



## **COST-BENEFIT ANALYSIS OF**

## **FAMILY PLANNING IN GHANA**

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# **Costs and Benefits of Family Planning in Ghana**

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## **Ghana Priorities**

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## **Academic Abstract**

High fertility rates can hamper economic growth and development. Access to contraception is a key strategic lever for development – to empower women and adolescents, increase investments in children, and ultimately contribute to poverty reduction. The interventions analyzed here treat both adult women (married and unmarried), offering sensitization/information to stimulate uptake and family planning commodities; and adolescents, offering compulsory and comprehensive sexual and reproductive health education at Junior and Senior High School levels, and the provision of male condoms. The main outcome is the avoidance of unwanted pregnancies, from which are derived various socioeconomic and health benefits. Extension of the current family planning programme in Ghana with the objective of increasing the contraceptive prevalence rate by ten percentage points among married women has a benefit-cost ratio of 33.6. Increasing the contraceptive prevalence rate by twelve percentage points for unmarried women has a benefit-cost ratio of 29.3. Compulsory, comprehensive, and universal sexual and reproductive health education in junior and senior high schools (including the redesign of the curriculum and the retraining of teachers) and the provision of contraceptives has a benefit-cost ratio of 2.3.

Key Words: cost-benefit analysis, demographic dividend, family planning, maternal health

## Policy Abstract

### The Problem

Unplanned pregnancies, including teenage pregnancy, perpetuated by low demand for, and lack of access to family planning are linked with higher risks of birth complications such as maternal deaths and early child deaths, and malnutrition in children under-five. Access to contraception is therefore a key strategic lever for development. Contraception affords women the opportunity to adequately space their children, further their own education and that of existing children, enter the workforce, improve the nutritional profile of household members, among other things. Securing access to family planning services therefore remains a critical component of building human capital in most developing countries.

In 2015, Ghana mounted a family planning program which had as its objective to increase the contraceptive prevalence rate (CPR) of married women aged 15-49 from 22.2 to 29.7 percent, and that of unmarried women from 31.7 to 40 percent by 2020 (GFPCIP, 2015). The implementation of the program has been successful, the CPR is 30.8 percent for married women (compared with 22.2 in 2014 before the program) and 38.4 percent for unmarried women compared with 31.7 in 2014 (Ghana Maternal Health Survey 2017). These represent an annual average increase in CPR by 2.9 percentage points for married and 2.2 percentage points for the unmarried. However, survey data suggests that there remain a significant percentage of women with an unmet need for contraception.

This first intervention makes the investment case for an extension of the current programme (post 2020) by demonstrating that the economic and health benefits far exceed the costs of the programme.

Likewise, the relevant information and the unavailability of family planning commodities to adolescents, places teenage childbearing in Ghana higher than the global average. According to UNICEF, In 2018, the estimated adolescent birth rate globally was 44 births per 1,000 girls aged 15 to 19; in West and Central Africa, this figure stood at 115 births, the highest regional rate in the world; in Ghana, it is 75 (MICS 2017/18). Children of teen mothers run the risk of high morbidity and mortality. Teen mothers are more likely to

have adverse pregnancy outcomes and are less likely to continue with their education, thus pushing them (and their children) into poverty.

Sexual and reproductive health education does form part of the curriculum in Ghana, and approximately 77 percent of adolescents are exposed to sex education by the time they complete Senior High school (Awusabo-Asare, 2017). However the coverage of topics is minimal, and drop out rates are considerable for Junior (40%) and Senior High school (20%). Exposure to adequate comprehensive sex education is needed for adolescents to have a good understanding of their reproductive health and appropriate adaptive behavior to maintain adequate sexual and reproductive health.

The second intervention analyzed here demonstrates that compulsory, comprehensive, and universal (boys and girls) sexual reproductive health education, as well as the provision of contraceptives, is also a beneficial intervention.

## **Intervention 1: Increase the CPR by 10 pp for married women; 12 pp for unmarried women**

### **Overview**

The intervention proposed here makes the investment case for an extension of the current programme, with an increase in CPR targets: In phase 2, a five-year programme targeting increase in the CPR from 29.7% to 40% for married women and a six-year programme targeting an increase in the CPR from 38% to 50% for unmarried women. A 2% annual increase in the contraceptive prevalence rate (CPR) is modeled, based on the Government of Ghana's past performance.

Of the estimated 7.4 million women between the ages of 15 and 49, 4.2 million are married, and the number of annual unintended pregnancies per year is 292,700, of which 81,500 are avoided by the intervention.

Of the 3.2 million unmarried women (never-married and divorced/separated), the number of unintended pregnancies is approximately 220,800 per year, of which 71,600 are avoided by the intervention.

### **Costs and Benefits**

#### **Costs**

The costs that we consider are activity costs, commodity and direct consumables, indirect costs (consisting of the cost of transportation to health facilities as well as time spent at health facility to receive FP service), and the cost of side effects. The activity cost, US\$5.52 per woman targeted, covers demand creation and service delivery. It also includes all direct point-of-service costs. The costs of family planning commodities and direct consumables is US\$3.74 per actual user as computed in GFPCIP (2015) and include a variety of additional loaded costs for each commodity (e.g., freight, insurance, customs and clearing charges, warehousing, and distribution fees to the last mile). Financing, policy and enabling environment, management and accountability were components of the programme, as it was implemented in 2015, but the health infrastructure having been reinforced as a consequence of the first phase, these components are not considered additional to the second phase. The exchange rate, GHS per USD is 4.56.

The indirect costs of family planning consider transport costs and the opportunity cost of time and have been valued at GHS101 per user. It is assumed that users visit a health facility/doctor four times per year.

The percentage of women experiencing side effects ranged from 9 to 11% according to the DHS. It was assumed that, while the side effects from contraception may be experienced for some portion or throughout the duration of the contraceptive period, there is only one visit to the FP provider, valued at GHS101 per user.

Below are the cost components for both married and unmarried women.

**Table 1. Cost components, married and unmarried women, GHS millions  
(8% discount rate)**

<i>Costs items</i>	<i>Married women</i>	<i>Unmarried women</i>
Activity costs	345.5	270.4
FP commodities	26.1	30.0
Indirect costs	615.4	707.6
Side effects	1.4	4.9

Total discounted costs (8%) are GHS 988.5 million for married; GHS 1,012.9 million for unmarried. Note that short-term costs and benefits are modeled over a 6-year and 8-year period respectively for married and unmarried women with an assumed 2pp increase in CPR per year. The longer time frame for the intervention targeting unmarried women is required because there is a larger assumed total increase in CPR among unmarried



women (12 pp increase vs 10pp for married women), and the average time for contraceptive use is longer among unmarried women (3 years for unmarried women and 2 years for married women).

### **Benefits**

The anticipated benefits of increasing the CPR by 10 and 12 percentage points for married and unmarried women, respectively, include maternal and infant deaths averted, pregnancy and induced abortion costs avoided, and the demographic dividend that results from a decrease in the dependency ratio.

The maternal mortality rate, which includes death during delivery and 2 months post delivery, is 310 per 100,000 live births (Ghana Maternal Health Survey 2017). Approximately 25 maternal deaths are averted for every 2% increase in the CPR for married women; 12, for unmarried. Each maternal death leads to 38.2 life years gained. Maternal mortality averted among married women is valued at GHS 240 million over 6 years; among unmarried, GHS 189 million over 8 years.

The causes of neonatal mortality are, unfortunately, numerous and vary greatly. It was decided to use the infant mortality rate associated with inadequate spacing. Failure to space live birth at least 24 months apart has a current mortality rate of 36 per 1000 live births; the risk ratio of neonatal mortality from lack of spacing is 1.26. Approximately 47 and 23 neonatal deaths are averted per 2% increase in the CPR for married and unmarried women, respectively. Life expectancy being 63.5 years at birth, total neonatal mortality has been valued at GHS 742.1 million (married) over 6 years, and GHS 582.8 million (unmarried) over 8 years.

Since the intervention is anticipated to avert 81,500 and 71,600 pregnancies for married and unmarried women, respectively by the end of the program, there is a benefit associated with the avoided costs of antenatal care, delivery and newborn costs. Another benefit is avoided abortions. The percentage of unwanted pregnancies aborted is 11.6%, an average across the age groups 15-49 (Ghana Maternal Health Survey, 2017). It is estimated that raising the CPR averts approximately 4,725 and 2,769 abortions among married and unmarried women, respectively by the end of the program timeline. These benefits are relatively minor, valued at GHS 34.9m and 25.7m respectively for married and unmarried women.

What is the impact of a 10% increase in CPR on the current TFR of 3.9? Using Ghana, among other countries, as a case study, Bongaarts (2017) theorizes that a 1% increase in the CPR leads to a 0.054 decline in the TFR. For married women, holding all things equal including the fertility rate of unmarried women and adolescents, the TFR declines to 3.59 as a result of 10% in CPR. For unmarried women, a 12% increase in the CPR causes the TFR to decline to 3.62.

The socioeconomic impact that a decline in TFR has on the economy is what is referred to as the demographic dividend. Ashraf et al. (2013), using Nigeria as an example, postulates that a reduction in TFR by 0.5 leads to 5.6 percent increase in GDP per capita over 20 years. This translates into a proportional increase of 3.45% and 3.12% of GDP per capita over 20 years, associated with the increase in CPR for married and unmarried women respectively. As is evident below, the demographic dividend benefit is the largest category of benefit, comprising 97% of the total benefit.

**Table 2. Benefit streams for both married and unmarried women, GHS millions (8% discount rate)**

<i>Benefit streams</i>	<i>Married Women</i>	<i>Unmarried women</i>
Demographic dividend	32,187	28,920
Maternal mortality	240	189
Neonatal mortality	742	583
Pregnancy costs	33	24
Abortion costs	2	2

Total discounted benefits (8%) are GHS 33,204 million and GHS 29,717 million for interventions targeting married and unmarried women, respectively.

## **Intervention 2: Universal compulsory sexual and reproductive health education (SRHE) for both boys and girls, 15-19 years; (re) training School-Based health coordinators; provision of male contraceptives**

### **Overview**

According to Darroch et al. (2016), the percentage of African girls who had ever had sex by age 16 was 27%; whereas, by age 19, it was 66%. Slightly more than one-third of the adolescents who had ever had sex (32% of the males and 39% of the females) reported that the first sexual intercourse was unplanned. Furthermore, although virtually every adolescent interviewed had heard of contraceptives, the proportion that used a method to

prevent pregnancy at first or last sexual activity was lower: 46% of the males and 49% of the females. The unmet need for contraception among Ghanaian adolescents indicates that more information needs to be transmitted to adolescents: 95% of sexually active adolescent females, who are unmarried, want to avoid pregnancy within the next two years, but 62% have an unmet need for family planning. The evidence suggests that an intensive intervention that targets adolescents at the junior and senior high school levels and responds to their contraceptive needs would be a key element in reversing the high rate of unwanted pregnancies in Ghana.

The Ghana Adolescent Reproductive Health Policy (2000) adopted a multisectoral approach to addressing adolescent reproductive health issues. The policy explicitly encouraged and led to the inclusion of a reproductive health component in the educational curriculum at the primary, junior high and senior high school levels. In 2013, the National HIV and AIDS, STI Policy advocated for the inclusion of age appropriate SRH education in the school curriculum, which includes lessons on HIV/AIDS and other STIs for girls, 10-19 years.

However, given the fact that certain core themes are electives and girls are the principal beneficiaries because certain subject matters have been combined with home economics courses and the like, the intervention proposed here is universal (boys and girls), comprehensive, and compulsory SRHE, throughout JHS and SHS, a revision of the curriculum, the (re)training School-based health coordinators, and the distribution of contraceptives (i.e. condoms).

The number of unintended pregnancies, and hence dropouts, at some point during JHS is estimated to be 56,300; 24,900 at SHS level.

The intervention is modeled over 7 years: the first year assigned to revision of curriculum and retraining; the following six years represent the movement of one cohort through JHS and SHS, three years each.

## **Costs and Benefits**

### **Costs**

The costs of the intervention are:

*Curriculum adaptation, retraining and delivery.* We relied on per unit estimates from the costing estimates by the GFPCIP. The cost per student is \$8.73 (2015). The cost of a similar activity in Nigeria was estimated to be \$6.84 in 2011 (Kivela et al, 2013).

*Cost of FP commodities.* This was costed in the GFCPCIP at \$3.74 per user (2015).

*Cost of additional years of schooling.* The total (direct and indirect) cost of education was estimated at GHS 1184 per student, per year (Results for Development, 2015). The opportunity cost of education was also included here and was based on what is considered the next best alternative available to minors, who are not attending school. The national child labour rate being 30%, this figure was taken as an estimation of the number of dropouts who would be able to secure employment, using the mean wage for those without/primary education (Turkson et al, 2019) of GHS 5119.

*Recurrent costs* were assumed to be 10% of annual programme costs.

**Table Cost components of the SRHE programme  
(8% discount rate)**

<i>Cost components of the SRHE Program</i>	<i>GHS, millions</i>
Curriculum adaptation, retraining and delivery	68.5
Cost of FP commodities	8.2
Cost of additional years of schooling	15.0
Opportunity cost of schooling	34.8
Recurrent costs	0.8

Total discounted costs (8%) are GHS 127 million.

### **Benefits**

In order to arrive at the number of unintended pregnancies avoided by the intervention, a review of the literature of randomized trials discovered that the relative effect of SRHE interventions was an increase in birth control methods (specifically condoms) by 18%. It is assumed that the use of birth control averts pregnancy. Therefore the number of unintended pregnancies avoided by the intervention is 10,140 at the JHS level and 4480 at SHS level.

It is assumed that contraceptive use by sexually-active adolescents delays pregnancy to an age when it is physically safer to have children. Therefore all benefits should be considered as relative to pregnancy at an older age. The anticipated benefits from delayed pregnancy include avoided medical costs of birth, fistula, caesareans and abortions, infant and maternal mortality, and the marginal income gain from completed JHS and SHS.

--The avoided medical costs associated with antenatal care, pregnancy and delivery are estimated at GHS 266 and include direct and indirect costs.

--Cesareans make up 16% of all births, and early pregnancy increases this risk by 80% (Yussif et al. 2017). The medical cost of a caesarean is estimated at GHS 3000.

--The prevalence of induced abortions for mothers who are less than 20 years of age is 18.8%, and adolescent mothers are 86% more likely to have an induced abortion (Ghana Maternal Health Survey, 2017). The medical cost of abortion is assumed to be approximately GHS 425 in Ghana.

--The maternal mortality for all women is 310 per 1000 women, but 510 per 1000 women for adolescent girls, an increased risk of .20% (Nove et al. (2014). Approximately 9 deaths would be averted per cohort.

--According to the Ghana Maternal Health Survey (2017), among adult women, the incidence of infant mortality is 27 per 1000 births, but the pregnancies of adolescent women are 30% more likely to result in the death of the infant. Approximately 118 infant deaths would be averted due to the intervention.

--Lastly, around 1.6 per 1000 births lead to obstetric fistula in women (Ghana Health Service, 2015), while for adolescents the risk is 28% higher (Tebue et al 2012).

The value of maternal and child lives saved follows standard protocols throughout the *Ghana Priorities* project, and assumes each adolescent maternal life saved avoids 53 years of life lost (YLL), each child life saved avoids 64 YLLs and each YLL is valued at around GHS 13,000 increasing with GDP per capita growth (Wong and Dubosse, 2019). Fistula is assumed to lead to a life-long disability that remains untreated, and the disability weight for untreated fistula is 0.346 years lost to disability (YLD) per year (Higashi et al. 2014). Each YLD avoided is valued at the same as each YLL avoided.

Lastly, with respect to continued education, benefits are valued as the marginal lifetime income gain associated with increased education attainment. The marginal increase in wage for a year of JHS is GHS 666 per year and for SHS is GHS 896, based on Mincerian equations estimated from GLSS 7 data and documented in another paper in the *Ghana Priorities* series (Turkson,, et al., 2019). This increased wage value per year is assumed to increase with real income per capita growth, and lasts for the entirety of the

women’s working lives. In two of the interventions, the increase in wages associated with more education is the largest benefit.

**Table Benefits of the SRHE programme  
(8% discount rate)**

<b>Benefits</b>	<b>GHS, millions</b>
Pregnancy costs avoided	3.1
Cesarean procedures avoided	4.4
Fistula avoided	0.5
Abortions avoided	0.8
Maternal deaths avoided	6.0
Infant deaths avoided	94.3
Income boost from completed education	175.4

Total discounted benefits (8%) are GHS 285 million.

### **BCR Summary Table**

<i><b>Intervention</b></i>	<i><b>Discount Rate</b></i>	<i><b>Benefits, GHS, millions</b></i>	<i><b>Costs, GHS, millions</b></i>	<i><b>BCR</b></i>
Family Planning, married women	8%	33,204	988	<b>34</b>
Family Planning, unmarried women	8%	29,717	1,013	<b>29</b>
SRHE for adolescents in school	8%	285	127	<b>2.3</b>

The BCR for unmarried women is slightly lower, despite the fact that the intervention models a 12 percentage point increase in the CPR, as opposed to 10 for married women. There are, in fact, fewer unmarried women (43% of all women ages 15 - 49), who have a preference for long-term contraception, and it is assumed that contraceptive adherence lasts for an average of three years. This results in increases in both the FP commodity costs and the indirect costs associated with visiting a service provider. Furthermore, the increase in the CPR for married women has a greater impact on the population total fertility rate, declining from 3.9 to 3.59; whereas, it declines to 3.62 for unmarried women. This bears on the demographic dividend estimation, which constitutes over 90% of benefits.

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# 1. Introduction

Family planning plays an important role in the reproductive health and the rights of women, and contributes to economic development. Preventing unwanted pregnancies results in the reduction in both maternal and child mortality and morbidity (LeGrand and Philips, 1996; WHO, 2019). Additionally, it reduces the number of dependents per adult in the labour force, increasing per capita incomes. This demographic dividend that results from lower fertility rates is not only derived from rising incomes, it can also be attributed to higher labor force participation rates for women, increased investment in the health and education of (existing) children, thereby increasing their future productivity, and higher national savings rates and investment (Karra et al., 2017).

According to the Ghana Maternal Health Survey 2017, the total fertility rate is 3.9 for all women of reproductive age. Reducing this rate will require deliberate planning and effort at the national, community, and household levels, involving the sensitization of the whole of society and access to contraception, all requiring the use of scarce resources.

In 2015, Ghana mounted a family planning program which had as its objective to increase the contraceptive prevalence rate (CPR) of married women aged 15-49 from 22.2 to 29.7 percent, and that of unmarried women from 31.7 to 40 percent by 2020 (GFPCIP, 2015). The implementation of the program has been quite successful, the CPR is 30.8 percent for married women (compared with 22.2 in 2014 before the program) and 38.4 percent for unmarried women compared with 31.7 in 2014 (Ghana Maternal Health Survey 2017). These represent an annual average increase in CPR by 2.9 percentage points for married and 2.2 percentage points for the unmarried. However, survey data suggests that there remain a significant percentage of women (~30%) with an unmet need for family planning (DHS, 2014, MICS 2017/18).

This first intervention makes the investment case for an extension of the current programme (post 2020) by demonstrating that the economic and health benefits far exceed the costs of the programme.

Likewise, the relevant information and the unavailability of family planning commodities to adolescents, places teenage childbearing in Ghana higher than the global average. According to UNICEF, In 2018, the estimated adolescent birth rate globally was 44 births per 1,000 girls aged 15 to 19; in West and Central Africa, this figure stood at 115 births,



the highest regional rate in the world; in Ghana, it is 75 (MICS 2017/18). Children of teen mothers run the risk of high morbidity and mortality. Teen mothers are more likely to have adverse pregnancy outcomes and are less likely to continue with their education, thus pushing them (and their children) into poverty.

Sexual and reproductive health education does form part of the curriculum in Ghana, and approximately 77 percent of adolescents are exposed to sex education by the time they complete Senior High school (Awusabo-Asare, 2017). However the coverage of topics is minimal, and drop out rates are considerable for Junior (40%) and Senior High school (20%). Exposure to adequate comprehensive sex education is needed for adolescents to have a good understanding of their reproductive health and appropriate adaptive behavior to maintain adequate sexual and reproductive health.

The second intervention analyzed here demonstrates that compulsory, comprehensive, and universal (boys and girls) sexual reproductive health education, as well as the provision of contraceptives, is also a beneficial intervention.

## **2. Increasing contraceptive use for Married and Unmarried Women in Ghana**

### **2.1 Literature Review**

According to the Ghana Multiple Indicator Cluster Survey 2017/18, two in every five women demand family planning and are satisfied with modern methods of family planning. However, the percentage of women, age 15-49 years, currently married or in union with met need for family planning for spacing is only 16% and 12% for limiting the number of children. These constraints cannot be attributed to lack of access alone. In the Democratic Republic of Congo, where one quarter of women have an unmet need for family planning, Muanda et al (2017) report, after having conducted 6 focus groups in zones with adequate access to health services, that the key barriers that emerged were fear of side effects (especially sterility), costs of the method, sociocultural norms (especially the dominant position of the male in family decision-making), pressure from family members to avoid modern contraception, and lack of information/misinformation. Several studies confirm the same social pressures and fears in Ghana. Guure et al (2019) cite the fear of contraceptive side effects, age of the respondent, infrequent sexual intercourse, opposition from partners, wealth index, respondents educational level,

respondents and partner's occupation, and religion and ethnicity as significant factors that affect the uptake of contraceptives. These findings are similar to Nketiah Amponsah et al. (2012), Teye (2013), and Beson et al. (2018).

Policy initiatives focusing on demand generation have been positively associated with increases in the CPR. Muanda et al. (2017) recommended that programmes should stress expanded access to both information and services as well as greater depth of education and understanding for young men and women even before marriage, when they begin to feel a great deal of cultural pressure from pro-natalist family members and communities alike. Belaid et al. (2016) undertook a Cochrane review of family planning interventions to assess their effectiveness. Demand generation interventions were positively associated with current use of contraceptives (pooled OR 1.57; 95% CI: 1.46–1.69,  $P < 0.01$ ).

The anticipated socioeconomic benefits of the provision family planning services are numerous.

Access to family planning and maternal and child health services is likely to have economic repercussions for families, extending beyond the reductions in fertility and improvements in health. For example, improved control of fertility and health of women and children will give women more opportunity to acquire skills that could raise lifetime earnings. Additionally, a reduction in total fertility might lead parents to accumulate more physical assets than they would have otherwise done, particularly if the assets are a partial substitute for the support and care they expect from a child. Moreover, human capital investments parents make in each of their children's health and schooling might rise as a result of reproductive health programmes that provide information and access to family planning. Finally, general equilibrium effects might occur at the community or aggregate level if fertility declines exceed increases in child survival, leading to fewer young people in the community than in previous generations. Within two decades after a decline in fertility, fewer young adults than previously would reach working age, possibly causing wages to rise, at least for young people, because of a scarcity of workers (assuming the supply of other productive factors and technology does not change) (Canning and Shultz, 2012).

There are many studies which demonstrate the cost-effectiveness of the provision of family planning services. Zakiyah et al., (2016) from a systematic review of existing studies concludes that improving family planning interventions in low- and middle-income countries is cost-effective as measured against accepted international cost effectiveness benchmarks. In areas with high HIV prevalence, integrating family planning and HIV services can be efficient and cost effective. Babigumira et al. (2012) implemented a hypothetical new contraceptive program in order to determine the cost

effectiveness over the current contraceptive program. Mean discounted life expectancy and disability-adjusted life expectancy (DALE) were higher under the new versus the current; 28.74 vs. 28.65 years and 27.38 vs. 27.01, respectively. Mean pregnancies and live births per woman were lower under the new programme NCP (9.51 vs. 7.90 and 6.92 vs. 5.79 respectively). Mean lifetime societal costs per woman were lower for the new programme.

Several cost-benefit analyses have been done on the promotion and provision of family planning services. In a systematic review of published economic evaluation studies, providing a synthesis of evidence on costs, consequences and cost-effectiveness of strategies to improve family planning interventions in low and middle-income countries, Zakiyah et al (2016) concluded that, compared to other strategies to reduce maternal morbidity and mortality, reducing the unmet need for family planning is the most cost-effective single intervention. USAID (2009) evaluated the costs and benefits of meeting the need for family planning in Kenya. The costs of provision are outweighed by the reductions in maternal and child mortality and reduced pressure on the health and education systems, by a factor of 4. In Kiribati, where the total fertility rate is 3.8 and the CPR is less than 20%, ensuring universal access to contraception is valued at AUD\$807,000 and would yield the similar benefits of averted maternal and infant deaths, maternal morbidity, and the costs of unintended pregnancy, as well as the economic benefits that result from reducing the dependency ratio. The benefit-cost ratio (BCR) of meeting all family planning needs is 23 (Family planning New Zealand, 2014). Using an almost identical model, Kennedy et al (2013) calculate BCRs of 18 and 33 for Vanuatu and the Solomon Islands, respectively. Similar analyses reveal BCRs for Egypt at 40 (Chao, 2005); Haiti, 18 (Kohler, 2017); sub-saharan Africa, 90-150 (Kohler 2012); Rajasthan, 32 and Andhra Pradesh, 16 (Sodani et al. (2018).

## **2.2 Description of intervention**

The Government of Ghana is at the terminal point of a family planning programme, which began in 2015, and is structured around five thematic areas: demand creation; service delivery; contraceptive security; policy and enabling environment; financing, and stewardship, management and accountability (Government of Ghana, 2015). The activities under each theme in accordance with the Ghana Family Planning Costing Implementation Plan (GFPCIP) are explained below.

*Demand creation* aims to increase the demand for and uptake of family planning by expanding knowledge through public campaigns and community-level mobilization activities. *Service delivery* involves strengthening the health system for the provision of FP services to potential users. *Commodity security* focuses on maintaining a robust and reliable supply of contraceptive commodities to meet clients' needs. *Policy and enabling environment* involve training low-level healthcare personnel on the use of existing FP related policies and guidelines to reduce the gap in dissemination and implementation of existing policies. *Financing* focuses on enhancing domestic financing of FP and decreasing dependence on external funding. *Stewardship, management and accountability* entails measures which improve monitoring, management, leadership, and accountability (GFPCIP, 2015).

The implementation of the program has been successful, the CPR is 30 percent for married women (compared with 22.2 in 2014 before the program) and 38.4 percent for unmarried women compared with 31.7 in 2014. These represent an annual average increase in CPR by 2.9 percentage points for married; 2.2 percentage points for the unmarried women.

The intervention proposed here makes the investment case for an extension of the current programme: In phase 2, for married women, a targeted increase in the CPR to 40% and, for unmarried women, an increase in the CPR to 50%.

### **2.2.1 Assumptions**

The identification and measurement of the cost and benefits were based on the following assumptions:

- The pregnancy prevalence rate is 14% (MICS 2017/18).
- The percentage of unintended pregnancies is 37%, as reported by the Guttmacher Institute.
- The percentage of women married or in-union is 57%; unmarried, 43% (Ghana Maternal Health Survey 2017).
- The principal motivation for the uptake of contraceptives by married women is for spacing. Since the medically recommended amount of time between births is 2 years, we assume that this is the minimum amount of time that married women will remain on contraception. Likewise, the assumed motivation for unmarried women is to avoid becoming pregnant. We have therefore taken the period of

three years as the average amount of time that a sexually-active married woman would remain on contraceptives at any given time.

- Based on the government's past performance in increasing the CPR, we assume that the pace would continue: a 2% increase in the CPR per annum. This translates into 5 years for married women ; 6 years for unmarried.
- The effectiveness of contraceptives is assumed to be 97.3%, the average of a selection of modern methods as presented by Bradley et al. (2017).
- Short-term costs and benefits are modeled over a 6 year and 8 year period respectively for married and unmarried women with an assumed 2pp increase in CPR per year. The longer time frame is required because there is a larger assumed total increase in CPR among unmarried women (12 pp increase vs 10pp for married women), and the average time for contraceptive use is longer among unmarried women (3 years for unmarried women and 2 years for married women).

### **2.2.2 Baseline calculations**

Of the estimated 7.4 million women between the ages of 15 and 49, 4.2 million are married, and the number of annual unintended pregnancies is 292,700 per year, of which 81,500 are avoided by the intervention.

Of the 3.2 million unmarried women (never-married and divorced/separated), the number of unintended pregnancies is approximately 220,800 per year, of which 71,600 are avoided by the intervention.

## **2.3 Calculation of Costs and Benefits**

### **2.3.1 Estimation of costs**

The costs that we consider are activity costs, commodity and direct consumables, indirect costs (consisting of the cost of transportation to health facilities as well as time spent at health facility to receive FP service), and the cost of side effects. The activity cost, US\$5.52 per woman targeted, covers demand creation and service delivery. It also includes all direct point-of-service costs. The costs of family planning commodities and direct consumables is US\$3.74 per actual user as computed in GFPCIP (2015) and include a variety of additional loaded costs for each commodity (e.g., freight, insurance, customs and clearing charges, warehousing, and distribution fees to the last mile).

Financing, policy and enabling environment, management and accountability were components of the programme as it was implemented in 2015. The health infrastructure having been reinforced as a consequence of the first phase, these components are not considered additional to the second phase. The exchange rate used is GHS:USD, is 4.56.

The indirect costs of family planning consider transport costs and the opportunity cost of time and has been valued at GHS101 per user. It is assumed that users visit a health facility/doctor four times per year.

The percentage of women experiencing side effects ranged from 9 to 11% according to the DHS. It was assumed that while side effects may persist for the duration of the contraceptive period, there is only one visit to the FP provider, valued at GHS101 per user.

Below are the cost components for both married and unmarried women assuming an 8% discount rate.

**Table 1. Cost components, married and unmarried women, GHS millions**

<i>Costs items</i>	<i>Married women</i>	<i>Unmarried women</i>
Activity costs	345.5	270.4
FP commodities	26.1	30.0
Indirect costs	615.4	707.6
Side effects	1.4	4.9

Total discounted costs (8%) are GHS 988 million for married; GHS 1013 million for unmarried.

### **2.3.2 Estimation of Benefits**

The anticipated benefits of increasing the CPR by 10 and 12 percentage points for married and unmarried women, respectively, include maternal and infant deaths averted, pregnancy and induced abortion costs avoided, and the demographic dividend that results from a decrease in the dependency ratio.

The maternal mortality rate, which includes death during delivery and 2 months post delivery, is 310 per 100,000 live births (Ghana Maternal Health Survey 2017). Approximately 12 maternal deaths are averted for every 2% increase in the CPR for married women; 9, for unmarried. The weighted average age of maternal death being 33.7, the life expectancy at that age is 38.2, which is considered the years of life lost

(YLL) if the death does indeed occur. The monetary value of these years is a function of GDP per capita in 2017, inflated to the present time. Maternal mortality averted among married women is valued at GHS 28.2 million; among unmarried, GHS 26.3 million.

The causes of neonatal mortality are, unfortunately, numerous and vary greatly. It was decided to include infant deaths associated with inadequate spacing. Failure to space live births at least 24 months apart has a current mortality rate of 36 per 1000 live births; the risk ratio of neonatal mortality from lack of spacing is 1.26. Approximately 22 and 16 neonatal deaths are averted per 2% increase in the CPR for married and unmarried women, respectively; a total of 108 and 95 over the intervention period. Life expectancy being 63.5 years at birth, total neonatal mortality has been valued at GHS 87.2 million (married) and GHS 81.3 million (unmarried).

Since the intervention is anticipated to avert 22,600 and 19,900 pregnancies for married and unmarried women, respectively, there is a benefit associated with the avoided costs of antenatal care, delivery and newborn costs. Valued at GHS 266 per woman, the total values at the end of the intervention period are GHS 5.2 and GHS 4.6 million.

Another benefit is induced abortions. The percentage of unwanted pregnancies aborted is 11.6%, an average across the age groups 15-49 (Ghana Maternal Health Survey, 2017). It is estimated that raising the CPR by 10 percentage points averts approximately 2184 and 1920 abortions among married and unmarried women, respectively, valued at GHS 362,000 and GHS 318,000.

What is the impact of a 10% increase in CPR on the current TFR of 3.9? Using Ghana, among other countries, as a case study, Bongaarts (2017) theorizes that a 1% increase in the CPR leads to a 0.054 decline in the TFR. For married women, holding all things equal including the fertility rate of unmarried women and adolescents, the TFR declines to 3.59 as a result of 10% in CPR. For unmarried women, a 12% increase in the CPR causes the TFR to decline to 3.62.

The socioeconomic impact that a decline in TFR has on the economy is what is referred to as the demographic dividend. Reduced fertility impacts the economy through several channels, as discussed by Ashraf et al., 2013: The *Malthus effect* refers to that of population on the congestion of fixed factors, such as land. The *Solow effect* refers to the capital shallowing that results from higher growth in the labor force. A reduction in

fertility leads, at least temporarily, to a higher ratio of working-age adults to dependents. Holding income per worker constant, this mechanically raises income per capita and is termed the *dependency effect*. A concentration of population in their working years may raise national saving, feeding through to higher capital accumulation and higher output, which is called the *life-cycle saving effect*. Slower population growth shifts the age distribution of the working-age population itself toward higher ages, resulting in an increase in experience, which would translate into increased productivity. This is called the *experience effect*. If older workers participate in the labor market at a higher rate than workers just entering the workforce, the shifting age distribution towards higher ages will lead to higher overall labor force participation, thereby increasing income per capita and is referred to as the *life-cycle labor supply effect*. Reduced fertility lowers the quantity of adult time that is devoted to child-rearing, freeing up more time for productive labor, known as the *childcare effect*. Finally, the *child-quality effect* refers to the increases in parental investment per child that results from reductions in fertility.

The demographic dividend that comes from a decrease in the TFR does not happen instantaneously. Rather, the benefits are realized in phases, and the beneficiaries change slightly as time goes on. The first and primary source of the demographic dividend is increased incomes, which result from both the increased supply of female labour and from fewer expenditures on the dependent portion of the population. This *dependency effect* is by far the dominant channel in the short run, explaining roughly 70 percent of the income gain in the first 15 years of Ashraf's simulation, and only falling below 40 percent of the total after 45 years (Bloom et al., 2016). Returns to human capital (e.g. education and health) are expected to be realized later, the magnitude of which depends greatly on the availability and costs of such services within country and the sociocultural norms which determine demand uptake.

An Ashraf et al. (2013) simulation, using Nigeria data as a baseline, postulates a reduction in TFR by 0.5 leads to 5.6 percent increase in GDP per capita over 20 years. Assuming a proportional, linear relationship between GDP per capita boost and TFR reduction, this translates into an increase of 3.45% and 3.12% of GDP per capita over 20 years, associated with the interventions targeting married and unmarried women respectively in Malawi. The increase in GDP per capita is assumed to phase in linearly over time. We calculate the annual welfare impact by multiplying the GDP per capita boost by the expected population in a given year. The stream of welfare impacts is then



discounted at the appropriate exchange rates to estimate the demographic dividend benefit. The demographic dividend benefit is very large under both interventions, comprising 97% of the total benefit. This is broadly consistent with cost-benefit analyses of family planning interventions conducted under previous Copenhagen Consensus projects.

**Table 2. Benefit streams for both married and unmarried women, GHS millions**

<i>Benefit streams</i>	<i>Married Women</i>	<i>Unmarried women</i>
Demographic dividend	32,187	28,920
Maternal mortality	240	189
Neonatal mortality	742	583
Pregnancy costs	33	24
Abortion costs	2	2

Total discounted benefits (8%) are GHS 33,204 million and GHS 29,717 million for interventions targeting married and unmarried women, respectively.

### 2.3.3 Summary of Costs and Benefits

As expected, the most significant component of the benefit is demographic dividend for both married and unmarried women.

<i>Intervention</i>	<i>Discount Rate</i>	<i>Benefit, GHS millions</i>	<i>Cost, GHS millions</i>	<i>BCR</i>
<i>Family Planning, married women</i>	5%	48,347	1099	44
	8%	33,204	988	<b>34</b>
	14%	17,048	811	21
<i>Family Planning, unmarried women</i>	5%	43,461	1,162	37
	8%	29,717	1,012	<b>29</b>
	14%	15,080	786	19

The BCR for unmarried women is slightly lower, despite the fact that the intervention models a 12 percentage point increase in the CPR, as opposed to 10 for married women. There are, in fact, fewer unmarried women (43% of all women ages 15 - 49), who have a preference for long-term contraception, and it is assumed that contraceptive adherence lasts for an average of three years. This results in increases in both the FP commodity costs and the indirect costs associated with visiting a service provider. Furthermore, the increase in the CPR for married women has a greater impact on the total fertility rate,

declining from 3.9 to 3.59; whereas, it declines to 3.62 for unmarried women. This bears on the demographic dividend estimation, which constitutes over 90% of benefits.

## **3. Adolescent sexual and reproductive health education**

### **3.1 Introduction**

It is estimated that about half of pregnancies among adolescent women aged 15–19 living in developing regions are unintended, and more than half of these end in abortion, often under unsafe conditions. About 15 million of these adolescents use a modern contraceptive method, while 23 million have an unmet need for modern contraception and are thus at elevated risk of unintended pregnancy (Darroch et al., 2016).

Furthermore, some sexual activity occurs in the context of human rights violations such as child marriage, coerced sex or sexual abuse. For example, Moore et al. (2007), in a study of 12–19-year-old girls and young women in four countries, found that, in Malawi, 38% said that they were “not willing at all” at their first sexual experience; this was reported by lower, but still substantial, proportions of 12–19-year-olds in Ghana (30%), Uganda (23%) and Burkina Faso (15%).

Although adolescence is generally considered to begin at around age 10, the tranche of 15 - 19 years appears critical. According to Darroch et al. (2016), the percentage of African girls who had ever had sex by age 16 was 27%; whereas, by age 19, it was 66%. There is ample research that links young mothers to poverty, constrained productivity, neonatal and infant mortality, malnutrition, among other things.

The evidence below suggests that an intensive intervention that targets adolescents at the junior and senior high school levels and responds to their contraceptive needs would be a key element in reversing the high rate of unwanted pregnancies in Ghana.

### **3.2 Literature review**

Esantsi et al. (2015) conducted a study with a view to generating evidence on the knowledge, perceptions and practices regarding adolescent sexual and reproductive health among four urban slums in Ghana (two from the Greater Accra Region and another two from Brong Ahafo Region). Structured interviews were conducted with 1,303 adolescents aged 13-19 years and 626 parents/guardians and focus group

discussions held with 42 community leaders drawn from schools, nongovernmental organizations/community based organizations. The main findings include the following:

- About one-third of the adolescents (32% of the males and 34% of the females) had ever had sexual intercourse. According to Awusabo-Asare et al. (2017), the percentage of females, aged 15-19, that have had sexual intercourse is markedly higher at 43%.
- Slightly more than one-third of the adolescents who had ever had sex (32% of the males and 39% of the females) reported that the first sexual intercourse was unplanned. Although virtually every adolescent interviewed had heard of contraceptives, the proportion that used a method to prevent pregnancy at first or last sexual activity was lower: 46% of the males and 49% of the females.
- For the majority of the adolescents, school was the major source of information on SRH issues including puberty (79% of the males and 64% of the females) and reproduction (74% of the males and 65% of the females). In addition, schools were one of the main preferred sources of information on these topics (for puberty: 37% of males and 28% of females; for reproduction: 40% of males and 33% of females).
- Nine out of ten (91%) parents/guardians were willing to allow their adolescent children to receive reproductive health information and services. An equally high proportion of parents/guardians (97%) wanted reproductive health information to be provided in schools although 87% reported that they were comfortable discussing sexual-related matters with their adolescent children.
- Most community opinion leaders approved the use of contraceptives by adolescents, mainly to avoid teenage pregnancy (which they felt was quite prevalent in the community), abortion and the risk of contracting sexually transmitted infections.

Among the recommendations made, the authors identified the need to incorporate sex education appropriate for each educational level, to ensure that information is communicated by individuals with appropriate training that takes into account the special needs at different levels, and to develop appropriate curriculum methodologies and materials that recognize gender differences in SRH knowledge, attitudes and practices.

The unmet need for contraception among Ghanaian adolescents indicates that more information needs to be transmitted to adolescents: 95% of sexually active adolescent females, who are unmarried, want to avoid pregnancy within the next two years, but 62% have an unmet need for family planning.

The current Sexual and Reproductive Health Education (SRHE) Curriculum in Ghana was evaluated recently by the Guttmacher Institute (Awasabo-Asare et al., 2017).

A summary of the findings includes the following observations:

- Ghana has a supportive policy environment for SRH education. The Adolescent Reproductive Health Policy, revised in 2015, led to the inclusion of a reproductive health component in the curriculum in junior high and senior high schools.
- Some SRH topics are core (compulsory) and others elective; topics in elective subjects tend to be more comprehensive. Many of the latter include negotiation skills, accessing and using contraceptives, gender-based violence and human rights. For example, the 'Management in living' course in SHS addresses the most extensive list of SRH topics, including abortion (in the context of how illegal abortion affects adolescents), family planning, STIs and decision making. However, this subject is not compulsory; it is offered as part of the home economics elective program, which is generally attended by only a small group of students, and mainly females.
- Curricula focus heavily on the promotion of abstinence and exclude coverage of healthy sexual behaviors. Furthermore, information is often presented from a negative perspective by emphasizing challenges that young people face rather than opportunities, and problematizing sexual behaviors among young people.
- While 83% of teachers claimed to teach all topics that constitute a comprehensive SRH education, only 8% of students reported learning about all of them. Fewer than half of students had learned about contraceptive methods or practical skills, such as where to access HIV/STI services, communicating in relationships, how to use contraceptives and where to get them.
- Teachers and students both agreed that messages conveyed by teachers tended to be reactive and focused primarily on abstinence, with an emphasis that sexual relationships are dangerous and immoral for young people and should be delayed until after marriage.

- And most worryingly, while nearly all teachers reported covering contraceptives, the nature of the information varied, with most teachers emphasizing that condoms are not effective in preventing pregnancy (86%). Some also taught that condoms are not effective for STI/HIV prevention (34%), and that contraceptives are not effective in preventing pregnancy (24%).
- Only 39% of teachers had received any in-service training, and fewer than 15% had received any such training within the past three years.

There is a growing literature that shows the importance of education and its potential impact on family planning and reproductive health in general. The findings seem to consistently point to the conclusion that education levels are important factors that influence reproductive health choices (Guure, Chris, et al. 2019; Ontiri et al. 2019, Teye, 2013). Muanda et al (2017), for example, providing evidence from the Democratic Republic of Congo, concludes that programs should stress expanded access to both information and services as well as greater depth of education and understanding for young men and women even before marriage, when they begin to feel a great deal of cultural pressure from family members and communities alike. This strand of literature highlights the important role education could play in policies targeted at improved reproductive health.

Origanje et al. (2016) have undertaken a systematic review of both individual and cluster randomized control trials up to November 2015, with the objective of assessing the effects of primary prevention interventions (school-based, community/home-based, clinic-based, and faith-based) on unintended pregnancies among adolescents. The interventions were placed in one of three categories: education only, contraception promotion, or multiple interventions (a combination of the first two). The authors conclude that multiple interventions lowered the risk of unintended pregnancy among adolescents significantly (RR 0.66, 95% CI 0.50 to 0.87; 4 individual RCTs, 1905 participants, *moderate quality evidence*). However, this reduction was not statistically significant from cluster RCTs. For adolescents who received contraceptive-promoting interventions, there was little or no difference in the risk of unintended first pregnancy compared to controls (RR 1.01, 95% CI 0.81 to 1.26; 2 studies, 3,440 participants, *moderate quality evidence*). Educational interventions were unlikely to significantly delay the initiation of sexual intercourse among adolescents compared to controls (RR 0.95, 95% CI 0.71 to 1.27; 2 studies, 672 participants, *low quality evidence*). However,

Educational interventions significantly increased reported condom use at last sex in adolescents compared to controls who did not receive the intervention (RR 1.18, 95% CI 1.06 to 1.32; 2 studies, 1431 participants, *moderate quality evidence*). The risk ratio of 1.18 is what is used to calculate the effect size of the number of pregnancies averted from condom promotion and use.

A cluster randomized control trial was conducted in Northern Ghana from April to August 2018. Participants within the ages of 13-19 years were enrolled voluntarily from six randomly selected Senior High Schools (3 for intervention and 3 for control), for a total of 363 adolescents. Control participants received their normal classes while the intervention group additionally received comprehensive sexuality education for 1 month by qualified midwives. Though there was no difference at baseline between the two groups in terms of sexual activity, the educational intervention resulted in a significant difference in sexual abstinence between intervention and control groups (OR = 13.89, 95% Confidence Interval (2.46-78.18,  $P < 0.003$ ) (Ibrahim et al. 2019).

The above studies demonstrate the importance of SRHE and access to family planning commodities at the start of adolescents' sexual experiences. The Guttmacher Institute (2014) estimates that if all women who want to avoid a pregnancy used modern contraceptives and all pregnant women and their newborns received care at the standards recommended by WHO, the benefits would be dramatic. Compared with the current situation,

- unintended pregnancies would drop by 70%, from 74 million to 22 million per year;
- maternal deaths would drop by 67%, from 290,000 to 96,000;
- newborn deaths would drop by 77%, from 2.9 million to 660,000;
- the burden of disability related to pregnancy and delivery experienced by women and newborns would drop by two-thirds; and
- transmission of HIV from mothers to newborns would be nearly eliminated—achieving a 93% reduction to 9,000 cases annually.

### **3.3 Description of intervention**

The Ghana Adolescent Reproductive Health Policy (2000) adopted a multisectoral approach to addressing adolescent reproductive health issues. The policy explicitly encouraged and led to the inclusion of a reproductive health component in the educational curriculum at the primary, junior high and senior high school levels. In 2013,

the National HIV and AIDS, STI Policy advocated for the inclusion of age appropriate SRH education in the school curriculum, which includes lessons on HIV/AIDS and other STIs for girls, 10-19 years.

However, given the fact that certain core themes are electives and girls are the principal beneficiaries because certain subject matters have been combined with home economics courses and the like, the intervention proposed is universal (boys and girls), comprehensive, and compulsory SRHE, throughout JHS and SHS, a revision of the curriculum, the (re)training School-based health coordinators, and the distribution of contraceptives (i.e. condoms).

In accordance with the GFPCIP 2016-2020, sex education will be integrated into the life skills education curriculum of both the JHS and SHS program. In addition, Ghana Education Service staff, including teachers, and school health coordinators will receive training as a way of improving their capacity to teach FP or contraceptive education. The training will also be integrated in the curriculum of all Colleges of Education to ensure that teachers receive pre-service training. In addition, access to and the provision of condoms will be introduced.

The compulsory aspect of the SRHE is achieved when all students are exposed to all SRH concepts through the core curriculum. The comprehensiveness aspect of SRHE is addressed with a revision of the core curriculum. As reported by Awusabo-Asare et al. (2017), a limited range of topics is covered as part of the compulsory school subjects. Topics such as communication and interpersonal skills, which are imperative for adolescent development, are included in the management in living elective curriculum and the HIV Alert module, and contraception topics are included in management in living and biology electives, but neither of these subjects is taken by all students. Other pertinent issues—such as negotiation skills, ability to manage risks, how to use and where to access contraceptives, gender and marriage, body autonomy, gender-based violence and gender equality—are not included in the compulsory social studies curriculum. Furthermore, issues involving young males are not given as much attention as those involving females. For instance, beyond the physical maturation of young males (semenarche), the challenges of male development and behavior (e.g., the societal macho image) are not addressed.

### 3.3.1 Assumptions and baseline calculation

The following assumptions were used to calculate the costs and benefits of the intervention:

- The number of adolescents, aged 15 - 19, is 3.05 million; the number of girls, aged 15-19, is 1.5 million.
- The net attendance ratios for JHS and SHS are 0.40 and 0.20, respectively (MICS 2017/18); however, for girls it is 0.43 and 0.19, respectively.
- There are 1.2 million JHS students and 611,000 SHS students.
- The pregnancy prevalence rate is 0.144 (Ghana Maternal Health Survey 2017).
- The unmet need for contraception of girls, 15 - 19, is 0.61(MICS 2017/18).
- All girls, who become pregnant, drop out of school.

Based on the above, it was calculated that the number of unintended pregnancies, and hence dropouts, at some point during JHS is 56,300; 24,900 at SHS level.

The intervention is modeled over 7 years: the first year assigned to revision of curriculum and retraining; the following six years represent the movement of one cohort through JHS and SHS, three years each.

## 3.4 Calculation of Costs and Benefits

### 3.4.1 Estimation of Costs

The costs of the intervention are:

*Curriculum adaptation, retraining and delivery.* We relied on per unit estimates from the costing estimates by the GFPCIP. The cost per student is \$8.73 (2015). The cost of a similar activity in Nigeria was estimated to be \$6.84 in 2011 (Kivela et al, 2013).

*Cost of FP commodities.* This was costed in the GFCPCIP at \$3.74 (2015).

*Cost of additional years of schooling.* The total (direct and indirect) cost of education was estimated at GHS 1184 per student, per year (Results for Development, 2015). The opportunity cost of education was also included here and was based on what is considered the next best alternative available to minors, who are not attending school. The national child labour rate being 30%, this figure was taken as an estimation of the number of dropouts who would be able to secure employment, using the mean wage for those without/primary education (Turkson et al, 2019) of GHS 5119.



*Recurrent costs* were assumed to be 10% of annual programme costs.

**Table Cost components of the SRHE programme**

<i>Cost Components of the SRHE Program</i>	<i>GHS, millions</i>
Curriculum adaptation, retraining and delivery	68.5
Cost of FP commodities	8.2
Cost of additional years of schooling	15.0
Opportunity cost of schooling	34.8
Recurrent costs	0.8

Total discounted costs (8%) are GHS 127.2 million.

### **3.4.2 Estimation of Benefits**

In order to arrive at the number of unintended pregnancies avoided, the risk ratio of 1.18 was applied as the relative effect of SRHE intervention on the use of birth control methods (specifically condoms). It is assumed that the use of birth control averts pregnancy. As mentioned above, this ratio was taken from a systematic review of RCTs, in which the main outcome measured was unintended pregnancies. The number of unintended pregnancies avoided by the intervention is therefore 10,140 at the JHS level and 4480 at SHS level.

It is assumed that contraceptive use by sexually-active adolescents delays pregnancy to an age when it is physically safer to have children. Therefore all benefits should be considered as relative to pregnancy at an older age. The anticipated benefits from delayed pregnancy include avoided medical costs of birth, fistula, caesareans and abortions, infant and maternal mortality, and the marginal income gain from completed JHS and SHS.

--The avoided medical costs associated with antenatal care, pregnancy and delivery are estimated at GHS 266 and include direct and indirect costs.

--Cesareans make up 16% of all births, and early pregnancy increases this risk by 80% (Yussif et al. 2017). The medical cost of a caesarean is estimated at GHS 3000.

--The prevalence of induced abortions for mothers who are less than 20 years of age is 18.8%, and adolescent mothers are 86% more likely to have an induced abortion (Ghana Maternal Health Survey, 2017). The medical cost of abortion is assumed to be approximately GHS 425 in Ghana.

--The maternal mortality for all women is 310 per 1000 women, but 510 per 1000 women for adolescent girls, an increased risk of .20% (Nove et al. (2014). Approximately 9 deaths would be averted per cohort.

--According to the Ghana Maternal Health Survey (2017), among adult women, the incidence of infant mortality is 27 per 1000 births, but the pregnancies of adolescent women are 30% more likely to result in the death of the infant. Approximately 118 infant deaths would be averted due to the intervention per cohort.

--Lastly, around 1.6 per 1000 births lead to obstetric fistula in women (Ghana Health Service, 2015), while for adolescents the risk is 28% higher (Tebue et al 2012).

The value of maternal and child lives saved follows standard protocols throughout the *Ghana Priorities* project, and assumes each adolescent maternal life saved avoids 53 years of life lost (YLL), each child life saved avoids 64 YLLs and each YLL is valued at around GHS 13,000 increasing with GDP per capita growth (Wong and Dubosse, 2019). Fistula is assumed to lead to a life-long disability that remains untreated, and the disability weight for untreated fistula is 0.346 years lost to disability (YLD) per year (Higashi et al. 2014). Each YLD avoided is valued at the same as each YLL avoided.

Lastly, with respect to continued education, benefits are valued as the marginal lifetime income gain associated with increased education attainment. The marginal increase in wage for a year of JHS is GHS 666 per year and for SHS is GHS 896, based on Mincerian equations estimated from GLSS 7 data and documented in another paper in the *Ghana Priorities* series (Turkson, et al., 2019). This increased wage value per year is assumed to increase with real income per capita growth, and lasts for the entirety of the women’s working lives. The increase in wages associated with more education is the largest benefit.

**Table Benefits of the SRHE programme**

<i>Benefits</i>	<i>GHS, millions</i>
Pregnancy costs avoided	3.1
Cesarean procedures avoided	4.4
Fistula avoided	0.5
Abortions avoided	0.8
Maternal deaths avoided	6.0
Infant deaths avoided	94.3

Income boost from completed education	175.4
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Total discounted benefits (8%) are GHS 285 million.

In summary, the analysis suggests that an intervention that provides sexual and reproductive health education to students up to secondary level is economically viable.

### **BCR Summary Table**

<i>Discount Rate</i>	<i>Benefit</i>	<i>Cost</i>	<i>BCR</i>
5%	458	138	3.3
8%	285	127	2.2
14%	155	109	1.4

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*The Ghanaian economy has been growing swiftly, with remarkable GDP growth higher than five per cent for two years running. This robust growth means added pressure from special interest groups who demand more public spending on certain projects. But like every country, Ghana lacks the money to do everything that citizens would like. It has to prioritise between many worthy opportunities. What if economic science and data could cut through the noise from interest groups, and help the allocation of additional money, to improve the budgeting process and ensure that each cedi can do even more for Ghana? With limited resources and time, it is crucial that focus is informed by what will do the most good for each cedi spent. The Ghana Priorities project will work with stakeholders across the country to find, analyze, rank and disseminate the best solutions for the country.*

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