

# Link Between Education and Fertility in Low and Middle Income Countries

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# Opportunity costs of children higher for mothers employed in formal labor markets

Economic theory of fertility I

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- ❑ **Economic model of allocation of time and wealth of families:** Demand and supply of children, costs of fertility regulation
- ❑ Demand depends on **household income**, **cost of children** and **parents' preferences for children** relative to other goods
- ❑ Supply depends on couple's **natural fertility** and **child mortality**
- ❑ Unitary Household Model contrasted with Bargaining Model
  - ❖ Household preferences versus preferences of individuals
  - ❖ Educated women have more bargaining power in the household

# Increased education could lead to higher human capital investment per child

Economic theory of fertility II

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- ❑ Increasing levels of education for children, and increasing returns to education: parents want fewer children with higher human capital investment (education and health investments) rather than more children with minimal capital investment
- ❑ Increasing returns to education results in fertility decline
- ❑ Capital Constraint: A less educated household might be constrained by capital to educate their children despite high returns to education

# Educated families may desire fewer children

## Ideation Theory of Fertility

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### **Sociological Theory**

- ❑ Ideational Change
- ❑ Groups (by ethnicity, language or religion) tend to move together
- ❑ Women with more schooling may have better access to global communication networks, and through school and community, have different ideas of desired family size.
- ❑ Women with more Schooling also have increased access to, and awareness of family planning methods

# Conceptual Framework

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## **Female education could impact fertility in following ways**

- ❑ Increased bargaining power of women within household
- ❑ Increased access to, and understanding of family planning methods
- ❑ Smaller desired family size: Ideation theory
- ❑ Higher labor force participation and increased opportunity costs
- ❑ Better access to health services for children, could indirectly reduce fertility through reduced infant and child mortality

# Male versus female schooling: What matters more?

Evidence from macro data

<b><u>Dependent Variable: Ln[Total fertility rate]</u></b>	
<b><u>Independent Variables</u></b>	
<b><u>Panel A:</u></b>	
Mean years of schooling, both sexes	-0.024 ***
Ln[GDP per capita]	-0.047 ***
<b><u>Panel B:</u></b>	
Mean years of schooling (female)	-0.024 ***
Schooling ratio (male:female)	-0.011
Ln[GDP per capita]	-0.047 ***
<b><u>Panel C:</u></b>	
Mean years of schooling (male)	-0.015 *
Schooling ratio (male:female)	-0.011
Ln[GDP per capita]	-0.047 ***
Ln[x] denotes natural log of variable x    Period: 1970–2010    Countries: 80    Observations: 688	

# Male versus female schooling: What matters more?

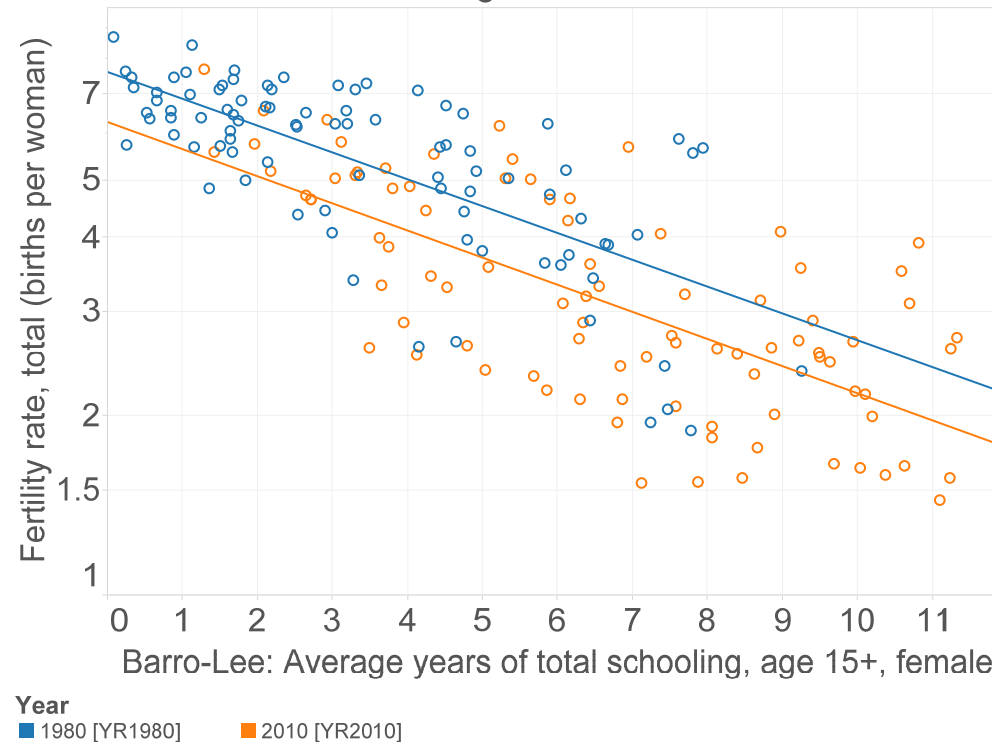
Evidence from micro data

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- ❑ In Indonesia, Breierova and Duflo (2004) found that female education matters more in increasing age at marriage and delaying fertility.
- ❑ Male education might increase fertility
  - ❖ increased the economic resources available to the household
- ❑ Women usually bear the opportunity costs of childbearing

# Education matters, but so do other determinants

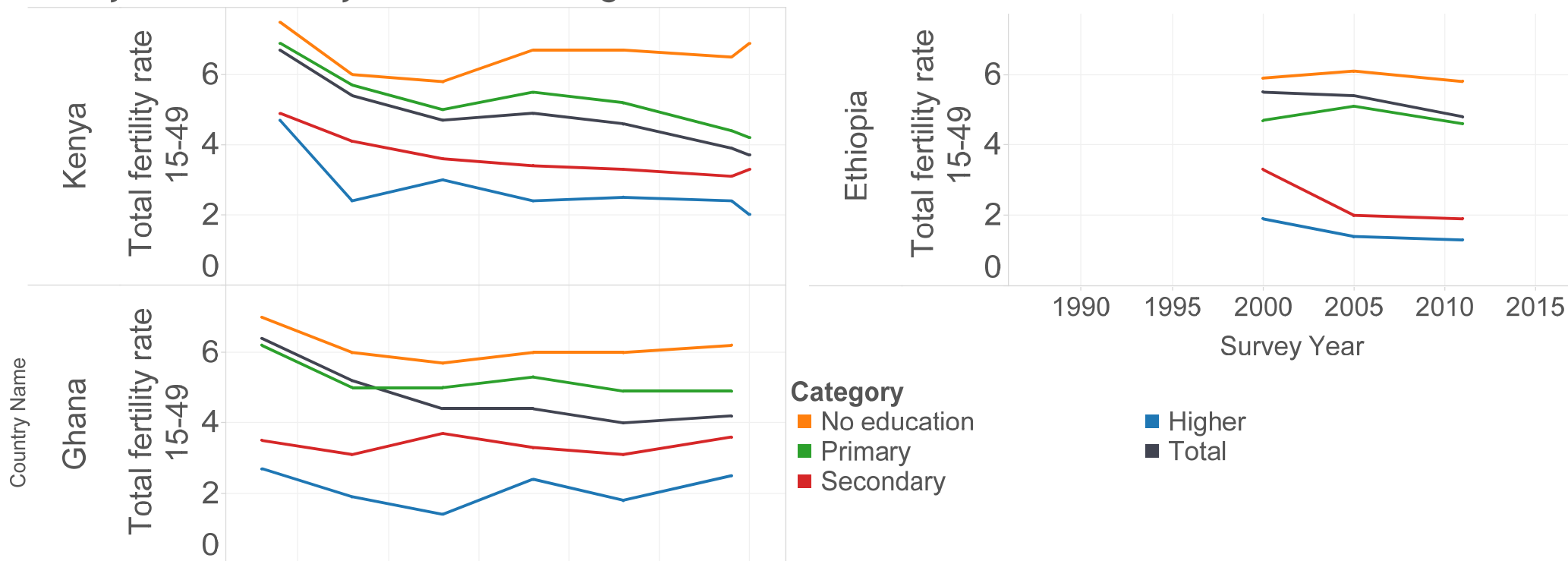
Link between Female Schooling and TFR in LMICs





# Fertility differentials across education groups

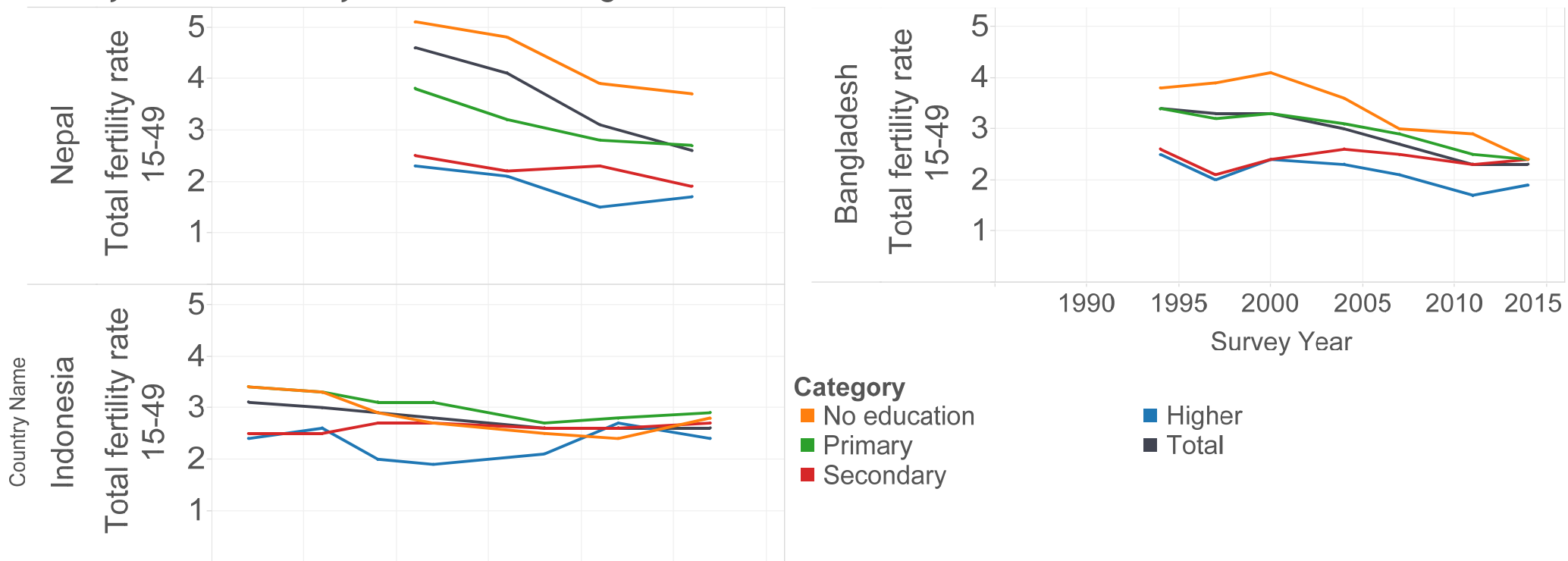
Fertility Differentials by Female Schooling



# Context matters!

Trends in fertility decline across education groups are different in different countries

Fertility Differentials by Female Schooling

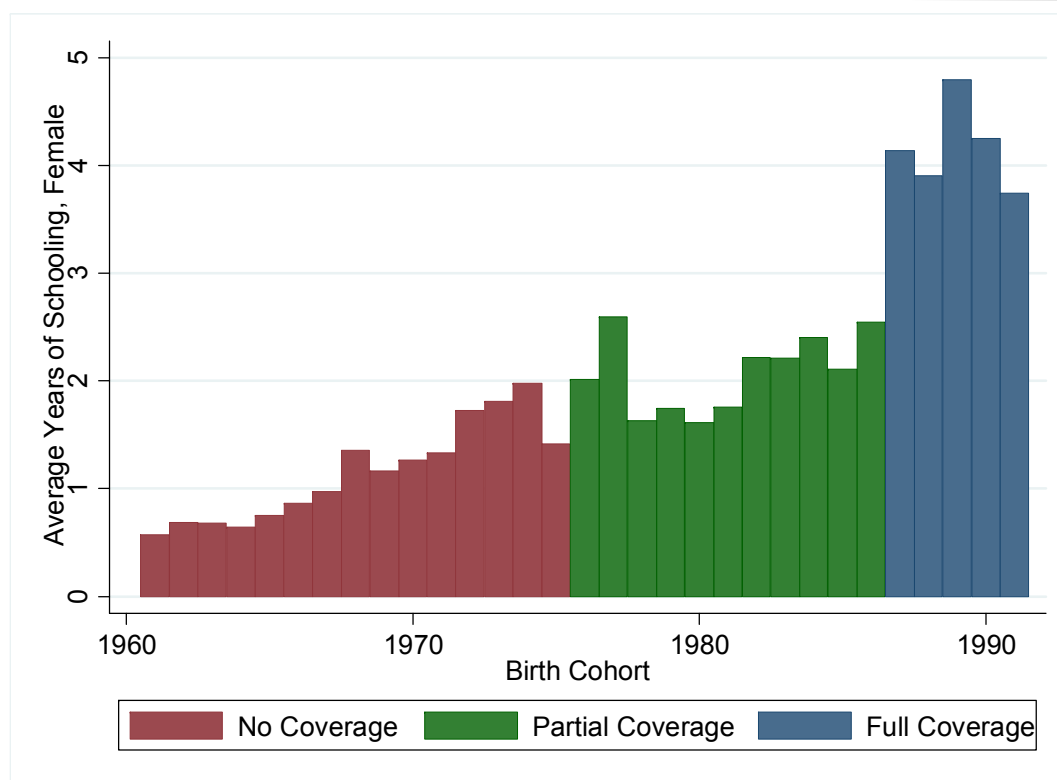


# Causal impact of female schooling on early fertility

1994 education reform in Ethiopia increased average female schooling by about 0.8 years

## Education Reform in Ethiopia

- ❖ Abolished school fees for grades (1-10)
- ❖ Introduced teaching in local languages
- ❖ School feeding programs in rural areas
- ❖ Curriculum Reform
- ❖ Increased Education Budget to establish new primary schools and train more teachers



# Causal impact of female schooling on early fertility

Each additional year of female schooling lowers the probability of teenage marriage and childbearing by about six percentage points

	Dependent Variables		
	Teenage Birth	Teenage Marriage	Teenage Sex
<b>Years of Schooling</b>	-0.067*** (0.006)	-0.060*** (0.009)	-0.014 (0.049)
<b>Time Trend</b>	0.016 (0.014)	0.015 (0.014)	-0.028 (0.027)
Observations	2,740	2,740	2,740
*** p<0.01. Standard Errors in Parenthesis. All regressions controlled for religion, ethnicity, number of siblings that the woman had, and her birth order.			

- ❑ Women with eight years of schooling should have TFR about 53 percentage point lower than women with no schooling

# Multitude of evidence for causal impact of female education on early fertility

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## □ Nigeria (Osili and Long 2008)

- ❖ Education Reform: Differential investment (building schools) in universal primary education (1976-1981)
- ❖ Increasing female education by one year reduces early fertility (Birth before 25) by 0.26 births

## □ Kenya (Chicoine 2012)

- ❖ Education Reform: Increased duration of primary schooling by a year
- ❖ Reform delayed age at marriage and reduced early fertility
- ❖ Authors suggest postponement of marriage, increased early use of contraceptives as factors contributing to reduced fertility

## □ Indonesia (Breierova and Duflo 2004)

- ❖ Education Reform: School building program
- ❖ Reform increased education levels and delayed fertility

# Which mechanisms are important?

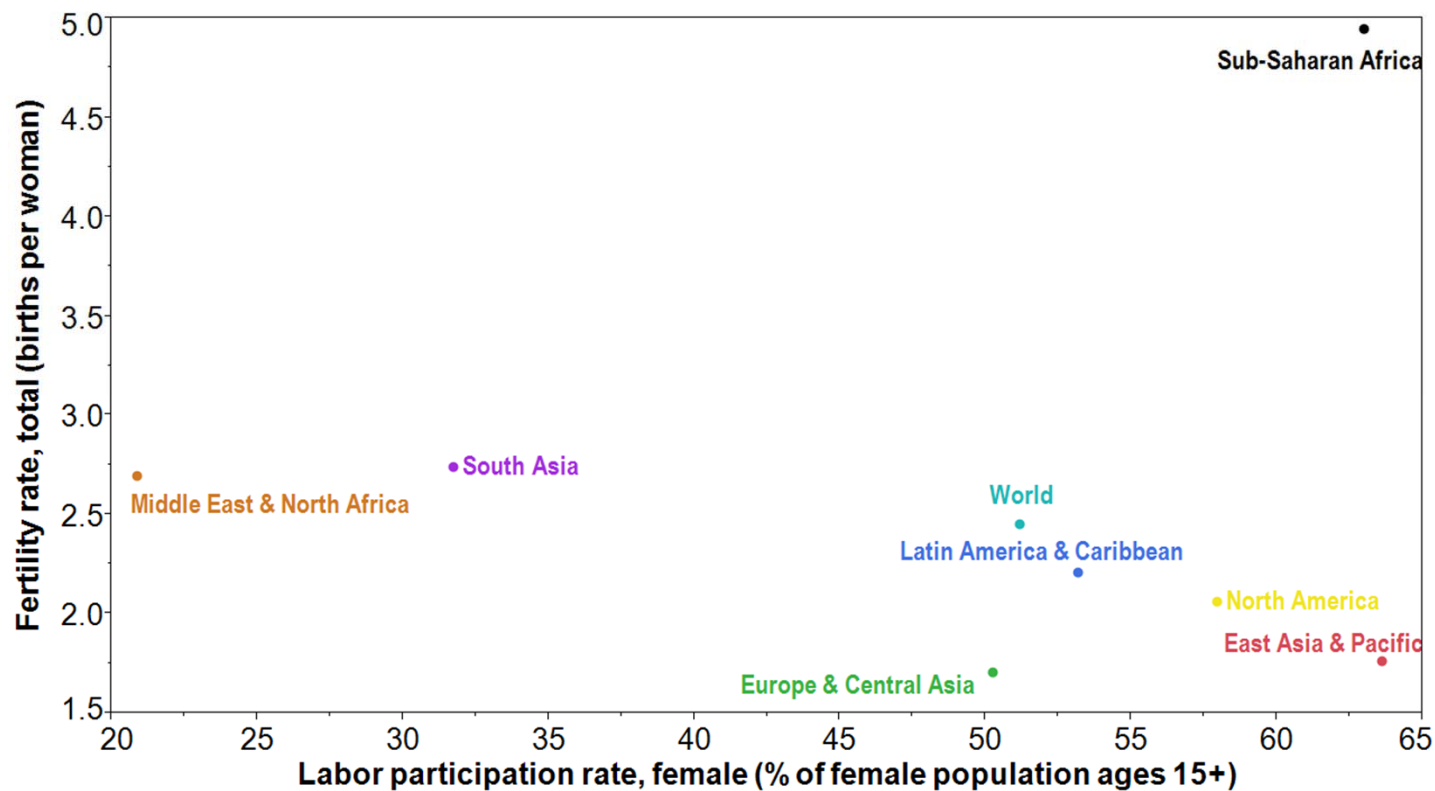
Ideation and increased bargaining power equally important mechanisms through which female schooling leads to fertility decline

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- ❑ Hard to disentangle economic mechanisms from ideation mechanisms
- ❑ Some evidence from Arab community in Israel on the importance of ideation pathway (Lavy and Zablotsky 2015)
  - ❖ Exogenous shock which increased female schooling led to a decline in completed fertility
  - ❖ female labor force participation has stayed constant in the 15-18% range.
  - ❖ mechanism of education leading to fertility decline not through increased labor force participation, but through
    - increased bargaining power of women
    - preference of higher investment per child rather than large number of children
    - increased access to contraceptives

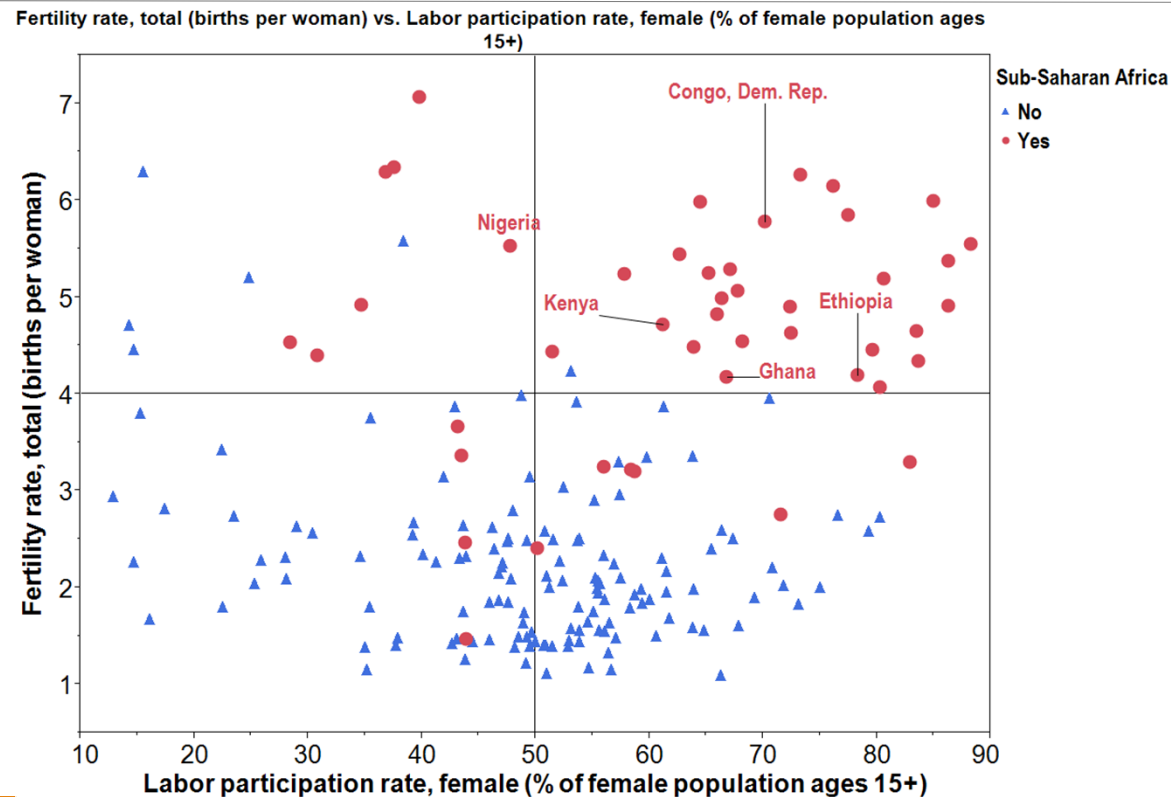
# Other determinants of fertility

Link between Female Labor Force Participation and Fertility



Source: Pradhan and Canning 2013

# High levels of informal labor market participation for women in Sub-Saharan Africa

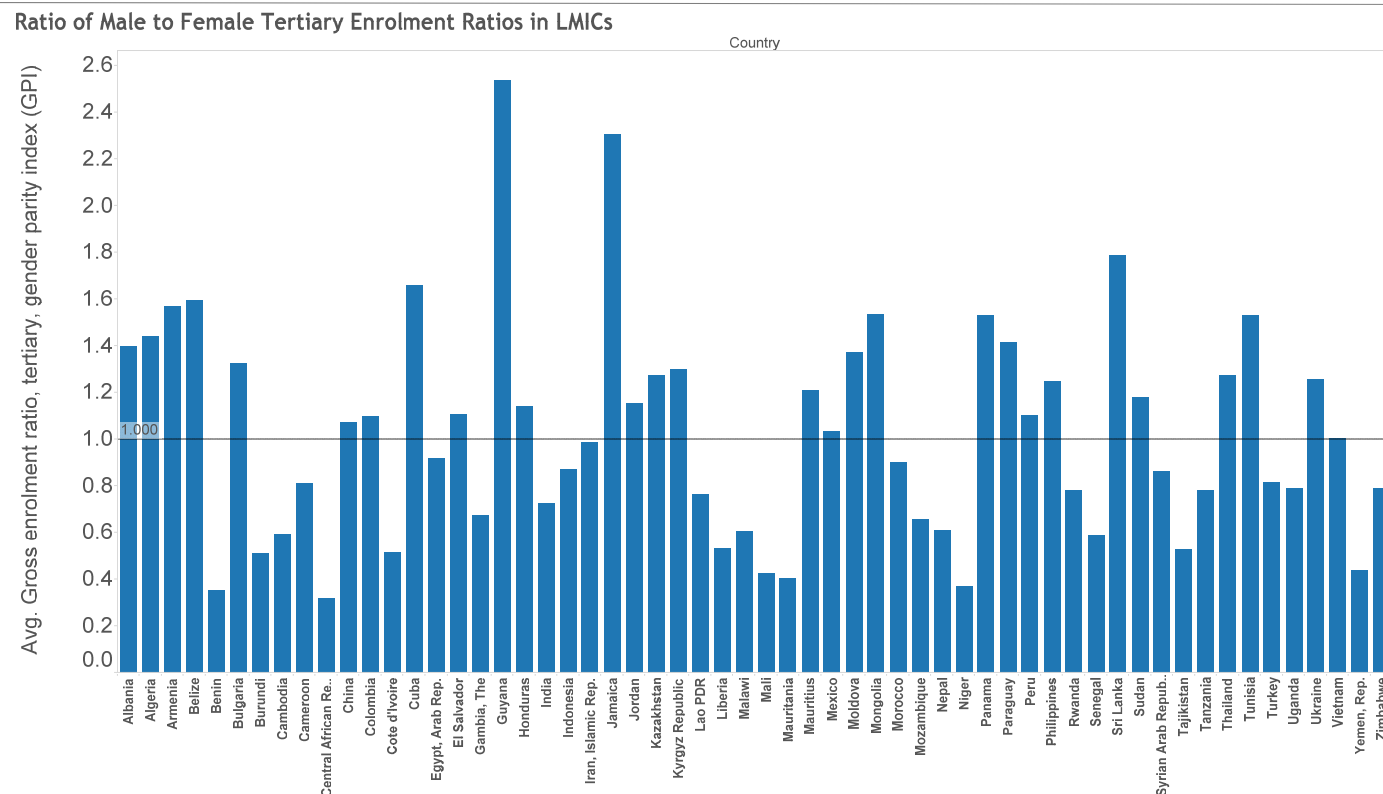


Source: Pradhan and Canning 2013



# Need to address gender gap

Ratio of male to female tertiary enrolment ratios in LMICs

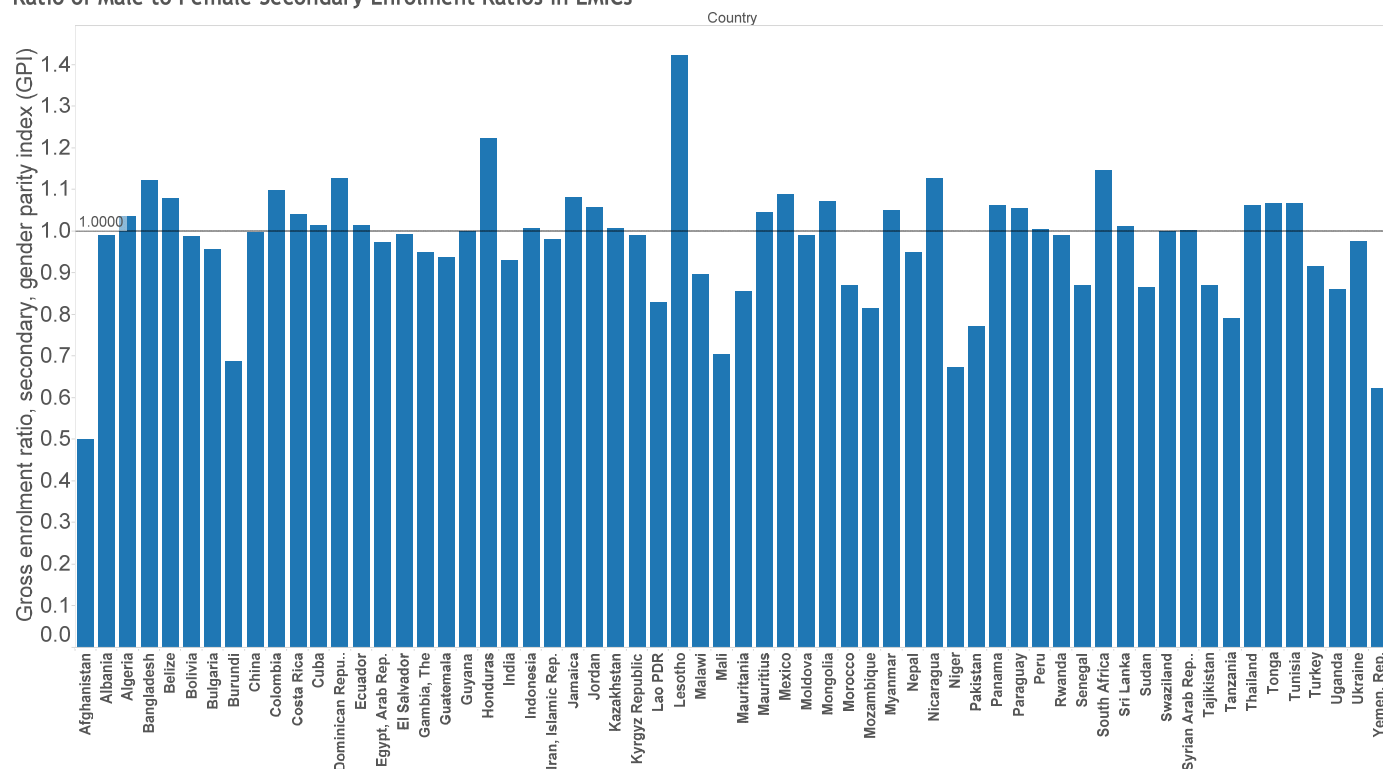


Data: World Bank Indicators 2016. 2010 data graphed for LMICs. Data not available for 31 countries

# Need to address gender gap

Ratio of male to female Secondary enrolment ratios in LMICs

Ratio of Male to Female Secondary Enrolment Ratios in LMICs



Data: World Bank Indicators 2016. 2010 data graphed for LMICs. Data not available for 27 countries

# Discussion: Education for whom?

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- ❑ Women and couples have heterogeneous family size preferences, constricted and informed by their economic, social and cultural environments
- ❑ Primary reason for interventions in increasing female schooling has to be to increase women's own agency and human capital
- ❑ ICPD 1994: Reproductive rights, and women's choice at the forefront of provision of family planning methods
- ❑ Create enabling environments in which men and women can realize their desired fertility
  - ❑ higher quality education: Increases women's bargaining power within the household
  - ❑ Formal labor force employment structures
  - ❑ Increased access and knowledge of reproductive health programs

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# Education Reform in Ethiopia

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## □ Education Reform in Ethiopia

- ❖ Abolished school fees for grades (1-10)
- ❖ Introduced teaching in vernacular languages
- ❖ School feeding programs in rural areas
- ❖ Curriculum Reform
- ❖ Increased Education Budget to establish new primary schools and train more teachers

## □ Identification: Age at policy change

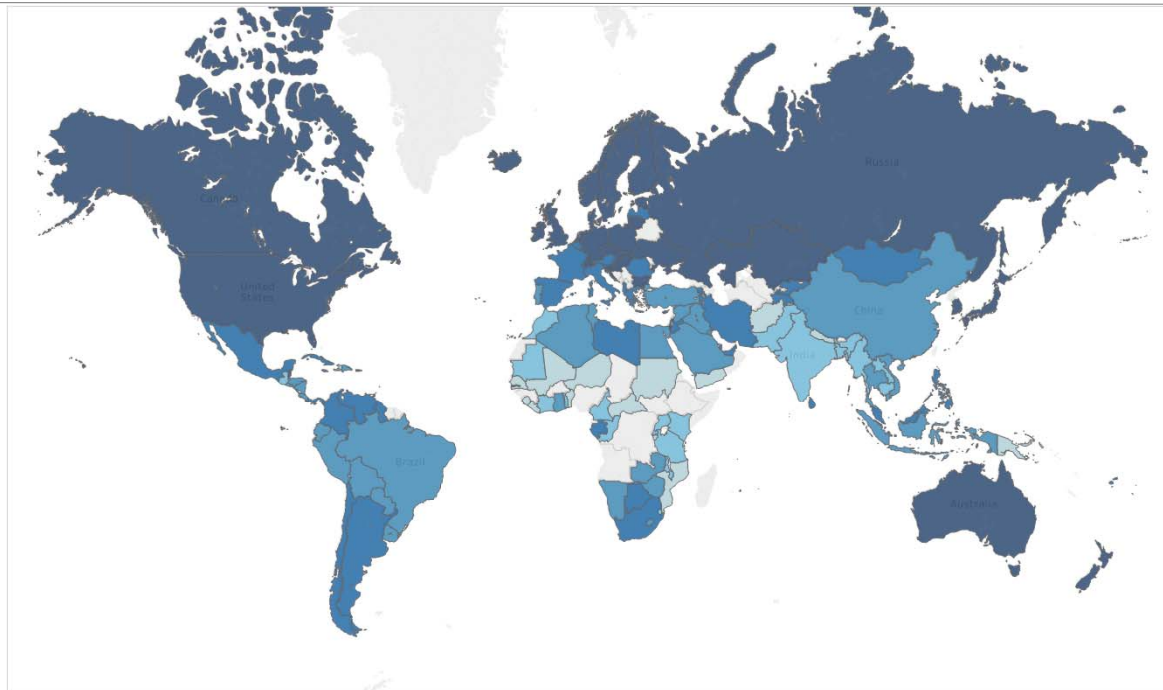
$$\text{Coverage} = \begin{cases} 0 & \text{if older than 18} \\ 1 & \text{if between 8 and 18} \\ 2 & \text{if 7 or younger} \end{cases} \begin{cases} \text{in academic year 1994 – 1995,} \\ \text{when the policy reform was enacted.} \end{cases}$$

# Which mechanism is important?

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- ❑ Hard to disentangle economic mechanisms from ideation mechanisms
- ❑ Some evidence from Arab community in Israel on the importance of ideation pathway
  - ❖ Instrument: Abrupt end of military rule which restricted mobility of Arabs in Israel until mid-1960s
  - ❖ This exogenous shock increased female schooling
  - ❖ the increase in schooling led to a decline in completed fertility
  - ❖ female labor force participation has stayed constant in the 15-18% range.
  - ❖ mechanism of education leading to fertility decline not through increased labor force participation, but through
    - ❖ increased bargaining power of women
    - ❖ preference of higher investment per child rather than large number of children
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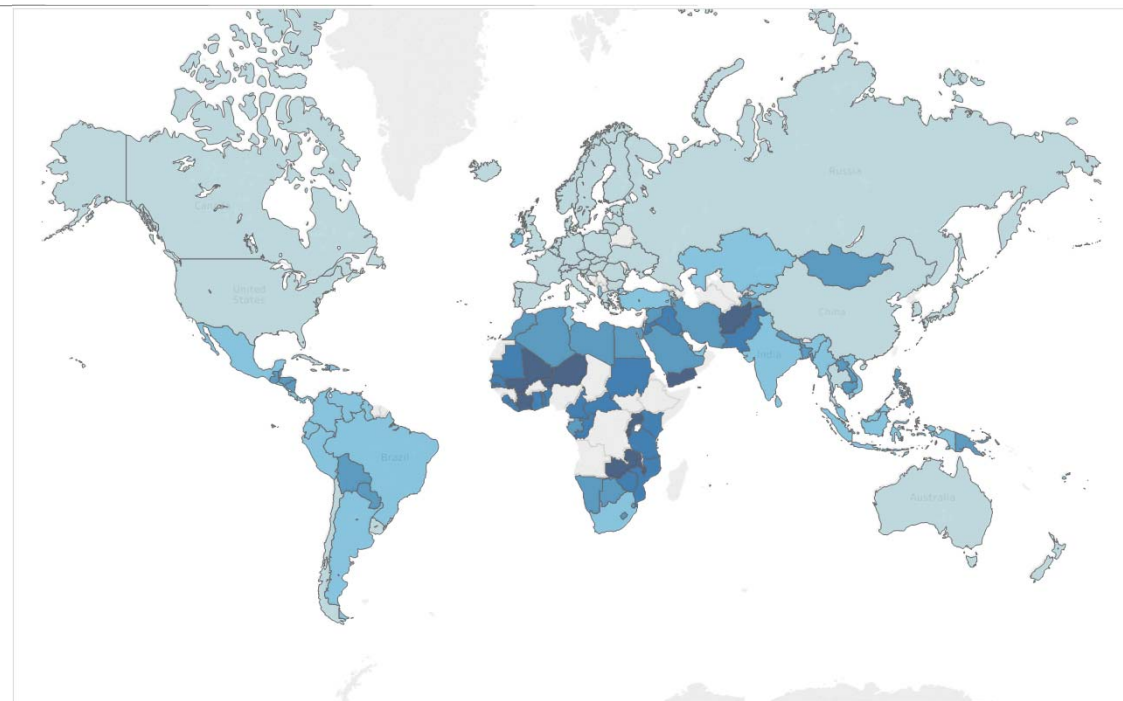
# Average Years of Female Schooling, 2010 Age 15+



(Barro-Lee: Average years of total schooling, age 15+, female)

1.30 13.23

# Total Fertility Rate, 2010



(Fertility rate, total (births per woman))

2.73



15.28



# Marginal Returns to Primary versus Secondary Schooling?

<b>Dependent Variable:</b> Ln[Total fertility rate]	
<b>Independent Variables</b>	
<b><u>Panel D:</u></b>	
Mean years of female schooling (linear)	-0.100 ***
Mean years of female schooling (quadratic)	0.008 ***
Ln[GDP per capita]	-0.032 **
<b>Mean years of female schooling</b>	
<b>(effect size)</b>	
3 years	-0.053 ***
4 years	-0.037 ***
5 years	-0.021 ***
6 years	-0.005
7 years	0.01
Ln[x] denotes natural log of variable x      Period: 1970–2010      Countries: 80      Observations: 688	