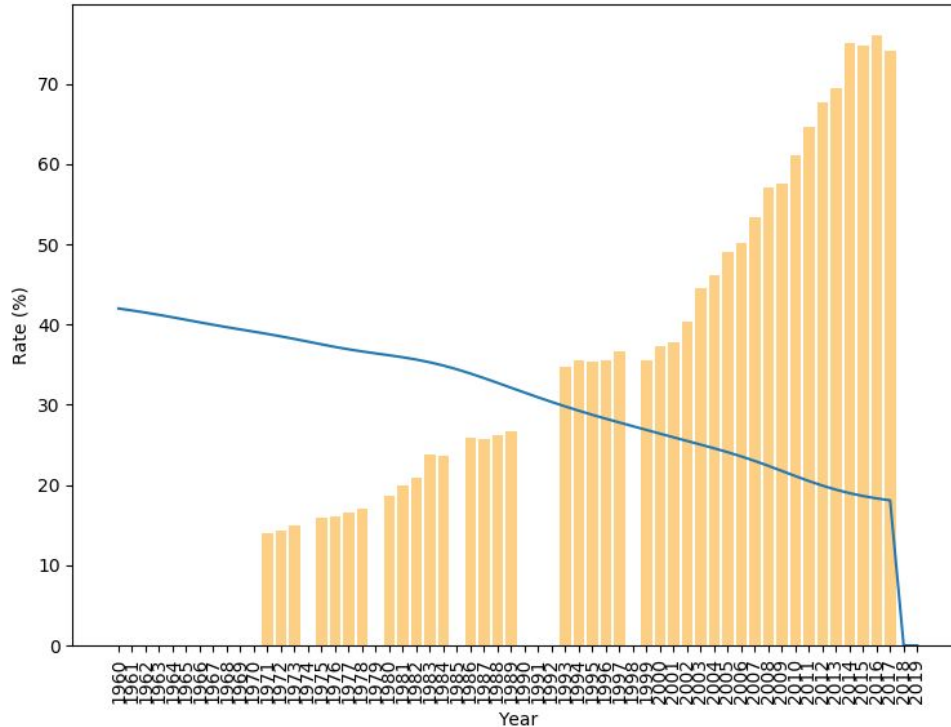


The higher education female received, the lower birth rate reaches.

- Yellow bars indicate education rate in each country
- Blue line indicates birth rate in each country

#1 Education Indicators - School enrollment, secondary, female (% gross)

India Female Education Rate VS Birth Rate



Education Index

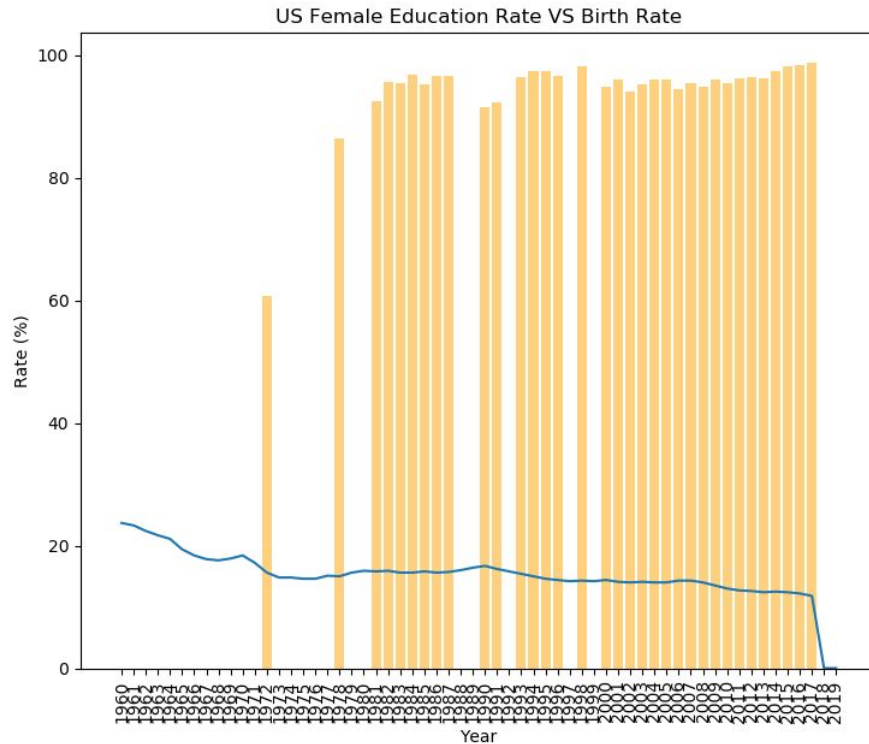
China Education Pearsons correlation: -0.312

US Education Pearsons correlation: -0.247

India Education Pearsons correlation: -0.585

- Yellow bars indicate education rate in each country
- Blue line indicates birth rate in each country

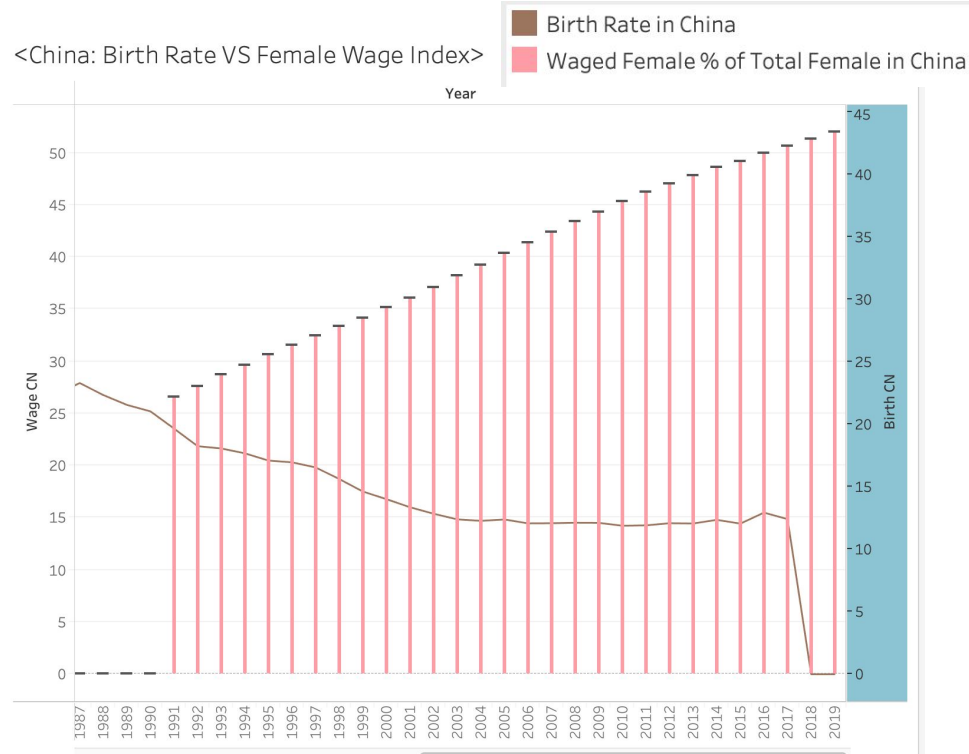
#1 Education Indicators - School enrollment, secondary, female (% gross)



However, the education level does not play an important role in the birth rate after it reached a certain value.

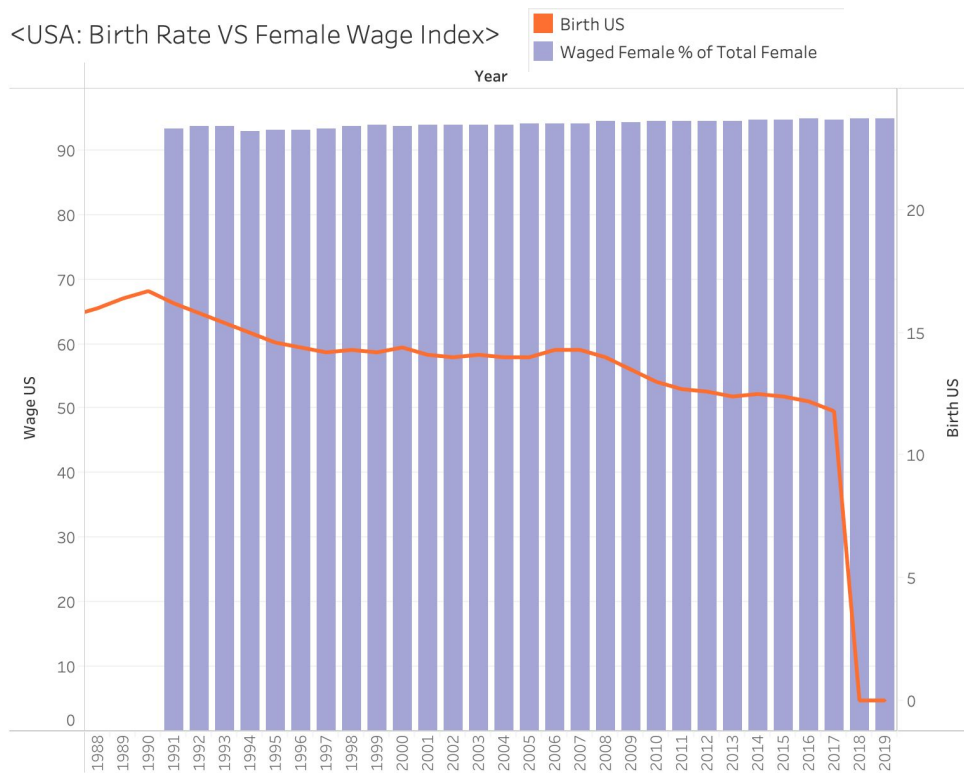
- Yellow bars indicate education rate in each country
- Blue line indicates birth rate in each country

#2: Wage and salaried workers, female (% of female employment)



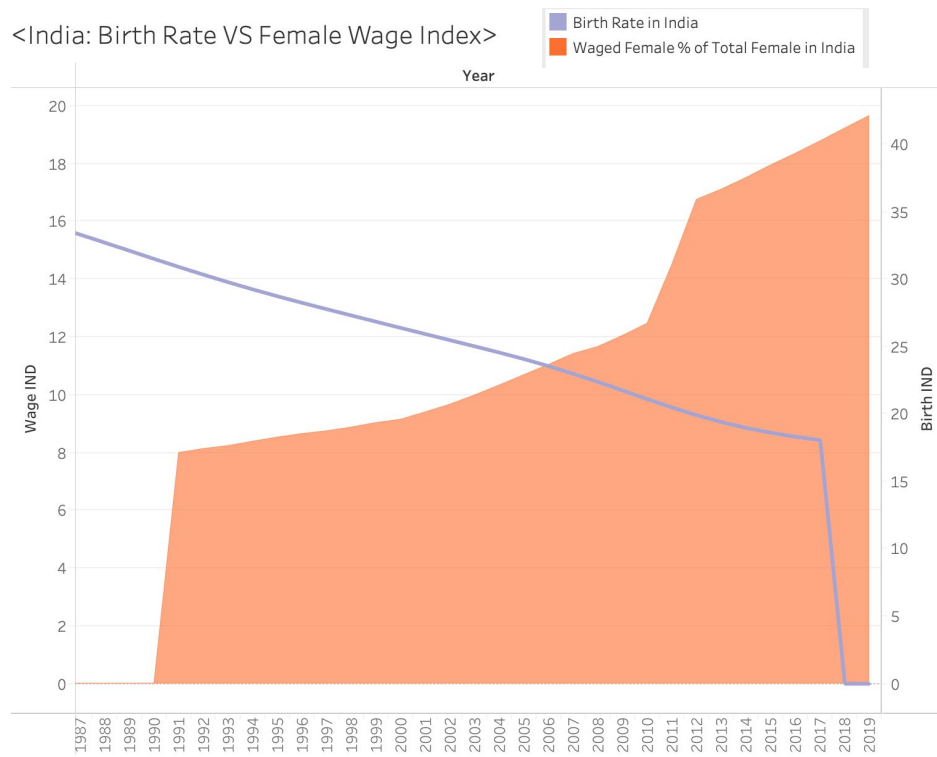
The higher ratio of salaried female, the lower birth rate reaches.

#2: Wage and salaried workers, female (% of female employment)



Similarly, the ratio of salaried women does not play an important role in the birth rate after it reached a certain value.

#2: Wage and salaried workers, female (% of female employment)



Gender Wage Gap Index

China Wage Pearsons correlation: -0.774

US Wage Pearsons correlation: -0.567

India Wage Pearsons correlation: -0.925

Two Features in Healthcare

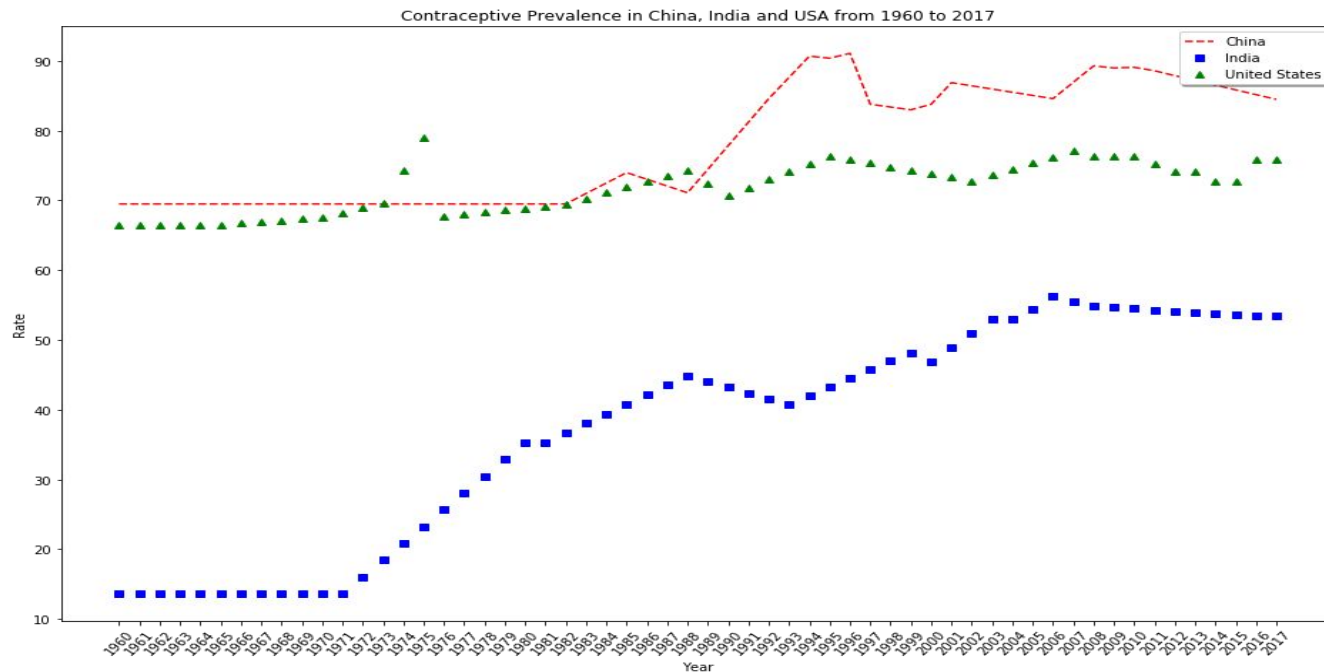
#1 Contraceptive Prevalence -- [Matplotlib]

The high rate of contraception means that a country has a better healthcare

#2 Mortality Rate of Infant -- [Matplotlib]

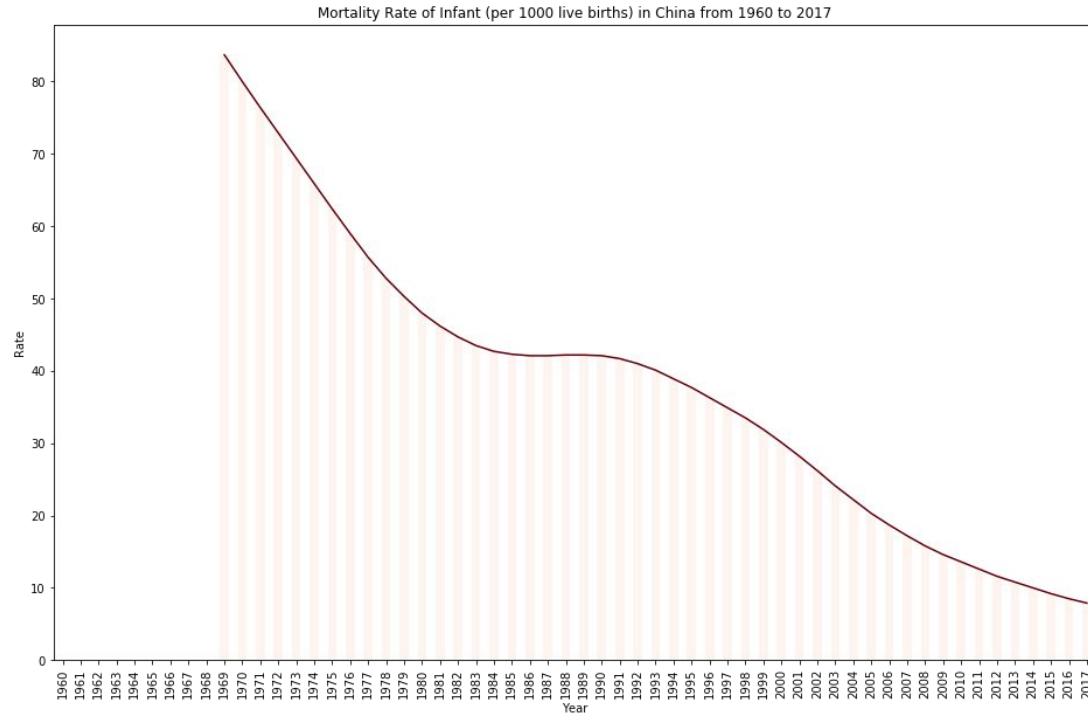
The lower mortality rate of infant, the better healthcare a country has

Contraceptive Prevalence

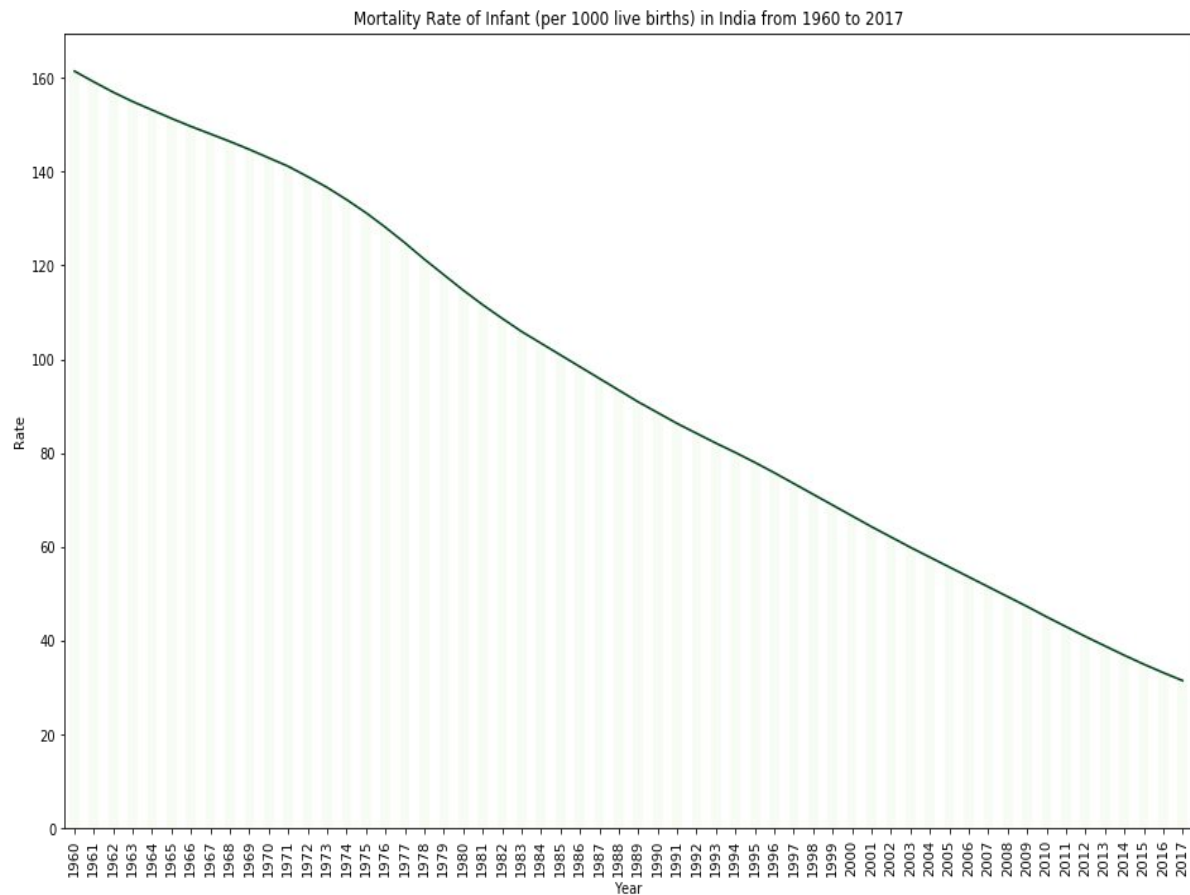


Mortality Rate of Infant

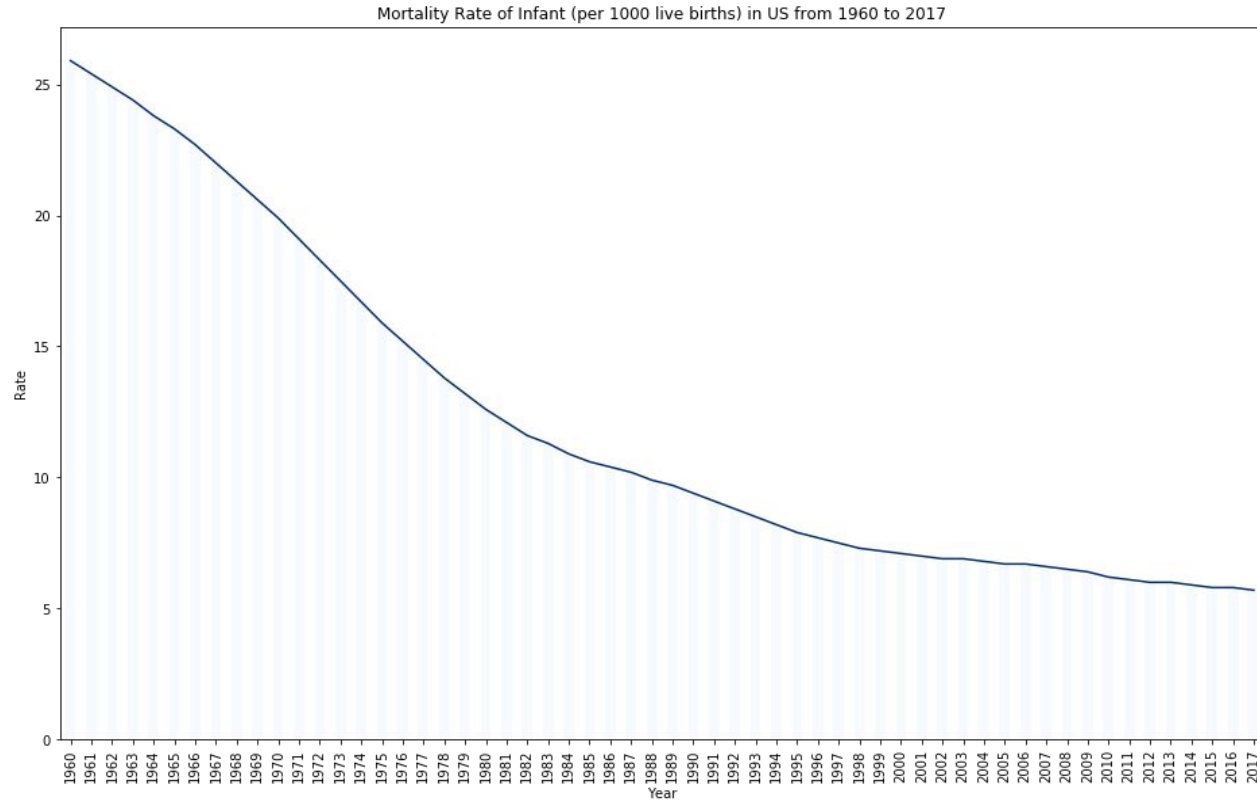
- China



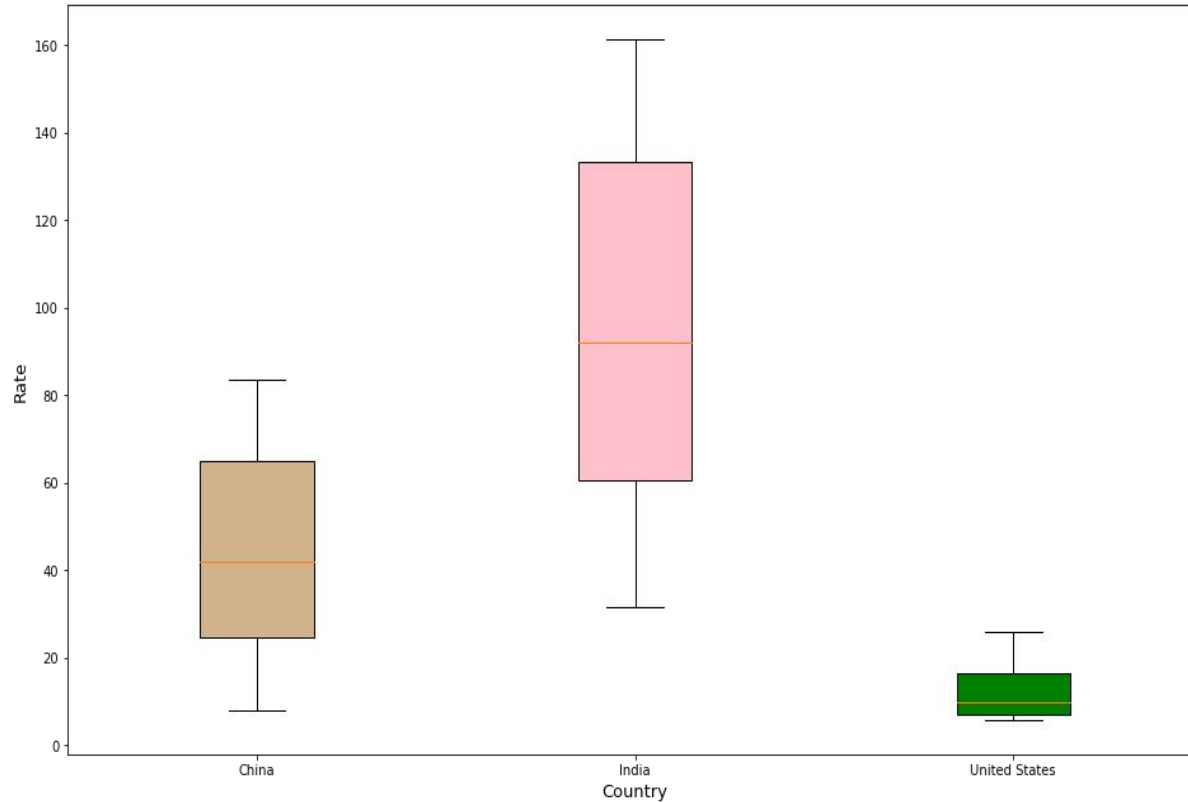
● India



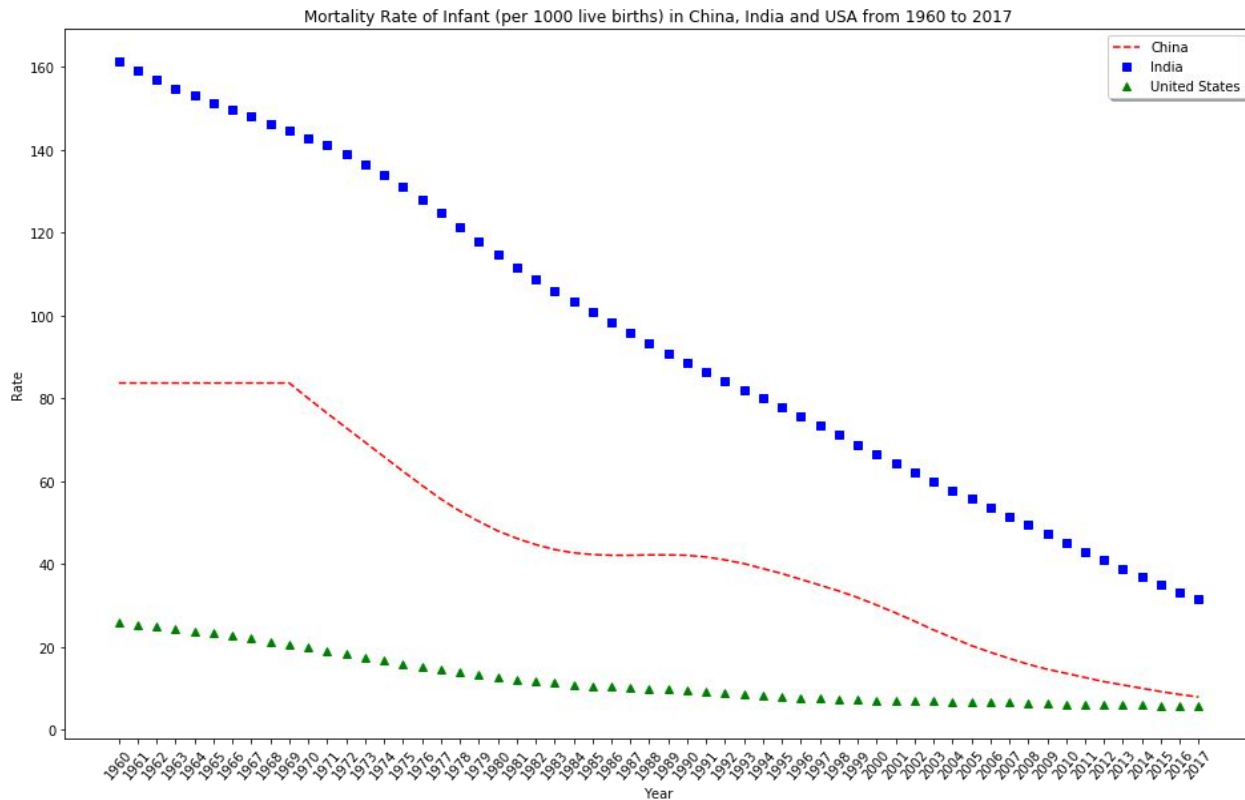
- United States



Mortality Rate After Dealing with Missing Values



Mortality Rate After Dealing with Missing Values



Correlation

- correlation between birth rate and contraceptive prevalence
 - China: -0.744
 - India: -0.927
 - United States: -0.751

Correlation

- correlation between birth rate and mortality rate
 - China: 0.894
 - India: 0.988
 - United States: 0.878



Part III: Conclusion

How Three Factors Impact Birth Rate?

- Economy

The higher the GDP, the lower the birth rate is.

- Gender Equality - Feminism

Within a certain range, the high education and wage female received, the lower the birth rate is.

- Health care

As rate of contraceptive prevalence goes up, the birth rate goes down
The higher mortality rate of infant with the higher birth rate

Other factors

- **Culture** - Religions, Openness to family types (LGBT parenting, single parent) ...
- **Policy** - Chinese One-child policy, German Family Policy ...

Suggestions to Policy Makers

- Improve medical quality
- Provide more welfare to family with more babies