Worldwide Contraceptive Use

And its correlating factors

By Lara Haase

The Problem

What factors influence Contraceptive Use, and what outcomes does usage have?

Potential Clients

- The World Bank
- Human Rights Watch
- Amnesty International
- FIDH: Worldwide Human Rights Movement
- International Women's Rights Action Watch
- other international human or women's rights organizations

The Data

World Bank Gender Statistics

- Data from all countries, some aggregated into regions and economic groups
- Over 600 features
- Updated Regularly
- Multiple sources/ data collection methods
- https://data.worldbank.org/data-catalog/gender-statistics

Other Potential Datasets

1. United Nations Gender Statistics: https://genderstats.un.org/
2. World Bank Education Statistics
3. United Nations Gender Info: https://www.quandl.com/api/v3/datasets/UGEN/GENC_5001.csv?api_key=522GtZ-iXb4LDM4xEEax
4. Contraceptive Use- World- (also available by country): https://www.quandl.com/api/v3/datasets/UGEN/CNTR_5001.csv?api_key=522GtZ-iXb4LDM4xEEax
5. Abortion Rate (also available by country) https://www.quandl.com/data/UGEN/ABRT_5001-Abortion-Rate-World
6. Johnston's Archive (historical abortion stats for countries) - 130 data sets

Data Wrangling

Raw Data

Country.Name	Country.Code	Indicator.Name	Indicator.Code	1960	1961	1962	1963	1964	1965	...	2007	2
Arab World	ARB	Access to anti-retroviral drugs, female (%)	SH.HIV.ARTC.FE.ZS	NaN	NaN	NaN	NaN	NaN	NaN	...	3.585854	5.611
Arab World	ARB	Access to anti-retroviral drugs, male (%)	SH.HIV.ARTC.MA.ZS	NaN	NaN	NaN	NaN	NaN	NaN	...	4.407830	6.393
Arab World	ARB	Account at a financial institution, female (% ...	WP_time_01.3	NaN	NaN	NaN	NaN	NaN	NaN	...	NaN	N
Arab World	ARB	Account at a financial institution, male (% ag...	WP_time_01.2	NaN	NaN	NaN	NaN	NaN	NaN	...	NaN	N
Arab World	ARB	Adolescent fertility rate (births per 1,000	SP.ADO.TFRT	133.555013	134.159119	134.857912	134.504576	134.105211	133.569626	...	49.999851	49.887

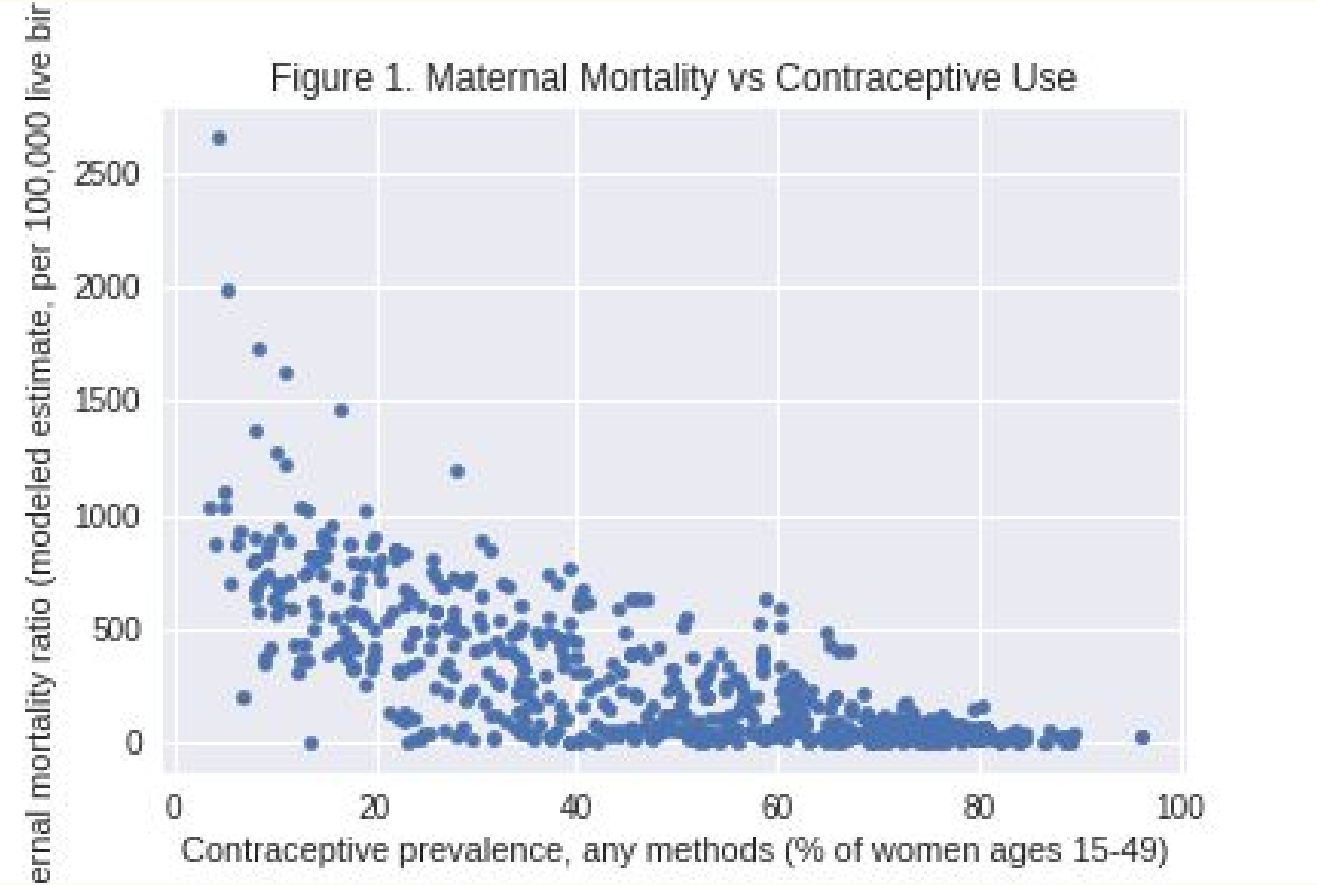
Wrangled Data

ountry.Name	year	Access to anti-retroviral drugs, female (%)	Access to anti-retroviral drugs, male (%)	Account at a financial institution, female (% age 15+) [ts]	Account at a financial institution, male (% age 15+) [ts]	Adolescent fertility rate (births per 1,000 women ages 15-19)	Age at first marriage, female	Age at first marriage, male	Age dependency ratio (% of working-age population)	...	Women who own land both alone and jointly (% of women age 15-49): Q3	Women who own land both alone and jointly (% of women age 15-49): Q4	Women who own land both alone and jointly (% of women age 15-49): Q5 (highest)	Women who own land jointly (% of women age 15-49)	Women who own land jointly (% of women age 15-49): Q1 (lowest)
Afghanistan	2000	0.0	0.0	NaN	NaN	153.8456	NaN	NaN	103.254202	...	NaN	NaN	NaN	NaN	NaN
Afghanistan	2001	0.0	0.0	NaN	NaN	150.0468	NaN	NaN	102.933042	...	NaN	NaN	NaN	NaN	NaN
Afghanistan	2002	0.0	0.0	NaN	NaN	146.2480	NaN	NaN	102.217020	...	NaN	NaN	NaN	NaN	NaN
Afghanistan	2003	0.0	0.0	NaN	NaN	140.4764	NaN	NaN	101.290161	...	NaN	NaN	NaN	NaN	NaN
Afghanistan	2004	0.0	0.0	NaN	NaN	134.7048	NaN	NaN	100.247559	...	NaN	NaN	NaN	NaN	NaN
Afghanistan	2005	0.0	0.0	NaN	NaN	128.9332	NaN	NaN	99.078444	...	NaN	NaN	NaN	NaN	NaN
Afghanistan	2006	0.0	0.0	NaN	NaN	123.1616	NaN	NaN	99.574274	...	NaN	NaN	NaN	NaN	NaN
Afghanistan	2007	0.0	0.0	NaN	NaN	117.3900	NaN	NaN	100.000371	...	NaN	NaN	NaN	NaN	NaN
Afghanistan	2008	0.0	0.0	NaN	NaN	111.4708	15.0	25.3	100.215886	...	NaN	NaN	NaN	NaN	NaN
Afghanistan	2009	1.0	0.0	NaN	NaN	105.5516	NaN	NaN	100.060480	...	NaN	NaN	NaN	NaN	NaN

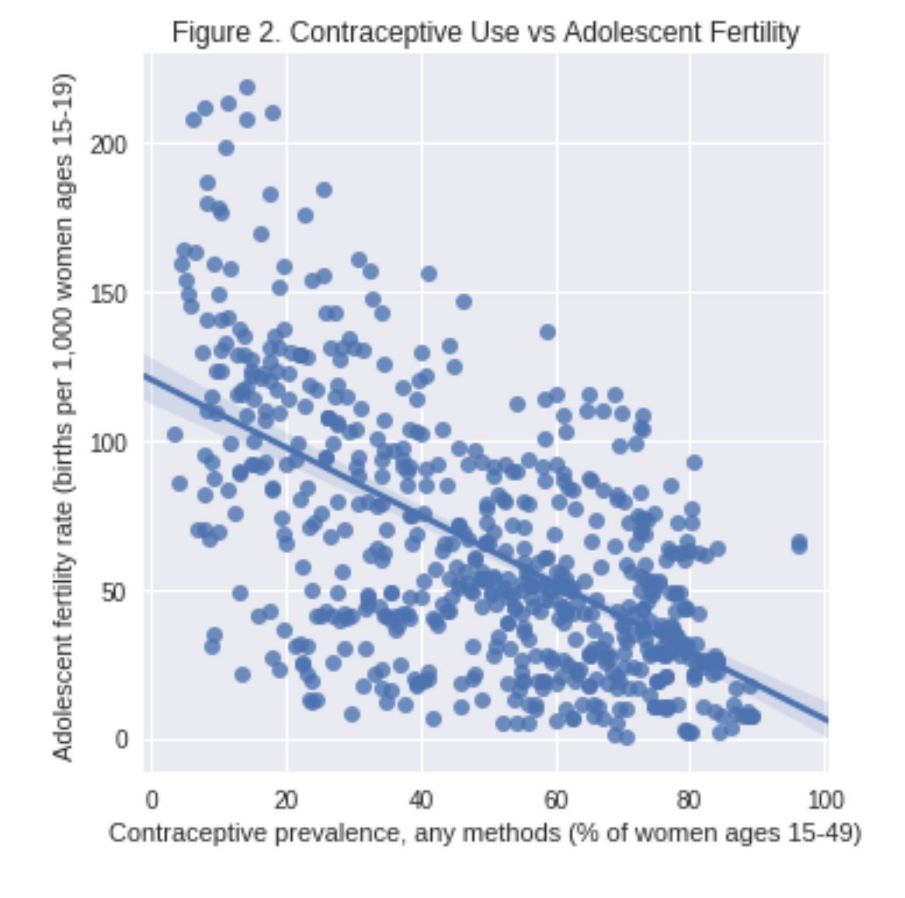
Exploratory Findings

Contraceptive Prevalence as the Dependent Variable

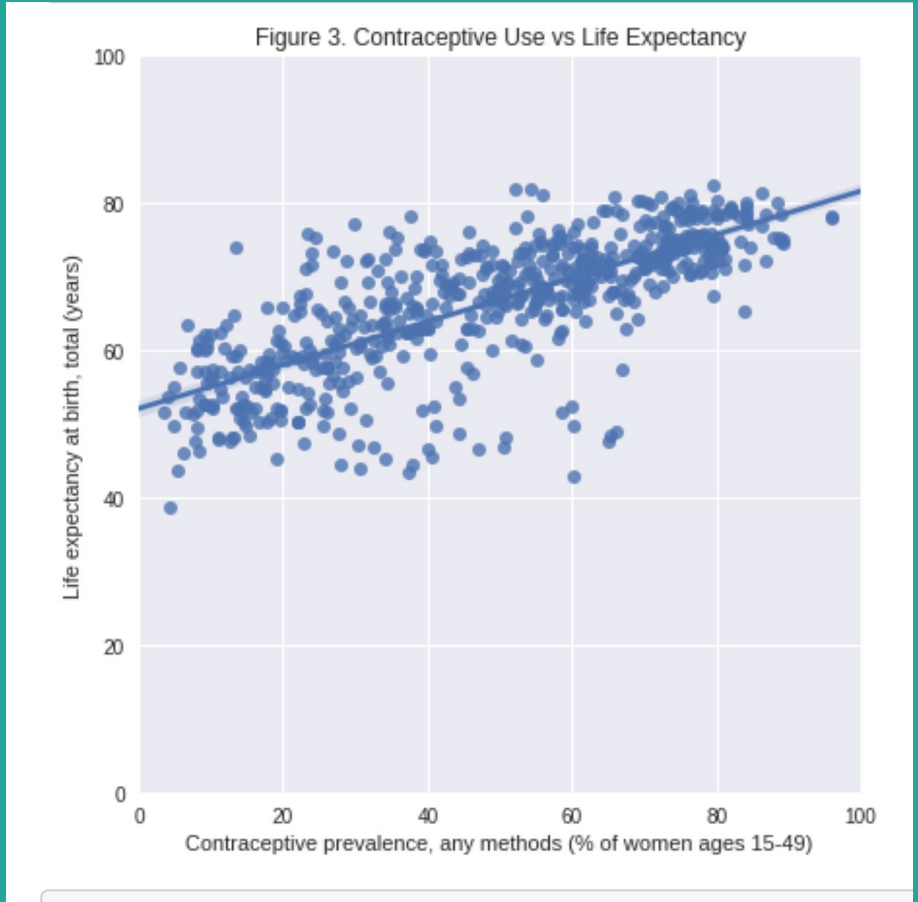
Correlation coefficient: -0.72



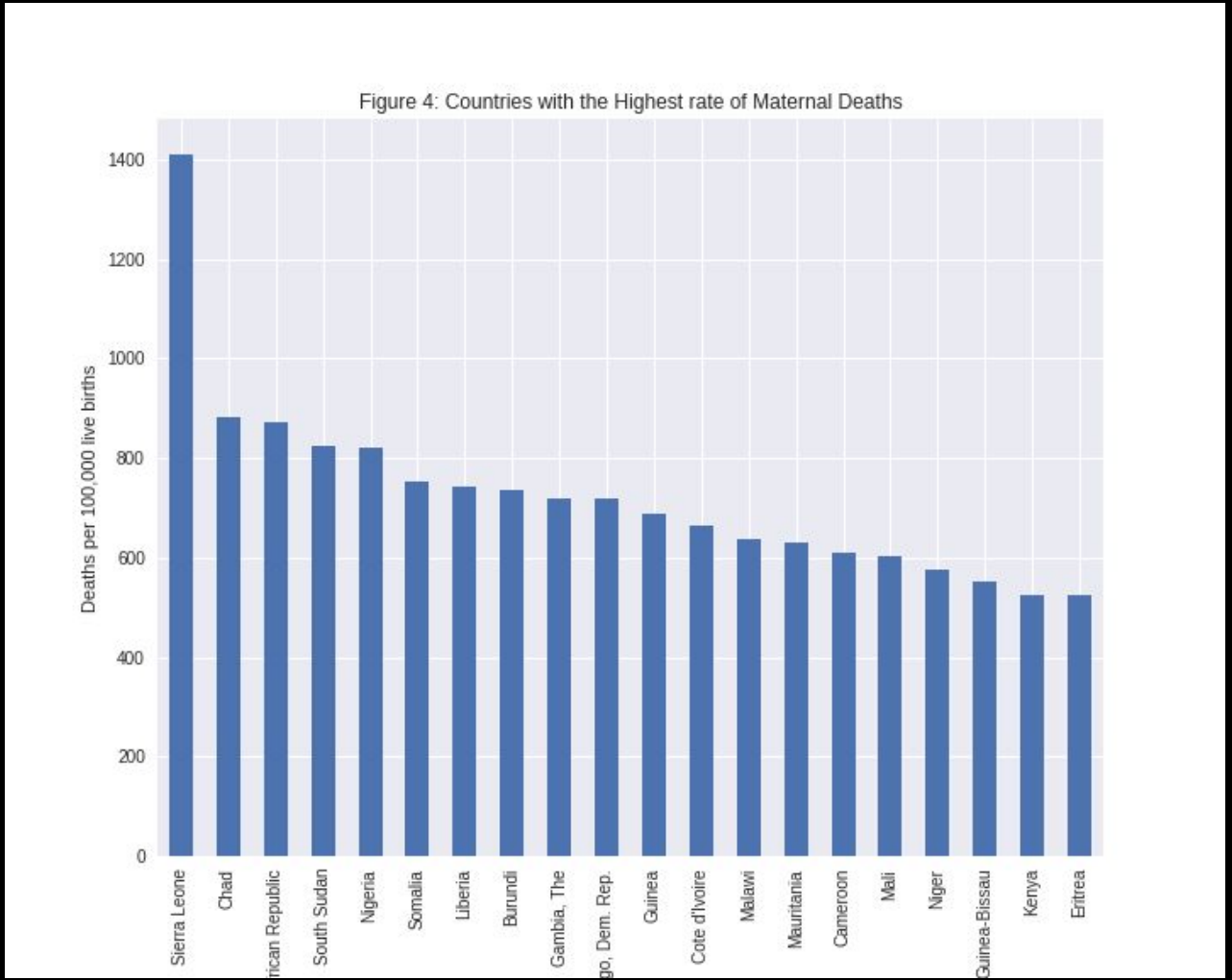
Correlation coefficient: -0.56



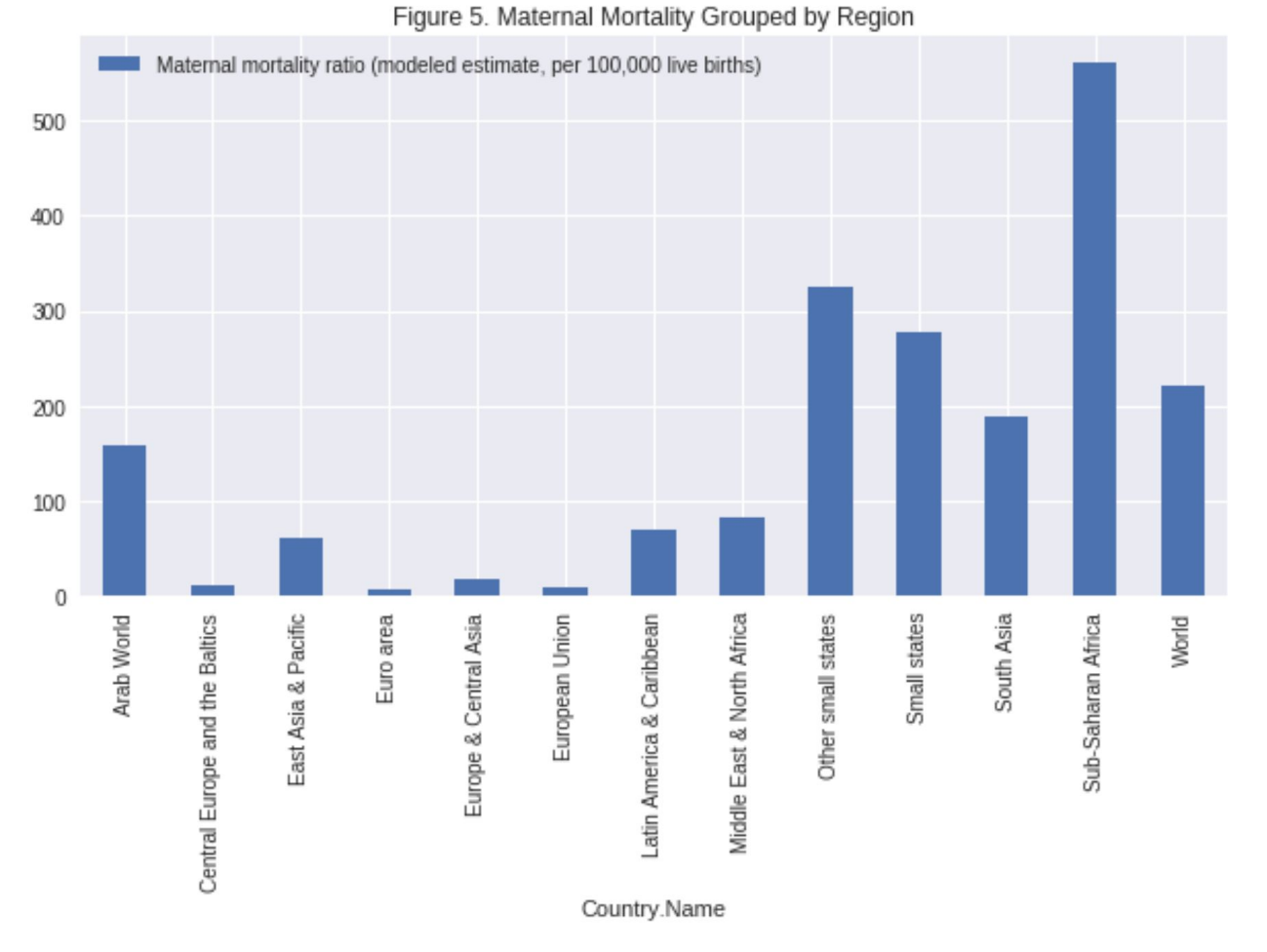
Correlation coefficient: 0.77

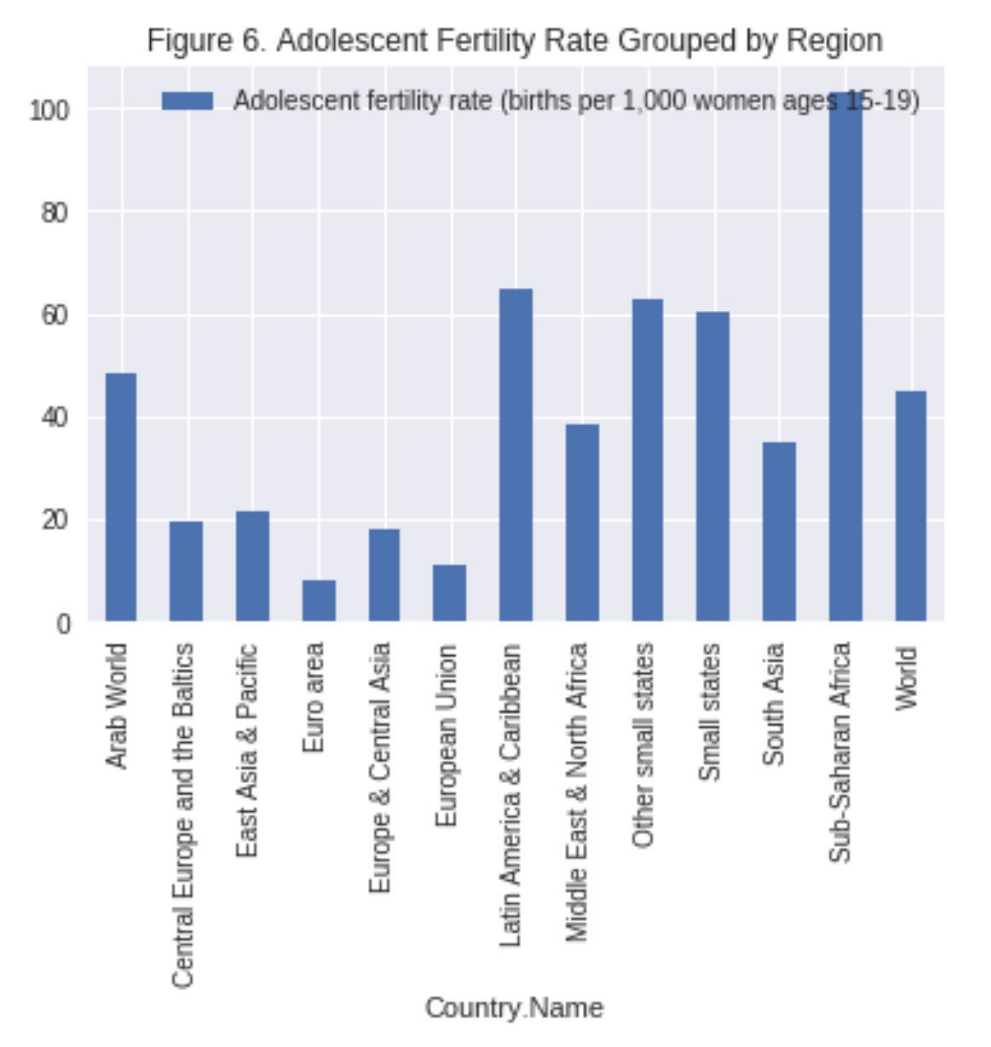


Sub-Saharan countries have the world's highest ratios of Maternal Mortality



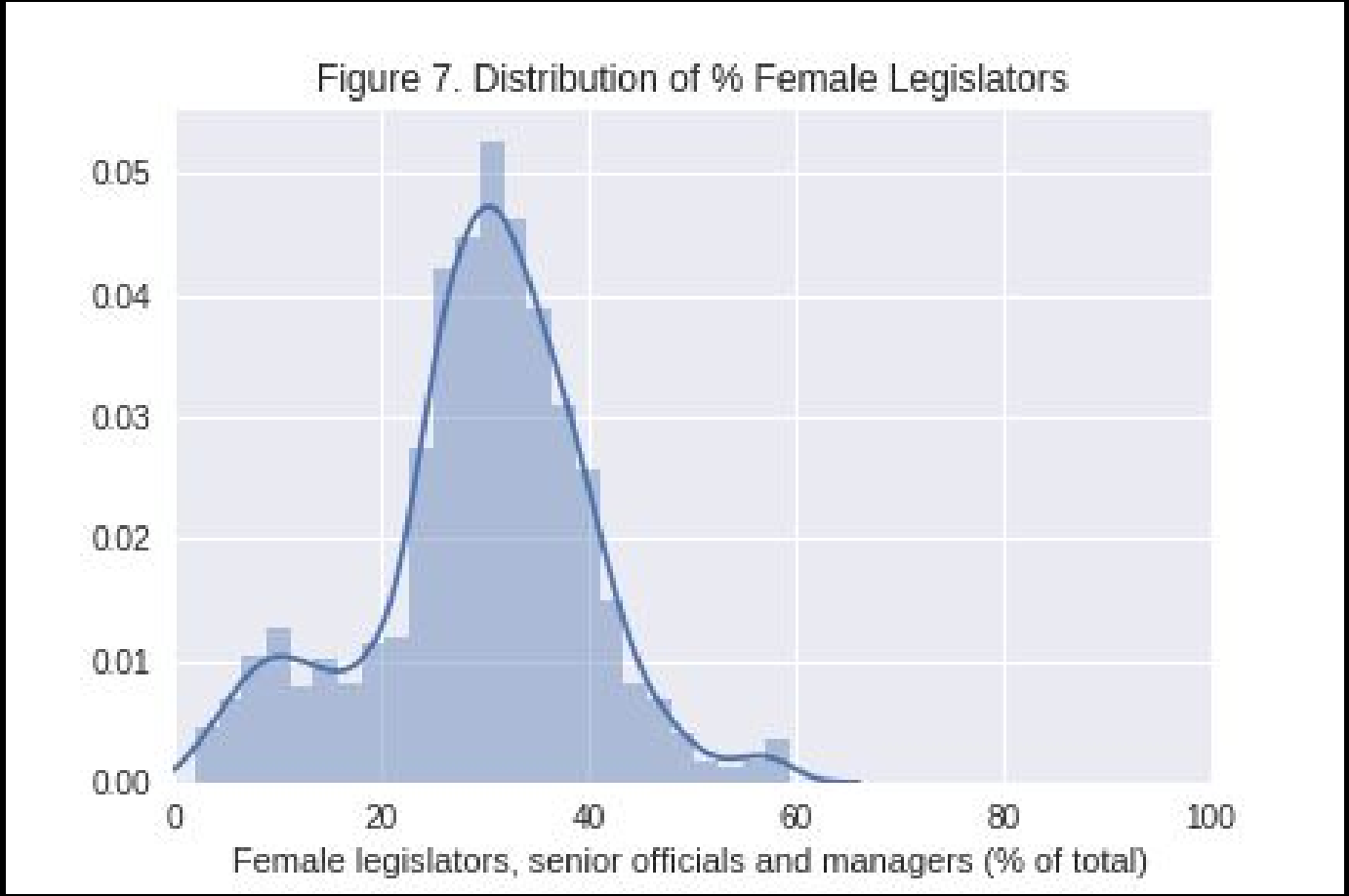
Maternal Mortality by Region

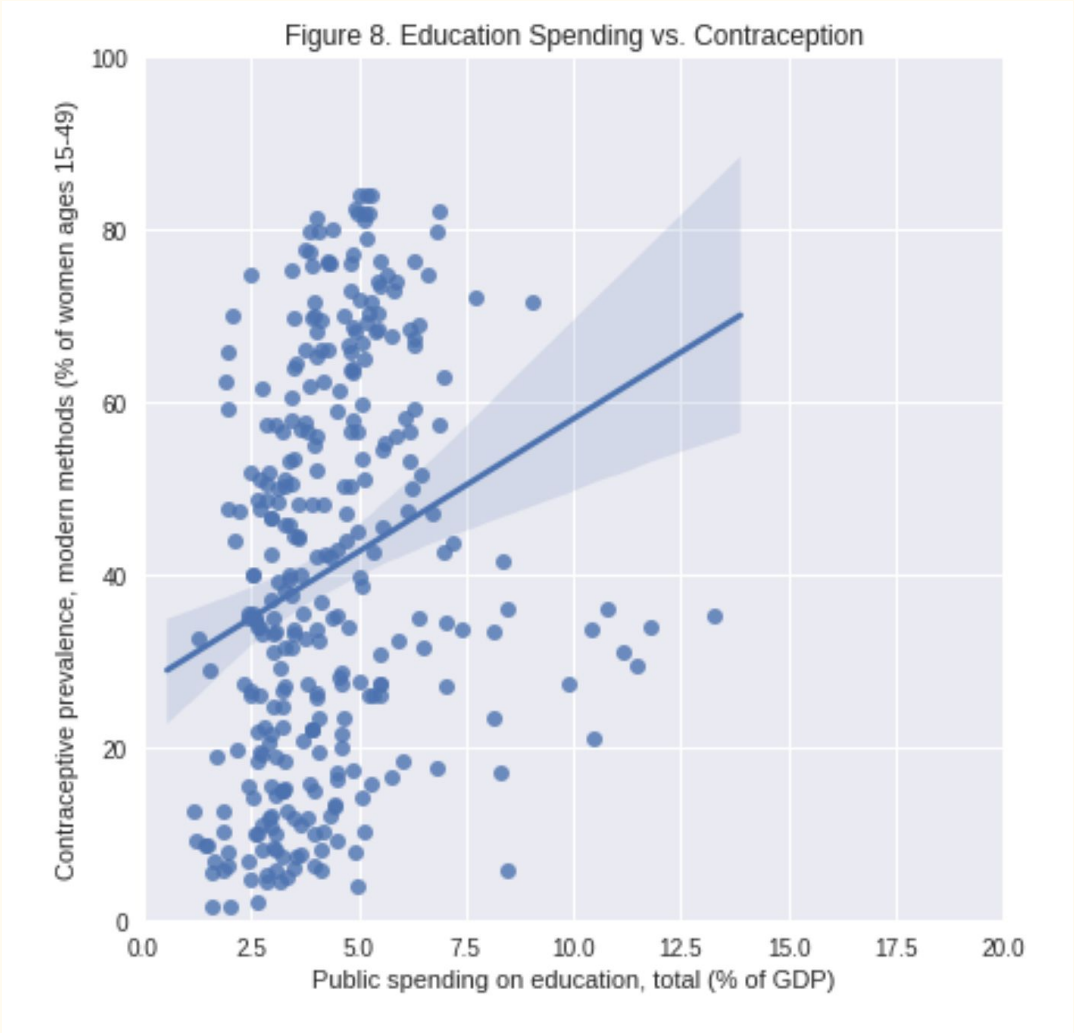




Sub-Saharan Africa also has the highest rate of Adolescent Fertility

The distribution mean of Female Legislators, Senior Officials and Managers is well below 50%





Correlation Coefficient: 0.29

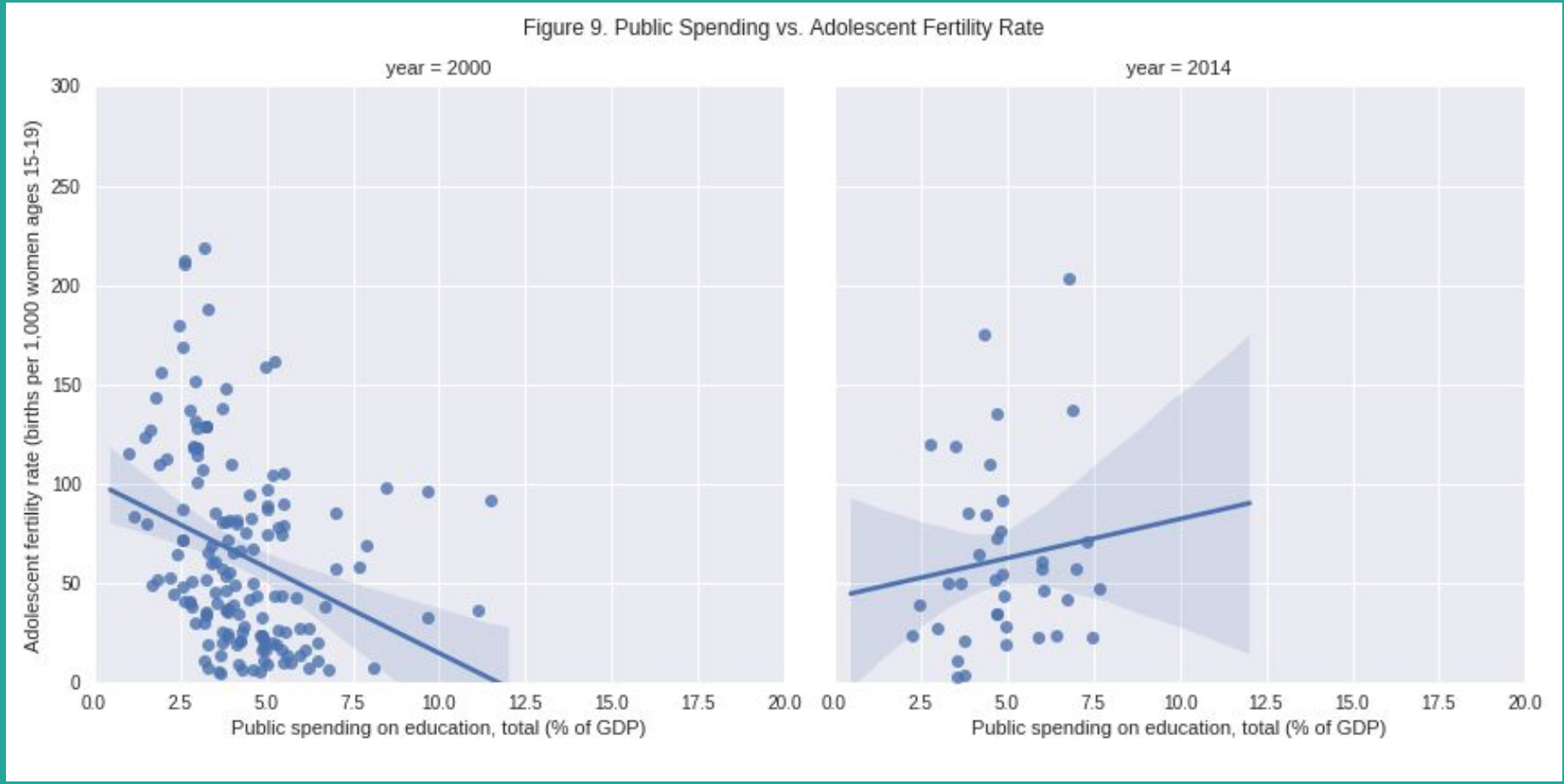
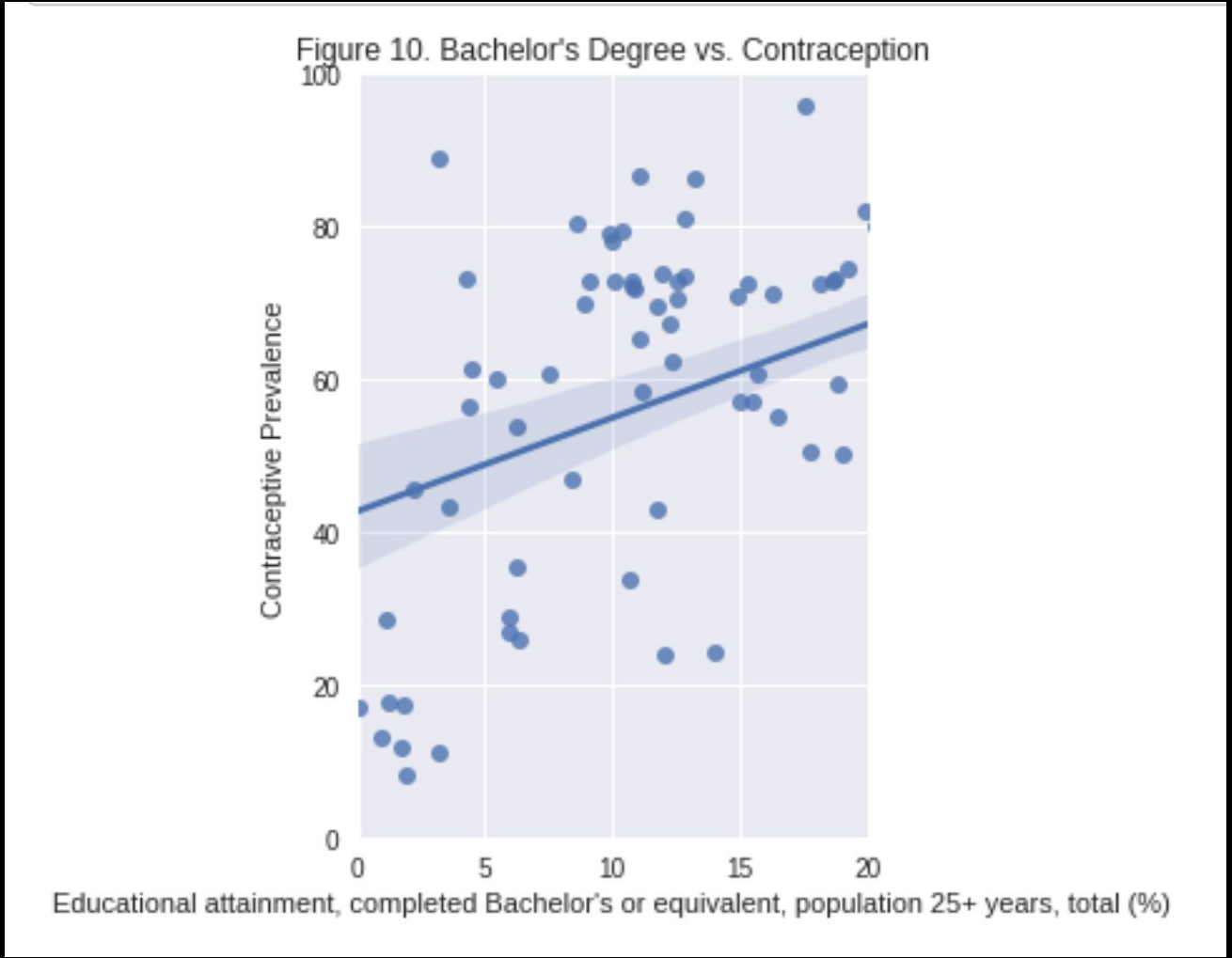


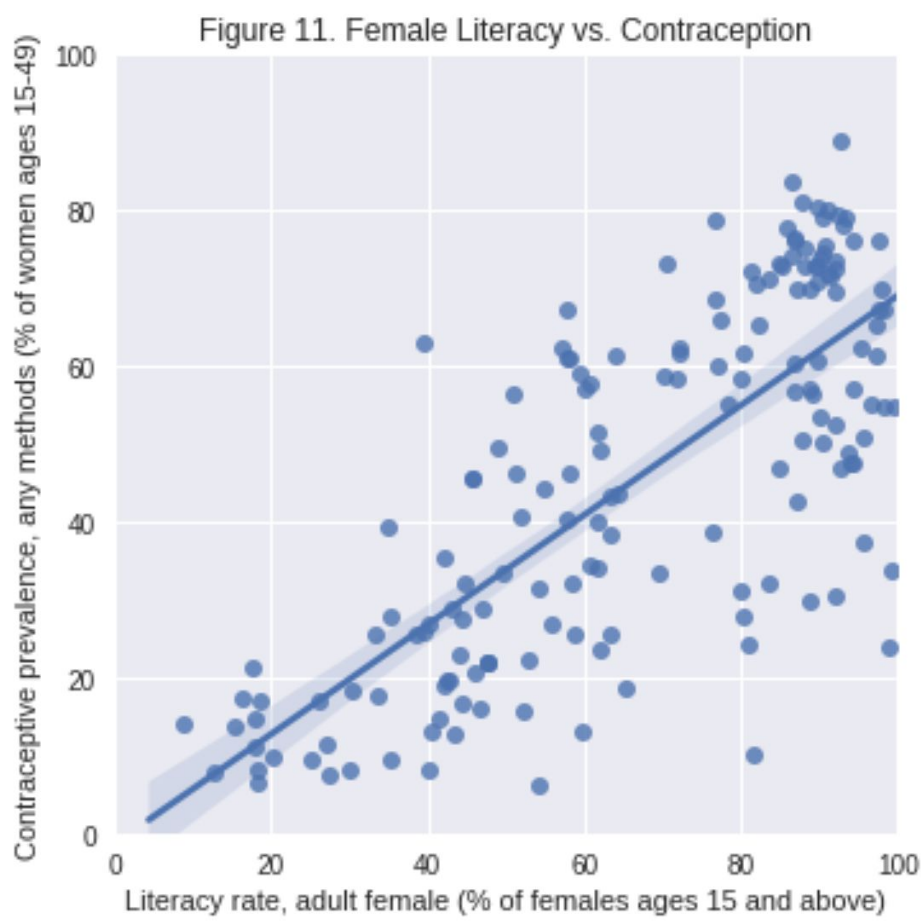
Figure 9. Public Spending vs. Adolescent Fertility Rate
year = 2000
year = 2014
Adolescent fertility rate (births per 1,000 women ages 15-19)
0
50
100
150
200
250
300
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Public spending on education, total (% of GDP)
Public spending on education, total (% of GDP)

Correlation Coefficient: 0.4388

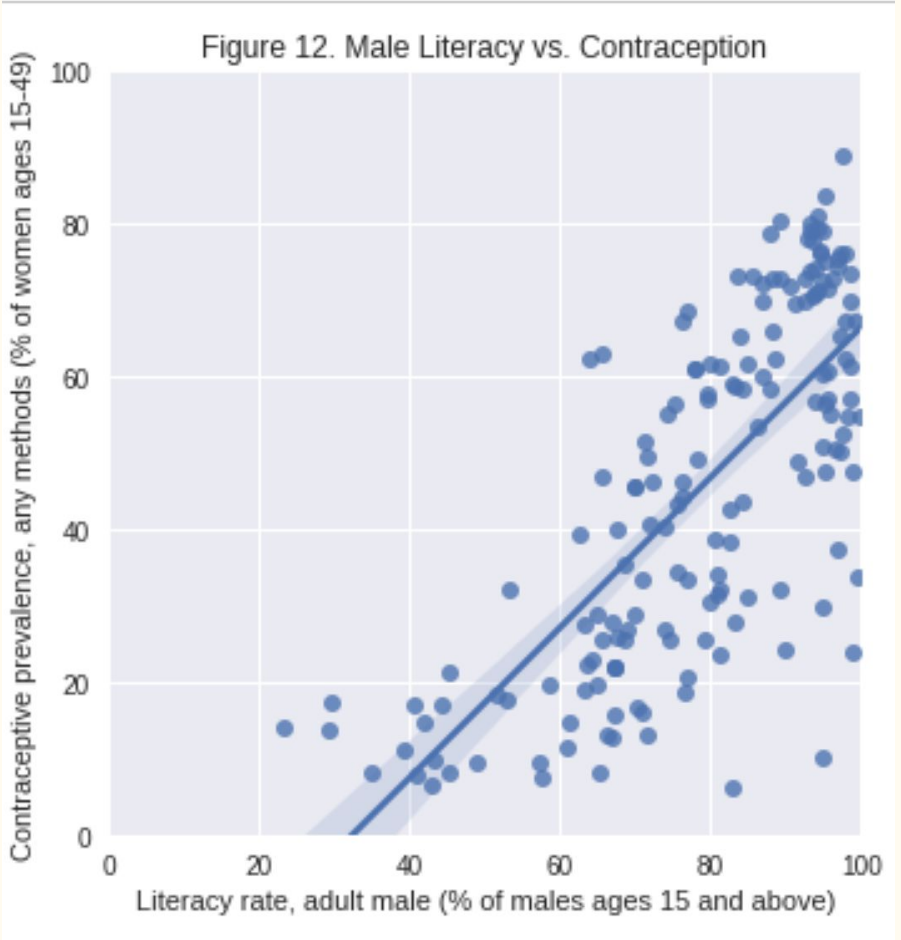
Female only: 0.467



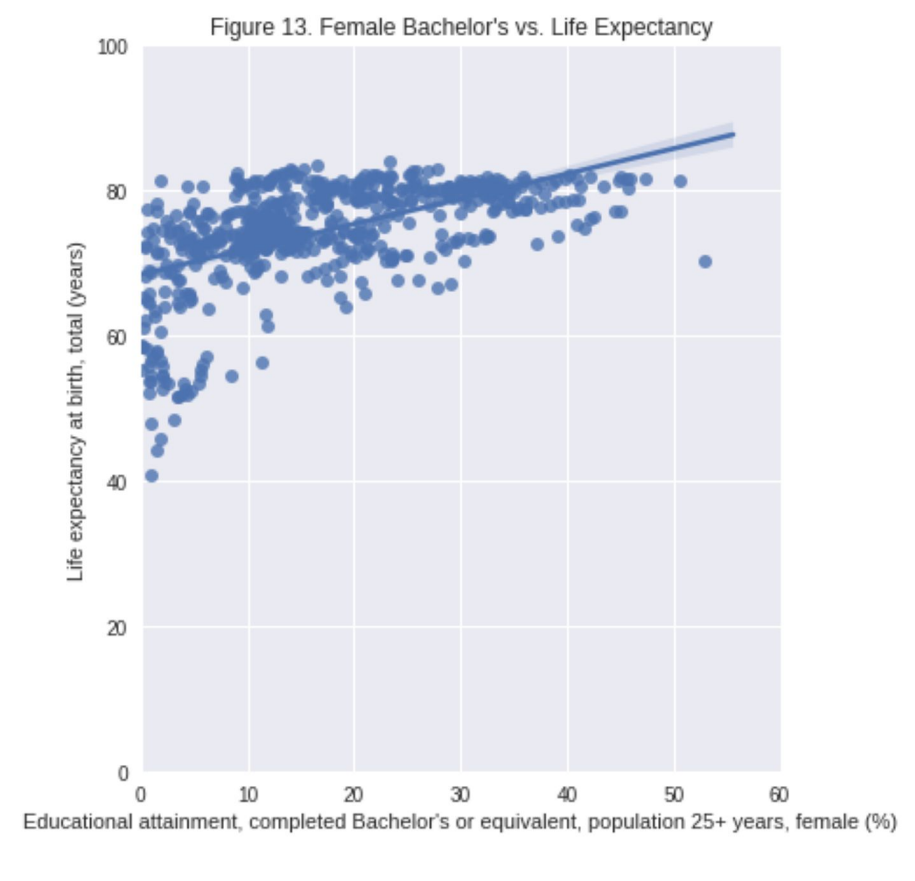
Correlation Coefficient: 0.7128



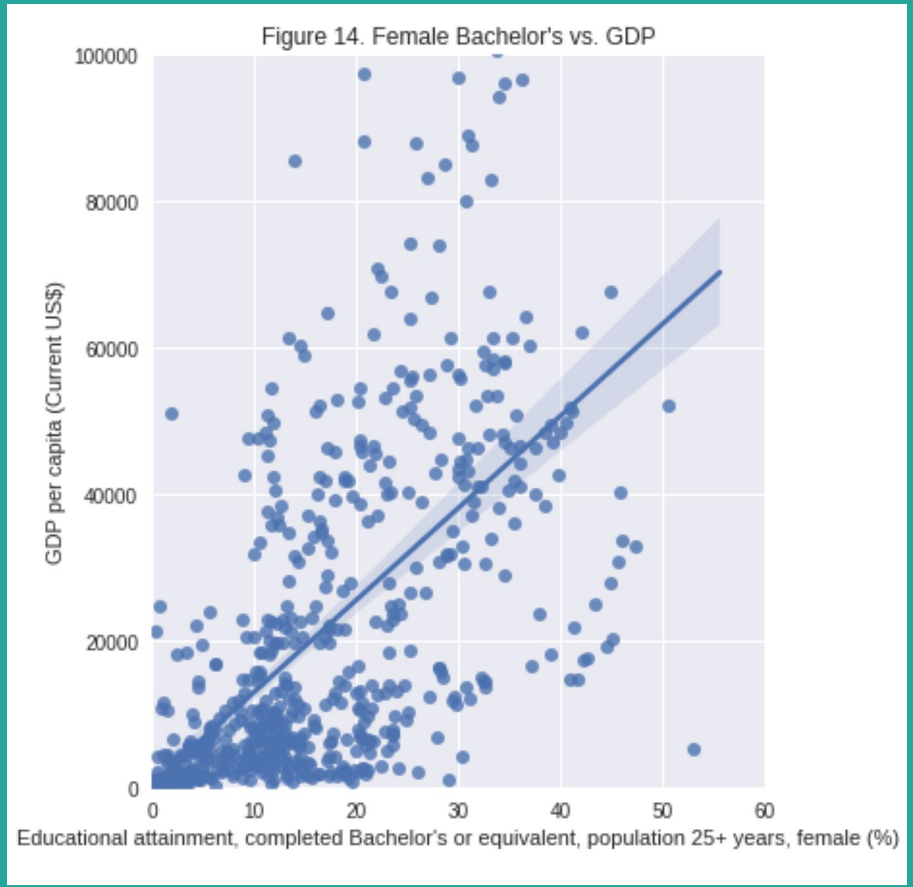
Correlation Coefficient: 0.7122



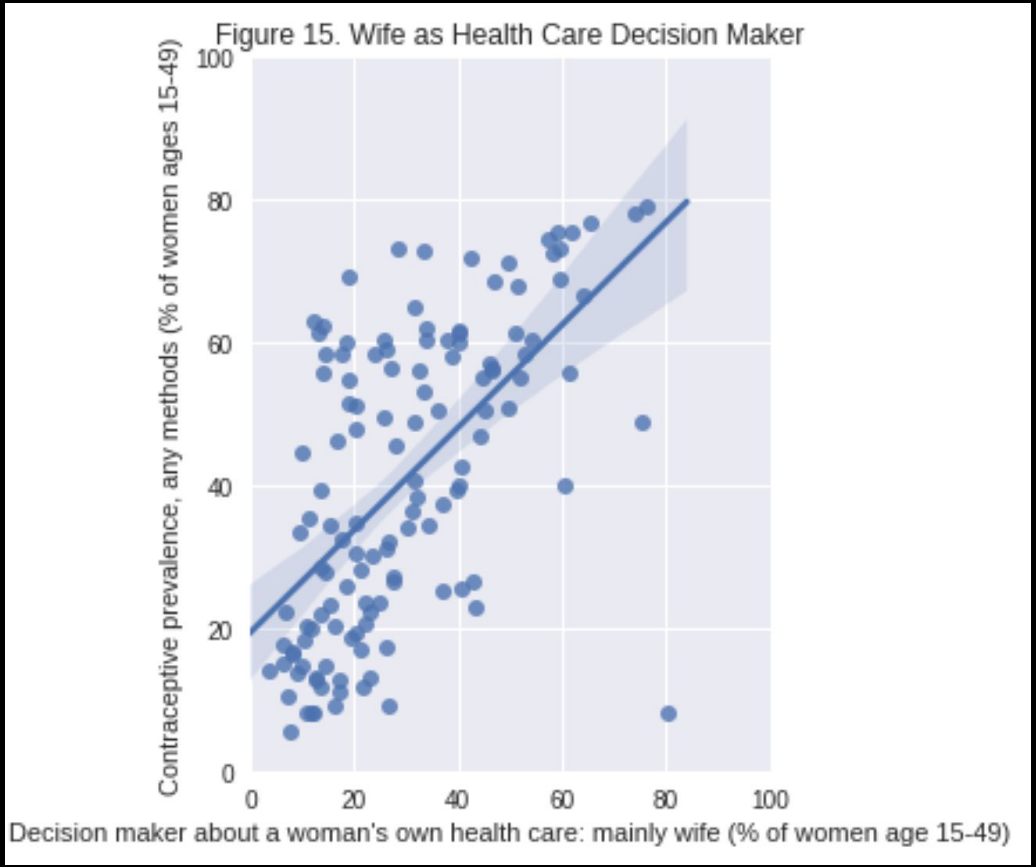
Correlation coefficient: 0.467



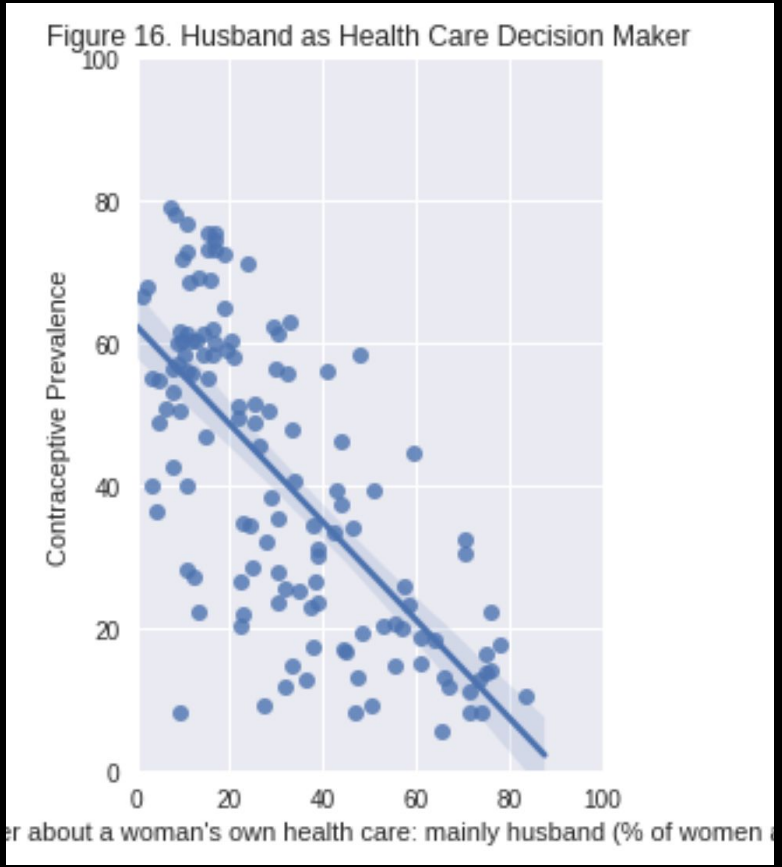
Correlation coefficient: 0.66777



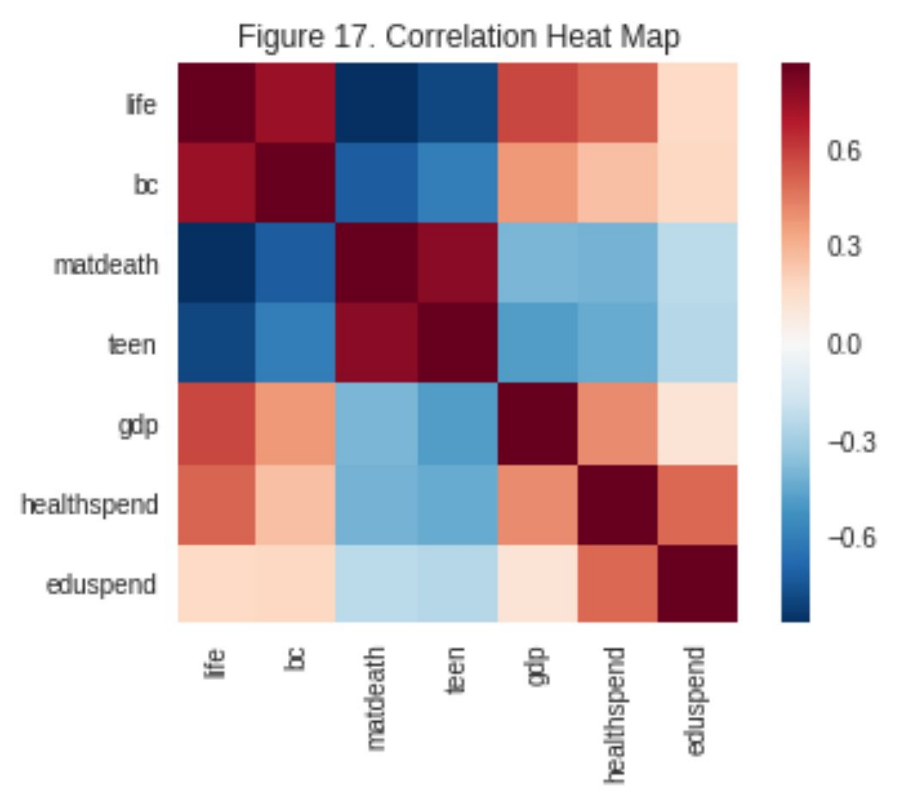
Correlation Coefficient: 0.6178



Correlation Coefficient: -0.68



Inferential Statistical Analysis



- Contraceptive Prevalence, any methods (% of women ages 15-49): relabeled as **‘bc’**
- Life Expectancy at birth, total (years): relabeled as **‘life’**
- Maternal Mortality ratio (modeled estimate, per 100,000 live births): relabeled as **‘matdeath'**
- Adolescent Fertility rate (births per 1,000 women ages 15-19): relabeled as ‘teen'
- GDP per capita (Current US$): relabeled as **'gdp’**
- Health expenditure, public (% of GDP): relabeled as **'healthspend'**
- Public (Government) Spending on Education, total (% of GDP): relabeled as **'eduspend’**

“Cause”

Contraceptive Prevalence as the Dependent Variable

- **GDP** per capita (Current US$)
- **Health** expenditure, public (% of GDP)
- Public (Government) Spending on **Education**, total (% of GDP)

“Effect”

Contraceptive Prevalence as the Independent Variable

- **Life** Expectancy at birth, total (years)
- **Maternal Mortality** ratio (modeled estimate, per 100,000 live births)
- **Adolescent Fertility** rate (births per 1,000 women ages 15-19)

“Cause”

Contraceptive Prevalence as the Dependent Variable

```
RandomForestRegressor(bootstrap=True, criterion='mse',
max_depth=4,
            max_features='auto', max_leaf_nodes=None,
            min_impurity_split=1e-07, min_samples_leaf=1,
            min_samples_split=2, min_weight_fraction_leaf=0.0,
          n_estimators=150, n_jobs=-1, oob_score=False,
         random_state=None,verbose=0, warm_start=False)
```

Training Data: MSE 326.85
Testing Data: MSE 323.2377

DV: Life Expectancy IV: Contraceptive Use

KNeighborsRegressor(algorithm='auto', leaf_size=30, metric='minkowski',
metric_params=None, n_jobs=1, n_neighbors=40, p=2,
weights='uniform')

Training Data: MSE -191.66
Testing Data: MSE 222.83

DV: Maternal Mortality

IV: Contraceptive Use

SVR(C=100, cache_size=200, coef0=0.0, degree=3, epsilon=13,
gamma=5e-07, kernel='rbf', max_iter=-1, shrinking=True, tol=0.001,
verbose=False)

Training Data: MSE -223.4890
Test Data: MSE 220.41

DV: Adolescent Fertility IV: Contraceptive Use

RandomForestRegressor(bootstrap=True, criterion='mse', max_depth=4,
max_features='auto', max_leaf_nodes=None,
min_impurity_split=1e-07, min_samples_leaf=1,
min_samples_split=2, min_weight_fraction_leaf=0.0,
n_estimators=900, n_jobs=1, oob_score=False, random_state=None,
verbose=0, warm_start=False)

Training Data: MSE -333.4272
Testing Data: MSE 316.5440

Conclusion

- People most at risk: adolescent girls in Africa
- Contraception is integral to quality of life in regards to Maternal Mortality, Adolescent Fertility, and Life Expectancy.
- Access to contraception and education about contraception may help improve these outcomes
- Balance of male vs. female Legislators, Senior Officials and Managers may improve policies on economic, education and health factors
- Autonomy over health decisions (Husband vs Wife) has a huge impact on quality of life and successful outcomes.
- The relationship between education and contraceptive use is complicated to tease out. There are many ways to measure educations levels (literacy seems to have biggest effects), and examining features over time could give insight
- More analyses need to be run to establish if any effects are actually causational. Such discoveries could help create policies to improve situations of people most at risk.

Photo credits

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-Black&White Girl ("Exploratory Findings” slide): Photo by Omar Alnahi from Pexels https://www.pexels.com/photo/eyes-portrait-person-girl-18495/

-African Women (“Conclusion” slide): Photo by Follow Alice from Pexels https://www.pexels.com/photo/two-woman-looking-on-persons-bracelet-667203/