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Benefit-Cost Analysis

Cost-Benefit Analysis:
Improving Girl's Retention in School

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Un plan de **développement** alternatif

COST-BENEFIT ANALYSIS: IMPROVING GIRL'S RETENTION IN SCHOOL

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0.1. Academic Summary

Despite conventions and declarations, programs from different projects in support of Basic Education, the disparities between boys and girls in enrollment and retention remain a concern, especially in developing countries. In Haiti, much remains to be done in this area to achieve schooling at all levels for girls. The purpose of this study is to identify and analyze the costs and benefits of a program relating to improving the retention of girls in schools at the secondary level in rural Haiti, which will bring maximum benefits per gourde spent.

The proposed program is a program that provides assistance scholarships that cover the schooling fees of 6,583 of the most disadvantaged girls in rural areas of the country. This program accrues such direct costs such as the cost of the amount of the scholarship, the cost of managing the scholarship funds. Indirect costs are associated with the opportunity cost of time, the cost of extending the program throughout the country, and the cost of a survey for the identification of recipients. The expected benefits are: wage benefits, benefits of preventing incidences of Human Immunodeficiency Virus (HIV), benefits of preventing infant mortality, benefits of preventing teen pregnancy and low birth weight, and benefits of preventing the failure to thrive in children. Benefits-Cost Analysis allows us to show that investing in this project would be profitable for the country. Indeed, based on the criterion of the Benefit-Cost Ratio (BCR) analysis, it has been proven that the girls not only come out largely benefiting from the program, but the gourdes invested in this program will especially yield huge economic and social benefits for the country.

0.2. Policy Summary

0.2.1. Overview and Background

0.2.1.1. Issues

In the education sector, there are major discrepancies in terms of residence, gender and the economic conditions of parents. If at the primary level the figures indicate a constant parity, the situation is different for the secondary. As the age of girls increases the gap between the school attendance of girls and boys increases. This gap is even greater for those living in rural areas, as

well as for those whose parent's economic situation is difficult. This is explained by the fact that most schools Haiti are private, making it very difficult for most parents. The cost of education remains excessively high compared to the income of families (According to the World Bank 40% of the average income earned is allocated to education). From the start, we face a situation where the poorest, who are the majority, are the most affected by the weakness of the education system as a whole.

Cases of dropping out are very common among rural girls. Indeed, the poverty rate is much higher in rural areas (over 70%) and parents struggle to continue to cover the cost of schooling for their daughters until the end of their studies. The latter must often repeat a grade and even are forced to drop out for various reasons including non-payment of fees or of teen pregnancies. Also according to the United Nations (UN), the education of girls is a guarantee for sustainable development in their nations. Therefore, we must consider the many causes that are preventing girls from completing their education and try to propose solutions. The real problem is not only increasing the enrollment of schoolgirls, but also keeping them in classes so that they can complete their studies.

0.2.1.2. Assistance Program

The program includes a series of varied activities, particularly focusing on girls living in the most disadvantaged rural areas of the country, most susceptible to not pursuing their secondary studies due to their parent's economic difficulties. Studies show that we see the most cases of girls dropping out of secondary school. Therefore, this program will focus on granting secondary school scholarships to girls ending on the last basic education in rural areas of the country. These scholarships will provide free tuition and the provision of learning materials and uniforms for 6,583 secondary schoolgirls in rural areas. Recipients will therefore be those who have not been able to earn a place in public schools (being limited in number across the country) to continue their studies and if their parents cannot afford to pay the school fees for private schools. They will be identified through a regional survey on the identification of recipients.

0.2.2. Factors relating to the implementation

0.2.2.1. Costs

The direct costs of the program include those accrued while generating the funds for the academic support scholarships that will be granted to girls finishing their last elementary cycle (9th grade) whose parents are disadvantaged, so that they can complete their studies. These costs include the cost of the amount of the scholarship and the cost of managing the scholarship funds. Indirect costs associated with the opportunity cost of the time, the cost of a survey for the identification of recipients and the cost of extending the program across the country.

Table 1: Costs per recipient per year in gourdes

Program extension cost	1,489
Scholarship amount	29,782
Scholarship management fees	2,978
Cost of performing the survey	5,317
Time opportunity cost	27,669
Total	67,236

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

The total costs for 6,583 recipients for 4 years, therefore amounts to **1,770,324,820 gourdes**.

0.2.2.2. Potential sources of revenue

To address the various costs associated with the implementation of the program, we rely on internal resources (public treasury). Moreover, one can also take the opportunity to initiate financing mechanisms [1] to finance the operation.

0.2.2.3. Indicators of success and audit

To follow-up on the progress of the program's results, we will use the evolution of the following indicators: Increase in net enrollment rate for girls in secondary school, higher gross enrollment rate for girls in secondary school, higher net rate attendance of schoolgirls, reduction of dropout

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[1] According to the OECD, these are mechanisms for mobilizing funds to support international development and going beyond traditional patterns of expenditure that share the following characteristics: Engaging the public sector, transfer of resources to developing countries and the mobilization of additional funding

rate of girls in secondary school, increased school completion rates for girls, increased gender parity index between the sexes, declining birth rates among adolescents, reduced infant mortality, percentage reduction of teen pregnancy, etc.

0.2.2.4. Enforcement agency

The main implementing agency of the program is the Ministry of National Education and Vocational Training (MENFP). This ministry is responsible for the development and monitoring of state educational policies, education resources management, cooperation and regulation.

0.2.2.5. Timing of program implementation

The program will launch for the 2017-2018 academic year and will take place over a period of 10 years. During this period, the MENFP will ensure the annual payment of tuition, payment of food expenses and the provision of learning materials for a group of girls admitted into secondary school to the end of their standard studies, over a 4-year period. However, the cost-benefit analysis that is included in this document will be made only for the inclusion of the first group of recipients.

0.2.2.6. Risks

The main risk that could threaten the implementation of the program are the financial restraints. Haiti constantly encounters huge budgetary issues. It does not manage to collect the necessary resources to finance development projects. In the case of our program, the MENFP could face difficulty in mobilizing enough domestic resources in the national budget to finance the tuition fees for all the selected scholarship recipients. In addition to this risk, we also have other threats such as non-compliance with the scholarship selection criteria, the mismanagement of the program funds, the risk that recipients will not regularly attend or no longer attend school during the year for reasons such as early pregnancy or obligations at home. This can lead to the repetition of certain recipients at the end of the year and at the same time to their disqualification for the scholarship.

0.2.3. Justification for the program

0.2.3.1. Benefits

The program will ensure that more girls can continue and complete their secondary education. World Bank studies show that, in general, that one year of secondary schooling above the average raises the potential individual salary from 15 to 25%, the increase being overall greater for girls than for boys. Thus, the implementation of the program will lead to direct wage benefits for recipients. Besides this advantage, the program also provides benefits including preventing instances of HIV, preventing instances of infant mortality, preventing instances of teen pregnancy and low birth weight, and preventing the failure to thrive in children.

Table 2: Benefits per recipient per year in gourds at a 5% reduction rate

Wage benefits	261,665
Infant mortality prevented	61,064
The failure to thrive prevented	19,482
Incidences of HIV prevented	3,992
Instances of teenage pregnancy and low birth weight prevented	468
Total	346,671

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

It was assumed that out of the 6,583 recipients of the first group, 85% of them will graduate from high school. So the real total benefits for financing secondary school for the first group of recipients are equal to **7,758,674,639 gourdes**.

0.2.3.2. Description of the recipients

The program's principle recipients are girls aged 15-19 who have completed the 3rd year of primary education, are admitted to secondary 1 and traditionally called 3rd secondary. The selection cover the whole territory of the country, particularly in the most disadvantaged rural areas.

0.2.3.3. Unmeasured benefits

Due to a lack of reliable data from across the country, some benefits could not be quantified. These include, among others: faster economic growth, food security for the population, family well-being, women's well-being.

0.2.4. Table of costs and benefits

The following table summarizes the costs and benefits per recipient at a 5% reduction rate. The first takes into account the costs and benefits per recipient and the second represents the total costs and benefits for 4 years of the program for the first recipient group. The Benefit-Cost Ratio (BCR) index is also calculated to determine the program's level of effectiveness.

Table 3: Costs and benefits per recipient at a 5% reduction rate

	Benefits	Costs	Benefit-Cost Ratio	Data Quality
Improved retention of school girls	*346,671*	*67,236*	*5.2*	*High*

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

Table 4: Total costs and benefits of the program at a 5% reduction rate

	Benefits	Costs	Benefit-Cost Ratio	Data Quality
Improved retention of school girls	*7,758,674,639*	*1,770,324,820*	*4.4*	*High*

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

List of abbreviations

ODA: Official Development Assistance
BPN: Low birth weight
CCC: Copenhagen Consensus Center
CEDAW: Convention on the elimination of all forms of discrimination against women
DALY: Year of Life Adjusted on Disability
DGI: National Tax Office
DPEC: Department of Planning and External Cooperation
ECVH: Survey on living conditions of Life in Haiti
ECVMAS: Survey of Living Conditions of Households after the Earthquake
EMMUS: Mortality, Morbidity and Use of Services Survey (Enquête Mortalité, Morbidité et Utilisation des Services)
EFA: Education for All
UPE: Universal Primary Education
FGRM: Minimum Income Guarantee Fund
FSSAP: Female Secondary School Assistance Program
GTEF: Work Group on Education and Training
HISI: Haitian Institute of Statistics and Information
MEF: Ministry of Economics and Finance
MENFP: Ministry of National Education and Vocational Training
MSPP: Ministry of Public Health and Population
STD: Sexually transmitted Disease
OECD: Organization for Economic Cooperation & Development
ODD: Sustainable Development Goals
MDG: Millennium Development Goals
UN: United Nations
BCR: Benefit-Cost Ratio
AIDS: Acquired Immunodeficiency Syndrome
NSA/EFA: National Strategy for Action Education for All
ART: Antiretroviral therapy
UNESCO: United Nations Educational, Scientific and Cultural Organization
UNFPA: United Nations Fund for Population Activities
UNICEF: United Nations International Children's Emergency Fund
HIV: Human immunodeficiency virus
WHO: World Health Organization
YLD: Years Limited by Disability

Introduction

Education plays an important role in the empowerment of girls and boys. It gives them the skills and knowledge to stay healthy, to secure employment, better pay, and to be active in the development of their community and society in general. For many years, the education of girls was neglected, until in 1948 with the Universal Declaration of Human Rights, which stipulates the educational rights of every individual, nations have committed to the fight for the education of all girls worldwide. The signing of the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) in 1981, the Millennium Development Goals (MDGs) in 2000 had strengthened this determination. Despite all these conventions and declarations, the disparities between boys and girls in enrollment and retention remain a concern in Developing Countries. Especially in the 2000s, Haiti had one of the lowest school enrollment rates in the world with a net enrollment rate is about 60% according to UNICEF. In recent years, the country has made significant progress in terms of education: the level of school attendance from 50% (EMMUS 4) to 77% in 2012 (EMMUS 5). Despite these remarkable advances, the country is still below the world average in developing regions, the net rate of overall enrollment is estimated at 90% in 2011 and below the regional average in Latin America and the Caribbean, this being 95%.

Furthermore, there is much to do to retain students in schools in Haiti. While in 2012 about 90% of primary school aged children were enrolled as noted in the last household censuses, only 50% of these children completed primary school and much less completed their secondary education. These figures reveal that gender differences that exist at the secondary level did not differ significantly between urban and rural areas. However, girls drop out more quickly than boys after the age of 14. This difference is uniform in urban and rural areas and is probably due in part to the fact that girls mature faster than boys[2]. Moreover, according to the 2010-2011 statistical directory, about 50% of rural girls drop out of school in the transition period from the 9th grade to the 1st year of secondary school. This situation is worrying because dropouts are expensive for the government and society in general.

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[2] World Bank, 2016, better spending, better service: Journal of Public Finance p.16.

Although according to UNICEF, 70% of young women, aged 15 to 24 are literate in Haiti, the fact is that they leave school earlier than boys do. The challenge remains to identify strategies to not only bring girls to attend school at a higher rate but also to ensure that they can stay there, advance and graduate successfully. For this reason, the state must develop policies and programs that first take into account the reasons why girls drop out more easily than boys and then investing in the redistribution of resources while targeting the education of girls and by adopting special measures to reduce the number of girls that dropout of secondary school. One of the solutions proposed by Barbara Herz[3] in her article "Educating girls: Solutions that Work" is to make the cost of educating their daughters affordable for parents. According to her, the most direct and fastest way to strengthen and improve the school attendance of girls is to reduce what it costs for parents to educate their daughters. For example, China, Indonesia and Uganda, among many other countries, saw the enrollment of girls in primary schools increase after reducing tuition fees as part of broader education reforms.

She argues, scholarships or financial aid programs can help increase the enrollment of girls at both the primary and secondary level. She references the Female Secondary School Stipend Program in Bangladesh as an example. Through her efforts, nearly two thirds of girls now attend school, equaling the number of boys. All girls living in rural areas can receive a scholarship if they regularly attend to school, get good grades and do not marry during their schooling. The program not only helps retain schoolgirls but also encourages academic achievement and delays early marriage.

Thus, in our work, we propose a process that involves granting secondary school scholarships to girls from ages 14 to 19 in order to improve the matriculation rate of girls at school.

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[3] Barbara Herz is a specialist in the politics of educating girls. A member of the Council on Foreign Relations, she worked for the US Agency for Development and the World Bank where she founded the Women's Division in the development and led the work on education and health in Bangladesh, Pakistan and Sri Lanka.

Objective of the work

In this document, we want to determine whether the program presented in the policy summary will be a good investment for the country. To do this we will determine the costs and benefits that could result from its implementation and then analyze them.

Sub-classification of the work

The study is organized into four parts. To venture behind the scenes of education in Haiti, a diagnosis of the state of the survey is necessary. That is why in the first part, some background on education in Haiti will be presented. The second part is that the literature review around our research topic. The analysis we propose is a series of studies, which resemble our research topic. First it includes a historical overview on the willingness to take into account the case of girls in education. Then will follow a presentation on the different effective experiences that have already been applied worldwide for the retention of schoolgirls, after having presented a study by the World Bank on actual costs of dropping out. The third part will indicate the theoretical orientation of our work. The theory of human capital will be the essential component of this part. In the fourth and final part, we present the different results of our study of the costs and benefits that will generate our program. We will also proceed to calculate the cost-benefit ratio, which measures the price of each gourde invested in the project, before making the necessary conclusions and recommendations.

1. Education in Haiti at a glance

1.1. Organization of the Haitian educational system

According to the 1982 law, Haitian schools are defined as the establishment of a unique teaching system applying equally to public and private institutions and providing equal opportunities for all. This educational system includes four levels of education. Under the terms of this law, these are the 4 levels of education: nursery or Preschool (ages 2-5), 9-year primary school which includes 2 cycles (1st cycle: ages 6-11 and 2nd cycle: ages 12-14), secondary education (ages 15-19) and higher education (19+). However some schools still adopt a traditional structure that divides the school system into 4 levels which are: Preschool ages (2-5), Primary School (ages 6-11), Secondary School that includes 2 cycles (1st Cycle: ages 12-14 and 2nd Cycle: ages 15-19) and higher education. These levels are organized around a network of public and private schools, established throughout the whole country. The private network is now much larger than the public sector[4].

1.2. Characteristics of the Haitian education system

The Haitian educational system is characterized by the:

Unequal distribution of educational provisions. What is offered is clearly dominated by the private sector and unevenly distributed throughout the territory. Over 80% of schools are private and therefore paying, and secondary schools are highly concentrated in urban areas.

Inefficiency of the educational system. We can see that school success rates are very low during official baccalaureate exams and dropout rates very high: repetition and dropping out. Students cannot really meet the requirements. The secondary level admission rate is only 21.5%. The completion rate for the first two fundamental cycles was estimated at 66.2% in 2012, a decrease of 1.8 points compared to 68% in 2008. According to data from the HISI (2003), only 19% of entrants in the system (from 6 years) have completed at least one year of secondary school. The NSA/EFA (MENFP, 2007) points out that out of a group entering seventh AF, only 7.8% get their

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[4]MENFP, 2013-2014 Statistical Census, p.18

diploma upon completion of secondary education. The 2010 census also describes this trend at the primary level by informing on a group of 100% of children admitted in their 1st year, out of these only 50.8% reach 6th grade.

Overcrowding in public schools and secondary schools. The physical conditions are conducive to learning no suitable for the student. There are a high number of students per class so that some attend the school year standing up. Public schools are starved of adequate materials and where do they exist, they are not treated well.

Marginalization in rural education. Rural school attendance rates calculated for extremely poor children is 50% against 59% for the Metropolitan Area. In addition, rural girls are less educated (near 50%) than those in the Metropolitan Areas, for example (near 70%). The net enrollment rate in secondary schools in the metropolitan area is 5.5 times that of rural areas.

The majority of dropouts are among girls from rural areas. Across the country, the school attendance rate is higher for boys than for girls. Similarly, the difference is even more alarming in rural areas than urban areas. Moreover, when one takes into consideration the level of household income, the gross enrollment rate for students from the richest households is far higher than that of students from the poorest households (71% vs. 23%). The latest poverty surveys in Haiti confirm that poverty is concentrated in rural areas with a contribution rate of 77% in extreme poverty. And in rural areas, girls are more likely to drop out because of their parent's economic difficulties.

2. Documentation Analysis

2.1. Historical analysis of interest in gender equality in education

From the 1948 Universal Declaration of Human Rights which states that everyone has the right to education, to the development of the Sustainable Development Goals (SDGs) in 2015, various measures have been taken to reduce the disparities between girls and boys in the access, retention and completion of primary and secondary cycles. The first call was made in 1962, when the UNESCO convention urged all States to formulate policies conducive to the promotion of equal opportunities at all levels of education in order to banish discrimination in all its forms. Efforts were deployed throughout the world to realize its ambitions. Moreover, in 1981, the ratification by 173 countries of the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) came to support this mutual concern with very general provisions on the Elimination of gender-based discrimination. This instrument proclaimed that it must be done with "*no distinction between men and women in regards access to education*," and called for equal opportunities and elimination of any stereotyped concept of the roles of men and women.

Additionally, other important provisions have been adopted including the Dakar goals and the Millennium Development Goals (MDGs) of the early 2000s, which advocated for not only Universal Primary Education (UPE), but also the elimination of gender disparities in primary and secondary education by 2005 and the entire educational system by 2015. Since then, major progress has been made in improving access to education and increasing enrollment rates during primary education especially for girls. However, few countries have achieved this target at all levels of education. That is why in 2015 the 4th SDO goal also supports universal access to quality education on an equal basis, and promotes lifelong learning opportunities by the year 2030.It is therefore necessary, especially for developing countries to redouble their efforts to move forward even faster towards achieving the objectives in the field of universal education.

2.2. Impacts of girls' education on society

Investing in girls' education is one way to fight against poverty. Indeed, girls' education leads to many benefits on society and on the economy of a country. Among the many articles that have addressed the subject extensively, both are presented in the following lines.

2.2.1. Global Monitoring Report on Education for All (EFA), UNESCO[5]

A mother's education is crucial for her own health. If every girl finishes primary school, the number of maternal deaths would be reduced by two thirds, which would save 98,000 lives. In SSA (Sub Saharan Africa), if every girl finishes primary school, the number of maternal deaths would be reduced by 70%, which would save nearly 50,000 lives.

Educating girls can save millions of lives: if every girl finishes primary school, infant mortality would decrease by 15%. If each adolescent attended secondary school, infant mortality would decrease by half, which would save 3 million lives.

A mothers' education improves children's nutrition. If every girl finishes primary school, 1.7 million children escape the failure to thrive due to malnutrition. If all adolescents attended secondary school, 12 million children would escape the failure to thrive due to malnutrition.

Girls who have reached higher levels of education are less likely to have an unexpected pregnancy. If every girl in sub-Saharan Africa and South and West Asia finished their primary education, the number of adolescents under 17 years old with a child would be reduced by 10%. If every of sub-Saharan Africa and South and West Asia attended secondary school, the number of adolescents under 17 years old with a child would be reduced by 60%.

Promoting girls' access to education is a key factor in the demographic transition to reduce birth rates. In sub-Saharan Africa, women who have no education have an average of 6.7 children. The figure lowers to 5.8 for women who have completed primary school and 3.9 for those with a secondary education.

Girls who have accessed higher levels of education are less likely to marry early. If every girl finishes primary school, the number of early marriages would be reduced by 14%. If every girl attended secondary school, the number of early marriages would be reduced by two thirds

Education reduces the wage gap between men and women. . In Pakistan, women who have completed primary school earn 49% less than that of men. Those with a secondary education

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[5] Global Monitoring Report on the EFA, Fact Sheet, October 2013

earn 30% less than that of men. In Jordan, women who have completed primary school earn 47% less than that of men. Those with a secondary education earn 37% less than that of men.

Educated *women are more likely to find a job*: In Brazil, only 37% of women who have not completed primary school work. This figure reaches 50% if they have completed primary school, and 60% if they have a secondary education.

Women's Empowerment. Education gives women the ability to overcome discrimination. Girls and young, educated women have a greater awareness of their rights, and they enjoy more confidence and freedom to make decisions that could affect their lives, improve their health and chances of survival as well as their children, and increase their employment prospects. In sub-Saharan Africa and South and West Asia, one in eight girls is already married by the age of 15, and one in seven is already a mother at the age of 17 Keeping girls in school is one of the surest ways to prevent child marriage and early pregnancy. Education is also a key factor in accelerating the demographic transition to lower birth and mortality rates.

2.3. Actual costs of girls dropping out of school, World Bank

Early pregnancy is one of the banes that prevents teenagers from completing their studies. A study by the World Bank shows the opportunity costs associated with teen pregnancy and school dropout. This study reports that if the teen had delayed pregnancy until their early twenties, Brazil and India would have had an increased revenue of more than $3.5 billion and $7.7 billion respectively. Therefore, adolescents dropping out of secondary education is very expensive for the country. It generates not only economic costs, but also social costs. It generates not only economic costs, but also social costs.

The economic costs to cover the loss of productivity in the workforce and the costs incurred for women's health; studies by the World Bank show that children of teenage mothers in turn reach a lower level of education. The real social costs include those of the poorer health status of these adolescents' children, a shorter life expectancy at birth, the difficulty of unemployed adolescents to gain skills, and weaker social empowerment.

2.4. Different types of programs for the retention of schoolgirls

In 2014, experts from different institutions[6]and various universities around the world came together to produce a study on the different types of programs to improve the retention of schoolgirls. This study proposes a theory of change, developed as a multilevel model for examining the relationships within the context, the various forms of programs, the results for girls' education and more general results of gender equality. This theory distinguishes three types of programs that may have overlapping concerns. These include programs focused on resources and infrastructure, programs focused on the evolution of the institutions and programs focused on the evolution of standards and a more marginalized inclusion in decision-making in matters of education.

Programs *focused on resources and infrastructure:* These are the physical inputs and materials that target the supply, demand or the two combined. These include the provision of financial support (eg scholarships, fund transfers, fee exemption, lower costs or child grants, school feeding programs). The development of infrastructure (eg roads, building new schools and reinforcing existing schools, boundary walls, water, sanitation, electricity, provision of boarding schools, improved transportation). The literature reviewed shows that the effectiveness of the programs in terms of resources depends on carefully targeting families whose resources are inadequate and carefully designing programs focused on the most at-risk girls.

Programs focused on policy development and changing institutional cultures at different levels (International, national, provincial or local) or the implementation of changes in policy and practice, either by changing the culture or the social relations of institutions. These include legislation and the integration of the gender dimension in educational administrations focusing on gender and learning by adopting curricula, pedagogues, training programs for teachers and teaching material that takes into account gender-specific characteristics, the presence of

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[6] Education Rigorous Literature Review, Girls' education and gender equality, June 2014. Authors: Elaine Unterhalter, Amy North, Jenny Parkes (Institute of Education, University of London), Madeleine Arnot (University of Cambridge) Cynthia Lloyd (Independent consultant), Lebo Moletsane (University of KwaZulu Natal), Erin Murphy-Graham (University of California, Berkeley), Mioko Saito (International Institute for Educational Planning, UNESCO)

teachers and supervisors in schools, on women's involvement in community with school boards, on the association of education with the workforce and other social development strategies, and the development of links with health programs and social protection (including HIV). A significant number of studies suggest that successful programs related to institutional change and policy in the education sector could also have a greater impact on the results of the gender equality.

Programs aimed at changing gender norms and strengthening inclusion: These programs focus on the discussion, reflection, decision making and action for groups and individuals previously excluded. This include the development of girls' clubs, work with boys, control strategies against gender-based violence (eg, through training, school policies or work with boys), opening spaces for girls' opinions, advocacy campaigns for girls' education and links with women's rights activism, engagement in religious communities, a realization that girls' education does not prevent other attachments (eg, family, religion or friendship), questioning the dominant genre traditions in the national culture and local religions while also recognizing the importance of culture in people's lives, working with groups and marginalized communities and literacy programs

2.5. Some programs executed in other countries

In our program, we opted for granting scholarships to girls based on the economic situation of their parents. These awards are a means of encouraging girls to continue their secondary education. Many countries have already experimented with a scholarship system for disadvantaged girls as a policy of equal opportunities in education. A selection of two of these experiments were carried out.

2.5.1. Secondary school scholarship program for girls in Bangladesh[7]

The current national program in Bangladesh since 1994, the Female Secondary School Assistance Program (FSSAP) has had a significant impact on school enrollment. To qualify, girls must attend school for at least 75% of the school year, earn specific test scores and grades, and remain single. The disbursements are paid directly to their bank account, which helps them develop

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[7] Mentioned in the introduction

their sense of responsibility. This had a positive impact on the retention of schoolgirls in Bangladesh.

2.5.2. The "Bolsa Escola" program in Brazil

The "*Bolsa Escola* ", in English the "School Scholarship" is a Brazilian innovation policy launched for the first time from 1993 to 1996 in the district of Brasilia by Cristovam Buarque, the State's Governor. This program, which aimed to prevent child labor and school desertion offered financial assistance to the poorest families in exchange for their children's regular school attendance. It was later implemented in various municipalities of Brazil. Among them, Belo Horizonte, the state capital of Minas Gerais, as well as Recife, Belém, Campinas, each implementing it according to a particular modality. In 2000, the federal government nationalized the initiative by creating a program, the FGRM (Minimum Income Guarantee Fund), intended to partially finance the *Bolsa Escola* programs in the country's states and municipalities. In 2004, the *Bolsa Familia* (Family Scholarship) replaced *Bolsa Escola* at the federal level, melting together he different social aids for needy families (including food, gas payments, and finally school) in order to secure more resources and to provide a more globalized action. This program has had a much more significant effect for girls whose numbers in schools have increased dramatically. Kenya and Nicaragua have also had promising results with scholarship programs.

3. Theory

From an economic point of view, education benefits the community through growth, but it has a more direct benefit on individuals. It is established that investing in human capital is not only a source of income, but it helps protect against unemployment and job insecurity. Our study is based mainly on the human capital theory.

3.1. Human capital theory

Economists have recognized the importance of investing in human beings since the pioneering work of Mincer (1958, 1974), Shultz (1961) and Becker (1962). Expenses dedicated to education,

vocational training, labor migration and health care contribute to an increase in the quality of labor and an increase productivity. The impacts of capital investment[8] are:

a) *Individual income*

Mincer elaborated on the formula that currently takes the human capital earnings function and draws on the work of Becker: $\log(y) = a + bS + cX + dX^2 + e$ (1)

Where y represents the individual's salary (which can be measured by the hourly, monthly, wage etc.), S being the number of years of education received and X being the number of years of professional experience, and e the error variable. International bodies (the World Bank, in particular) based the estimates provided using the remuneration function to assist in the definition of public policies for education (Bennell, 1996). However, against the Mincer model, one can notice that it hardly takes into account the variable quality of education.

b) *Economic growth*

Human capital has a positive impact on economic growth. The observation highlights the principle that the benefit of education obtained is significantly greater at the level of the society than the sum of individual benefits. The result is that education affects not only the individual's productivity but also that of those around him/her. Economists designate this phenomenon by the "externalities" as positive, associated with human capital. There are two different methods to measure the benefits of education for the entire economy, one micro and one macro. Both take into account the externalities of human capital but diverge concerning the treatment of these externalities. Macroeconomic models are based on the endogenous growth theory (Romer, 1986), ranking human capital as the main source of economic growth.

To measure the level of a country's human capital and the extent of its impact in terms of economic growth, Lucas (1988) it takes into consideration that the production of a company is due as much to the human capital of the employees as it is to the average human capital across the economy. Alternatively, if a company remunerates its workers by paying them wages, it does

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[8] UNICEF, Non-schooling in Morocco An analysis in terms of opportunity cost, capital investment impacts, p15

not compensate the average human capital factor in the overall economy for its contribution to the production of this company. Therefore, this latter factor induces a positive externality. However, human capital investment decisions are individual and do not take private returns into consideration. This raises the question of how to "internalize externalities", i.e. it aims to find ways to encourage an individual to consider the public interest when deciding the number of years of schooling he/she will pursue. It is up to public policy to influence all individual decisions to meet the strategic objectives of human capital investments.

Makiwl Romer and Weil (1992) used a measure of schooling as a proxy for human capital accumulation and found that the model scope was well within the data in terms of convergence on growth predictions and estimates of production elasticizes.[9] In a micro economic perspective, Black and Lynch (1996) find that human capital is an important determinant of cross productivity changes at the institutional level, and a 10% increase in the average level of education leads to an increase of 8.5% in manufacturing productivity and an increase of 12.7% in non-manufacturing productivity.

3.2. Human capital opportunity costs[10]

Human capital refers to all the qualities (knowledge, aptitudes, qualifications, skills, etc.) that are relevant from the workforce viewpoint (Hartog, 1999). The theoretical principle is that individuals consider the number of years spent in school as an investment. As the purchase of physical capital generates a profit, human capital investment provides a future benefit. The only difference between human capital and physical or financial capital is that the former is embodied in individuals: one cannot, in fact, separate a person from knowledge he has acquired in the same way one could separate him from his wallet (Schultz, 1961, 1962; Becker, 1967).

From the perspective of economic theory, the opportunity cost of the use of a resource in a given activity corresponds to gain from the use of this resource in the most cost effective alternative activity. From this point of view, the most advantageous occupation for a school-age child is his involvement in school activities. This result is all the more significant when taking into

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[9] Canadian Industry Research Publications Program: Investment and Productivity Growth (June 2000, number 24)
[10] UNICEF, Non-schooling in Morocco, An analysis in terms of opportunity cost, pg. 15

account not only the direct benefits that schooling provides to the child, but also the earnings generated for the family and for society.

4. Cost-Benefit Calculations

4.1. Program presentation

4.1.1. Program description

The proposed program is similar to the types of programs linked to resources and infrastructure presented in the literature review aimed at expanding the education of girls, including increasing enrollment, attendance, retention, academic achievement, results and completion of learning rather than on the relationship between girls' education and gender equality in society. This program is part of a medium and long term perspective. To carry it out, an entire program will be implemented. This program will include a series of activities focused particularly on girls between 15 and 19 from the poorest rural areas of the country. These girls must be in transition from primary to secondary school. Studies show that we see the most cases of girls dropping out of secondary school. This amount is even more alarming in rural areas. So this program will include granting academic assistance scholarships to girls according to the following selection criteria:

1) The recipient must be a girl.
2) She must be admitted to secondary 1 (new secondary) or 3rd secondary (traditional secondary school).
3) She must live in the poorest rural areas of the country.
4) She must have an average greater or equal to 60 out of 100 for the basic level.
5) She must attend school for at least 80% of the academic year.

In order to ensure a greater effectiveness of the program, schools hosting the recipients shall provide a regular annual report to the MENFP on the academic progress of these latter (average, number of tardies, number of absences...). At the end of the school year, recipients who have not reached a general average of 50.5 out of 100, or who were absent more than 20% of the academic year will be disqualified for the scholarship. The program will launch during the 2017-

2018 academic year and will take place over a period of 10 years. During this period, each year the program will finance the secondary studies of a group of recipients for their first year of secondary school to the end of their traditional studies. The scholarship will include the payment of tuition fees, provision of academic materials, the provision of uniforms and the provision of two meals a day (breakfast and lunch). The program may be renewed year after year.

4.1.3. Program financing

To address the various costs associated with the implementation of the program, we rely on internal resources (public treasury). Moreover, one can also benefit from the opportunity of innovative financing mechanisms from the Official Development Assistance (ODA) to ensure the program's funding and sustainability. The funds for the scholarships will be managed by a committee overseen by the Ministry of Education and Vocational Training (MENFP).

4.1.4. Program objectives

The main objective of this program is to achieve a higher rate of completion among schoolgirls. Through this program, reaching the same number of boys and girls at the secondary level of education is not of particular interest to us. This is to offer girls from the most disadvantaged rural areas of the country a chance to pursue and complete their traditional studies, enjoying the same teachings and receiving the same learning as wealthy children. Recipients will subsequently have an equal opportunity to succeed in society, at a personal and/or professional level. By improving the retention of schoolgirls at the secondary level, we will be reach parity between girls and boys.

4.1.5. Counterfactual scenario

Keeping girls in school is the best way to fight against gender disparity that is currently in schools and increases the country's enrollment rate. The annual rate of girls that dropout is very costly to the state and families. Additionally, these dropouts increase the risks of early pregnancy and the risk of being victims of HIV/AIDS since these latter that leave school do not have access to various information on the subject. And when parents do not have the financial means to pay for their daughter's school, they may be forced to compromise with a man, which can lead to early

pregnancy. Therefore, the adolescent may be forced to end her studies; her employment prospects vanish and vulnerability to poverty, exclusion and dependence grows.

Recent studies by the World Bank shows that any dropout that occurs before the 4th year of primary school led to illiteracy. When a girl does not go to school, her health, her education, her potential and her future income may be affected and she may be condemned to a life of poverty, exclusion and helplessness. This is what fuels the country's chronic poverty. This program is important because girls' education is an ideal investment for the country; the educated girl develops the economy by working to lower costs in all areas: health, employment, justice, family planning, education and finance.

4.2. Determining the target population

As mentioned above, the target population of our program includes a number of girls living in rural areas who are admitted to 3rd secondary school (traditional school) or secondary 1 (new secondary school) but are forced to abandon their studies. These dropouts are rooted in two fundamental reasons. First, the fact that the number of schools is very limited in rural areas that means that they are unable to find a place in them. Secondly, their parents face great economic difficulties and lack the means to pay the (very expensive) private school fees.

To determine our target population we used data from the 2012 school census conducted by the Department of Planning and External Cooperation (CAPB) of the MENFP. Indeed, an audit of the 2010-2011 Statistical Census confirms that approximately 50% of girls in rural areas drop out of secondary school. So, through our program we specifically target this group of girls. For the calculation, we applied this percentage of 50%, which represents the percentage of girls at risk to the number of girls admitted in the first year of secondary school in rural areas. The different steps to get to achieve the end result are presented in the following table.

Table 5: *Determining the target population*

Indicators	Values	Sources
Number of girls in 9th grade in rural areas	13,165	(2010-2011) School census CAPB-MPCE
Number of rural repeaters	2,203	(2010-2011) School census CAPB-MPCE
Number of girls admitted at the secondary level	10,962	Calculation
% of girls at risk (the most disadvantaged girls)	50%	Hypothesis
Target population	6,583	Calculation

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

4.3. Cost description and calculation

The inherent costs of the program (direct and indirect) include those accrued while generating the funds for the academic support scholarships that will be granted to girls finishing their last elementary grade (9th grade) whose parents are disadvantaged, so that they can complete their studies. The programs direct costs include: the cost of the scholarships, the cost of funds management. And indirect costs include: the cost of extending the program across the country, the cost of a survey for the identification of recipients and the opportunity cost of time.

4.3.1. Scholarship costs

The cost of the award relates to the cost of schooling. It includes tuition, expenses for uniforms, and expenses for school materials and expenditures for food. The only reliable data on the costs of education in Haiti come from the Survey of Living Conditions in Haiti (ECVH-2001), which were then presented in a report in 2003. According to the report, the average expenditure for a high school student rose in 2001 to 7,224 gourdes, broken as follows: 28.3% (tuition), 25.5% (cost of academic materials, cost of uniforms and other expenses) and 46.2% (cost of food). However, in a survey conducted from June to August, 2012, Rollet et al (2014) interviewed the families of 358 children in Milot Valley in Haiti. The results revealed among other things that 14% of children have only 1 to 1.5 meals per day and 48% of children have 2 to 2.5 meals per day. Through the intervention, it is planned to provide 2 of 3 meals a day to the recipients. So, for 14% of children,

the school provides 1.75 extra meals, and for 48% of children, the school and provides an extra 0.75 meal. The weighted average is 0.6 additional meals. For 2 meals per day, this represents a new food cost (marginal cost of food) of 30% of the total cost of food. The interpretation is that 70% of the cost of food would have been spent by parents anyway, and 30% of the cost of food is new and therefore part of the additional cost of education. This 30% is applied to the proportion of food costs at 46.2% which is added to the cost of other components in % (tuition, uniforms, materials and other). We have here a proportion of 67.78% representing the total incremental costs of education. By multiplying the average value spent on secondary education by this percentage we get the value of the expenditure cost of the scholarship for the year 2001. Using the Haitian inflation data provided by the World Bank[11] (Inflation rate = 6.93%), equivalent values were calculated for 2017. Finally, the cost of the scholarship per beneficiary equals 29,782 gourdes for 2017.

4.3.2. Scholarship fund management costs

A committee within the MENFP will handle the scholarships funds management for the program. Its operating cost will amount to 10% of the scholarship amount assumed to the amount of 2,978 gourdes per recipient.

4.3.3. Program extension costs

Costs will be incurred for the program's extension to the rural population. These costs correspond to the cost of creating banners and placards, the cost of media advertising and are assumed to be 5% of the amount of the scholarship, equivalent to 1,489 gourdes per recipient.

4.3.4. Time opportunity costs

The time opportunity cost is the loss of time girls spend on household or farm chores or their contribution to household income when they go to school. This cost can be a source of concern for parents, especially among the poorest and may seem higher for girls because they perform more household work outside school. This cost is calculated by multiplying the % of girls aged 15-19 in the workforce (29% according ECVMAS) by the potential of income of the girls before

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[11] http://data.worldbank.org/indicateur/FP.CPI.TOTL.ZG? Locations = Before Taxes

entering the secondary level (95,411 gourdes). Ultimately this cost will be equal to 27,699 gourdes per recipient.

4.3.5. Costs of performing a survey

To better identify the most vulnerable girls, a survey shall be conducted annually to identify the group of recipients. This cost is estimated based on the financial results of the survey to develop a potential poverty map of Haiti. It is equal to 5,317 gourdes per recipient.

Table 6: Costs per recipient for one year

Items	Parameters	Value	Source
Scholarship amount	Average cost of the scholarships amount per recipient for one year in Gourdes	29,782	Calculation
Fund management	Management of scholarship funds (% of the scholarship cost)	10%	Hypothesis
	Fund management costs in Gourdes	2,978	Calculation
Time opportunity cost per recipient			
	Time opportunity cost	27,669	Calculation
Program extension	Extension of the program (% of the scholarship cost)	5%	hypothesis
	Program extension cost	1,489	Calculation
Total cost per recipient	Cost per recipient outside the survey	61,919	
Survey identifying recipients	Cost of performing the survey per recipient	5,317	Calculation
Costs per recipient	Total 2017 costs in Gourdes per recipient	67,236	Calculation

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

4.3.6. Total cost of the program

On the basis that the scholarship will be provided for all 4 years of secondary school, the costs of the program for the first group of recipients will be spread out over 4 years. Assuming that current prices remain the same during these 4 years while the total costs of the program per

recipient will equal 67,236 gourdes for one year of study and 268,944 gourdes for 4 years. By financing the 6,583 girls in the target population, the total costs of the program for the first group of recipients will amount to *1,770,324,820 gourdes* (Table 7).

Table 7: Total costs of the program

Year	1	2	3	4	Total
Total costs of the program	442,581,205	442,581,205	442,581,205	442,581,205	1,770,324,820

4.4. Description and calculation of benefits

The program will ensure that more girls can continue and complete their secondary education. This will lead to several advantages especially for the girls and for the whole country in general. The quantifiable and quantified benefits in our work are: Wage benefits for the girls, the benefits of preventing infant mortality, the benefits of preventing the impact of HIV, the benefits of preventing the failure to thrive among children, and the benefits of preventing early pregnancy and low birth weight.

4.4.1. Wage benefits

World Bank studies show that, in general, that one year of secondary schooling above the average raises the potential individual salary from 15 to 25%, the increase being overall greater for girls than for boys. Thus the implementation of the program will result in a direct increase in income for the recipients. For the calculation of these benefits, the following parameters are used: the rate of inflation since 2012, the annual average growth rate, the percentage of girls aged 15-19 employed in the work force, the participation rate of women in the workforce, salaries by level of study. The values and different sources are presented in the following tables.

Table 8: Parameters used to calculate wage benefits

Parameters	Value	Source
Inflation since 2012	1.21	MEF (Finite Elements Analysis)
Average growth rate	2.70%	Hypothesis
% of girls aged 15-19 employed in the workforce	29.00%	ECVMAS, 2012
Women's participation rate in the workforce	61.00%	WB http://data.worldbank.org/indicator/SL.TLF.CACT.FE.ZS

Table 9: Wages by level of study

Level of Education	Monthly salaries HTG, 2012	Annual salaries, USD
No Education	3,569	996
1st and 2nd fundamental cycle	5,636	1,573
3rd fundamental cycle	6,571	1,834
Professional	8,365	2,334
Secondary	12,314	3,437
Higher	12,680	3,538

Source: ECVMAS 2012 and exchange rate of 43 HTG

Based on previous data we were able to achieve wage advantages per recipient of the program for each year of secondary studies. These benefits were calculated by determining the income gap between people reaching the secondary level and those only reaching the 3rd basic cycle multiplied by the percentage of girls aged 15-19 employed in the workforce. Then they were updated at different reduction rates (3%, 5% and 12%) over a period of 50 years, the age of the girl at the beginning of the study (15 years old) at the age of retirement (65 years old).

Table 10: Wage benefits per recipient in Gourdes

Wage benefits per year of education, 3%	429,606
Wage benefits per year of education, 5%	261,665
Wage benefits per year of education, 12%	78,389

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

4.4.2. Benefits of preventing infant mortality

Increasing the level of education is usually accompanied by a decrease in infant mortality. Indeed, by staying in school, adolescents are at less risk in some cases of fatal diseases such as AIDS or are less likely to get pregnant. Falling pregnant, they put their lives and that of their children in danger. According to the World Health Organization (WHO), about 1 million children born to teenage mothers do not reach their first birthday. In countries where three-quarters of women have a secondary education, women typically have two or three children, these children are more likely to attend school and the infant mortality rates decline as incomes rise. According to numerous studies, a higher than average education for the mother brings a lower infant mortality rate of 5 to 10%. For the calculation of these benefits, the following parameters were used: infant mortality in Haiti per 1000 live births, the average number of children per woman, the average number of infant deaths per woman, reduction of infant mortality for the average year of education attained by women, reducing deaths of children per woman with each additional year of study, preventing the undiscounted DALYS of infant mortality. Their values are shown in the table below.

Table 11: Parameters used to calculate the prevented infant mortality rate

Parameters	Value	Source
Infant mortality in Haiti, per 1000 live births	88.00	WHO
Average number of children per woman	3.5	http://dhsprogram.com/pubs/pdf/SR199/SR199.eng.pdf
Average number of infant deaths per woman	0.31	Calculation
Reduction of infant mortality for each average year of education attained by the women	9.50%	Gakkidou et al (2010) - http://can-mnch.ca/wp-content/uploads/2012/06/5.-EducationandChildSurvivalLancet.pdf
Reduction of child deaths per woman for each additional year of study	0.02926	Calculation
Undiscounted DALYS on the infant mortality prevented	63	Life expectancy table for Haiti

The health benefits are measured in DALYs prevented. By applying the different rates of reduction on DALYS of the infant mortality rate prevented, knowing that life expectancy at birth is 63 years, the following table was created.

Table 12: current DALYs at a reduced rate

DALYs, currently at 3%	28.2
Current DALYs at 5%	19.1
Current DALYs, at 12%	8.3

Since the value of the DALY is equal to 3 times the GDP per capita, then it will be equal to 109,408 gourdes in 2017 (the first year of the program). To calculate the benefit due to the prevented infant deaths with additional year of study, multiply the value of the DALYS by the reduction rate of infant deaths per woman with an additional year of study by the DALYs depending on the reduction rate. The results are shown in the following table.

Table 13: Benefits of infant mortality prevented per recipient in gourdes

Benefits of preventing infant deaths per year of education, 3%	90,134
Benefits of preventing infant deaths per year of education, 5%	61,064
Benefits of preventing infant deaths per year of education, 12%	26,656

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

4.4.3. Benefits of preventing incidences of HIV

Dropouts increase the risk of becoming victims of HIV/AIDS. Studies show that adolescents are more vulnerable to HIV infection due to physiological factors, lack of information and services, and social norms and values that undermine their ability to protect themselves. In addition, girls who drop out of school do not have access to various information on the subject. So by keeping girls in school they will be less likely to be victims of HIV/AIDS, which will help them be safe and have more control of their lives. To quantify these benefits, we used the following parameters: female incidence rate, the risk of contracting HIV, by year of education in Uganda, HIV infections prevented per educated woman per year, the number of cases of HIV infection within the program, the number of women living with HIV in 2013 15 years old and above, DALYs associated with HIV in women, the years lost to disability, ex. associated with HIV for women 15 years old and above, the annual number of women with HIV, the number of deaths associated with HIV in women 15 years old and above, the number of annual deaths per woman with HIV, the average life expectancy of an HIV-positive person, the average life expectancy of a person with HIV without ART (Antiretroviral Treatment). The percentage of Haitians living with HIV with ART, the percentage of Haitians living with HIV without TAR and the average life expectancy of a person with HIV. Their respective values are found in the following table.

Table 14: Data used in the calculation of the benefits of prevented incidences of HIV

Parameters	Value	Source
Incidence rate of women, 2013	0.0550	From UNAIDS data assuming 50% new infections are women
Risk of contracting HIV, per year of education obtained in Uganda	0.918	De Walque (2007) - http://dx.doi.org.esc-web.lib.cbs.dk/10.1016/j.jdeveco.2006.12.003
HIV infections prevented per educated woman, per year	0.0045	Calculation
Number of cases of HIV infection within the program	5.93	Calculation
Women living with HIV, in 2013 15 years old and above	74,000	UNAIDS
DALYs associated with HIV in women, 2013	188,589	Global Burden of Disease, 2013
Years lost through disability, associated with HIV for women 15 years old and above	7,977	Global Burden of Disease, 2013
Annual number of women with HIV	0.108	Calculation
Deaths associated with HIV in women aged 15 and over	3,533	Global Burden of Disease, 2013
Annual deaths in woman with HIV	0.048	Calculation
Average life expectancy of a person with HIV	26.7	Uganda: https://www.ncbi.nlm.nih.gov/pubmed/21768555
Average life expectancy of a person with HIV without ART (Antiretroviral Treatment)	10	https://www.aids.gov/hiv-aids-basics/just-diagnosed-with-hiv-aids/hiv-in-your-body/stages-of-hiv/
% of Haitians living with HIV with ART	49%	Calculation
% of Haitians living with HIV without ART	51%	Calculation
Average life expectancy of a person living with HIV	18.23	Calculation

To determine the benefits of preventing incidences of HIV, the value of preventing HIV must necessarily be calculated. To calculate this, one must first determine the value of YLD for each year of age of the girl at the beginning of the program (15) until the age of 33. Then the values are updated at different reduction rates (3%, 5% and 12%) over a period of 18 years, the age of the girl at the beginning of the program until the age of 32; at which time the value of deaths prevented is added to the reduction rates when the recipient reaches the age of 33. Results are shown in the following table.

Table 15: Value of preventing HIV in gourdes

Value of preventing HIV per case prevented, 3%	1,459,471
Value of preventing HIV per case prevented, 5%	885,245
Value of preventing HIV per case prevented, 12%	217,158

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

To determine the benefits of preventing incidences of HIV, multiply the number of HIV infections prevented per woman educated in a year by the value of preventing HIV per case prevented depending on the reduced rate.

Table 16: Benefits of preventing instances of HIV per recipient in gourdes

Benefit of preventing infection by HIV per year of school, 3%	6,582
The benefit of preventing infection by HIV per year of school, 5%	3,992
The benefit of preventing infection by HIV per year of school, 12%	979

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

4.4.4. Benefits of preventing a child's failure to thrive

Children of teenage girls who survive are at greater risk of failing to thrive and being premature than children of women aged 20 to 29 Indeed, education, especially when it empowers women, promotes the sustainable elimination of the specter of malnutrition because they have the

means to feed their children better. To quantify the benefits of preventing the failure to thrive in children, the following parameters were used: the probability of having a child that fails to thrive, by grade girls, the percentage of children who fail to thrive in Haiti, rural areas, the gross chances of failure to thrive in Haiti, the chances of a failure to thrive with an additional year of study, the relative risk of failing to thrive with an additional year of study, the percentage of the children failing to thrive that are prevented with a year of study, the average number of children per woman, the average age of first births in rural areas, median birth interval in months. Their values together with their respective different sources are presented in the table below.

Table 17: Parameters used to calculate the advantages of preventing a child's failure to thrive

Parameters	Value	Source
Likelihood of having a child that fails to thrive, per school year of girls	0.95	Semba (2008) http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(08)60169-5/fulltext
% of children failing to thrive in Haiti, rural areas, 2012	25%	ECVMAS, 2012
Gross chances of failing to thrive in Haiti	0.33	Calculation
Likelihood of failing to thrive with an additional year of study	0.317	Calculation
Relative risk of failing to thrive, with an additional year of study	24.1%	Calculation
% of children failing to thrive that are prevented with a year of study	0.9%	Calculation
Average number of children per woman	3.5	ECVMAS, 2012
Average age of first birth, rural areas	21.3	ECVMAS, 2012
Median interval between births in months	37.4	ECVMAS, 2012

According to ECVMAS every Haitian woman has 3.5 children, the first when she is 21.3 years old. So on average, there is a gap of 37.4 months between each birth. With this information we were able to estimate the following data.

Table 18: Average age of women at birth according to the number of children

Average age at the first birth	21.3 years old
Average age at the second birth	24.4 years old
Average age at the third birth	27.5 years old
Average age at the last birth	30.7 years old

To calculate the benefits of preventing the failure to thrive of children, first we calculated the total benefits by failure to thrive prevented. To find these figures we share the ages of the future children of the girl who is currently receiving education. First we calculate the value of the benefits for the first child who does not fail to thrive. These benefits are calculated for a period of 50 years from the age of 15 until the child is 65 years old and updated at various reduction rates. One performs the same calculation process for her second, her third and her fourth (half of women have 4 children) future child. Then one adds the benefits that each future first, second, third and fourth child will enjoy to obtain the total benefits of preventing their failure to thrive. Then the total profits are multiplied by the percentage of healthy children by year of study to find the benefits of preventing the children's failure to thrive by the year the mother has studied. The following table summarizes the results obtained.

Table 19: Benefits preventing failure to thrive in children per recipient in gourdes

Benefits of preventing failure to thrive by year of study, 3%	50,418
Benefits of preventing failure to thrive by year of study, 5%	19,482
Benefits of preventing failure to thrive by year of study, 12%	1,345

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

4.4.5. Benefits of preventing early pregnancy and low birth weight

A survey assessed for the country's progress in implementing the International Conference on Population and Development of 1994's Program of Action confirms that higher literacy rate among adolescents aged 15 to 19 is associated with a significantly lower birth rate among them. In addition, a study found that children born to teenage mothers are more likely to have low birth weights (BPN). To quantify the benefits generated by the decrease in cases of teenage pregnancies, the following parameters were used: the percentage of pregnant girls before 18 years of age at primary level, the percentage of pregnancy risk reduction per grade level of the girls, early pregnancies avoided per school year, the ratio between weight at birth and early pregnancy, the percentage of babies in Haiti with a low birth weight, gross chances of having a BPN in Haiti, the chances of having a BPN due to teen pregnancy, the level of relative risk of having a BPN due to teen pregnancy, the average number of teen pregnancy babies with low birth weight, and the effect of the grade level on the BPN through the reduction of early pregnancy per educated girls. . Their values are shown in the following table:

Table 20: Parameters used in the calculation of the benefits of preventing teenage pregnancy

Parameter	Value	Source
% of girls pregnant before the age of 18, primary school	20%	EMMUS, 2012
% of teen pregnancy risk reduction by the girl's grade	30%	Baird et al (2010) http://onlinelibrary.wiley.com.esc-web.lib.cbs.dk/doi/10.1002/hec.1569/epdf
Teenage pregnancy prevented by school year	0.060	Calculation
Ratio between birth weight and teen pregnancy	1.39	Gibbs et al (2012) - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4562289/
% of BPN babies in Haiti, 2013	23%	UNICEF, 2016
Gross chances of having a BPN in Haiti	0.30	Calculation
Chance of having a BPN per teenage pregnancy	0.415	Calculation
Relative risk of having a BPN per teenage pregnancy	29.3%	Calculation
Number of babies with a low birth weight per teenage pregnancy	0.063	Calculation
Effect of a year of schooling on the BPN through the reduction of teen pregnancy per educated girl	0.0038	Calculation

To determine the benefits of preventing teen pregnancy and low birth rates, the same calculation process for calculating the benefits of preventing the failure to thrive was followed. We determine the total benefits realized at different reduction rates to be having a child with a normal birth weight. Then, we multiply the result obtained by the effect of a year of schooling on the BPN through the reduction of teen pregnancy per educated girl. The results obtained are presented in the following table.

Table 21: Benefits of preventing teen pregnancy and low birth weight per recipient in gourdes

Benefits of preventing teen pregnancy and BPN per school year, 3%	1,097
Benefits of preventing teen pregnancy and BPN per school year, 5%	468
Benefits of preventing teen pregnancy and BPN per school year, 12%	44

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

4.4.6. Total benefits of the program

For the calculation of the total benefits, we will assume that out of all 6,583 recipients in the first group, 85% of them will graduate from secondary school. Which will mean that a total of 5,595 girls will complete their education. The benefits per recipient a year of study at the rate of 5% amounting to 346,671 gourdes (table 22) and reaching 1,386,685 gourdes for the 4 years. By multiplying these results by the number of girls likely to complete their education yields the total benefits for financing secondary school for the first recipient group to be equal to *7,758,674,639 gourdes* (table 23).

Table 22: *Total benefits per recipient for one year gourdes*

Reduction rate	Wage benefits	Benefits of prevented infant mortality	Benefits of preventing a child's failure to thrive	Benefits of preventing incidences of HIV	Benefits of preventing of teen pregnancy and BPN	Total benefits of the program
3%	429,606	90,134	50,418	6,582	1,097	577,838
5%	261,665	61,064	19,482	3,992	468	346,671
12%	78,389	26,656	1,345	979	44	107,414

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

Table 23: Total benefits of the program

Reduction rate	Wage benefits	Benefits of prevented infant mortality	Benefits of preventing a child's failure to thrive	Benefits of preventing incidences of HIV	Benefits of preventing of teen pregnancy and BPN	Total benefits of the program
3%	9,614,797,083	2,017,243,987	1,128,380,049	147,308,451	24,551,409	12,932,303,359
5%	5,856,193,533	1,366,642,852	436,016,901	89,342,956	10,474,074	7,758,670,316
12%	1,754,385,015	596,574,608	30,101,773	21,910,510	984,742	2,403,979,027

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

Conclusion

To help improve the retention of girls in school, through our research, we have proposed a program based on granting scholarships to girls likely to abandon their studies and living in the most disadvantaged rural areas. Through this paper, an analysis of the costs and benefits that will lead the implementation of this program was done. The rough estimate of the costs and benefits allowed us to arrive at certain conclusions. The results reflect that the impact of the intervention will be positive and high for each recipient of the program. Indeed, at a 3%, 5% and 12% reduction rate, the BCR will be equal to 8.6, 5.2 and 1.6 (Table 24) respectively. This means that each gourd invested in this program will lead to a reduction rate of 8.6, 5.2 and 1.6 gourdes of general benefits. It is also worth noting that the impacts will be highest in terms of wage terms with an RAC = 6.4, 3.9 and 1.2 respectively at a reduction rate of 3%, 5% and 12% while the impacts are lower for other programs benefits (Tables 26 and 27 in the appendix).

But in reality, the total benefits of the intervention will be less. In fact the project is targeting an 85% efficiency rate, and by doing so, reducing the expected profits by 15%. While the main BCR of the program is equal to 7.3, 4.4 and 1.4 at a 3%, 5% and 12% reduction rate (Table 25). This means that each gourde invested in this program will follow the reduction rate of 7.3, 4.4 and 1.4 gourdes of general benefits. Which leads us to say that even when profits will be slightly lower, the impact of the program will be just as high.

Moreover, the net cash flows that will generate the program will amount to 777,714 gourdes per recipient. And by multiplying these figures by the number of recipients likely to complete their education, we get a total of 4,085,858,743 gourdes in actual cash flow for the recipients. These figures reflect that by spending *1,770,324,820 gourdes* for the first group of recipients, the program will provide gross profits of *5,856,183,563 gourdes* and net profits *of 4,085,858,743 gourdes* (Table 28)*.*

Given the importance of this data, we can say that this program is going to be very effective for the country. Investment in girls' education really provides great benefits to girls themselves, their community and the whole society. Education can have a multiplier effect by encouraging the promotion of other human rights (especially health and employment, and equality between the sexes). The government has an interest in investing in girls' education specifically in this program to be able to establish equal opportunities at the secondary level. Some economists believe even that it represents the most profitable investment in developing countries. The figures obtained can confirm this.

Table 24: Summary of benefits and costs in Gourdes

Program	Reduction	Benefit	Cost	BCR	Quality of evidence
Improved retention of school girls	3%	577,838	53,437	8.6	High
	5%	346,671	53,437	5.2	
	12%	107,414	53,437	1.6	

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

Table 25: Summary of costs and total benefits of the program

Program	Reduction	Benefit	Cost	BCR	Quality of evidence
Improved retention of school girls	3%	12,932,295,058	1,770,324,820	7.3	High
	5%	7,758,674,639	1,770,324,820	4.4	
	12%	2,403,971,601	1,770,324,820	1.4	

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

Recommendations

The study allowed us not only to analyze the educational situation of secondary schoolgirls in Haiti, but also to identify the factors that prevent them from pursuing and completing their studies. In addition to the proposed program, other measures should be undertaken. Including:

Emphasize the quality of education. We must not only increase the number of girls in school but also focus on the quality of education to ensure that girls are well prepared for secondary school. We must find a balance between quantitative objectives and quality improvements. Therefore, we need to improve teacher training

Mobilize communities. To educate girls, especially in poorer areas, it is essential to mobilize communities and commit them to educating all children, to find acceptable teachers, encourage teachers and students, and to meet the needs of schools, students and teachers.

Sex education programs in schools. We must promote sex education in schools in order to encourage students to better protect themselves against the risk of contracting a Sexually transmitted disease (STD) or becoming pregnant.

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Appendix

Table 26: Impacts of wage earnings per recipient

Program	Reduction	Wage benefits	Cost	BCR	Quality of evidence
Improved retention of school girls	3%	429,606	67,236	6.4	High
	5%	261,665	67,236	3.9	
	12%	78,389	67,236	1.2	

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

Table 27: Impacts of other benefits per recipient

Program	Reduction	Other benefits	Cost	BCR	Quality of evidence
Improved retention of school girls	3%	148,231	67,236	2.2	Medium
	5%	85,007	67,236	1.3	
	12%	29,024	67,236	0.4	

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

Table 28: Total benefits per year at 5% reduction rate

Wage benefits	1,464,045,891
Infant mortality prevented	341,663,203
The failure to thrive prevented	109,003,453
Incidences of HIV prevented	22,338,290
Instances of teenage pregnancy and low birth weight prevented	2,617,824
Total	1,939,668,660

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

Table 29: Cash Flows realized for the first group of recipients in gourdes at a 5% reduction rate

Year	1	2	3	4	Total
Program costs per recipient	67,236	67,236	67,236	67,236	268,944
Program benefits per beneficiary	261,665	261,665	261,665	261,665	1,046,658
Total costs of the program	442,581,205	442,581,205	442,581,205	442,581,205	1,770,324,820
Total benefits of the program	1,464,045,891	1,464,045,891	1,464,045,891	1,464,045,891	5,856,183,563
Cash flow per recipient	194,429	194,429	194,429	194,429	777,714
Total cash flows	1,021,464,686	1,021,464,686	1,021,464,686	1,021,464,686	4,085,858,743

Source: Excel spreadsheet of cost-benefit analysis of the education program for improving the retention of schoolgirls in Haiti for the Prioritize Haiti project, November 29, 2016

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.

Haïti Priorise

Un plan de **développement** alternatif

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