The Effect of Education on Teenage Fertility: Evidence from the Education Reform in Ethiopia

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Abstract

We investigate the causal effect of female education on teen fertility using educational policy changes in Ethiopia in 1994 as a natural experiment that led to a jump in female educational attainment. Using a regression discontinuity approach we find that each additional year of schooling lowers the probability of a teen birth by 6.6 percentage points; completing lower primary school (4 years of schooling) therefore reduces the probability of a teenage birth by 0.26. We show that the decline in teenage fertility with schooling can be explained by a similar decline in the probability of teenage marriage.

Motivation

- Young age of the mother at first birth is linked with adverse maternal and child health outcomes
  - High risk of maternal mortality, maternal anemia and caesarian delivery
  - Children born to adolescent mothers face high risk of death and are more likely to be stunted, underweight and have anemia.
- Fertility and economic growth
  - Early age of marriage and birth are linked to a high youth dependency rate.
  - Opportunity costs of childcare in particular female labor supply

Theory: Education and Adolescent Fertility

Increase in female education decreases adolescent fertility

- Increases in labor market opportunities and delayed age at marriage
- Increased bargaining power within marriage
- Increased awareness of and access to modern family planning methods

Identification Issues

- Adolescent childbearing affects mother's educational attainment
- Omitted variables such as family or community background could affect both education and adolescent fertility
- Use of exogenous variation in schooling required

Education Reform in Ethiopia 1994

- 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

Data and Methods

- Ethiopia Demographic and Health Survey 2011.
- Method: Regression Discontinuity Analysis
- Sample Women in Cohorts born 1985-1988
- Identification: Exposure to policy change at potential school entry at age 7

$$\text{Coverage} = \begin{cases} \text{Partial} & \text{If Birth Cohort 1985 or 1986} \\ \text{Full} & \text{If Birth Cohort 1987 or 1988} \end{cases}$$

- Dependent Variables of Interest: Teenage Marriage, Teenage Birth and Teenage Sex (Marriage, Birth or Sex before the age of 20)

Regression Discontinuity Design

Figure 1: Average Years of Schooling by Birth Cohort and Reform Coverage.

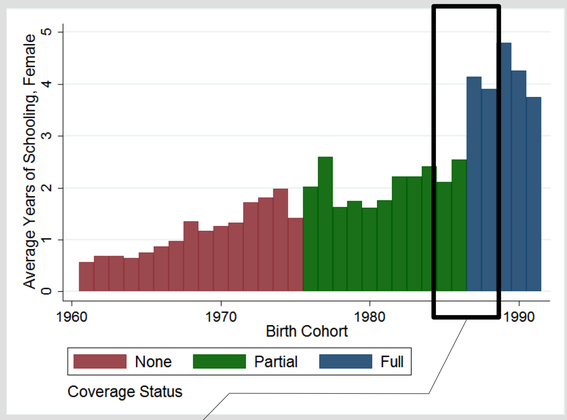
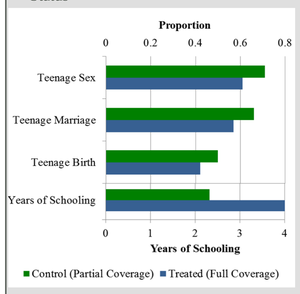


Figure 2: Sample Means by Coverage Status



Control: If Birth Cohort 1985/1986
Treated: If Birth Cohort 1987/1988

Regression Discontinuity Model

Women on either side of the policy shock are assumed similar except for the allocation of the shock. While we control for observed covariates and a time trend, unobserved factors are assumed similar across treatment and control groups. Hence, differences in years of schooling and adolescent reproductive behavior relative to trend reflect the policy change.

Adolescent Reproductive Behavior by Educational Attainment

	Percentages		
Years of Schooling	Teenage Birth	Teenage Marriage	Teenage Sex
None (0 year)	60.9	79.2	80.9
Incomplete Primary (1-7 years)	41.4	57.8	64.8
Completed Primary & Higher (8 years & higher)	15.6	21.9	31.2
Full Sample	47.0	62.5	67.1
Reproductive outcomes before age 20 for cohorts born 1985-1988			

First Stage Results: Effect of Policy on Years of Schooling

Dependent Variable: Years of Schooling	
Full Coverage	0.745**
	(0.321)
Time Trend	0.327**
	(0.130)
Observations	2740

*** p<0.01, ** p<0.05. Standard errors in parentheses, clustered at primary sampling unit level. All regressions controlled for religion, ethnicity, number of siblings that the woman had, and her birth order.

Marginal Effects of Education on Adolescent Reproductive Behavior

	Dependent Variables:		
	Teenage Birth	Teenage Marriage	Teenage Sex
Years of Schooling	-0.067***	-0.060***	-0.014
	(0.006)	(0.009)	(0.049)
Time Trend	0.016	0.015	-0.028
	(0.014)	(0.014)	(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.

- Robust findings: Estimates consistent across various robustness tests
- Potential threat to causality: Ethiopia Population Policy Launched in 1993
  - Women in our sample between 6 to 10 years of age.
  - Findings robust to smooth increases in availability of family planning programs since we control for annual time trends

Impact of Policy on Education Across Sub-Groups

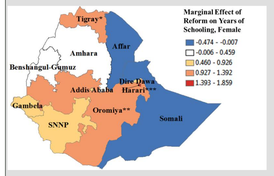


Figure 3: Effect of Policy Change on Educational Levels across Regions

Respondent's Language		Ethnicity	
Amarigna (33%)	1.21***	Amhara (25%)	0.89*
Oromigna (23%)	1.23***	Oromo (25%)	1.32***
Tigrigna (10%)	1.08*	Tigrie(10%)	0.98*
Other (34%)	0.14	Other (40%)	0.27

Marginal Effect of the Policy Change on Years of Schooling across Language groups and Ethnicities

- Impact of policy on years of schooling heterogeneous across geographic regions but similar across major ethnic and language groups.

Conclusions

- Four years of schooling reduces probability of teen birth by 26 percentage points, of teen marriage by 24 percentage points

Years of Schooling	Teenage Birth	Teenage Marriage	Teenage Sex
0	60.9%	79.2%	80.9%
4	34.4%	55.2%	75.8%
8	7.9%	31.3%	70.7%

Predicted Probability of Adolescent Reproductive Behavior by Completed Years of Schooling Based on the Model.

Education reforms can significantly increase the enrollment and educational attainment of girls, and can have a large effect on adolescent marriage and fertility.

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