

Randomized Trials in Education: What Have We Learned?

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Outline

- Broadening access to education
 - Background
 - Prices, user fees, subsidies, and incentive payments
 - School health
 - Information
- Improving Learning
 - Background
 - Increasing existing inputs
 - Inputs to correct systems distortions
 - Provider incentives
 - Decentralization, community monitoring, local control
 - Vouchers
- Impact on longer-run outcomes

Access to Education

- Average years of education in low-income countries
 - 1960: 1.6 years
 - 2000: 5.2 years

- 100 million primary-school age children (15%) out of school
 - 30 million in South Asia
 - 40 million in Sub-Saharan Africa

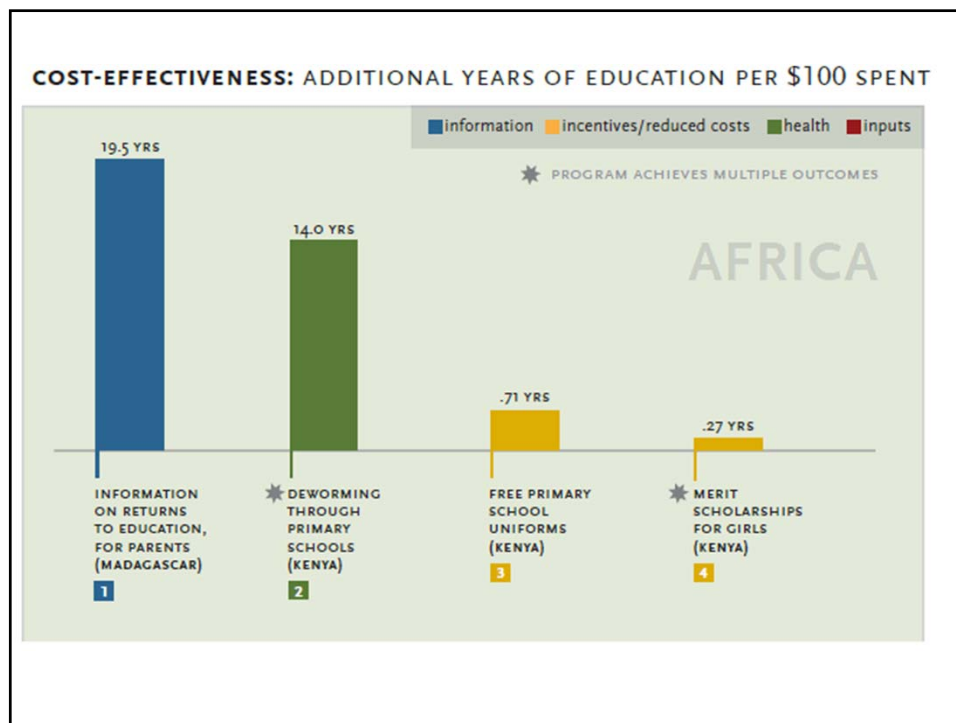
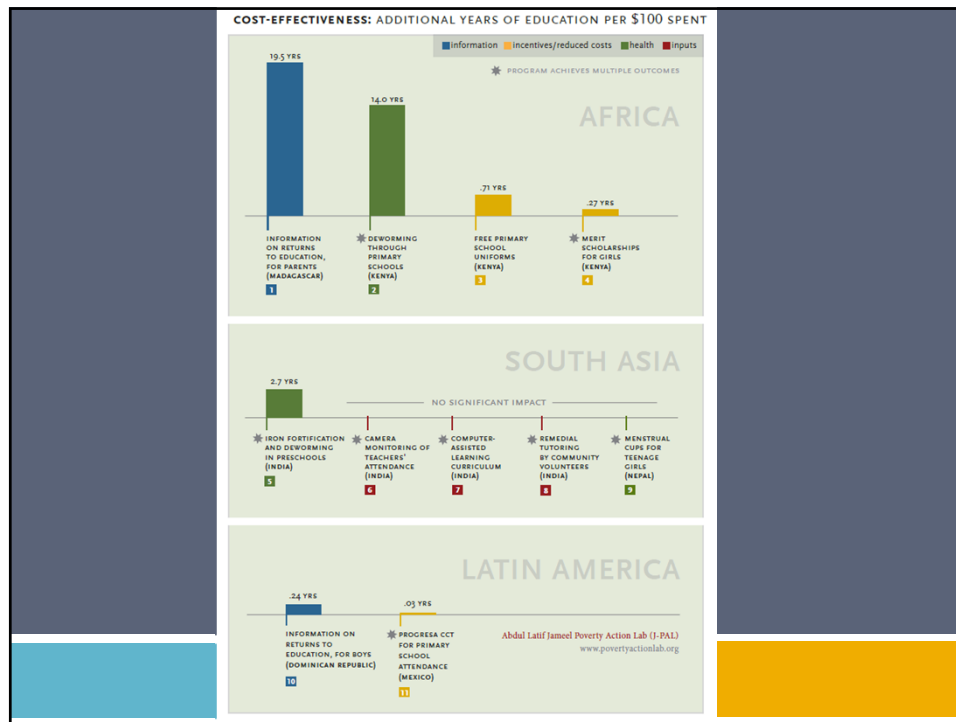
Strategies for increasing access

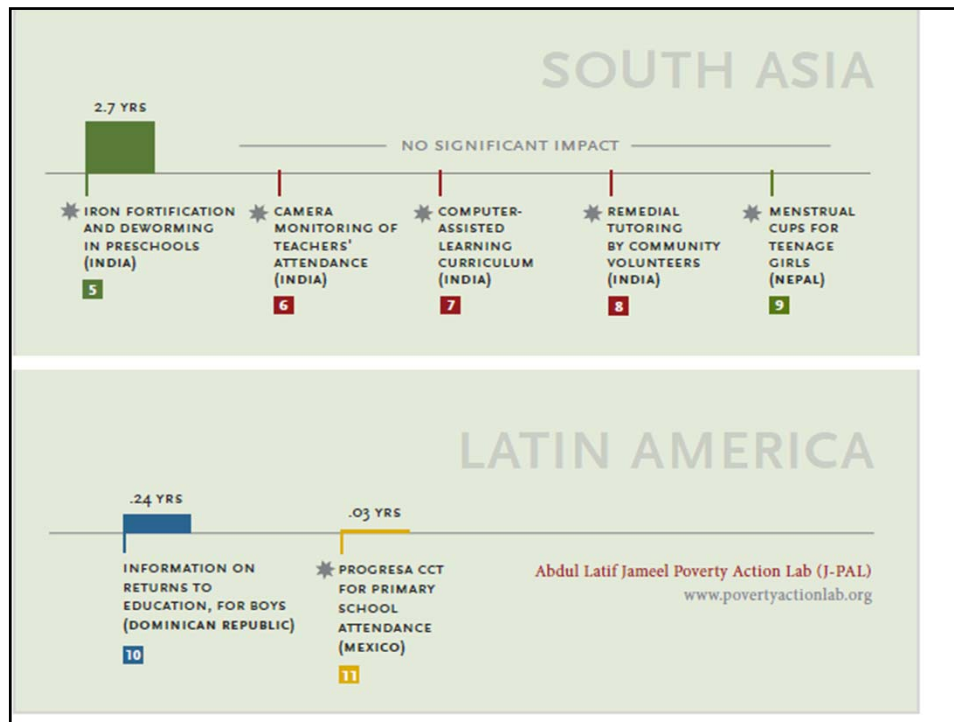
- Reducing costs, subsidizing education, and merit scholarships

- School health

- Information on returns to education

- Improving school quality





Learning : Background

- Very low scores on international tests
 - Average science score in Peru equivalent to lowest scoring 5% in US on PISA
- 36% of 6th graders in India unable to answer: India (Lockheed and Verspoor, 1991), Bangladesh (Greany, Khandker and Alam, 1999)

The dog is black with a white spot on his back and one white leg.

The color of the dog is mostly: (a) black, (b) brown, or (c) grey

Education systems

- Typically centralized curriculum, testing, hiring,
- Elite orientation
- Spending per student low as fraction of GDP
- Budgets overwhelmingly on teachers
 - Salaries an average of 3.7x GDP/capita (UNESCO, 2005)
 - Account for ¾ of education budgets (Bruns et al, 2003) → high pupil-teacher ratios.

Provider incentives

- Government providers have weak incentives [Chaudhary et al. 2006]
 - 19% of teachers absent from school in 6 country absence survey
 - In India, 25% absent from school; only half teaching

Spending: Reducing pupil-teacher ratios

- Extra Teacher Program in Kenya (Duflo, Dupas, and Kremer, 2007)
 - ▣ Gave school committees funds to hire local contract teacher for grades 1 & 2
 - ▣ Brought class size down to 46 from 84
 - ▣ No test score impact for students assigned to civil service teachers in treatment schools
- Balsakhi Program in urban India (Banerjee, Cole, Duflo, and Linden, 2007)
 - ▣ Trained woman from community tutors 15-20 lowest performing students outside classroom for 2 hours/day
 - ▣ Remaining students have lower pupil-teacher ratio but no test score gains relative to comparison classrooms
- Extra teacher program in non-formal schools in rural India (Banerjee, Jacob, Kremer, Lanjouw, and Lanjouw, 2005)
 - ▣ No impact on test scores
- Influx of students after free uniform provision in Kenya ((Kremer, Moulin, and Namunyu, 2003)
 - ▣ Treatment schools receive 9 additional students (base class size: 27)
 - ▣ No impact on test scores

Non-teacher inputs

- Provision of official government textbooks in rural Kenya (Glewwe, Kremer, and Moulin, 2009); (Lockheed and Hanushek, 1988)
 - ▣ No impact on test scores for typical student
 - ▣ No impact on dropout or repetition
- No impact of flipcharts presenting material from government curriculum (Glewwe, Kremer, Moulin, and Zitzewitz, 2004)

System distortions undermine impact of spending

- Extra Teacher Program in Kenya (Duflo, Dupas, and Kremer, 2007)
 - ▣ Contract teachers reduced likelihood that civil service teachers in class and teaching by 12.9 percentage points (base: 58.2%)
- Textbooks (Glewwe, Kremer, and Moulin, 2009); (Lockheed and Hanushek, 1988)
 - ▣ Pupils in top 2 quintiles in pre-test score 0.14 - 0.22 SD higher
 - ▣ Higher transition rate to secondary school
 - ▣ Typical student can't effectively use textbooks

Working around system distortions

- Inputs that allow shifts in pedagogy to adapt to weak teacher incentives and to match teaching to students' level
- Technology-assisted learning
 - ▣ Radio mathematics in Nicaragua (Jamison, Stearle, Galda and Heyneman, 1981)
 - 1.5 SD increase in math scores after 1 year from radio instruction
 - 1/3 SD increase for supplemental workbooks
 - ▣ Computers with math games in India (Banerjee, Cole, Duflo, and Linden, 2007)
 - 0.47 SD increase in math test scores after 2 years
 - Gains of 0.10 SD persist one year after program end
 - ▣ Electronic machine or flash cards to teach English in India
 - 0.3 SD increase in English test scores

Working around system distortions

- Remedial education (Banerjee, Cole, Duflo, and Linden, 2007)
 - 2 interventions in India show that training community members w/10-12th grade education to provide remedial education can be very effective
 - Reading intervention in rural India (Banerjee, Banerji, Duflo, Glennerster, and Khemani, 2008)

- Tracking in Kenyan ETP program (Duflo, Dupas, and Kremer, 2011)
 - 0.14 SD test score gains for both high and low achieving students
 - Civil service teachers in tracked schools 11.2 percentage points more likely to be in class teaching than in untracked schools

Provider incentives: Attendance bonus

- Informal schools in India
 - Cameras for teachers to take pictures with students w/ time-date stamps (Duflo, Hanna, and Ryan, 2007)
 - Pay based on presence documented in photos
 - Impact
 - 21 percentage point decrease in teacher absence rate (base: 44%)
 - No effect on activity while in school
 - 0.17 SD increase in test scores after 1 year
 - 10 percentage point increase in graduation rate to mainstream primary schools (base: 16%)

Provider incentives: Attendance bonus (cont'd)

- Preschools in Kenya (Kremer and Chen, 2001)
 - Bonuses paid for presence
 - Headmasters gave bonuses regardless of presence
 - No impact on teacher attendance

- Nurse compensation in rural India (Banerjee, Duflo, and Glennerster, 2008)
 - Time and date stamp machines for attendance; no recording if machine broken
 - First 6 months: ANM presence T group = 60% (C: 30%)
 - After 15 months: ANM presence in T group = 25% (C: 35%)

Provider incentives: Linking teacher pay to student test scores (Kenya) (Glewwe, Ilias, and Kremer, 2003)

- Bonus of 21-43% of monthly salary for top scoring or most improved schools on annual district exams
- Increase in test-taking but no impact on dropout, repetition, or graduation
- 0.14 SD gain on incentivized tests during program; gains don't persist
- No improvement on non-incentivized test w/ different format
- No effect on teacher absence
- Increase in test-preparation sessions outside of school hours
- Evidence of improved test-taking techniques
- Teacher seems focused on short-term signaling rather than long-run learning

Provider incentives:

Linking teacher pay to student test scores (India)

(Muralidharan and Sundararaman, 2010)

- Paid for every percentage point increase in test scores (10 percentage points \approx 30% of monthly salary)
- 0.22 SD test score increase over 2 years
- No change in teacher absence or activity in classroom
- 38 percentage point increase in test preps (base: 25%)
- Evidence on long-term learning
 - Equal gains on questions w/ unfamiliar format
 - Program effect increases
 - Bigger gains with individual than school-wide incentives

Community monitoring:

Extra Teacher Program in Kenya

(Duflo, Dupas, and Kremer, 2009)

- Randomly selected school committees receive training to monitor contract teacher
- No impact on absence of contract teacher
- Civil service teachers 7.3 percentage points more likely to be in class teaching relative to unmonitored program schools
- Students w/ monitored civil service teachers relative to program counterparts w/o monitoring
 - Attendance 2.8 percentage points higher (base: 86.1)
 - Score 0.18 SD higher in math

Information to parents in Pakistan

- Information on child, school (Das et al. 2010)
 - Increased learning achievement 0.1 to 0.15 s.d. in government schools and low-quality private schools
 - Reduced fees at higher-quality private schools by 21 percent

Community monitoring: Other cases

- Interventions in rural communities in India (Banerjee, Banerji, Duflo, Glennerster, and Khemani, 2008)
 - Meetings on school conditions
 - Meetings plus community participation in student testing
 - High household participation but no impact on
 - performance of village education committees
 - school involvement/knowledge of parents
 - teacher absence
- School committees evaluate teachers and give prizes in Kenya (de Laat, Kremer, and Vermeersch, 2008)
 - No change in teacher absence
 - Little systematic and significant evidence of changes in pedagogy, student attendance, test scores
 - More educated and older people become committee members over program duration
- Para-worker in rural Rajasthan to check presence of providers (Banerjee, Deaton, and Duflo, 2003)
 - Prevailing rate: 44%
 - No external punishment for provider but potential social pressure
 - No effect of para-worker

Local hiring

- Contract teachers in Extra Teacher Program in Kenya (Duflo, Dupas, and Kremer, 2007)
 - ▣ Same qualifications as regular teachers, paid 1/4 as much
 - ▣ 16 percentage points more likely to be in class teaching than civil service teachers in comparison schools (base: 58.2%)
 - ▣ 29.1 percentage points more likely than civil service teachers in program schools
 - ▣ Students' performance relative to those assigned to civil service teachers in program schools
 - Scored 0.23 SD higher
 - Attended 1.7 percentages points more often (base: 86.1%)

- India (Muralidharan and Sundararaman, 2010)
 - ▣ Contract teachers much less qualified than civil service teachers
 - ▣ 10.8 percentage points less likely to be absent (base: 26.8%)
 - ▣ 8.4 percentage points more likely to be engaged in teaching (base: 39%)
 - ▣ 0.12 SD increase in student test scores
 - ▣ Civil service teachers in schools w/ contract teachers increase absence by 2.4 percentage points and decreased teaching by 3.2 percentage points

School vouchers

- Colombia PACES program
 - ▣ Demand for vouchers exceeded supply → lottery
 - ▣ Allowed to attend private schools
 - ▣ Renewable conditional on satisfactory performance

- Impact
 - ▣ Short-run (Angrist, Bettinger, Bloom, King, Kremer, 2002)
 - Lottery winners complete 0.12 -0.16 more years of schooling from base of 7.5 yrs, scored 0.2 SD higher on standardized tests, worked 1.2 fewer labor hours/week from base of 4.9
 - ▣ Medium-run (Angrist, Bettinger, Kremer, 2006)
 - Winners were 5-7% more likely to graduate high school, on a base of 25-30%; higher test scores
 - ▣ Strong impacts for applicants to vocational schools, despite weak peers

Impact over time

- School-Based Deworming (Baird, Hamory, Kremer, and Miguel, 2011) one decade on
 - ▣ 0.1 more meals per day
 - ▣ Work 3 more hours per week (if not still in school)
 - ▣ 20% plus increase in earnings for wage earners, sectoral shifts

- Columbia voucher program seems to lead to significant wage increases.

Social and political impact

- Reduced cost of education for girls/conditional cash transfers
 - ▣ reduced teen child bearing, STI risk
- Merit scholarship for girls (Friedman, Kremer, Miguel, Thornton, 2011)
 - ▣ reduction in arranged marriages
 - ▣ reduced acceptance of husband's right to beat wife and children
 - ▣ Lower political satisfaction, less willingness to accept authority

Implications

- Expanding Access
 - Eliminating fees, providing subsidies can expand access
 - Spillover effects
 - Impact of program design – timing of payment, merit scholarship component
 - School-health programs and provision of information on earnings extremely cost effective
- Improving Learning
 - Limited impact of increases in existing inputs; evidence due in part to systems distortions (teacher incentives, curricula)
 - Changes in pedagogy to work around these distortions (technology-assisted learning, remedial education, tracking) dramatically improve learning at low cost
 - Students learn more when teachers given incentives to attend
 - Mixed evidence on merit pay tied to students' test scores, providing information to communities
 - Locally hired contract teachers: much cheaper, absent less, and students learn more
 - School voucher program effective in Colombia
- Huge adult impact of successful programs

Areas Where More Work Needed

- ECD, secondary education, vocational education, tertiary education
- Pedagogy
- Long-term impact on learning, wages, health and social outcomes
- System-wide effects
- Political economy

END

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Policy Lessons

- Elimination of fees for basic education highly desirable
- School preparedness for young children: ECD with locally hired teachers
- Incentives designed to address behavioral issues
- Investigation of ECD, curricula reform, teacher monitoring

Alternates

Newspaper readership, political knowledge

- Reduced satisfaction with economic and political situation in Kenya
- No increase in support for democracy, increased willingness to accept violence in politics.

Decentralization

- Pitfalls of mismatches between authority and responsibility under partial decentralization
- Kenyan Harambee system
 - Local school committees pay for construction, central government pays teacher salaries
 - Incentives for local school committees to build many small schools and set fees and requirements higher than what median parent could afford
- Influx of students following provision of free uniforms
 - Median parents prefers combination of lower-costs, more non-teacher inputs, and much higher PTRs
- Multiparty democracy
 - Move towards preferences of median parent
 - Abolition of school fees and surges in enrollment

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Health education

- HIV/AIDS education and teen childbearing
 - ▣ No impact of teacher training with government HIV/AIDS curriculum
 - ▣ 65% reduction in childbearing with older men after NGO provided info on risks of cross-generational sex (“Sugar daddies”)
- Deworming
 - ▣ No effect of health education on wearing shoes, clean hands, exposure to fresh water/swimming in fresh water
 - ▣ Knowing treated pupils reduces take up

Progress in Education

- Average years of education in low-income countries
 - ▣ 1960: 1.6 years
 - ▣ 2000: 5.2 years

- 85% of world's primary-school age children in school
 - ▣ 100 million remain: 40 million in Sub-Saharan Africa; 30 million in South Asia
 - ▣ Most have school nearby

Fees in education: Free uniforms in Kenya

- De facto requirement for school – cost \$6

- 3 separate programs of free uniform provision
 - ▣ Reduced dropout rate by 14-17% for 6th grade girls.
 - Teen childbearing rate down by 1.5 percentage points from base of 15%
 - ▣ Reduced absence rate by 13 percentage points (64%) for younger students with no uniform originally
 - ▣ Induced 0.5 more years of education over primary school

Subsidies:

Conditional cash transfers: PROGRESA in Mexico

- Cash transfers (1/4 of household income) conditional on school attendance and preventive health behaviors
- Premia for older children and girls
- Results
 - 11.1 percentage point increase in transition rate to junior secondary school from base of 58%
 - Attendance spillovers to ineligible

Subsidies:

Conditional cash transfers: Bogota, Colombia

- Program variants
 - Part of monthly payment withheld and saved until time to pay school fees following year
 - Increased current attendance by 2.8 percentage points from base of 79.4%, like basic CCT
 - And increased secondary and tertiary school enrollment by 3.6 percentage points (base: 69.8) and 8.8 percentage points (base: 22.7%) following year, *unlike* basic CCT
 - Negative spillovers to untreated within the home in a Colombian CCT program, positive to treated friends
 - Evidence of positive spillovers consistent with a model in which children choose between schooling and social activity with peers.

Incentive payments

- Merit scholarships for 6th grade girls in top 15% on govt exams in western Kenya
 - Girls eligible to compete score 0.19 SD higher
 - Teacher absence lower by 4.8 percentage points (base: 16%)
 - Some evidence of lower student absence and benefits to ineligible (boys and initially weaker performing girls)
 - Impact on political and social attitudes

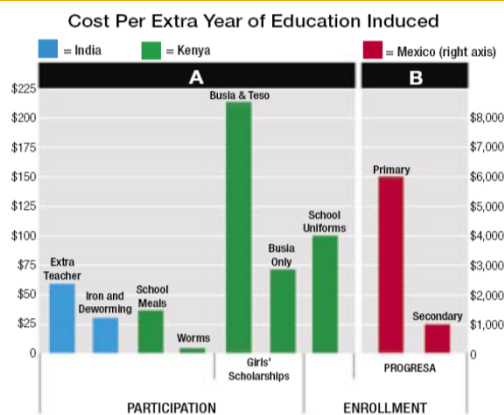
- Graduation/matriculation treatment in Colombia CCT program
 - Forced savings treatment + transfer \approx 73% of first year tuition in voc school
 - 5 percentage points higher contemporaneous secondary school attendance (base: 79.3%)
 - 49.7 percentage points higher enrollment in tertiary institution in subsequent year (base: 19.3%)

Information on returns to education

- Returns to education
 - Providing information about primary-secondary school earnings difference to 8th grade boys in Dominican Republic
 - Increased enrollment in secondary school next year by 17% (base: 30%)
 - Increased educational attainment 4 years later by 0.20 years (base: 9.66 yrs)
 - 4th graders in Madagascar
 - 0.20 SD increase in test scores

School-based health programs

- School-based mass deworming treatment in Kenyan primary schools
 - ▣ Reduced infection rates by 25 percentage points (base: 52%)
 - ▣ Reduced absence by 7 percentage points (base: 30%)
 - ▣ Health and education externalities to non-treated students, nearby schools
 - ▣ Cost per additional year of schooling = \$3.50; benefit/cost ratio



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Education and Opportunity

- Indonesian school construction
 - ▣ Decent returns
 - ▣ No magic spillover