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Benefit-Cost Analysis

Interventions to improve access, retention and learning outcomes in Haitian primary schools

COPENHAGEN CONSENSUS CENTER

Haïti Priorise
Un plan de développement alternatif

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Haïti Priorise

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Canada

Academic Abstract

The primary education system is highly inefficient in Haiti: children start primary school two years late on average, and only 30% of children will pass the 6th grade. As in most developing countries, returns to primary education is however relatively high. To investigate the priorities for investment in primary education in Haiti, the paper provides a comparison of the costs and benefits of four interventions: mother tongue instruction, training teachers, private schools subsidies, and providing school uniforms for free.

As a result, it is shown that, depending on the intervention considered, benefit-cost ratios range from 3 to 8 when we consider a 5% discount rate. The four interventions considered thus appear to be beneficial investments and could be recommended per se. Among the less costly and most efficient intervention is mother tongue instruction which presents high BCR for relatively low cost of implementation. The second most beneficial one appears to be training teachers, although costs might be more substantial if the goal is to implement this intervention in all Haitian schools. BCR for private school subsidies and free uniforms are relatively lower than previous ones, although they appear to be beneficial as well.

Policy Abstract

Overview

The primary education system is highly inefficient in Haiti: children start primary school two years late on average, and only 30% of children will pass the 6th grade. As in most developing countries, returns to primary education is however relatively high. Hence, potential benefits of primary education interventions should also be high. In order to investigate the priorities for investment in primary education in Haiti, the paper provides comparative cost-benefit analysis of four interventions: mother tongue instruction, training teachers, private schools subsidies, and providing school uniforms for free.

The four interventions considered appear to be beneficial investments and could be recommended per se. Among the less costly and most efficient intervention is mother tongue instruction which presents high BCR for relatively low cost of implementation (even if implemented to a large population). The second most beneficial one appears to be training teachers, although costs might be more substantial if the goal is to implement this intervention in all Haitian schools. BCR for private school subsidies and free uniforms are relatively lower than previous ones, although they appear to be beneficial as well.

Implementation Considerations

The targeted population for the intervention is arbitrarily fixed to 1000. All of the direct costs and direct benefits (except further wage benefits and extra education costs) are based on an average of 1000 and the final completion rate. For example, for mother tongue instruction, costs are based on the average of the starting cohort, 1000 and the ending cohort by grade 6, 729 that is 865. The implicit assumption behind this is a linear decline across the 6 years from 1000 to 729 students, and costs and benefits are best approximated by the average.

Time horizon is 55 years old for a single cohort.

Direct costs of interventions are reported in Tables below for a cohort of 1000 recipients.

Table S1: Costs per cohort of 1000 recipients

Parameters	Values
Upfront cost of mother tongue instruction for the cohort	$6 536
Training cost for 1 teacher for 1 year's curriculum	$500
Wage of trained teacher	$3 391.20
Wage of untrained teacher	$2 516.80
Extra materials, USD per child	$16.80
Cost of uniform per student	$51
Cost of primary education including marginal food per child, 2017 USD (= cost of private schools subsidies, one year)	$168

Rationale for Intervention

The interventions will ensure that more pupils will complete primary school and/or improved learning scores. Benefits are calculated by considering increase in future earnings due to these improvements.

Table S2: Impact on primary school completion rate

Parameters	Values
Target population - one cohort of primary school	1 000
Pre-intervention, % students completing primary school	50%
Post-intervention, % students completing primary school – Mother tongue instruction	73%
Post-intervention, % students completing primary school – Training teachers	50%
Post-intervention, % students completing primary school – Private school subsidies	65%
Post-intervention, % students completing primary school – Providing school uniforms for free	56%

Table S3: Impact on learning scores and wages

Parameters	Values
Wages for no primary school completion	$996
Wages for primary school completion	$1573
% wage boost from mother tongue instruction	2.8%
% wage boost from trained teacher	6.2%
% impact on wages for a 1 SD increase in literacy score	8.8%
% impact of mother tongue instruction on literacy score	32%
% impact of teacher training on literacy score in terms of SD	11.4%
Average unemployment rate across lifetime including formal and informal	23.8%

Cost Benefit Table

Table S4: Summary Table

Interventions	Benefit	Cost	BCR	Quality of Evidence
Mother tongue instruction	$2 664 737	$318 671	8.4	Strong
Training teachers	$789 196	$130 801	6.0	Strong
Private school subsidies	$2 041 322	$703 491	2.9	Strong
Free uniforms	$778 222	$255 529	3.0	Strong

Notes: All figures assume a 5% discount rate

Contents

1. Introduction

In many developing countries, evidence shows that it is not enough to ensure that children go to school. Education systems also have to guarantee that once children are in the classroom they are able to acquire basic skills and knowledge for further development. In Haiti, today, a majority of children are in school: more than 90% of 14 years old. However, although enrollment is high, quality of education is a major challenge (Adelman et al., 2015a): fewer than 60% of first graders will reach 6th grade; fewer than two third of them sit for end of 6th grade examinations; and, among those, only three quarter pass the exam.

Despite improvements, the primary education system is highly inefficient: children start primary school two years late on average, and fewer than 60% will reach the last grade of the cycle (Adelman et al., 2015b). Possible causes of these poor results are: insufficient time spent in class; class time effectively offered to students may be low; lack of teaching materials (book and manual are used in classroom only 40% of the time); problem with the language of instruction in the early years; also, education remains relatively inefficient because of outdated methodologies. However, teacher absenteeism does not seem to be a problem, which is explained in part by the rather unique incentive scheme applying to Haitian teachers (80% of them are in private schools).

Once students are enrolled, many factors can affect learning: schools must be open (which is a problem in case of shocks); pupils and teachers must be present; students must be prepared to learn; and teachers should have the skills and motivation to teach in a way that is effective. In particular, on the long run, improving teachers training so as to enhance their mastery of content, encouraging the practice and feedback in the classroom and meeting standards on the basis of a revised program should help to improve instruction and student learning.

This paper proposes to investigate the priorities for investment in primary education in Haiti. In particular, it provides cost-benefit analysis of four interventions: mother tongue instruction, training teachers, private schools subsidies, and providing school uniforms for free.

Methodology is based on a cohort approach which considers costs and benefits for one single cohort over its life-cycle. This simple approach can be expended to a more complex, multiple cohort approach.

As a result, it is shown that, depending on the intervention considered, benefit-cost ratios range from 3 to 8 when we consider a 5% discount rate which allows us to prioritise some of these interventions.

The paper is structured as follows. A second section presents data and context for Haiti. A third section presents primary education interventions and methods to be used for cost-benefit analysis of these interventions. A fourth section presents the results and last section concludes.

2. Data and Context

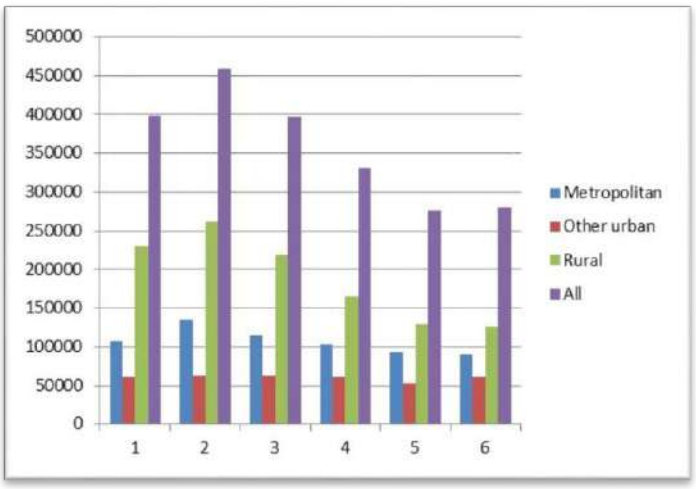
2.1 Education system in Haiti

Formal education in Haiti is structured across four levels: preschool, basic education, secondary school, and higher education. Preschool is meant to serve children from age 2 to 5, and is considered to have four levels based on these ages: poupons, petits, moyens, and grands. However, this structure is not formally mandated by public policy. The first two cycles—grades 1–6 for children aged 6–11—are considered primary education. Thereafter, children may enter into vocational programs or continue to the third basic cycle (lower-secondary school), which consists of three grades for children aged 12–14. Similarly, vocational programs are available after lower secondary, or children may continue on to secondary (upper-secondary) education, which consists of three or four grades depending on the model followed by the school. Higher (tertiary) education includes a range of university, technical, and vocational programs.

2.2 Intake, completion and learning

Several steps should be considered between the entrance of a child in primary school and the full acquisition of the necessary basic skills and knowledge. First, the child must have access to school, that is to say that certain barriers to entry exist and should be bypassed by children in school age and their family in order to effectively access primary schooling. Second, from the first grade to the last, the child must acquire competencies and knowledge such that he will be able to complete his education. The probability that a new entrant in first grade reaches the end of primary or lower secondary education is called the survival rate. Finally, the child must have the opportunity to learn, which will then be essential to his integration into society and working life. Thus, taking into account these three fundamental steps, we can draw the probability for a child of basic school-age to acquire basic skills and knowledge at school. In the case of Haiti, this probability is relatively low, as pointed out in the introduction. Indeed, only 30% of children pass the 6th grade (60% enrolled times 67% get to grade 6 times 75% pass the grade 6 exam) and so interventions considered in this paper could aim at improving outcomes at the grade school level.

Figure 1: Number of students by grade

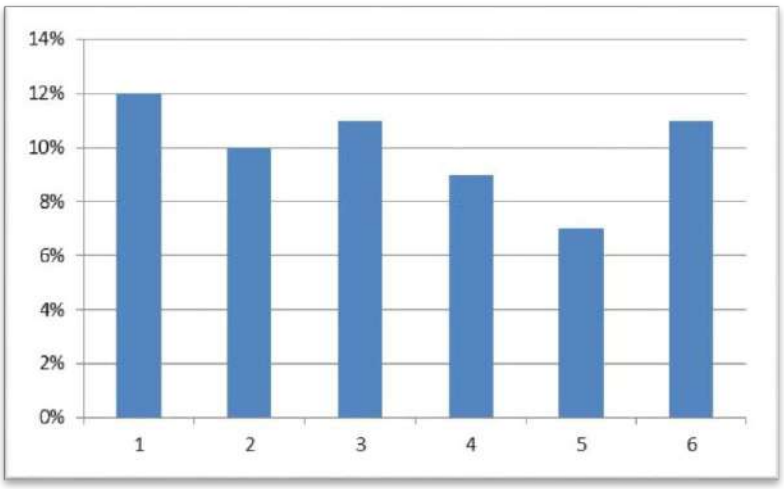


Sources: Demographic Health Survey, 2012.

As shown in Figure 1, in Haiti, the number of students is increasing from grade 1 to grade 2 and then decreasing according to grades in rural and metropolitan areas, while it is rather stable in other urban areas. This means that primary completion rate is rather low in Haiti (about 50%), especially in rural areas.

On the other hand, as shown in Figure 2, failure/repetition rate is also rather decreasing by grade, from 12% at the first grade to less than 7% at the fifth grade. Figure 2 is interesting for several reasons. First, the higher repetition rate at grade 1 is not coherent with automatic promotion at first grade which should be the rule in Haiti. A reason for this is that many children do not have the level when entering school. Indeed, disparities exist at first-year between those coming from preschool and those without initial education. Second, 3rd year of primary school is generally considered as difficult which can explain the higher repetition rate. Finally, until 2012, official exams in 6th grade can explain higher repetition rates; after 2012, exam occurs only at grade 9. All these can explain higher repetition rates for grades 3 and 6, as well as lower promotion rates for those years, as shown in Figure 3.

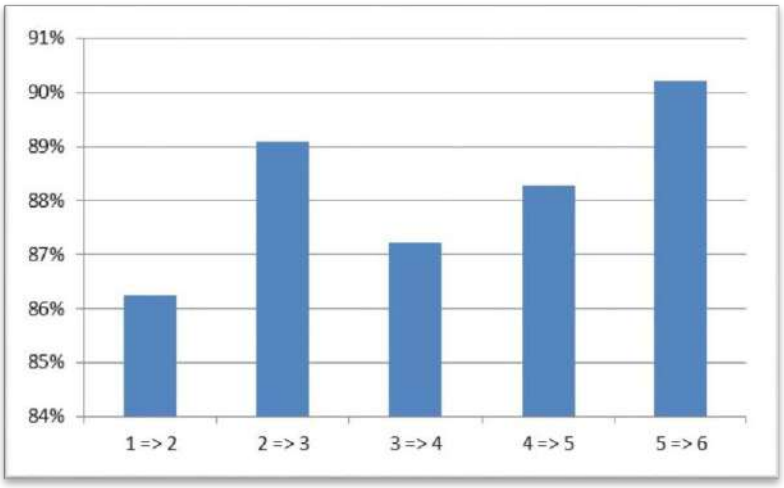
Figure 2: Repetition rate by grade



Sources: Demographic Health Survey, 2012.

Indeed, as shown in Figure 3, promotion rate is rather increasing by grade, although it is higher for third and sixth grades. Hence, the chance to complete primary school is logically increasing according to grade due to the selection process.

Figure 3: Promotion rate by grade



Sources: Demographic Health Survey, 2012.

A higher promotion rate at the end of primary school is generally considered as an indicator of quality of the school. However, even if children complete their education cycle, it is not certain that they will develop sufficient skills and knowledge. Indeed, according to Adelman et al. (2015a), many students, particularly in poor communities, seem to learn little from primary schooling, not even the minimum standards in literacy and numeracy.

Note finally that school delay—which is not described here—is an important phenomenon in Haiti. This is due to economic and financial factors, poor school infrastructures and school proximity. What is more, children often lack school because of domestic work tasks, diseases, mobility, etc.

2.3 Public and private schools

The supply of public schools in Haiti is limited. According to data of the 2013/14 school census, only 16% of the 16,993 schools in Haiti are public, and they host 38% of pupils in primary and secondary schools.

Distribution of schools is presented in Table 1 below. Schools are distributed into 2653 (16%) public schools and 14340 (84%) private schools. 6450 (38%) of them are in urban areas and 10543 (62%) are in rural areas. What is more, about 77% of students are in private schools, and the average number of students is lower in private schools (67) than in public ones (220).

Table 1: Number of schools

	Total	Public	Private	Urban	Rural
Number of schools	16 993	2 653	14 340	6 450	10 543
Number of students / school	90	220	67	N.A.	N.A.
% of students in private schools			77%	N.A.	N.A.
% of teachers in private schools			82%	N.A.	N.A.
% of private schools			84%	89%	82%

Sources: School census, 2013-2014

The number of non-public schools has increased exponentially during the recent decades. Indeed, in less than 50 years, the number of non-public schools has multiplied by more than a factor of 20, while the number of public schools has only doubled. Slightly fewer than half of non-public primary schools are religiously affiliated. Protestant-affiliated schools make up the majority of these. Few data on non-public schools are systematically collected beyond the basic information voluntarily provided in the annual school census. Over half of all primary schools are not yet officially recognized by the government, which is currently developing a decentralized licensing system with multiple levels of official recognition.

3. Literature Review of the Effects of Interventions

In the Haiti context, various interventions can be implemented which could be efficient to increase access and quality of education. In particular, interventions considered in this paper are: mother tongue instruction, training teachers, private schools subsidies, and providing school uniforms for free. To achieve cost-benefit analysis of these interventions, we need to consider evidence from

the literature on the connection between interventions and changes in education outcomes. Many hundreds of studies exist on the effectiveness of interventions to improve education outcomes. Many interventions have impacts on multiple school outcomes.

For instance, mother tongue instruction will increase educational attainment for recipients (primary school completion), inducing increased future income. According to Bender et al. (2005), in their own language, dropout is 1/3 of non-mother tongue in Mali, and 25% lower in Guatemala. Such intervention may thus decrease (on average) by about 50% the education gap (*e.g.*, promotion rate will increase from 80% to 90%). A change in the promotion rate causes the flow of pupils to change. For example, in Haiti, if the education gap is decreased by 50%, there would be about 25% additional children expected to complete primary. Furthermore, it can be expected that the learning gap would also drop by about 30% (which is the effect of mother tongue instruction on literacy score) as a consequence of mother tongue instruction (Bender et al., 2005, evidence for Mali). This will in turn have an effect on future earnings: Hanushek and Zhang (2009) have, for instance, estimated an 8.8% impact on wages for a 1 SD increase in literacy score considering 13 countries.

Training teachers will also have an effect on educational outcomes. In particular, the potential effect on the learning gap is of about 11% according to McEwan (2015) meta-analysis of random experiments, which would induce a boost of future earnings (Hanushek and Zhang, 2009). However, according to our knowledge, no study reports any significant impacts of teacher training on dropout and repetition rates.

According to Kremer and Holla (2009), the provision of free school uniforms leads to 10%-15% reductions in dropout rates. Although Kremer and Holla look only at dropout, we can suspect similar improvements in entry.

Finally, similar effect is to be expected from private schools subsidies that will increase primary school completion in Haiti. Indeed, Adelman and Holland (2015) have found evidence of better access to primary school as a consequence of the Haitian tuition waiver program. In Haiti, families who have difficulties to pay for school often delay their children schooling and then enroll them discontinuously, depending on the state of their finances. This can explain important school delay: indeed, when children go back to school, they are back in the class they have abandoned or the one they missed. Similarly, children often repeat or when they have not been sufficiently present at school during the year.

All in all, these interventions, by improving educational outcomes, have the potential to generate important benefits in terms of future income that should outperform their costs. For the purpose

of measuring future benefits, we can consider the figures shown in Table 1, where the gap in annual earnings between primary education and no education was $577 in 2012.[1]

Table 1: Annual earning by educational level

Educational level	Annual earnings (USD)
No education	996
Primary	1573
Lower secondary	1834
Vocational	2334
Upper secondary	3437
Tertiary	3538

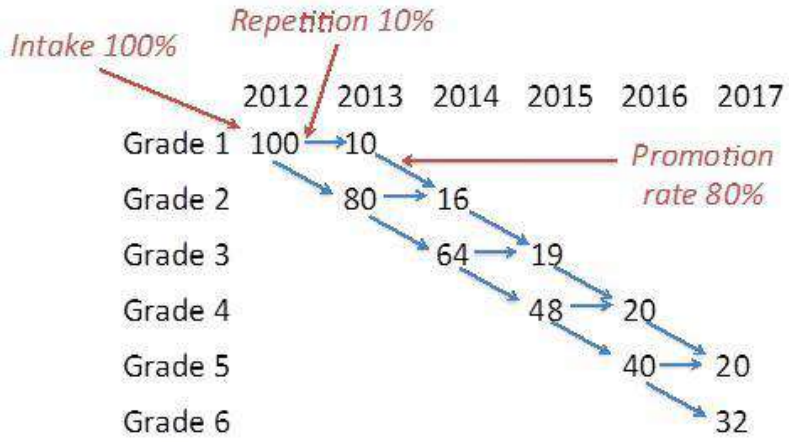
Sources: ECVMAS, 2012.

[1] Note that it is supposed that this gap increases by 2.7% per year according to Haiti Priorise assumption on growth rate in Haiti.

4. Calculation of Costs and Benefits

The education gaps affected by the interventions are proximate determinants – namely basic resources (schools, teachers, books), entry, progression, and learning rates – which lead to higher-level education outcomes such as the enrollment rates, survival and completion rates, the percentage of children who reach desired learning benchmarks or pass an exam.

Example below presents a simplified school life-cycle: 100 children who enter school in 2012 and have repetition rates of 10 per cent and promotion rates of 80 per cent throughout their progress through school.



The cost-benefit analysis of each intervention – for different outcomes – can be performed by putting together the costs of each intervention and the change attributed to each intervention. First, because there are multiple outcomes, three values of cost-effectiveness can be computed: for increasing the number of entrants; for increasing the number of children to complete primary school; and for increasing the number of children who attain the learning standards. Specifically, the cost-effectiveness of a particular intervention I, as measured by the dollars per additional child to achieve one of the outcomes O, is equal to: the costs of intervention I divided by absolute change in outcome O attributed to intervention I. The outcomes, O, can be either entry (E), completion (C), or learning (L). Estimations of costs of interventions are directly given by the model using various sources of data (household surveys, school census, administrative data…).

In order to perform cost-benefit analysis, a further exercise is to monetize the outcomes as follows:

- Benefit for Entry = #Children receiving the intervention * % of Children entering primary school * Increase in earnings due to entry in primary school.
- Benefit for Completion = #Children receiving the intervention * % of Children completing primary school * Increase in earnings due to completion.

- Benefit for Learning (scores) = #Children receiving the intervention * % (average) increase in learning scores * Increase in earnings due to better scores at schools.

Results can first be provided using a single cohort approach and then compared with results using a multiple cohort approach.[2] Differences may be significant insofar as the benefits calculated over multiple cohorts can be largely increased compared to costs which may not increase proportionally.

Appendix presents the main data and assumptions on which are based the Benefit-Cost Ratio (BCR) calculations. Some assumptions are common to all interventions. Others are specific to one particular intervention. Assumptions are averages which do not fully take into account heterogenous situations in Haiti. For instance, school subsidies of $168/year does not take into account the fact that some private schools in Haiti can be very expensive, in particular among those which provide higher quality education. This assumption is based on a calculation of education expenditures using household survey (ECVMAS, 2012).

For the single cohort estimates, the targeted population for the intervention is arbitrarily fixed to 1000. All of the direct costs and direct benefits (except further wage benefits and extra education costs) are based on an average of 1000 and the final completion rate. For example, for mother tongue instruction, costs are based on the average of 1000 and 729 that is 865. The implicit assumption behind this is a linear decline across the 6 years from 1000 to 729.

The wages are adjusted for future unemployment – acknowledging that not everyone who graduates will work all the time for the rest of their lives and earn the increased rate. Time horizon is 55 years old for the single cohort approach and 50 years for the multiple cohort approach (which can explain part of the slight difference in BCR between the two approaches). Indeed, multiple cohort approach has to set up an end date at which the program stops.

4.1 Mother tongue instruction

In Haiti, education in the mother-tongue, namely Creole, was the subject of public debates. The debate was amplified by the adoption of the Act on the creation of the Haitian Creole Academy on April 23, 2013, 27 years after the 1987 Constitution in which it was required the creation of an academy to promote the development of the Creole language.

Providing education in the mother-tongue is likely to be successful in Haiti. Creole is the only language spoken by all Haitians and over half speak only Creole (one-fifth of the Haitian population is able to speak or understand French, with varying degrees of understanding and performance), so having French as the official language of instruction seems to be an impediment to schooling.

[2] For some further results on cost-effectiveness of interventions in developing countries using a sophisticated multiple cohorts approach, see UNICEF (2015).

However, although mother tongue instruction can lower dropout and increase primary school completion (as discussed in section 3), returns to speaking Creole are limited.[3] Indeed, there are potential negative effects of having less proficiency in a global language like French. Over 80% of the Creole speakers in the world live in Haiti and so the children will have to learn another language to broaden their economic horizons. What is more, if Creole is made the official language of instruction, private schools that have French as the official language of instruction will attract the wealthier students.

Table 2: BCR Mother tongue instruction

Discount factor	Benefits	Costs	BCR
Single cohort			
3%	$4 588 425	$339 814	13.5
5%	$2 664 737	$318 671	8.4
12%	$600 177	$258 923	2.3
Multiple cohorts			
3%	$94 483 637	$8 808 901	10.7
5%	$47 808 235	$6 036 525	7.9
12%	$6 503 310	$2 405 777	2.7

As a result of calculations for a single cohort, we find that BCR of mother tongue instruction intervention ranges from 2 (at 12% discount rate) to 14 (at 3% discount rate). Table 2 also provides comparison with multiple cohorts approach which are very similar although a bit lower due to calculation assumptions.

4.2 Training teachers

According to figures from the Ministry of National Education and Vocational Training (MENFP), public and non-public institutions offering in-service initial training for fundamental and secondary teachers are responsible for about 400 graduates every year. This number is insufficient to meet the needs of the country's basic and secondary education, especially since teachers are often low-skilled and very old.

Hence, the second intervention proposed is to increase in-service training for teachers in order to improve quality of education in Haiti. Many reports have outlined the fact that the quality of

[3] It is important to note that a disproportionate share of Haitians who attain at least secondary training do leave the island, and French (or perhaps English) language ability is undoubtedly important to mobility and, thus, returns to schooling.

education is, on average, rather low in Haiti, and increasing quality of education has appeared as the main goal of the new national education plan.

It is however not clear how training teachers will have significant beneficial impacts on educational outcomes. The greater concern is that we do not have very good information on how to make teachers more effective. For instance, Rivkin et al. (2005) found that the most effective teachers looked identical to the least effective ones in terms of training and experience. Similarly, Unicef (2015, p.72) concluded that, "a large proportion of students' learning is related to varying efficiency levels among teachers and schools that have the same resources, rather than to the measurable environment of the student, *e.g.*, textbooks, teacher qualifications, experience or professional training."

The Asim et al. (2017) review of evidence from schooling interventions in Asia suggested that one could get benefits from training parents or communities or else by providing tutors or non-contract teachers, but that training was of secondary importance compared to teacher incentives in improving test scores. Harris and Sass (2011) conclude that there is no consistent relationship between formal professional development training and teacher productivity.

In the end, the evidence on what makes for a good teacher is simply not that consistent. It seems clear that prior education such as a teaching degree or Master's degree does not explain variation in test scores, although that may be due to a lack of variation in the observed education levels of teachers. Learning on the job should matter, but results are mixed there as well. Teaching experience improves productivity (Harris and Sass, 2011), has no effect on productivity (Asim et al., 2017), or lowers productivity (Chingos and Petersen, 2011) depending on the study and context.

A recent study by McEwan (2015) has gathered 77 randomized experiments that evaluated the effects of school-based interventions on learning in developing country primary schools. It appears that teacher training has one of the largest and most significant effects among interventions, with an estimated mean effect size on student tests scores of 0.123 SD.[4] Based on this conservative assumption, and supposing no impacts on dropout and repetition rates, BCR for teachers training intervention ranges from 2 to 10 for the single cohort approach. When considering a multiple cohort approach, BCR ranges from 2 to 8 (see Table 3 below).

[4] According to McEwan (2005), teachers training intervention is "effective, on average, even with a full set of moderator controls." However, "the results on teacher training merit some caution, since the degree of overlap with other interventions is substantial, though it is telling that almost all successful instructional interventions in our sample include at least a minimal attempt to develop teachers' capacity to deliver effective classroom instruction."

Table 3: BCR Training teachers

Discount factor	Benefits	Costs	BCR
Single cohort			
3%	$1 358 920	$139 601	9.7
5%	$789 196	$130 801	6.0
12%	$177 750	$105 951	1.7
Multiple cohorts			
3%	$27 982 520	$3 617 305	7.7
5%	$14 159 011	$2 477 143	5.7
12%	$1 926 037	$984 417	2.0

4.3 Private schools subsidies

The third intervention considered is private school subsidies. One issue would be whether the subsidy could come in the form of vouchers or tuition subsidies. As already discussed in section 3, tuition waiver program seems to have a proven impact on participation in Haiti. However, by increasing the ratio of student by teacher, which could have a detrimental effect on educational outcomes, the net effects of subsidies is questionable.

Adelman and Holland (2015) have tried to evaluate the school-level impact of the tuition waiver program launched in 2007 in Haiti giving $90 per year per child – more than the estimated tuition fees – in order to cover furnitures. This program covered children aged 6-8 entering primary school. The paper concludes that a school's participation in the program results in having more students enrolled, more staff, and slightly higher student-teacher ratios. The program also reduces grade repetition and the share of students who are over-age.

Although serious methodological limitations of the study, it concludes that public funding of private schools is justified in countries such as Haiti and is a viable and promising option for assisting children who are excluded from the system.

Assuming a 30% effect of private school subsidies on the percentage of students completing primary school, we obtain lower BCR than in other primary education interventions considered here. Indeed, BCR ranges from 1.5 to 4.1 when calculated for a single cohort and from 1.6 to 3.5 when considering the multiple cohorts.

Table 4: BCR Private school subsidies

Discount factor	Benefits	Costs	BCR
Single cohort			
3%	$3 096 307	$750 823	4.1
5%	$2 041 322	$703 491	2.9
12%	$833 761	$569 841	1.5
Multiple cohorts			
3%	$67 389 585	$19 455 119	3.5
5%	$37 261 281	$13 322 937	2.8
12%	$8 234 282	$5 294 537	1.6

4.4 Providing school uniforms for free

School uniform represents a large share of education expenditure in developing countries and it is generally considered as a serious impediment to school enrollment. According to Kremer and Holla (2009), for instance, provision of free school uniforms leads to 10%-15% reductions in dropout rates. Using these estimates in our calculations (see Appendix), we find that the BCR for this intervention ranges from 1.4 to 4.4 when calculated for a single cohort and from 1.6 to 3.5 when considering the multiple cohorts.

Table 5: BCR Free uniforms

Discount factor	Benefits	Costs	BCR
Single cohort			
3%	$1 212 933	$272 722	4.4
5%	$778 222	$255 529	3.0
12%	$288 813	$206 984	1.4
Multiple cohorts			
3%	$26 078 738	$7 066 693	3.7
5%	$14 155 751	$4 839 297	2.9
12%	$2 886 599	$1 923 138	1.5

5. Conclusion

This paper presents comparative cost-benefit analysis of four primary education programs: mother tongue instruction, training teachers, private schools subsidies, and providing school uniforms for free.

An important limitation of the simulations is the availability of studies on the actual causal impact of interventions. One can use randomized experiments and impact evaluations in other countries but in reality estimates are highly dependent on the country and intervention context. So, it is often difficult to generalize the results obtained in these particular contexts. Furthermore, for calculating the costs and benefits of interventions, many assumptions need to be made with the data so that it is important to be cautious when providing recommendations based on the simulation results (*cf.* Dhaliwal et al., 2012).

The four interventions considered appear to be beneficial investments and could be recommended per se. However, it is important to note that some of them might be particularly beneficial and thus more desirable. Among the less costly and most efficient intervention is mother tongue instruction which presents high BCR for relatively low cost of implementation (even if implemented to a large population). The second most beneficial one appears to be training teachers, although costs might be more substantial if the goal is to implement this intervention in all Haitian schools. BCR for private school subsidies and free uniforms are relatively lower than previous ones, although they appear to be beneficial as well.

Table 6: Summary Table

Interventions	Discount	Benefit	Cost	BCR	Quality of Evidence
Mother tongue instruction	3%	$4 588 425	$339 814	13.5	Strong
	5%	$2 664 737	$318 671	8.4	
	12%	$600 177	$258 923	2.3	
Training teachers	3%	$1 358 920	$139 601	9.7	Strong
	5%	$789 196	$130 801	6.0	
	12%	$177 750	$105 951	1.7	
Private school subsidies	3%	$3 096 307	$750 823	4.1	Strong
	5%	$2 041 322	$703 491	2.9	
	12%	$833 761	$569 841	1.5	
Free uniforms	3%	$1 212 933	$272 722	4.4	Strong
	5%	$778 222	$255 529	3.0	
	12%	$288 813	$206 984	1.4	

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7. Appendix

7.1 Mother tongue instruction

Table A1.1: Target population

Parameters	Values	Sources/Comments
Target population - one cohort of primary school	1 000	Arbitrary number, can be changed
Pre-intervention, % students completing primary school	50%	From DHS
Post-intervention, % students completing primary school	73%	Bender et al. (2005)*
Pre-intervention, students completing primary school	500	Calculation
Post-intervention, students completing primary school	729	Calculation
Difference	229	Calculation
Real growth rate	2.70%	Assumption of Haiti Priorise

Note: *In their own language, dropout is 1/3 of non-mother tongue in Mail, and 25% lower in Guatemala. We take average.

Table A1.2: Costs

Parameters	Values	Sources/Comments
Upfront cost of mother tongue instruction for the cohort*	$6 536	4-5% of education budget (Ouane-Glanz, 2011, Chap. 6)
Training cost for 1 teacher for 1 year's curriculum	$500	From MENFP (Haiti gov), adjustment for the fact that one session of training is good for 4 cohorts
Training renewal time (years)	4	Assumption
Pupils per teacher	40	From School Census
Total cost of training for target population, one year*	$10 807	Calculation
Extra materials, USD per child	$16.80	Assume new materials equal to 10% of total cost of education
Cost of primary education including marginal food per child, 2017 USD	$168	Standardised assumption
Cost of less fluency in global lingua franca	-	No evidence but discussed in paper

Note: *Cost is based on average of 1000 and 729, so 865; the implicit assumption behind this is a linear decline across the 6 years from 1000 to 729.

Table A1.3: Benefits

Parameters	Values	Sources/Comments
Wages for no primary school completion	$996	From ECVMAS
Wages for primary school completion	$1573	From ECVMAS
% wage boost from mother tongue instruction	2.8%	Calculation
% impact on wages for a 1 SD increase in literacy score	8.8%	From Hanushek and Zhang (2009)
% impact of mother tongue instruction on literacy score	32%	Bender et al. (2005) (impact in terms of SD not reported)
Average unemployment rate across lifetime including formal and informal	23.8%	Average World Bank and CIA data.

7.2 Training teachers

Table A2.1: Target population

Parameters	Values	Sources/Comments
Target population - one cohort of primary school	1 000	Arbitrary number, can be changed
Pre-intervention, % students completing primary school	50%	From DHS
Post-intervention, % students completing primary school	50%	Assumption: no impact on dropout and repetition rates
Pre-intervention, students completing primary school	500	Calculation
Post-intervention, students completing primary school	500	Calculation
Difference	0	Calculation
Real growth rate	2.70%	Assumption of Haiti Priorise

Table A2.2: Costs

Parameters	Values	Sources/Comments
Training cost for 1 teacher for 1 year's curriculum	$500	From MENFP, adjustment for fact one year of training lasts multiple cohorts
Training renewal time (years)	4	Assumption
Pupils per teacher	40	Assumption
Total cost of training for target population, one year	$9 375	Calculation
Cost of primary education including marginal food per child, 2017 USD	$168	Standardised assumption
Wage of trained teacher	$3 391.20	From MENFP (Haiti gov) data
Wage of untrained teacher	$2 516.80	1.6 * Wages from primary completion
Extra wages (cohort)	$16 395	

Table A2.3: Benefits

Parameters	Values	Sources/Comments
Wages for no primary school completion	$996	From ECVMAS
Wages for primary school completion	$1573	From ECVMAS
% wage boost from trained teacher	6.2%	Calculation
% impact on wages for a 1 SD increase in literacy score	8.8%	From Hanushek & Zhang (2009)
% impact of teacher training on literacy score in terms of SD	11.4%	From McEwan (2015) - 0.123 SD effect, over 12.9 month treatment
Average unemployment rate across lifetime including formal and informal	23.8%	Average World Bank and CIA data.

7.3 Private school subsidies

Table A3.1: Target population

Parameters	Values	Sources/Comments
Target population - one cohort of primary school	1 000	Arbitrary number, can be changed
Pre-intervention, % students completing primary school	50%	From DHS
Post-intervention, % students completing primary school	65%	From Adelman & Holland 2015
Pre-intervention, students completing primary school	500	Calculation
Post-intervention, students completing primary school	650	Calculation
Difference	150	Calculation
Real growth rate	2.70%	Assumption of Haiti Priorise
Average number of children per private school	67	From School Census

Table A3.2: Costs

Parameters	Values	Sources/Comments
Cost of private schools subsidies, one year	$168	From ECVMAS
Total cost of private schools subsidies, one year	$138 600	Calculation
Cost of primary education including marginal food per child, 2017 USD	$168	Standardised assumption

Table A3.3: Benefits

Parameters	Values	Sources/Comments
Wages for no primary school completion	$996	From ECVMAS
Wages for primary school completion	$1573	From ECVMAS
Saved costs of education (households)	$126 000	Calculation
Average unemployment rate across lifetime including formal and informal	23.8%	Average World Bank and CIA data.

7.4 Providing school uniforms for free

Table A4.1: Target population

Parameters	Values	Comments
Target population - one cohort of primary school	1 000	Arbitrary number, can be changed
Pre-intervention, % students completing primary school	50%	From DHS
Post-intervention, % students completing primary school	56.3%	According to Kremer and Holla (2009): provision of free school uniforms leads to 10%-15% reductions in dropout rates. Although Kremer and Holla look only at dropout, we can suspect similar improvements in entry.
Pre-intervention, students completing primary school	500	Calculation
Post-intervention, students completing primary school	563	Calculation
Difference	63	Calculation
Real growth rate	2.70%	Assumption of Haiti Priorise

Table A4.2: Costs

Parameters	Values	Comments
Uniform per student	$51	
Total cost of uniform for target population, one year	$39 844	Calculation
Cost of primary education including marginal food per child, 2017 USD	$168	Standardised assumption

Table A4.3: Benefits

Parameters	Values	Sources/Comments
Wages for no primary school completion	$996	From ECVMAS
Wages for primary school completion	$1573	From ECVMAS
Saved costs of uniforms (households)	$38 250	Calculation
Average unemployment rate across lifetime including formal and informal	23.8%	Average World Bank and CIA data.

Cost-Benefit Analysis of Education Interventions

Haiti Priorise

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As part of the Haiti Priorise project to identify and promote effective solutions to Haiti's development challenges, four papers analyze the costs and benefits of eleven education interventions which have received much attention (and in some cases shown significant promise) in developing countries. The eleven analyzed interventions vary substantially – from expanding access to good quality early childhood education to providing secondary school scholarships to girls. However, all eleven are found to have benefit to cost ratios over 1.0 at reasonable discount rates, and could therefore be justified as promising interventions to pursue in Haiti. How should we interpret these results?

In this paper, I first provide a brief snapshot of the broader context of the Haitian educational system into which these interventions would be introduced, then synthesize the findings of the four papers and discuss how these findings compare with actual domestic and international investments in education. Finally, I argue that turning promise into outcomes relies heavily on the quality of implementation, and that these cost-benefit analyses should be combined with realistic assessments of implementation feasibility in order to prioritize investments.

Education context in Haiti, briefly

As is well-known, Haiti faces many challenges in achieving universal access to quality education at all levels. While about 90% of primary school-age children were enrolled at the last household survey in 2012, only about 50% of children actually complete primary school, and far fewer complete secondary or beyond. Moreover, since 2012, economic challenges and several key policy decisions have threatened the gains made during the 2000s, raising the possibility that enrollment and achievement rates may have actually declined in recent years.

Beyond the headline statistics mentioned above, there is important variation within Haiti as access to education depends greatly on urban/rural location, household wealth, gender, disability, and other factors. For example, regarding gender, while girls drop out at a faster rate than boys after age 14, this difference appears to be largely driven by the fact that girls progress through school more quickly than boys, as more 15-19 year old women than men have at least some secondary education (Cayemittes et al; World Bank 2014 and 2016).

In terms of education financing and provision, the public sector continues to play a minor role at all levels. Public schools only educate about 6% of pre-school students, 23% of primary school students, and 26% of secondary school students, while the rest attend a wide variety of religious, community-run, and for-profit schools. Relatedly, public resources are estimated to account for only about 30% of total spending on primary education, while households account for about 60%, and international donors the remainder (World Bank 2016). Vocational and technical education is also largely privately financed and provided; however, the Government does play a large role in providing university-level education.

Eleven promising interventions, in context

With this as the backdrop, we turn to considering the eleven interventions analyzed in the four papers by Damien Echevin, George Psacharopoulos, Antonu Rabbani, and Melissa Torchenaud. I leave aside a discussion on the justification for focusing on these interventions and not others, as well as the fact that the level of specification varies widely, from the very specific (e.g. "introduce a civics course in the lower secondary curriculum") to the very broad (e.g. "provide quality preschool education"). Instead, taking these interventions as described in their respective papers, the table below compares the estimated benefit-cost ratios at the 5% level.[1]

Based on these estimates, we could simply conclude that investments in early childhood education and in the quality of primary education are among the most promising for Haiti in terms of expected net benefits. Despite several shortcomings of the cost-benefit analysis in each paper, this conclusion in fact lines up well with a range of broader analyses, including Heckman's well-known investment curve and previous work done for the Copenhagen Consensus on the post-2015 development agenda (Glewwe and Kraft 2014).

How do these results compare to the actual distribution of education financing? This is not an easy question to answer given the limitations on existing data, but a 2014 analysis of international financing finds that roughly 80% is focused on primary education, with the remainder going to secondary (including vocational), pre-primary, and tertiary. Breaking down public spending by levels is even more difficult, and we are unable to say much beyond the fact that at least 30% (and likely much more) of the Ministry of Education's budget goes to primary, while very little (likely well under 10%) goes to pre-primary (World Bank 2016). In addition to being based on incomplete data, these estimates are also attempting to hit a moving target – international financing levels in particular fluctuate greatly over time, but domestic resources do as well, as priorities change across administrations. Despite these caveats, we can (guess-)estimate that the primary level receives the majority of public education financing, but that this financing continues to fall short of actual needs, while pre-primary receives very little public money relative to its potential returns.

However, moving from identifying broad priority areas to a plausible proposal for financing and implementing interventions is exactly where much development work breaks down. I provide two specific examples based on the analyzed interventions. First, early childhood education investments are widely considered to have the types of large returns assumed by Rabbani only if the service being provided is of reasonably good quality. In Haiti, the starting point is a system with widely varying but on average very low quality provision and almost no public financing or

[1] All of the papers consider a 3%, 5%, and 12% discount rate, and the conclusions are qualitatively similar across all three.

oversight.[2] While the average annual operating cost per student used by Rabbani of roughly 160 USD is reasonable based on known costs in Haiti, the start-up costs (both financial and political) of asserting public authority in the sector, developing both pedagogical and bureaucratic management capacity, and improving physical spaces for classes in order to reach a minimal level of quality are likely to be very high. Moreover, even with expected high returns, identifying a reliable and recurring public source of financing for early childhood investments is a difficult task in a context where primary and secondary education are underfunded.

Second, the discussion around interventions to improve the quality of primary education relies on the assumption that the majority of children are in school. While this was true in 2012 as mentioned above, because public financing for primary education has fallen in subsequent years, enrollment rates are also at risk. Therefore, the extent to which the government will finance primary education, and with what resources, should be resolved as a matter of priority over and above other interventions. Beyond this challenge, considering the two quality interventions with the highest estimated ratios – mother tongue instruction and teaching at the right level – several factors suggest that effective implementation in Haiti would be costlier and generally more resource-intensive than assumed. First, regarding mother tongue instruction, the Ministry of Education has already directed schools to begin teaching students to read and write in Haitian Creole, rather than French, but anecdotal evidence suggests that most schools do not comply. Many reasons lie behind this – including parents' preference for their children learning French and the lack of Ministerial authority over a largely private sector (Adelman et al 2015). These reasons imply that progress (which is being made) requires building consensus across stakeholders, developing new materials in Creole, and re-training teachers – all costly and time-consuming efforts that are not fully factored into the analysis. Beyond Haiti, most of the evidence from rigorous evaluations of interventions on education quality in developing countries (including on teaching to the right level) comes from interventions implemented by non-governmental actors, and efforts to scale up these interventions through government have met a range of difficult and sometimes unpredictable challenges, which entail substantial extra costs, effort, and time to overcome (Bold et al 2013; Kerwin and Thornton 2015; Banerjee et al 2016).

In addition to these examples, every other intervention analyzed across the four papers could (and should) be carefully considered for feasibility in light of the known challenges of the context. Regarding the conditional cash transfers analyzed by Rabbani and Torchenaud, a program would need to factor in the costs of not only setting up the basic systems effectively from scratch but also of achieving agreement on targeting, given that identity registration systems do not function and 70% of the population is either poor or vulnerable to falling into

[2] Very little reliable data exists on the ECE sector in Haiti, but field visits and anecdotal evidence point to classrooms of over 40 children with little to no materials as a common occurrence.

poverty (World Bank). Regarding vocational education, as rightly pointed out by Psacharopoulos, existing programs in Haiti and many other countries have run into the added costs of providing substantial remedial education because basic skills are so weak and of identifying labor demand because markets are largely informal and almost no labor market information exists (World Bank).

Table 1: Estimated Benefit-Cost Ratios across eleven education interventions

Education level targeted	Intervention	Author	Benefit-cost ratio at 5% discount rate
Pre-primary	Two-year early childhood interventions at the pre-primary phase	Rabbani	13.9
Primary	Teaching at the right level	Rabbani	8.8
	Mother tongue instruction	Echevin	7.4
	Training teachers	Echevin	4.4
	Private school subsidies	Echevin	3.3
	Free school uniforms	Echevin	2.0
Secondary	CCT for secondary school	Rabbani	5.0
	CCT for girls in secondary school	Torchenaud	6.9
Lower secondary	Adding a civics course to the secondary school curiculum	Psacharopoulos	4.9
Upper secondary	Providing 3-year vocational education program	Psacharopoulos	2.0
	Creating a gap year program of civics and vocational education	Psacharopoulos	2.5

Conclusions

Considering the findings of the four papers on potential education interventions in Haiti altogether, it is clear that in a context where attainment and learning are so low, almost any reasonable intervention could have substantial net benefits. More importantly, the results point to a focus on early childhood and primary education as most likely to provide the largest long-term benefits, consistent with the broader literature and other research on education in Haiti. However, what the papers do not address is how feasible it would be to implement any of the analyzed interventions, including a broader consideration of the costs and time required. This is where I very much hope the conversation will go, as Haiti's future will be shaped by the human capital it builds today.

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Haiti faces some of the most acute social and economic development challenges in the world. Despite an influx of aid in the aftermath of the 2010 earthquake, growth and progress continue to be minimal, at best. With so many actors and the wide breadth of challenges from food security and clean water access to health, education, environmental degradation, and infrastructure, what should the top priorities be for policy makers, international donors, NGOs and businesses? With limited resources and time, it is crucial that focus is informed by what will do the most good for each gourde spent. The Haïti Priorise project will work with stakeholders across the country to find, analyze, rank and disseminate the best solutions for the country. We engage Haitans from all parts of society, through readers of newspapers, along with NGOs, decision makers, sector experts and businesses to propose the best solutions. We have commissioned some of the best economists from Haiti and the world to calculate the social, environmental and economic costs and benefits of these proposals. This research will help set priorities for the country through a nationwide conversation about what the smart - and not-so-smart - solutions are for Haiti's future.

For more information visit www.HaitiPriorise.com

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