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Safe and stable access to education is an ongoing priority for policymakers in low-income countries, where nearly 9 in 10 students fail to meet minimum standards in math or reading, according to UNESCO. Among the host of barriers hindering these students' advancement, the lack of classrooms and infrastructure at many schools is a primary concern, prompting development institutions to invest in new school construction alongside other education programming. In response to a question from a policymaker at the West African Development Bank/ Banque Ouest-Africaine de Développement (BOAD), this document examines the effects of infrastructure improvements on students in primary schools. The findings in this document are drawn from eight studies looking at five different school infrastructure interventions, with a majority from West Africa.

# What impact does upgrading physical school infrastructure to permanent materials have on students?

## Key Findings

- Infrastructure improvements increase student enrollment, retention and attendance rates.
- In the long run, infrastructure improvements raise student test scores.
- The provision of latrines results in significantly larger increases in attendance and enrollment for girls in particular.
- School infrastructure programs that target girls have positive impacts on all students in the long term.

## Key Recommendations

- Although they can be costly at the outset, school infrastructure improvements should be considered as a durable investment for increasing student enrollment, attendance, retention and test scores in the long run. Policymakers are advised to conduct a cost-benefit analysis of their program prior to implementation.
- Constructing latrines is key to improving enrollment and attendance amongst girls, especially in combination with complementary gender-targeted interventions.
- School infrastructure programs have less definitive effects outside of the classroom, so policymakers interested in non-educational impacts should consider integrating infrastructure improvements into broader child-wellbeing programs.

### Background

Access to education is an ongoing challenge in many parts of West Africa. More than 50 percent of children in the world that did not enroll in school lived in sub-Saharan Africa, and more than 85 percent of children in sub-Saharan Africa were not achieving minimum learning outcomes, according to a 2017 UNESCO report. In many communities, classrooms and schools are constructed from temporary materials such as mud, wood, or straw. Although these materials are cheaper, schools constructed from them need to be restored regularly. Additionally, schools like these are often rendered unusable during rainy and hot seasons, making them an impractical learning environment. Schools built from temporary materials also present substantial sanitation challenges. Pupils worldwide lose 272 million school days each year to diarrhea, and over 40 percent of diarrhea cases among schoolchildren are transmitted in schools, according to a 2006 report from the United Nations Development Programme. Improving school infrastructure using permanent materials mitigates these challenges, allowing students more stable and sanitary access to education throughout the year.

### Details of interventions

All five interventions reviewed in this document involved major infrastructure changes, including the construction of new classrooms, latrines, or school buildings. Two interventions targeted educational outcomes for girls specifically.

Each intervention underwent a quantitative evaluation to assess its impact on students. The interventions include:

- In Niger, between 2008 and 2010, the IMAGINE (IMprove the educAtion of Girls In NigEr) program constructed 68 primary schools with latrines from high-quality materials. In 2012, a follow-up program, NECS (Niger Education and Community Strengthening), implemented complementary components, including literacy and mentorship programs, extracurricular activities, and faculty training.
- In Burkina Faso, the BRIGHT (Burkinabé Response to Improve Girls' Chances to Succeed) program constructed high-quality primary schools with latrines in 132 rural villages. The program also included the following complementary interventions: provision of school supplies such as desks and textbooks; school feeding programs; hiring of more female teachers; training for teachers and parents; information campaign; and capacity building for local officials. This intervention included an initial phase in 2005 to 2008 and a second phase in 2009-2012.
- Benin implemented the second iteration of its Free Primary Education policy in 2006, which not only eliminated school fees, but also built new schools throughout the country and recruited teachers.
- In Uganda, the School Facilities Grant assisted schools across the country in acquiring physical infrastructure by constructing new classrooms, latrines, and teachers' living quarters. This longstanding program was launched in 1998.
- In India, the School Sanitation and Hygiene Education Program (SSHE) has provided latrines to 121,206 primary schools and 17,796 upper primary schools across the country since 1999.

The Burkina Faso project underwent two evaluations: a short-term evaluation (two and a half years after the program launched) and a long-term evaluation (seven years following program launch). Similarly, the Niger program underwent three evaluations: a short-term evaluation (one year after school construction was complete) and a longer-term evaluation (three years after school construction). A separate evaluation that included complementary activities was conducted six years after school construction. Each of the remaining interventions was evaluated only once, between six and seventeen years following initial implementation of the programs.

### Findings

Overall, interventions involving major physical infrastructural upgrades resulted in positive effects on student attendance, enrollment, test scores and retention (with less evidence available for retention in particular). These impacts were larger for girls, especially when interventions involved the provision of latrines.

#### Enrollment

All seven studies showed positive impacts on enrollment. Studies in Burkina Faso, Niger, Uganda, and India, in which the intervention included the provision of latrines, noted that increased enrollment was more pronounced among girls than boys. Longer term evaluations show that improvements in enrollment were sustained over time. The Benin program—the one study that did not include the provision of latrines—showed a higher increase in enrollment among boys than girls.

#### Attendance

All interventions resulted in positive impacts on attendance. For the Niger program, the short-term evaluation only found positive significant impacts for girls. But the longer-term evaluation showed significant positive effects on attendance for both genders.

#### Attainment

In short-term evaluations, impacts on learning outcomes – test scores – were small and mostly statistically insignificant. However, the two longer-term evaluations from Burkina Faso and Niger programs showed increased math scores for all students, in addition to improvements in language scores for girls in particular. These results indicate that it may take longer for test scores to rise following infrastructure improvements.

#### Retention

Three studies in Benin, India, and Burkina Faso evaluated retention outcomes. In all three, infrastructure improvements were linked to students staying in school longer. Specifically, the Burkina Faso study showed that students were more likely to advance to the next grade level. In India, evidence showed that students were less likely to leave school during a particular school year. In Benin, schoolchildren were completing more years of education on average following the intervention.

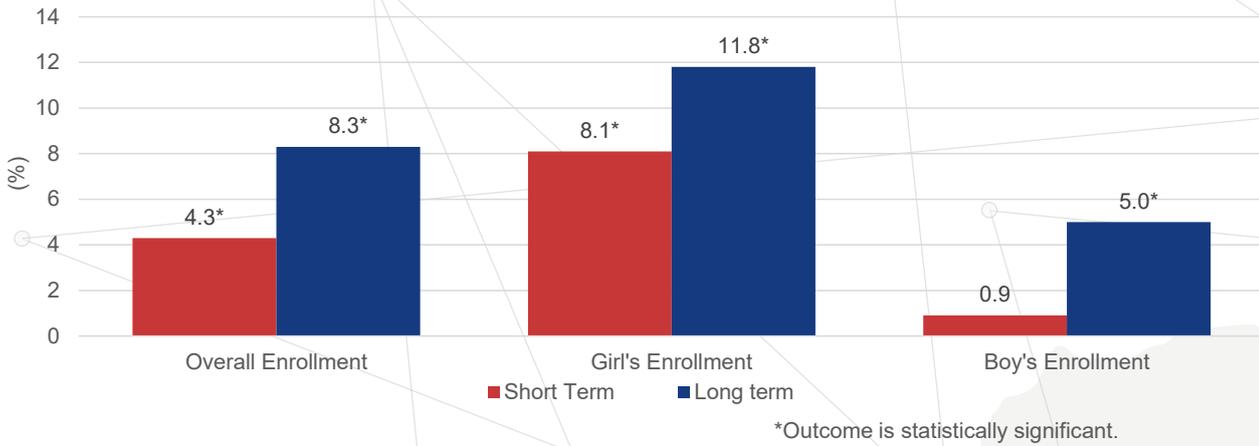
#### “Girl-friendly” schools

A central facet of the Burkina Faso intervention was that it constructed schools that were “girl-friendly”, meaning the school had characteristics such as separate latrines for boys and girls and more female teachers. Three other interventions included the provision of latrines, which may benefit girls more than boys. In these schools, enrollment, attendance, and test scores rose more for girls than boys. In the Niger and Burkina Faso interventions that targeted girls in particular, significant positive effects on boys were only evident in long-term studies.

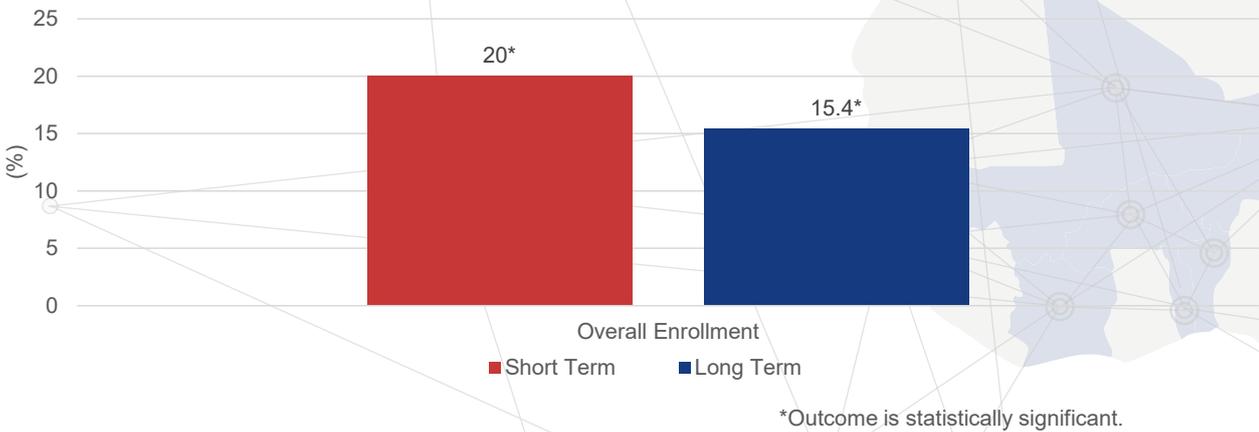
#### Cost Evidence

While these findings indicate promising results for infrastructure interventions, both Burkina Faso and Niger studies included cost analyses which found that infrastructure improvements tend to be significantly more expensive than other interventions, at least in the short term. Nonetheless, durable schools are a necessary component of quality education, and they create the physical environment which allows complementary interventions to be effective. While initially expensive, these durable construction components continue to yield benefits over many years.

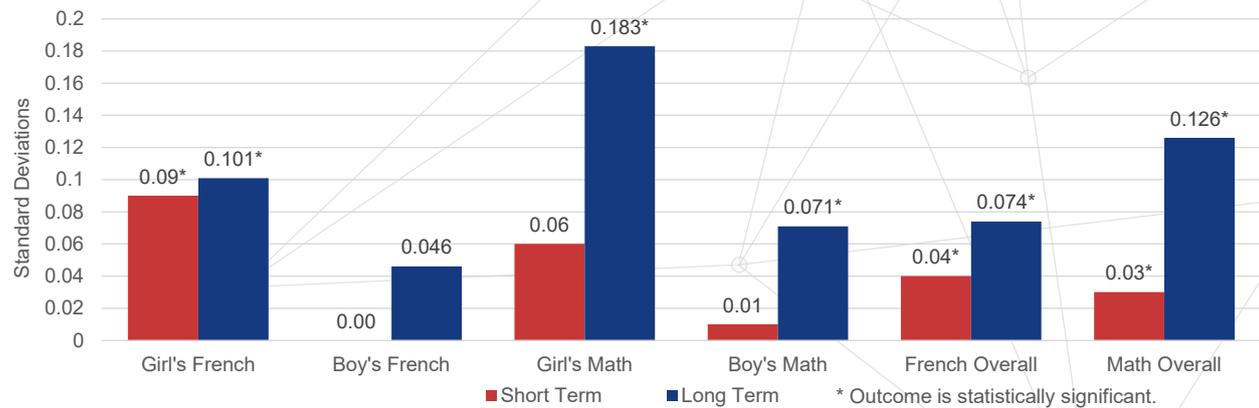
### Niger IMAGINE Program Impact on Enrollment (% change)



### Burkina Faso BRIGHT Program Impact on Enrollment (% change)



### Niger IMAGINE Program Impacts on Test Scores



### Recommendations

Infrastructure improvements should be considered by policymakers aiming to improve school enrollment, attendance, and retention in the short term. Such school infrastructure programs also raise test scores in the long run, according to studies from Burkina Faso and Niger.

Permanent sanitary infrastructure is key to addressing gender disparities in education in low-income countries. The provision of latrines improves girls' school enrollment, attendance, and test scores. This impact is even larger when the latrines are sex-specific. If policymakers are interested in positive impacts on girls' education, the provision of latrines should be a top priority in terms of infrastructure. If possible, the provision of latrines should be combined with other gender-targeted interventions, such as increasing the presence of female teachers, to maximize outcomes for girls. Additionally, targeting girls in infrastructure improvements by including the provision of latrines could help to diminish existing sanitation challenges, as well as mitigate inequalities in education.

To maximize benefits for children outside of the classroom, programs may need to implement additional activities and include school infrastructure improvements into broader child-wellbeing programs.

### Limitations

The majority of studies included in this brief were completed in West Africa, where most countries face similar challenges in terms of poor school infrastructure, making this evidence particularly relevant for those considering such programs in the region. However, this brief is based on a limited number of studies, all of which include a wide array of complementary interventions, making it harder to identify the impact of the infrastructure upgrades alone.

With regards to retention and cost-effectiveness specifically, few studies examined these variables, so additional data could provide a clearer picture of these outcomes.

### What is the WACIE helpdesk?

The WACIE helpdesk, a partnership between 3ie's WACIE program and IDinsight, provides rapid synthesis and evidence translation to help policymakers in West Africa understand what evidence exists for specific policy questions. The helpdesk can also connect interested policymakers with further resources to meet additional needs. It is staffed by the WACIE Secretariat in Cotonou and the IDinsight regional office in Dakar, with engagement from the wider 3ie and IDinsight technical staff and other experts as needed.

To submit a policy question, or for additional information, contact [wacie@3ieimpact.org](mailto:wacie@3ieimpact.org).

### What is WACIE?

The West Africa Capacity Building and Impact Evaluation (WACIE) program, a partnership between 3ie and the Government of Benin, was launched to help build evaluation capacity in the eight countries that comprise the West African Economic and Monetary Union (WAEMU): Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo. Program goals include increasing evaluation capacity in targeted countries, ensuring that policymakers have access to relevant evidence and promoting take-up of high-quality evidence by relevant stakeholders.

### This Rapid Response brief is based in part on the following papers

A. Adukia. 2017. "Sanitation and education." *American Economic Journal: Applied Economics* 9(2). 23-59.

E. Bagby et al. 2016. "Niger IMAGINE long-term evaluation." Washington, DC: *Mathematica Policy Research*.

E. Bagby et al. 2017. "Niger NECS Impact Evaluation Report." Washington, DC: *Mathematica Policy Research*.

A. Dumitrescu et al. 2011. "Impact Evaluation of Niger's IMAGINE Program Final Report September 13, 2011." *Washington, DC: Mathematica Policy Research*.

M.A. Fatoke-Dato. 2015. "Impact of an educational demand-and supply policy on girls' education in West Africa: Heterogeneity in income, school environment and ethnicity". BERG Working Paper Series, No. 101. *Bamberg University: Bamberg Economic Research Group (BERG)*.

H. Kazianga et al. 2013. "The effects of "girl-friendly" schools: Evidence from the BRIGHT school construction program in Burkina Faso." *American Economic Journal: Applied Economics* 5.3. 41-62.

H. Kazianga et al. 2019. "The Medium-Term Impacts of Girl-Friendly Schools: Seven-Year Evidence from School Construction in Burkina Faso" (No. w26006). *National Bureau of Economic Research*.

J. Wokadala. K. Ogawa et al. 2019. *Impact of the school facilities grant on access and learning achievements in the primary education sector in Uganda*, 3ie Grantee Final Report. New Delhi: International Initiative for Impact Evaluation (3ie).

#### Some of these papers were identified via the following systematic review:

B. Snilstveit, J. Stevenson, D. Phillips, M. Vojtkova, E. Gallagher, T. Schmidt, H. Jobse, M. Geelen, M.G. Pastorello et al. 2015. *Interventions for improving learning outcomes and access to education in low- and middle- income countries: a systematic review*. Systematic Review 24, International Initiative for Impact Evaluation (3ie).

More information, including a brief summary of the systematic review, is available here: <https://www.3ieimpact.org/evidence-hub/publications/systematic-reviews/interventions-improving-learning-outcomes-and-access>



The International Initiative for Impact Evaluation (3ie) promotes evidence-informed, equitable, inclusive and sustainable development. We support the generation and effective use of high-quality evidence to inform decision-making and improve the lives of people living in poverty in low- and middle-income countries. We provide guidance and support to produce, synthesise and quality assure evidence of what works, for whom, how, why and at what cost.



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