MATHEMATICA
Policy Research



Niger IMAGINE Program:
Long Term Impact Evaluation Findings

Presentation at the 3ie Conference: Making impact Evaluation Matter

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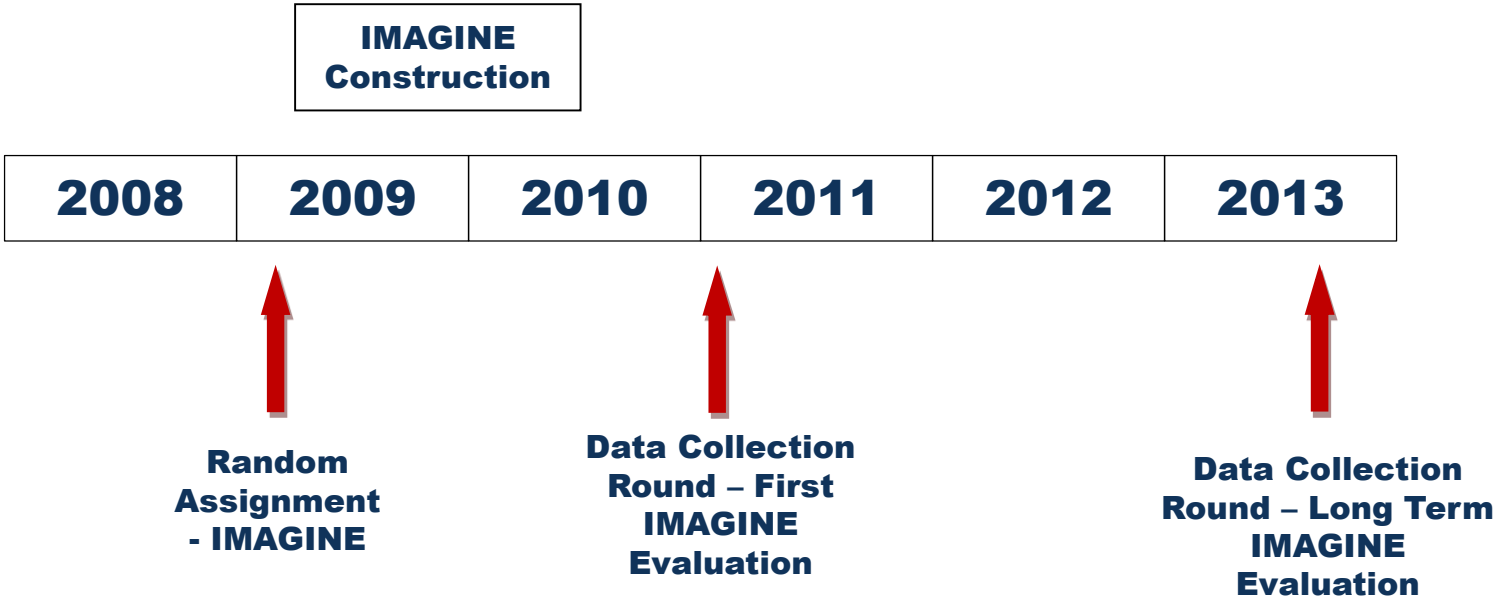
Emilie Bagby • Anca Dumitrescu • Cara Orfield • Matt Sloan

Niger IMAGINE Program

- Part of a 3-year, $23 million Threshold Program beginning in 2008 funded by the Millennium Challenge Corporation (MCC)
- Construction of 68 "girl-friendly" schools
  - 3 classrooms
  - Teacher housing
  - Separate latrines for boys and girls
  - Preschool
  - Water pump
  - Soft interventions
- Program administered by USAID and implemented by PLAN

IMAGINE School

IMAGINE Evaluation Timeline



Program Impacts were Small After 1 Year

- Overall Impacts:
  - Small impacts on enrollment (4 percentage points)
  - No impacts on attendance
  - No impacts on test scores
- Impacts observed for girls but not for boys
- IMAGINE increased the number of classrooms in the village, but did not affect whether a school existed in the village
- Stakeholders suggested that limited observed impacts were due to short exposure period

Four-Year Evaluation Questions

1. What is the availability and functionality of the infrastructure constructed under the IMAGINE program, four years after completion?
2. Are there any lasting impacts on key educational outcomes including enrollment, attendance and test scores?
3. Are impacts different for girls than for boys?
4. Are impacts different for children from households of different socioeconomic status?

Context

- Availability of primary schools and primary school enrollment rate in Niger were increasing prior to IMAGINE
- Need for a rigorous evaluation design
- Goal of impact evaluation is to compare:
  - How children in IMAGINE villages fared
  - How children in IMAGINE villages would have fared in the absence of IMAGINE

Evaluation Design

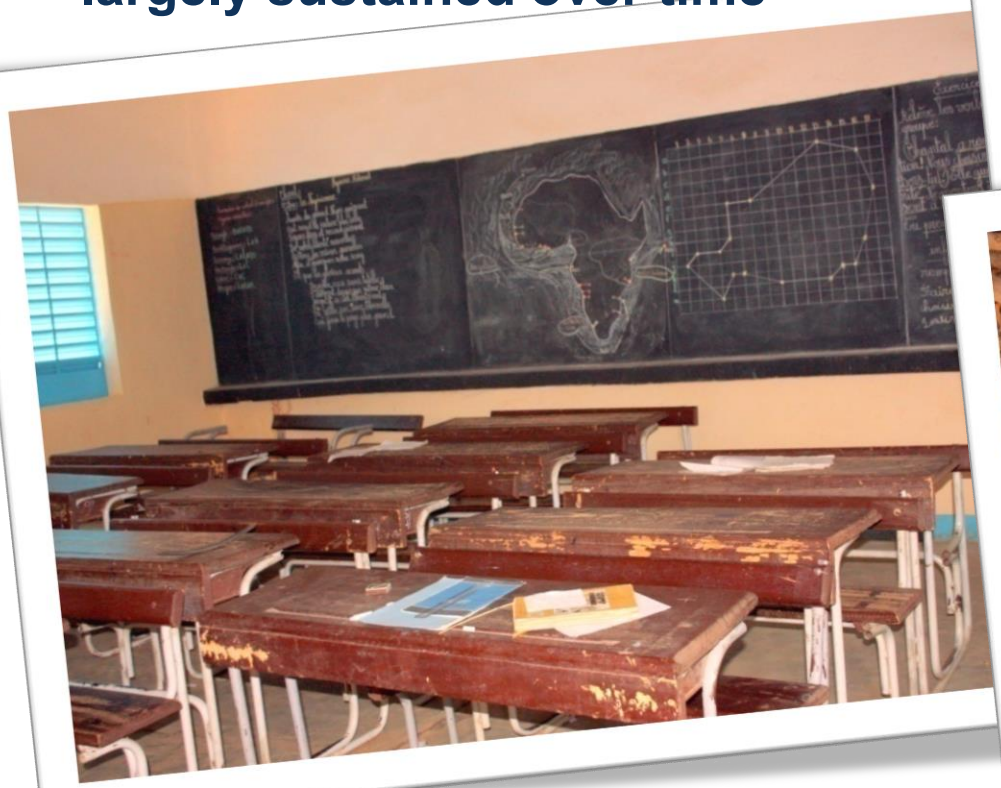
- Government of Niger identified **20 eligible communes** and 10-12 **eligible villages** within each of those communes
- Key stakeholders agreed to use **random assignment** for the evaluation
  - 65 villages were randomly selected from among 201 villages in 20 communes
- Random assignment was largely respected
- **Baseline equivalence tests** are consistent with random assignment

Four Year Impact Evaluation Sample

- **Key Data Sources**
  - Village census
  - School infrastructure observation
  - Household survey
- **Sample Sizes (villages)**
  - 57 treatment villages, 121 control villages
- **Sample Sizes (households and children)**
  - 6,914 Households
  - 15,093 Children
- Data collected in **October 2013**, just prior to the start of the school year

IMAGINE Schools vs. Other Schools

- Better infrastructure
- More and better classrooms
- Infrastructure improvements largely sustained over time



Impacts: Schools and Classrooms

	Treatment Group	Control Group	Impact
Schools per village	1.14	1.16	-0.02
Number of Classrooms per School	6.44	4.97	1.47***
Number of Classrooms of Durable Material per School	4.93	2.37	2.38***

***/**/* Statistically significant at the .01/.05/.10 level

Impacts: Other Infrastructure

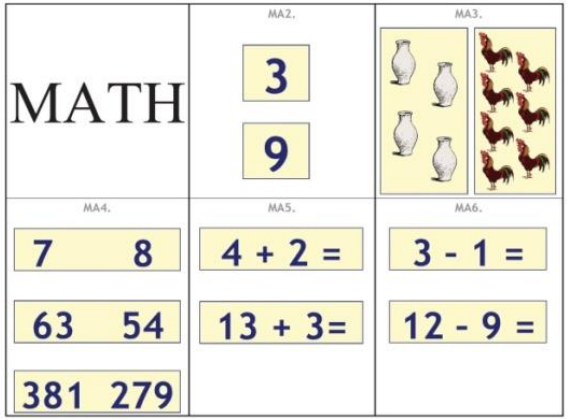
	IMAGINE Schools	Non-IMAGINE Schools	Difference
Potable water source present	79.6%	19.4%	60.2pp***
Potable water source functioning	50.0%	9.2%	40.8pp***
Toilet facilities functioning	98.1%	28.7%	69.4pp***
Separate toilets for boys and girls	98.1%	29.3%	68.8pp***
Teacher lodging	98.1%	9.4%	88.7pp***
Teacher lodging - females only	94.4%	1.6%	92.8pp***

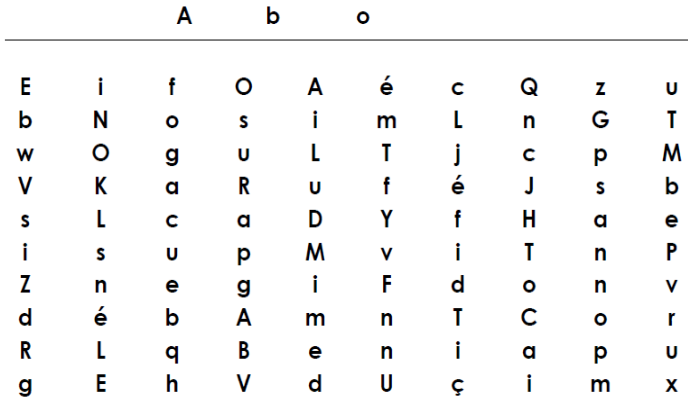
pp = percentage points

***/**/* Statistically significant at the .01/.05/.10 level

Primary Outcome Variables

- Enrollment: Child enrolled in school during previous school year according to household
- Absenteeism (attendance): Child absent more than 2 consecutive weeks during previous school year according to household
- Math and French tests were administered to all children in the sample
  - Test scores were normalized for each age group





Impacts on Primary Outcomes

	Treatment Group	Control Group	Impact
Child enrolled during last school year	0.74	0.65	0.08***
Child absent more than 2 consecutive weeks during last school year	0.34	0.42	-0.08***
Math Score - Normalized (sd)	0.24	0.12	0.13**
French Score - Normalized (sd)	0.06	-0.02	0.07

sd = standard deviations

Notes: Non-enrolled children are considered absent. Control group means are regression adjusted.

***/**/* Statistically significant at the .01/.05/.10 level

Impacts for Girls vs. Boys

	Impact for Girls	Impact for Boys	Difference
Child enrolled during last school year	0.12***	0.05*	0.07**
Child absent more than 2 consecutive weeks during last school year	-0.11***	-0.05*	-0.05**
Math Score - Normalized (sd)	0.18***	0.07	0.11**
French Score - Normalized (sd)	0.10**	0.05	0.06

sd = standard deviations

Notes: Non-enrolled children are considered absent. Control group means are regression adjusted.

***/**/* Statistically significant at the .01/.05/.10 level

Summary of Findings

- The improvement in school infrastructure has been largely sustained
- Overall Impacts:
  - Impacts on enrollment (7.8 percentage points)
  - Impacts on attendance (7.9 percentage points)
  - Impacts on math test scores (0.13 standard deviations)
  - No detectable impacts on French test scores
- Overall impacts driven largely by impacts on girls
- No difference in impacts based on household SES

1 year vs. 4 year impacts

	One Year Impacts	Four Year Impacts
School Enrollment (pp)	4.3**	7.8***
School Attendance (pp)	1.7	-
Absenteeism (pp)	-	7.9***
Math Test Scores (sd)	0.03	0.13**
French Test Scores (sd)	0.04	0.07

pp = percentage points; sd = standard deviations

***/**/* Statistically significant at the .01/.05/.10 level

Making Impact Evaluations Matter

- **Infrastructure is a costly intervention**
  - Need for credible evidence showing reasonable impacts to justify such an investment
- **Random assignment allows us to estimate causal effect of the program**
  - Use an evaluation design that fits the situation
- **Effect sizes are moderate and significant**
  - The counter-factual is important
- **Impacts are larger for girls than for boys**
  - Subgroup analyses are informative

continued…

Making Impact Evaluations Matter (*continued*)

- It may take a few years for learning effects to manifest
  - Be careful about the timing at which impacts are measured
- Measuring effects on enrollment and learning are sensitive to the sample frame
  - Be careful to define a sample frame that will allow for an unbiased estimation of the effects on primary outcomes of interest
- Stakeholders were concerned about the exposure period after the first evaluation
  - Stakeholders directly involved in decision to conduct this evaluation and hopefully will be likely to use these results
- IMAGINE in Niger modeled on BRIGHT in Burkina Faso
  - Success of the BRIGHT program influenced the implementation of the IMAGINE program

For More Information

- **Please contact:**
  - **Emilie Bagby**
    EBagby@Mathematica-MPR.com
  - **Anca Dumitrescu**
    ADumitrescu@Mathematica-MPR.com
  - **Cara Orfield**
    COrfield@Mathematica-MPR.com
  - **Matt Sloan**
    MSloan@Mathematica-MPR.com

THANK YOU! MERCI!

EXTRA SLIDES

Verifying Random Assignment

- **Baseline equivalence** tests conducted
- Results from baseline equivalence tests are consistent with a strong implementation of random assignment
  - Village level characteristics such as number of people and number of eligible households
  - School level characteristics such as whether school is a bilingual school or the presence of other outside interventions
  - Household and child level characteristics such as household size, measures of household socio-economic status, child gender

Impacts by Household SES

	Impact	Impact x HH SES Status
Child enrolled during last school year	0.09***	-0.03
Child absent more than 2 consecutive weeks during last school year	-0.08***	0.03*
Math Score - Normalized (sd)	0.12**	0.01
French Score - Normalized (sd)	0.07	0.04

sd = standard deviations

***/**/* Statistically significant at the .01/.05/.10 level

Impacts by Age

- Impacts were largest and significant for children ages 10-12 years old at the time of data collection (6-8 years old when the schools were built)
- Impacts on enrollment were approximately 6 percent, and on attendance were between 6-9 percent for this age group
- Impacts on test scores were between 0.13 std dev to 0.23 for math and 0.16 to 0.17 std dev for French or this age group
- Impacts on enrollment and attendance were also present for children ages 5 to 7

Estimates for In-School Children

	Impact Estimate for Evaluation Sample	Impact Estimate for Sample of Children that have Ever Been Enrolled	Treatment on the Treated Impact Estimate for Children that have Ever Been Enrolled
Child absent more than 2 consecutive weeks during last school year	-0.079***	-0.016	-0.103***
Math Score - Normalized (sd)	0.126**	0.073	0.164**
French Score - Normalized (sd)	0.074	0.037	0.096

sd = standard deviations

***/**/* Statistically significant at the .01/.05/.10 level

Random Assignment vs. Actual School Construction: Evaluation Sample

		Random Assignment		
		Treatment	Control	Total
Actual School Construction	IMAGINE School was constructed	53	1	54
	IMAGINE School was <u>not</u> constructed	4	120	124
	Total	**57**	**121**	**178**

Impact Estimation Method

- **Estimate the following regression equation:**

$$Y_{ihj} = \beta_0 + \beta_1 IMAGINE_j + \delta_1 COMM_1 + \cdots \delta_{18} COMM_{18} + u_{ihj}$$

  where β_1 represents the impact of IMAGINE

- **Standard errors are clustered at the village level to account for within-village correlations**

Robustness of Results

- Impact estimates were robust to:
  - Use of control variables in the regressions
  - Level of clustering of standard errors
  - Use of weights
  - Alternate sample specifications
  - Accounting for the initial roll-out of NECS intervention activities

Use of Control Variables in Regressions

- Included socio-demographic and village-level control variables to test the robustness of our results
- Socio-demographic controls:
  - Number of household members
  - Main material of the household's dwelling floor, roof, and walls
  - Whether the household owns a radio, telephone/cell phone, watch, bicycle, animal-drawn cart, cattle, or camel
  - Main source of water
  - Type of toilet
  - Number of meals per day
  - Whether anyone in the household has gone to bed hungry
  - Head of household characteristics (age, education level, languages spoken, and literacy)

continued…

Use of Control Variables in Regressions
(Continued)

- **Village-level controls:**
  - **Percentage of households that have a school aged boy**
  - **Percentage of households that have a school-aged girl**
  - **Percentage of households that have children**
- **In main estimates, commune fixed effects are the only control variables included**
- **When including additional controls, the precision of the impact estimates improves**
  - **Resulting in impacts on French test scores as well**

continued…

Use of Control Variables in Regressions
(Continued)

- In main estimates, commune fixed effects are the only control variables included
- When including additional controls, the precision of the impact estimates improves
  - Resulting in impacts on French test scores as well

Level of Clustering of Standard Errors

- In main estimates, standard errors were clustered at the village level to account for correlations in children's characteristics within villages
- Also verified that the results were robust to clustering standard errors at the household level

Use of Weights

- Household-level weights: to account for different probability of selection of households within villages
- Village-level weights: to account for different probability of selection into treatment group within communes

Alternate Sample Specifications

- **Results robust to alternate village sample specifications**
  - **Excluding Communes that Violated Random Assignment**
  - **Including Villages Not Surveyed During First Follow-Up**
  - **Including the Excluded Villages and Communes**
  - **Excluding villages receiving NECS intervention activities**
  - **Excluding villages where school started before data collection was complete**

Additional Impact Related Questions

- Impacts present for …
  - Age subgroups, in particular those children that were ages 10-12 at the time of data collection (ages 6-8 when IMAGINE schools were built)
  - Parent attitudes towards schooling and for schooling of girls
  - Some additional child outcomes related to education including age a child first starts school and attainment
- No impacts on …
  - Parent attitudes towards schooling of boys
  - Child labor, being over-age for grade