EVALUATING THE EFFECTIVENESS OF INCENTIVES TO IMPROVE HIV PREVENTION OUTCOMES FOR YOUNG FEMALES IN SWAZILAND

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The contents of this report do not necessarily represent the views and positions of the World Bank, participating government agencies or other partner institutions. In particular, the findings and modeling analyses presented in this report focus primarily on the cost considerations and epidemiological effects of HIV programs. Individual findings represented in tables or specific sections of this report should not be viewed or cited in isolation. They should be seen in the context of the overall recommendations of this report and other considerations such as equity in service access and health benefits beyond the HIV response.

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List of Acronyms

AGYW	Adolescent girls and young women
AIDS	Acquired Immune Deficiency Syndrome
ART	Anti-retroviral treatment
C	Control
CAPI	Common Application Programming Interface (SurveyToGo)
CAPRISA 007	KwaZulu-Natal (KZN, South Africa) School Study – CAPRISA 007
CSO	Central Statistics Office
E	Emalangeni (Swaziland national currency)
EA	Enumeration area
EFA	Education For All (Free Primary Education)
EI	Education intervention
eNSF	National Multisectoral HIV/AIDS Strategic Framework
FLAS	Family Life Association of Swaziland
GBV	Gender based violence
HIV	Human immunodeficiency virus
HPTN068	Agincourt (Mpumalanga, South Africa) Study – HPTN068
HTC	HIV testing and counselling
I	Intervention
IE	Impact Evaluation
IHM	Institute for Health Measurement Southern Africa
IR	Intervention and Raffle
ISAB	In school at baseline
max	Maximum
MICS	Multiple Indicator Cluster Survey
min	Minimum
OOSAB	Out of school at baseline
OVC	Orphaned and vulnerable children
PEPFAR	President's Emergency Plan for AIDS Relief
PLHIV	People living with HIV
py	person years
R	Rural
RESPECT	Rewarding STI Prevention and Control in Tanzania
SD	Standard Deviation
SHIMS	Swaziland HIV Incidence Measurement Survey
SIHR	Schooling, Income and Health Risk
SSA	sub-Saharan Africa
SSAB	Schooling status at baseline
STI	Sexual transmitted infection
SWAGAA	Swaziland Action Group Against Abuse
TB	Tuberculosis
U	Urban

Executive Summary

Swaziland HIV epidemic and Rationale for Sitakhela Likusasa impact evaluation

In 2015, Swaziland had an estimated 13,910 new HIV infections, 263,040 people living with HIV (PLHIV), and 5,890 HIV/AIDS related deaths.(1) When stratifying by sex, incidence is higher in females than males. (2) Amongst persons aged 15-24 years, HIV prevalence in females is more than two times higher than males, 16.0% compared to 7.1% respectively, in 2013. HIV incidence is the highest amongst young women aged 20-24 and was 4.1% in 2013. Factors associated with HIV in Swaziland include: low prevalence of male circumcision; multiple, long-term concurrent sexual relationships; early sexual debut, low rates of marriage or cohabitation and age mixing; low condom use, especially in longer-term sexual relationships; lack of long-term stable sexual relationships; high levels of youth unemployment (64% of Swazi youth are unemployed); high prevalence transactional sex amongst young women (14% in 2014); gender-based violence; and structural factors.

Within this context, the Government of the Kingdom of Swaziland and the World Bank are collaborating on the implementation of an impact evaluation that is designed to test an innovative approach to HIV prevention amongst adolescent girls and young women (AGYW) – conditional cash incentives that are intended to both encourage education enrolment, attendance and completion, and to reduce higher risk sexual behavior, including transactional sex.

Sitakhela Likusasa Evaluation Design and Primary Research Questions

Research questions: The Impact Evaluation (IE) is aiming to answer the following primary research questions.

1. Do financial incentives made to adolescent girls and young women aged 15 to 22 years contingent on school attendance, reduce the incidence of HIV compared to adolescent girls and young women not receiving financial incentives?

2. Do raffle prizes paid to adolescent girls and young women aged 15 to 22, contingent on being negative for two curable STIs (*Trichomonas vaginalis* and syphilis), reduce the incidence of HIV compared to adolescent girls and young women not enrolled in a raffle?

3. Is the provision of incentives cost-effective as a method of HIV prevention amongst Swazi AGYW?

Recognising possibly limited power to detect interaction, the study team is also keen to understand whether raffle incentives and education incentives act in an additive or multiplicative manner to reduce the incidence of HIV amongst AGYW over time.

Study design: The IE employs a two by two factorial design in which participants are enrolled in either the education incentive arm or the control arm. In each of these arms, 50% of participants were randomized to also receive the raffle.

Sitakhela Likusasa Impact Evaluation Intervention

Intervention: The intervention being evaluated, incentivizes (i) initiation or enrolment into some form of education, attendance at or completion of this form of education, and (ii) lower risk sexual behaviour. The initial design of the intervention was that cash incentives, conditional on either of the following criteria, would be provided throughout the intervention period:

a) E200 for enrolling in primary or secondary school in a given school year
b) E400 per school term for attending more than 80% of their classes each school term over the study implementation period
c) For a randomly selected sub-sample of the participants: E1000 for the winners of a raffle in which those who tested negative for two curable STIs (*Trichomonas vaginalis* and syphilis) were entered

At each interaction with the study team (whether for intervention implementation or data collection), the intervention also entails that study participants are screened for gender-based violence (GBV) using a screening tool developed in partnership with the Swaziland Action Group Against Abuse (SWAGAA). Throughout the study, the intention is that suspected GBV cases are referred to SWAGAA for follow-up and support as part of their routine counselling and support mechanisms.

During the first year of study implementation, a protocol amendment was approved whereby it was clarified how incentives for other forms of education than formal schooling would be paid, as follows:

- *Education incentive for initiating and completing upgrading classes:*
    - Enroll for upgrading classes in Swaziland; then receive E700
    - Apply for O level exams; then receive E700

- *Education incentive for initiating and sitting for exams at University, vocational school or technical college:*
    - Register at University or College within Swaziland for 2016 and/or 2017; then receive cash incentive of E700 per year
    - Sit for the annual exam at the end of the year; then receive cash incentive of E700 per year

- *Education incentive for initiating and completing a short course of any kind:*
    - Initiate attendance at short course during 2016 and/or 2017 through proof of payment; then receive a cash incentive of E700 per course
    - Complete the short course; then receive a cash incentive of E700 per course

Study Population and Sampling

Study Population: The Impact Evaluation aimed to enroll 4,400 AGYW who were aged 15 to 22 at enrolment into the study. Partiicpants were enrolled into the study ensuring that 50% of the study population were in school or other form of education at the time of baseline (ISAB), and 50% were out of school or other form of education at baseline (OOSAB).

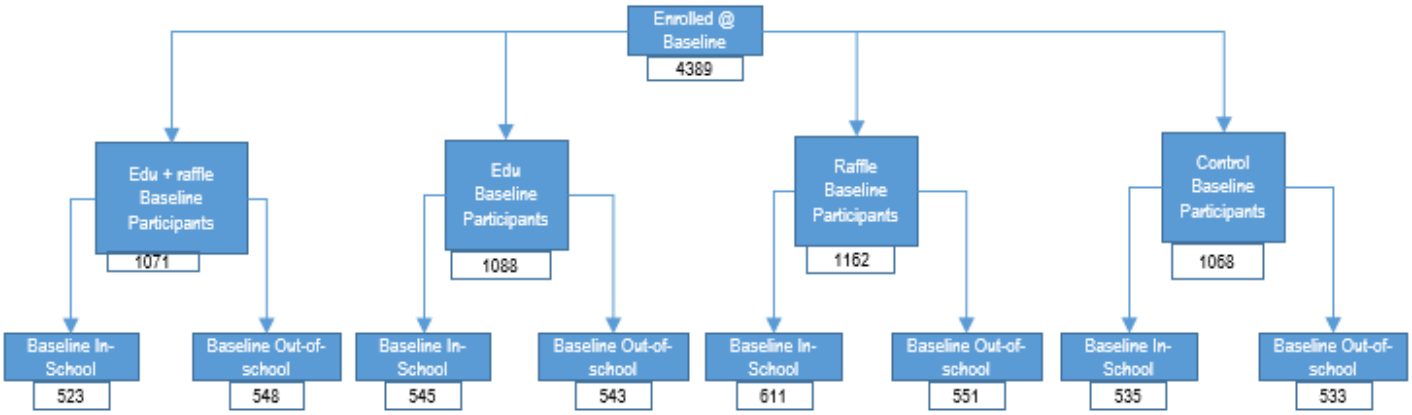
Sampling: The sampling was designed to achieve the following across the study arms: (a) 80% from rural enumeration areas (EAs) and 20% from urban EAs. In each of these groups and in the treatment and control arms, 50% had to be in some form of education at baseline, and 50% had to be not in some form of education at baseline.

Objectives of the Sitakhela Likusasa Enrolment and Baseline Results Report

The Sitakhela Likusasa enrolment and baseline results report provides the following information: (a) information about and demographics of those who participated in the baseline behavioral and biomedical data collection, and, of these participants, those who were HIV negative and opted to enroll in the study, (b) a cross-sectional analysis to better understand HIV and STI prevalence, characteristics and factors associated with being HIV and STI positive; (c) behavioral economic tendencies of the study population; (d) conclusions about the balance between study arms; (e) comparison of Sitakhela Likusasa baseline data with that of other similar studies designed to look at the effects of cash incentives on HIV and STI incidence; and (e) strengths and limitations of data collection at baseline.

Enrolment into the Study

Baseline data collection and enrolment: During enrolment and baseline data collection, **6055** AGYW were screened, of which **5231** AGYW were eligible and **4863** AGYW, who self-reported being between ages 15 to 22, consented/assented to participate in the baseline biological and behavioural survey. Of the **4421** HIV-negative participants at baseline, **4389** AGYW consented/assented to enroll into the Sitakhela Likusasa impact evaluation. Distribution by study arm and education status at baseline, is as follows:

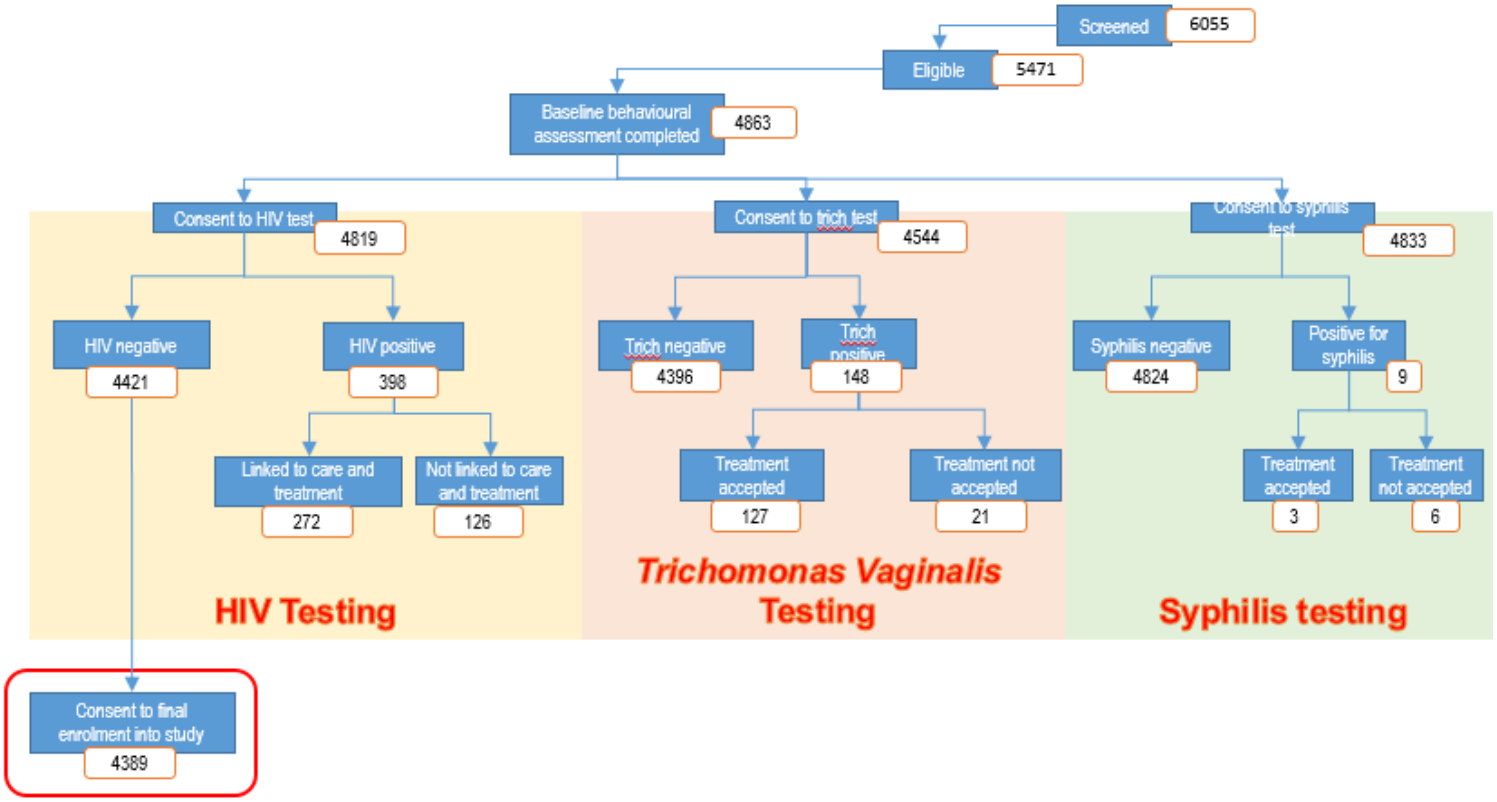


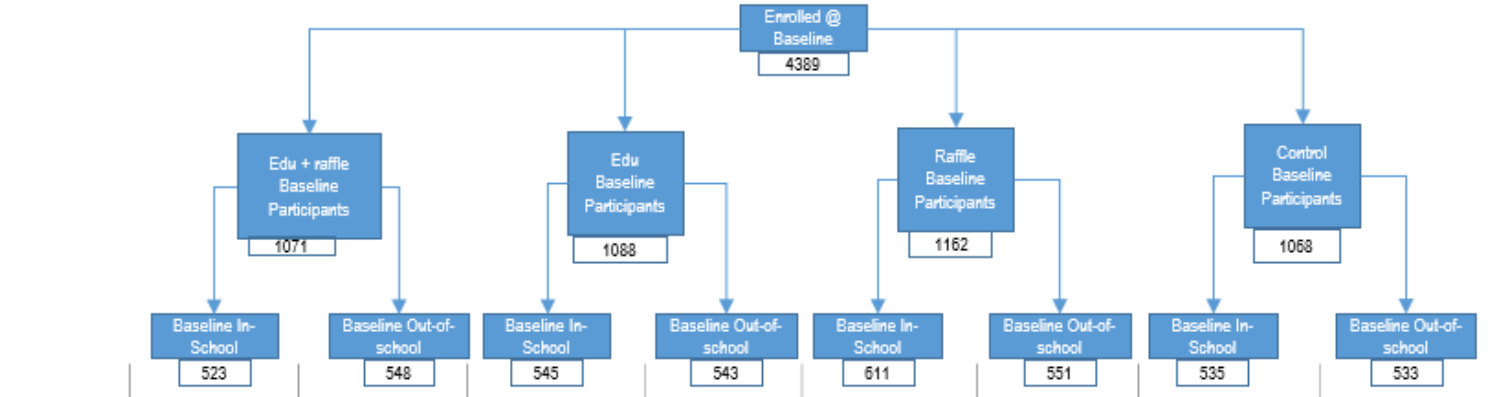
Baseline Data Results

The mean age of the sample was 18.22 years (standard deviation [SD]: ± 2.24) and 50.4% of those enrolled in the study were in some form of education at the start of the study

Over half (52.7%) of the AGYW surveyed at baseline had had their sexual debut. Of sexually active AGYW, 39.7% had sexual intercourse with a non-regular partner (not in a union or cohabitating). Additionally, 15.9% of AGYW who had sexual intercourse in the past 12 months, had sexual intercourse with an individual more than 10 years older than themselves, and 32.5% indicated that they had sexual intercourse in the exchange of money or gifts. The baseline survey mentioned participants' risk taking tendencies through administration of a behavioural economics 'game' that assessed the point at which participants discounted the future (larger) benefit in exchange for an immediate (smaller) benefit: the survey tracked, at different financial amounts, the point at which participants changed their decision from an immediate benefit to a larger, but delayed benefit. terms of general views and approaches to taking risk, the baseline survey measure. The answers to these questions were used to construct a risk taking profile for every participant. The behavioral economic tendency risk analysis indicated that ~25% of the AGYW were risk adverse, while ~20% of the population were risk taking.

At baseline, the prevalence of HIV, *Trichomonas vaginalis*, and syphilis among AGYW was 8.21%, 0.84%, and 0.06% respectively. Amongst participants who were in school at baseline (ISAB), HIV, *Trichomonas vaginalis*, and syphilis prevalence were at least 3.5 times higher than amongst participants who were out of school at baseline (OOSAB): 3.6%, 0.34% and 0%, respectively, compared to 12.49%, 1.35% and 0.12% respectively.





# and % trich positive	5 0.96%	29 5.30%	4 0.73%	0 0.00%	4 0.65%	18 3.27%	5 0.93%	16 3.00%
# and % syphilis positive	0 0.00%	1 0.18%	0 0.00%	0 0.00%	1 0.16%	1 0.18%	0 0.00%	1 0.18%

Factors that were significantly associated with HIV infection at baseline were older age, living in a rural community, not being in school, and lower grade attainment. Sexual behaviors and knowledge that were significantly associated with HIV infection included having sexual intercourse, age mixing (sexual partner >10 years older in the last 12 months), sexual intercourse with multiple partners (>1 sexual partner) over the last twelve months, sexual intercourse with non-regular partners (non-cohabiting and not in a union), comprehensive knowledge of mother-to-child HIV transmission (pregnancy, labour and delivery, and breastfeeding), heard of transactional sex, and were *Trichomonas vaginalis* positive.

Discussion and Conclusions

Good internal validity: The Sitakhela Likusasa Impact Evaluation successfully enrolled the required number of participants into the study. There is balance between the study arms and sub-arms, which is important for internal validity of study results. When comparing the Sitakhela Likusasa Impact Evaluation to other recent cash incentive studies on HIV prevention, the Sitakhela Likusasa Impact Evaluation maintained similar qualities in terms of balance between study arms. Only one category had more than 5% difference between study arms.

Good external validity: At baseline, the Sitakhela Likusasa Impact Evaluation analysis provides an in-depth view of the demographics, AGYW HIV and other STI prevalence, factors associated with HIV and other STI infections, characteristics of AGYW going to school, factors demographic and sexual characteristics associated with school enrollment, and an understanding of risk-taking behaviour of the study population at baseline. These results compare well with other similar surveys done over comparable time periods and for similar populations in Swaziland, suggesting that the study will have good external validity.

Contribute to global knowledge on HIV and cash transfers: Because of these significant differences between the Sitakhela Likusasa Impact Evaluation and these other two studies, it can be concluded that this study will contribute new global knowledge.

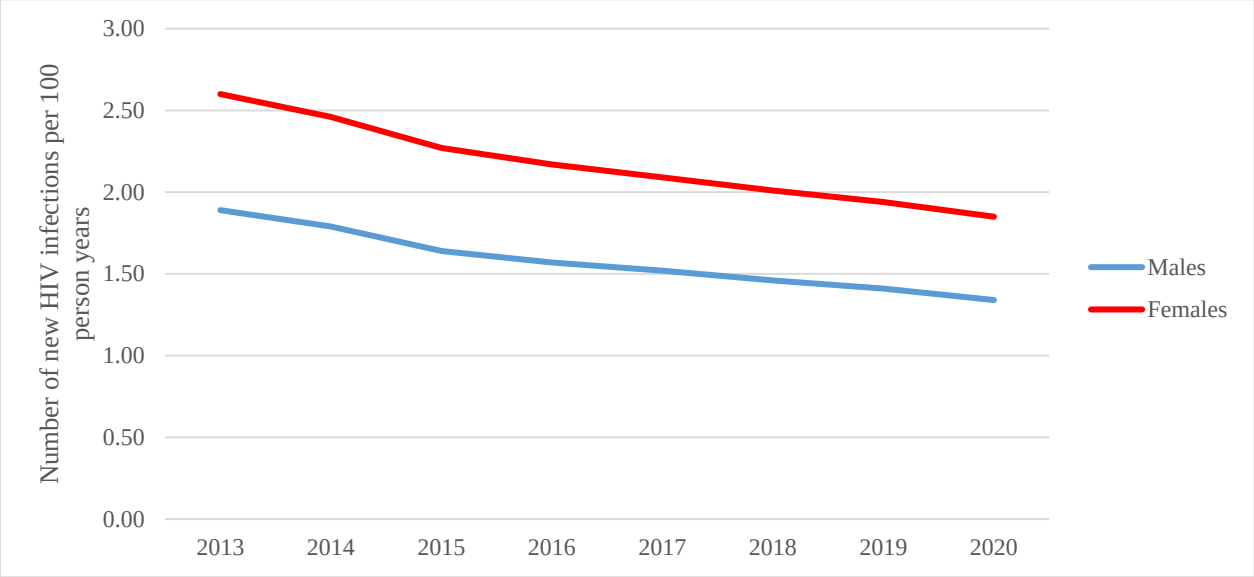
Relevance of the Sitakhela Likusasa intervention: Many of the study participants achieved Forms 1-6 (73.6%), but only 2.6% attained education above Form 5 or 6. Higher education attainment was associated with a 74% reduced risk of HIV infection and a 75% reduction of risk of *Trichomonas vaginalis* infection. Once AGYW are enrolled in school it is clear that there is a personal importance of going to school as 99.6% of enrolled AGYW viewed going to school as important and 99.5% of AGYW enrolled in school also thought it was important to achieve good marks. Potential barriers which may affect students staying in school are some of the sexual behaviour of the population which include age mixing, sexual intercourse with more than 1 partner in the last 12 months, and having sexual intercourse with non-regular partners. Additionally, risk taking behavior may play a role in HIV and STI infection. The incremental benefit of each additional E5 or E50 resulted in 274 and 292 individuals changing their behavior respectively. Therefore, the incentives paid for school attendance and remaining STI free can have an impact in behaviour.

1 Introduction

1.1 Swaziland HIV Epidemic Trends

The highest rates of HIV infection are in southern Africa, with more than 1% of the population in Botswana, Lesotho and Swaziland becoming infected per year.(1) There are 6 countries (Botswana, Lesotho, Namibia, Swaziland, South Africa, and Zimbabwe) that have HIV prevalence of more than 10% of the entire population.(1) In 2011, the Swaziland HIV Incidence Measurement Survey (SHIMS) published an HIV prevalence of 31%, and an incidence of 2.38 new HIV infections per 100 person years (py) in 15-49 year olds.(2) Since 2011 HIV prevalence is estimated to have dropped to 28% in 2015, and HIV incidence is estimated to be 1.94 new HIV infections per 100 py (95% CI: 1.61-2.29) in 2015 among 15-49 year olds(1). In 2015, this translates into an estimated 13,910 new HIV infections (annual HIV incidence of 1.55 new HIV infections per 100 py), 263,040 people living with HIV (PLHIV), and 5,890 HIV/AIDS related deaths.(1) The 2015 Spectrum modelling process further estimates that there is expected to be a gradual decline in HIV incidence to 1.72 new HIV infections per 100 py (95% CI: 1.33-2.24) in 2018 and 1.58 new HIV infections per 100 py (95% CI: 1.15-2.23) in 2020 among 15-49 year olds, Figure 1.(2)

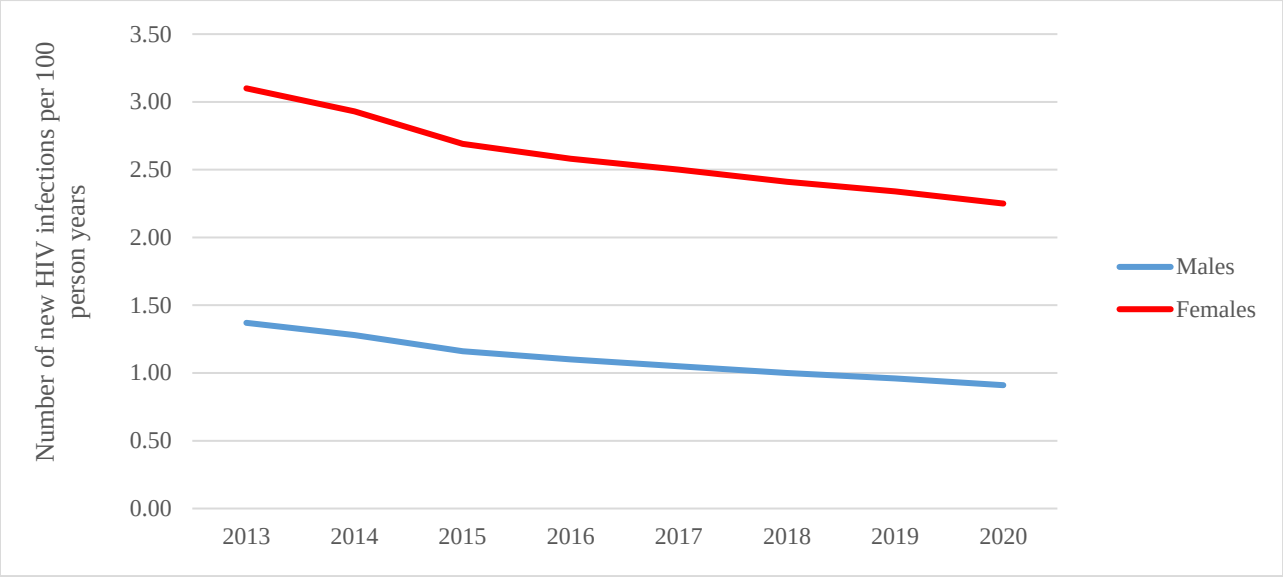
Figure 1: Projections of Historical and Future HIV Incidence in Adults 15-49 years old by sex (2013-2020)



Source: Swaziland HIV Estimates and Projections report, 2015

When stratifying by sex, modelled HIV incidence is higher in females, 2.27 new HIV infections per 100 py, than males, 1.64 new HIV infections per 100 py, in 2015, Figure 2.(2) In young individuals aged 15-24 years, HIV prevalence in females is two times higher than males, 16.0% compared to 7.1% respectively, in 2013.(2) Young individuals aged 15 to 24 are at the center of the epidemic for both rates of new infections and vulnerability.

Figure 2: Projections of Historical and Future HIV Incidence in 15-24 years old by sex (2013-2020)



Source: Swaziland HIV Estimates and Projections report 2015

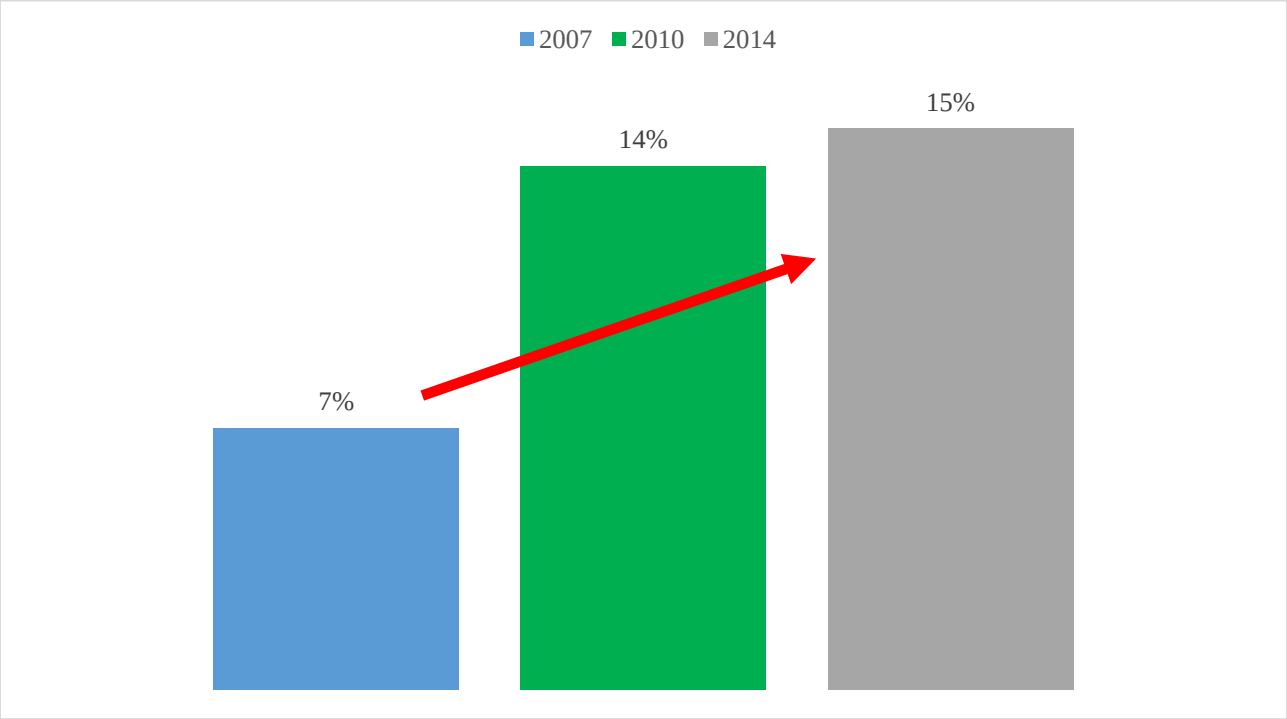
1.2 Factors associated with HIV acquisition in Swaziland

Low prevalence of male circumcision – In 2015 the percentage of males aged 10-49 who were circumcised increased to 45%.(3) This is up from 2010, where 19% of males aged 15-49 were circumcised.(3) The Ministry of Health has been making an effort to reach the globally accepted coverage level of 80% among adults and adolescents. To date progress has been made to achieving 80% coverage. Currently, 64% of new circumcisions occur in adolescents aged 10-14 years, but there has been less success to circumcise those older than 15 years and younger than 10 years.(4)

Multiple, long-term concurrent sexual relationships - These are common in Swaziland, which has a tradition of both polygamy, and non-formal, long-term multiple partners (a second partner – a makwapheni); both of which are widely seen as a sign of status for men. The Multiple Indicator Cluster Survey (MICS) 2014 observed that 3.3% of women and 21.2% of men aged 15-49 years had sexual intercourse with more than one sexual partner in the las 12 months.(5) This compares to the MICS 2010 survey where 2.7% of women and 15.4% of men reported having sexual intercourse with more than one partner in the last 12 months.(6) Additionally, the percentage of sexually active young people aged 15-24 years who had sex with a non-marital, non-cohabiting partner in the last 12 months was 37.3% among women and 40.9% among men.(5) 11.7% of women and 8.2% of men aged 15-49 years are in polygynous unions.(5)

Early sexual debut, low rates of marriage or cohabitation, transactional sex and sex with a person 10 years or older –The median age of sexual debut in Swaziland is 17 years for girls and 19 years for boys.(6) Furthermore, just under 10% of Swazi women's first sexual act is with a man 10 or more years older than them (age mixing): this has been proposed as one of the main reasons that HIV incidence increases so rapidly in this age group, and results in a disproportionate percentage of new HIV infections being seen in the most age-disparate couples, as older men often have HIV infection rates higher than young men, and the age-disparity can reduce the ability of girls to negotiate condom use.(7) Age mixing has also increased in prevalence from 7% in 2007 to 15% in 2014 among sexually active young persons aged 15-24 years, Figure 3.

Figure 3: Proportion of Sexually Active Young People 15-24 Engaging in Age mixing (Percentage of women aged 15-24 years who had sex in the last 12 months with a partner who was 10 or more years older) from 2007 to 2014



Source: DHIS 2007, MICS 2010, and MICS 2014

Low condom use, especially in longer-term sexual partnerships – Adult men report condom use of 71% with concurrent partners(5), an increase from 56% in 2006/7, but are inconsistent in their use. Additionally, the percentage of people who report having had more than one sexual partner in the last 12 months who also reported that a condom was used the last time they had sex occurred in 66% of women aged 15-49 years and 82.6% of men aged 15-49 years. There is still very low condom use with regular partners.(6)

Lack of family and community support – Fragile family structures, low rates of marriage (less than 25% of Swazi men have ever been married), and absent parents (often due to economic migration) contribute to increased risk behaviors and alcohol use.

Structural factors – High levels of migration and employment abroad, as well as female disempowerment contributing to transactional sex and gender-based violence, are important contributing factors to the epidemic. The patriarchal culture of Swaziland limits women's ability to negotiate safer sexual acts and to protect themselves from potential infections.(8)

1.3 Gender Inequality and Transactional Sex

The subordination of women in Swaziland has a long history, with women having few civil rights until recently. These inequalities are reflected in the Gender-Related Development Index, where Swaziland ranks 141 out of 186 countries.(9, 10) Only 55% of women are in the labor force, primarily in agriculture. The poor economic prospects for young women contributes to the increasing prevalence of age mixing and transactional sex, particularly as young women develop new desires and needs consistent with modern expectations of lifestyle.(7)

Adolescent girls and young women do have considerable negotiating power over partnership formation and continuation with older men, but that they have very little power over condom use and sexual practices within these relationships.(11) Adolescent girls and young women within age mixing relationships are also at a heightened risk of violence. Interestingly, evidence from a rural cohort of 2,444 women aged 15 to 29 in Kwa-Zulu Natal did not demonstrate any increased risk in HIV acquisition in women engaged in age-disparate relationships (the male partner is >5 years older), but did find an extremely high incidence of HIV (7.75 per 100 py).(12) This suggests that engaging in age mixing partnerships might confer different levels of risk in different settings, and that there might be some girls who are more vulnerable in these relationships than others, as seen in Botswana.(13)

1.4 Education in Swaziland

Education is critical to reducing long-term poverty and can reduce inequality. The benefits of educating girls are multi-fold and extend to all aspects of development. Not only does education improve knowledge and skills relating to health and employment, but it improve cognitive understanding and gives those who complete it, status and confidence to influence household decisions.(14) This leads to later marriage, better family planning, and better health outcomes and educational outcomes for their children. In Swaziland, the educational level of the mother is a very strong predictor of graduating from primary school and secondary school attendance.(15) Education increases the knowledge of infectious diseases and how to avoid transmission, as well as the uptake of vaccination. One study of national surveys from 1970 to 2009 estimated that 51.2% of the reduction in deaths in children under 5 during that period could be attributed solely to an increase in the education of women.(16)

The Government of Swaziland adopted the global Education for All (EFA) agenda in 1990, defining education as a basic right and focusing on improving access to primary schooling.(17) Primary school has officially been free since 2010, although there have been reports of principals demanding cost prohibitive top-ups from parents, up to $76 per year. All pupils in grade 1-3 are also provided with grants to cover other school expenses.(18) However, the school system suffers from very high rates of attrition. An estimated 84.7% of children enroll in primary education, and there is a completion rate of 60%.

Secondary school-aged (aged 15-19) girls comprise 11.6% of the total population, with an estimated 155, 241 girls in that age bracket.(19) Fewer girls than boys are enrolled in secondary school with a ratio of 0.90:1. In 2011, the gross enrolment ratio for girls in secondary school was 59%, and the net enrolment was 38%; only 6% continue on to tertiary education.(20) Girls have high rates of teenage pregnancy, which can lead to school expulsion, and high school repetition rates, resulting in the loss of motivation and dropping out. 41% of girls who leave school, do so because of teenage pregnancy. Thirty-six percent of adolescent girls were still attending primary school in 2010, with the Lebombo district recording the highest percentage at 48%.(15) Adolescent fertility is high, at 82.3 births per 1,000 women aged 15-19.(10) Childbearing during adolescence is more common among the poor, thereby perpetuating the cycle of poverty. Early marriage is also common for teenage girls. Furthermore, only 27% of women in Swaziland with no education use modern contraception as compared to 72% of women with secondary education or higher.(10) Finally, many families can gain income from their daughters working as

domestic workers and those are thus withdrawn from school, or encourage girls to depend on older men for support. This leads to high rates of leaving school; recent estimates found a 9.4% yearly dropout rate.(19)

1.5 Response to the HIV Epidemic in Swaziland

Swaziland extended its National Multisectoral HIV/AIDS Strategic Framework to 2014-2018. The extended National Strategic Framework (eNSF) has adopted an "investing for results" approach, in which high priority interventions aimed at preventing the maximum number of new infections and reducing mortality amongst PLHIV, are prioritized. The priority programs will be implemented in combination, and will be conducted while strengthening synergies with community systems and while addressing critical enablers such as gender inequality. The impact level results of the eNSF include reducing the annual incidence rate from 2.9% (2011) to 1.4% in 2018, reducing the percent of HIV infected infants born to HIV positive women from 15.4% in 2011 to 2% in 2018, reducing the percent of young people aged 15-24 years who are HIV infected from 23% for 15-24-year-old women in 2007 to 10% in 2018 and from 6% in 2007 for men to 2% in 2018.

The new strategy, with its focus on evidence-based approaches, espouses more innovation. Even if all the interventions in the eNSF were implemented as planned to the anticipated coverage levels, HIV incidence would not reach the eNSF targets. The health system itself is fragile, with frequent staffing and medication shortages. Cultural norms around procreation, and gender roles have been difficult to change.(21) Behavioral change programs seem to have met their limits, with little gain made in reducing age mixing or partner concurrency, and demand for medical male circumcision has stagnated since 2012. Further evidence of the role of economic status and transactional sex in HIV acquisition is desperately needed to determine other methods of preventing HIV in girls and young women.

The Permanent Secretary from the Ministry of Education has also emphasized the need to determine methods to improve retention in school for adolescent girls and young women. One such program is the use of financial incentives to increase school enrollment and attendance, and decreases HIV and sexually transmitted infection (STI) transmission. This is the program being tested in this impact evaluation.

2 Literature Review

Financial incentives are among the most evaluated developmental interventions. They can be provided conditionally to incentivize specific behaviors or outcomes. In these cases, receipt of a financial incentive is conditional upon established metrics, such as high rates of school enrollment and/or attendance, attending maternity or well-child visits, receiving immunizations, negative testing for sexual transmitted infections (STIs), etc. Unconditional financial incentives, on the other hand, are transfers not tied to any condition, which can also alleviate the chronic effects of poverty and lead to positive developmental outcomes. As opposed to incentivizing a specific behavior through conditions, unconditional financial payments may work through an income effect, in which it enables poor households to make an investment in human capital like education and health.

2.1 Financial Incentives and Health

Among health outcomes, financial incentives have consistently been effective at increasing health service utilization, especially for maternal and child health services. (22) Financial incentive programs have been effective in increasing uptake of preventative child health services, especially in Latin American countries. Mexico's *PROGRESA/Oportunidades* program was among the first of its kind to be implemented and is a key example of success in this area. This financial incentive program was conditional, requiring beneficiaries to accept preventative health and health education services. An

evaluation by Gertler found that this program resulted in 2.1 more child health visits per day to health facilities in Mexico. (23) Similarly, Nicaragua's *Red de Protección Social* program, designed after *PROGRESA*, and a trial in Honduras implemented health service uptake conditions with their financial incentive intervention. These programs led to 11-20% more children taken to health centers in a one to six-month period. (24, 25)

Maternal and newborn health has also benefitted from CT programs, specifically from uptake of health services. A meta-analysis of conditional financial incentive studies reporting maternal and newborn health outcomes found an 8% average increase among seven countries for adequate prenatal monitoring, with a 19% increase in Honduras. (26) Births attended by skilled personnel rose an average of 12% in six countries, reaching 37% in India. (26) In a smaller sample of three countries, the analysis showed that births in a health facility increased by an average of 21%, ranging from 4% in Nepal and 43.5% in India. (26)

2.2 Financial Incentives and Education

A focus on the vulnerability of families, and on threats to the human capital of children with lifelong and age mixing consequences, has accelerated international, regional and national commitments to social protection. Data from over 80 countries show that poor and malnourished children are likely to start school later, and/or complete fewer years of schooling compared to wealthier and healthier children.(27, 28) The dynamics between human capital losses and poverty are likely to be intensified in the context of AIDS. Food and nutrition insecurity increases susceptibility to HIV exposure and infection, and lowers resiliency to AIDS impacts.(27) However, to alleviate these impacts, financial incentives have the potential to increase and protect children's education by covering school expenses, compensating for lost income when children are sent to school rather than work, ensuring that children are better nourished at school and providing an incentive for attendance when cash is conditional.

Extra income can mitigate the costs of sending a child to school, either through direct costs of education (tuition, transportation) or indirect costs (fewer family members contributing towards household income). Financial incentives with conditions tied to attendance or enrollment criteria can also lead to more regular school attendance. Conditional and unconditional financial incentives alike have been evaluated for their impact on school enrollment, attendance, retention, and achievements, and many evaluations have been carried out on large financial incentive programs. Even more, this large evidence base has facilitated systematic reviews and meta-analyses that support financial incentive effectiveness in education. For example, Baird et al carried out a systematic review of 35 evaluations and found that financial incentives any kind resulted in a 36% greater chance of school enrollment and a 59% increase in the probability of school attendance within households receiving the transfer. (29) The analysis also revealed that the impact on odds of enrollment was greater at the secondary level (31%) vs. than at the primary level (4%), and girls' attendance was more impacted by conditional financial incentives than boys' attendance. (29)

The analysis by Baird et al. also compared impacts of conditional versus unconditional financial incentives. Conditional financial incentives had the strongest effects on school enrollment and attendance, improving odds of enrollment by 41% and of attendance by 65%. (29) Unconditional financial incentives only did so by 23% for enrollment and 42% for attendance. (29) The review found a correlation between increasing conditionality and the effect size of the financial incentive. The effect size of financial incentive programs with schooling conditions that were monitored and enforced (1.65 odds ratio of enrollment) was higher than those without conditions (1.18 odds ratio of enrollment) and those with conditions not enforced (1.25 odds ratio of enrollment).(29) Notably, just having schooling conditions impacted the effect size of financial incentives, as the effect of programs with no enforcement of schooling conditions was greater than those without conditions. Saavedra et al., also conducted a meta-analysis of the effect of conditional financial incentives on school enrollment, attendance and

dropout.(30) Like Baird et al., financial incentives were shown to significantly improve these outcomes, with larger effects on secondary schooling. The authors acknowledge a great heterogeneity in effect size among programs for all outcomes and schooling levels. They also found that greater transfers (relative to per capita income) resulted in greater effect sizes. (30)

Financial incentives impact children's school participation, and are expected to lead to higher education attainment. If students stay in school and progress, they could accumulate more human capital and enjoy higher future incomes. Many students experience delayed entry into school and reduced school completion among families that do not have enough income to feed children in a family.(31) Children who are malnourished experience a reduced capacity to learn, and stunted children have been found to be more likely than healthy children to have lower achievement levels and poorer grades (in Nepal, China, Jamaica, India, Philippine, Malaysia, Vietnam, Brazil, and Turkey, and among boys in Guatemala).(31) Stunting is also associated with lower scores on cogitative tests.(32) These human capital deficits have long-term impacts on earnings, completing the cycle that transmits poverty through generations of families. Therefore, fewer years of education, poorer cognitive development, and smaller stature in childhood reduce adult earning potential. In fact, studies from 51 countries show that each year of schooling increases wages by 9.7% on average.(32) Financial incentives are a means to reduce childhood malnutrition and increase educational achievement.(27)

2.3 Financial Incentives and HIV

Financial incentives have been used as a response to HIV infections.(27, 33) The use of financial incentives vary from directly rewarding HIV-protective behaviors to addressing some of the structural factors that shape risk behaviors. In eastern and southern Africa research trials have assessed the impacts of providing incentives to collect HIV test results(34), maintaining HIV-negative status for a year(35), keeping adolescent girls and orphans in school(36-38), encouraging young men and women to remain free from sexually transmitted infections (STIs)(39), and providing cash support to households of people living with HIV.(27) It has been shown that in sub-Sharan Africa (SSA), financial incentives improve outcomes for children made vulnerable by HIV/AIDS.(36, 40) SSA is disproportionally affected by high prevalence of HIV/AIDS related maternal mortality (41), and increased the number of orphaned and vulnerable children (OVC) related to HIV/AIDS.(42)

A major challenge in the HIV epidemic response is a leaky HIV treatment cascade and increasing the demand for HIV services. UNAIDS reports that out of the total population of people living with HIV (PLHIV), only an estimated 45% know their status and 39% are on treatment.(43) Only an estimated 29% of PLHIV have suppressed viral loads. On the demand side, real and perceived barriers to care and treatment include financial, logistical, and health costs associated with accessing HIV services, such as travel, missed work, out-of-pocket costs, delayed benefits, and treatment side effects. In theory, financial incentives can mitigate some of these costs and incentivize a greater demand for HIV services, as they have done so in other areas of health.

Studies evaluating the use of financial incentives to increase HIV service utilization have been limited, but there is some evidence that they work. For instance, offering vouchers redeemable upon receiving HIV test results doubled the demand to receive results in rural Malawi, an absolute increase of 27-39%, and higher value vouchers produced greater demand. (44) In Kenya, medium and high value conditional vouchers significantly increased male circumcision uptake, relative to no and low value vouchers. (45) Financial incentives can also help overcome financial barriers to accessing treatment. Providing a financial incentive of $5-8 to defray transportation costs to an HIV clinic resulted in higher HIV treatment retention in rural Uganda. ART retention in Uganda increased from 66% to 82%.(46)

The evidence evaluating financial incentives' effect on HIV treatment adherence and viral suppression is limited. Several very small US-based studies conditionalizing adherence and/or viral suppression have shown significant increases in adherence, as much as 30% in one study, however, the effect was not sustained after the intervention. (47-50) Preliminary evidence from Cluver et al also shows that Unconditional financial incentives, when paired with a social "care" intervention (treatment buddy, positive parenting) increase ART adherence in adolescents in South Africa (2.42 odds ratio). (51)

2.4 Financial Incentives and HIV prevention

Several studies have explored the impact of financial incentives on HIV prevention, looking at behavioral and biological outcomes. The strongest evidence for the impact of financial incentives on preventing HIV infection comes from several randomized controlled trials carried out in sub-Saharan Africa that have specifically evaluated HIV infection as an outcome, using education-based or sexual health based conditions. Educational attainment influences HIV risk through its effect on sexual and socioeconomic influencers. Students in school have smaller and safer social and sexual networks, and school attendance is associated with a reduction in lifetime sexual partners.(52) Educated women tend to have later sexual debut, marriage and pregnancy, and use condoms more often. (53) Similar outcomes were noted in the education-focused financial incentive studies in Malawi and South Africa. (54, 55) Educated women also enjoy better earning potential (53), which may counter a socioeconomic driver of transactional sex. While educational attainment could be considered a proxy for socioeconomic status, deemphasizing the protective effect of education, some studies have found that parental and individual income effects do not account for the relationship between HIV and educational attainment. (56, 57)

2.5 Recent Financial Incentive Studies on HIV Prevention

The most recent results from studies involving financial incentives in sub-Saharan Africa include: RESPECT (Rewarding STI Prevention and Control in Tanzania)(39); SIHR (Schooling, Income and Health Risk) Study (Malawi) (36); The Lesotho Study to reduce STI and HIV incidence (58); KwaZulu-Natal (KZN, South Africa) School Study – CAPRISA 007 (59); Agincourt (Mpumalanga, South Africa) Study – HPTN068. (60)

2.5.1 RESPECT (Rewarding STI Prevention and Control in Tanzania)

The RESPECT (39) study estimated a 25% reduction in the combined prevalence of *C. trachomatis, N. gonorrhoeae,T. vaginalis*, and *M. genitalium*, though this was only in the higher value financial incentive arm ($20 every four months) (39). A limitation with this study was its lack of statistical power to analyze HIV prevalence changes. However, as similar sexual risk behaviors are shared between many STI's, it is conceivable that HIV risk was also reduced. Another consideration with this trial's results is that the effect of the financial incentive intervention was not seen until later rounds of the trial, and it was not sustained in women one year after the trial ended. (61) This suggests that the impact of financial incentives may not be immediate or durable in absence of the intervention. Time required to achieve and sustain impact may not be the only issue with financial incentives; there may be a threshold in terms of the amount of cash needed. The impact of the financial incentive was only statistically significant with the higher value transfer, and effect of the intervention was strongest in the lowest socioeconomic group, stressing the importance of the financial incentive value relative to socioeconomic status. Therefore, more than a 'nudge' by financial incentives is needed to impact behavior and outcomes, which may be most effective in the poorest groups.

2.5.2 SIHR (Schooling, Income and Health Risk) Study (Malawi)

The SIHR Study (Malawi) (36) found a decrease in the HIV prevalence in groups of girls receiving conditional or unconditional financial incentive. As a combined intervention, there was a 70% reduction in HIV prevalence in comparison to the no transfer group. Even more, HSV-2 prevalence was decreased by 76%, potentially adding to reduced HIV infection through risk factors. In addition to the positive biological outcomes measured, namely reduced HIV and HSV-2 infection, positive behavioral outcomes were also influenced by the financial incentive, not directly to the schooling condition. However, the behavioral results from these studies should be interpreted with caution, as they are often self-reported and may bias the results toward more positive outcomes.[1] Absence of baseline HIV and HSV-2 data also makes it more difficult to assess whether prevalence differences between groups are due to the intervention.

2.5.3 The Lesotho Study to reduce STI and HIV incidence through raffles for remaining STI negative

The Lesotho study (58) resulted in a 25% reduction in HIV incidence among those in the lottery intervention group and a 31% reduction in the high-value lottery (chance to win $100) group. The effect was most pronounced in females, among whom there was a 33% HIV incidence reduction. While STI prevalence decreased in both control and intervention groups, the greatest effects were observed in the lottery arms. STI prevalence decreased 89% from baseline values in the high lottery group and by 82% in the low lottery group. Furthermore, risky sexual behavior was mitigated in the intervention group. Although the Lesotho trial was not like typical financial incentives, as STI negative participants received lottery tickets and then only received cash payments if they won the lottery, it supports another mechanism through which financial incentive programs may be administered. Costs of administering a lottery-based program may be lower than traditional financial incentive programs, and they might also target higher risk individuals. In fact, the authors suggest that the effect of the intervention may largely be due to safer changes in sexual behavior among “risk-loving” (also more likely to be STI-infected and acquire HIV) individuals.

2.5.4 KwaZulu-Natal (KZN, South Africa) School Study – CAPRISA 007

The CAPRISA 007 trial (59) found that at the end of the 2-year study period HSV-2 prevalence was 30% lower in the intervention group, compared to control, with effects strongest in boys (40% reduction in boys, 24% reduction in girls). HIV incidence was higher (HIV incidence rate ratio 1.26) in the intervention group, though too few HIV infection events (42 in intervention group and 33 in control group) to give any certainty to these results. Furthermore, HIV prevalence (4.7% and 3.7%) and HSV-2 prevalence (9% and 7.3%) were slightly higher at baseline in intervention schools, noting a flaw in the randomization. While disappointing, the results of the CAPRISA 007 trial do not argue against use of financial incentives for HIV prevention. Here, the conclusion of the trial is not that the intervention was ineffective. Instead, the study was severely underpowered to detect a statistically significant effect of the financial incentive intervention.

[1] Self-reported data is subject to recall bias; it is very likely that participants may not accurately remember, or at all, specific details like number of partners, frequency of condom use, HIV status of sexual partner, etc. Social desirability bias also factors in, especially in the context of studies featuring counseling and testing.

2.5.5 Agincourt (Mpumalanga, South Africa) Study – HPTN068

The HPTN068 trial (60) did not significantly improve HIV outcomes or attendance in the intervention group, which is very likely due to high attendance during the trial. School attendance was high at 95% in both intervention and control groups, with low school dropout rates (2.7% in both arms). Nearly all girls were in school and stayed in school during the study, thereby limiting the effect of the financial incentive in indirectly influencing HIV outcomes through its education-based condition. On the other hand, regardless of intervention or control group, school enrollment and attendance were shown to be protective against HIV acquisition. School dropouts were three times more likely to acquire HIV, with an equal probability of becoming HIV infected in those with school attendance rates less than 80%. And, although no differences were seen between groups regarding HIV or school attendance outcomes, there was a reduction in risky sexual behavior in the intervention group. Girls receiving the financial incentives reported fewer sex partners, less unprotected sex, and less violence from intimate partners than girls not given the transfer.

2.6 Literature Review Conclusion

Financial incentives have been found to have a greater effect on service use rather than final outcomes in education or health. Some evidence supports the ability of financial incentives to stimulate demand for HIV services, but additional and larger studies are required to investigate the use of financial incentives for this purpose. However, financial incentives have been successful in some studies for HIV prevention, by reducing risky sexual behavior directly through financial incentives and indirectly through education-focused transfers. Several of these studies have resulted in improved HIV infection outcomes.

3 The Sitakhela Likusasa Impact Evaluation Study Overview, Study Questions, Sampling Frame and Sampling Strategy

3.1 Study Overview

The IE employs a two by two factorial design in which participants are enrolled in either the education incentive arm or the control arm. In each of these arms, 50% of participants were randomized to also receive the raffle.

Intervention: The intervention being evaluated, incentivizes (i) initiation or enrolment into some form of education, attendance at or completion of this form of education, and (ii) lower risk sexual behaviour. The initial design of the intervention was that cash incentives, conditional on either of the following criteria, would be provided throughout the intervention period:

a) E200 for enrolling in primary or secondary school in a given school year
b) E400 per school term for attending more than 80% of their classes each school term over the study implementation period
c) For a randomly selected sub-sample of the participants: E1000 for the winners of a raffle in which those who tested negative for two curable STIs (*Trichomonas vaginalis* and syphilis) were entered

At each interaction with the study team (whether for intervention implementation or data collection), the intervention also entails that study participants are screened for gender-based violence (GBV) using a screening tool developed in partnership with the Swaziland Action Group Against Abuse (SWAGAA).

Throughout the study, the intention is that suspected GBV cases are referred to SWAGAA for follow-up and support as part of their routine counselling and support mechanisms.

During the first year of study implementation, a protocol amendment was approved whereby it was clarified how incentives for other forms of education than formal schooling would be paid, as follows:

- *Education incentive for initiating and completing upgrading classes:*
    - Enroll for upgrading classes in Swaziland; then receive E700
    - Apply for O level exams; then receive E700
- *Education incentive for initiating and sitting for exams at University, vocational school or technical college:*
    - Register at University or College within Swaziland for 2016 and/or 2017; then receive cash incentive of E700 per year
    - Sit for the annual exam at the end of the year; then receive cash incentive of E700 per year
- *Education incentive for initiating and completing a short course of any kind:*
    - Initiate attendance at short course during 2016 and/or 2017 through proof of payment; then receive a cash incentive of E700 per course
    - Complete the short course; then receive a cash incentive of E700 per course

3.2 Study Questions

The Sitakhela Likusasa Impact Evaluation is set to answer three study questions:

1. Do financial incentives made to adolescent girls and young women aged 15 to 22 years contingent on school attendance, reduce the incidence of HIV compared to adolescent girls and young women not receiving financial incentives?

2. Do raffle prizes to adolescent girls and young women aged 15 to 22 contingent on being negative for curable STIs (*Trichomonas vaginalis*, syphilis) reduce the incidence of HIV compared to adolescent girls and young women not enrolled in a raffle?

3. Is the provision of incentives cost-effective as a method of prevention of HIV in adolescent girls and young women in Swaziland?

Recognizing possibly limited power to detect interaction, the study team is also keen to understand whether raffle incentives and education incentives act in an additive or multiplicative manner to reduce the incidence of HIV amongst AGYW over time.

Table 1. Sitakhela Likusasa Impact Evaluation Intervention and Study Design

	Sub-arm: With Raffle	Sub-arm: Without Raffle
 **STUDY TREATMENT ARM: EDUCATION INCENTIVES**	**STUDY ARM 1: EDUCATION & RAFFLE** **Education incentive for enrolling in and attending public or private school in Swaziland:** ▶ Enrol in school in Swaziland in 2016 and/or 2017; then receive cash incentive (E200 per year) ▶ If in school with 80% or higher attendance for each school term; then receive cash incentive per term (E400 per term) **Education incentive for initiating and completing upgrading classes:** ▶ Enrol for upgrading classes in Swaziland; then receive E700 for the year ▶ Apply for O level exams; then receive E700 for the year **Education incentive for initiating and sitting for exams at University, vocational school or technical college:** ▶ Register at University or College within Swaziland for 2016 and/or 2017; then receive cash incentive (E700 per year) ▶ Sit for the annual exam at the end of the year; then receive cash incentive (E700 per year) **Education incentive for initiating and completing a short course of any kind:** ▶ Initiate attendance at short course during 2016 and/or 2017 through proof of payment; then receive cash incentive (E700 per course) ▶ Complete the short course; then receive cash incentive (E700 per course) **Raffle:** ▶ If randomly selected for STI screening and participant tests negative for Trichomonas Vaginalis and Syphilis; then possible incentive through raffle prize draw (E1 000 per raffle)	**STUDY ARM 2: EDUCATION ONLY** **Education incentive for enrolling in and attending public or private school in Swaziland:** ▶ Enrol in school in Swaziland in 2016 and/or 2017; then receive cash incentive (E200 per year) ▶ If in school with 80% or higher attendance for each school term; then receive cash incentive per term (E400 per term) **Education incentive for initiating and completing upgrading classes:** ▶ Enrol for upgrading classes in Swaziland; then receive E700 for the year ▶ Apply for O level exams; then receive E700 for the year **Education incentive for initiating and sitting for exams at University, vocational school or technical college:** ▶ Register at University or College within Swaziland for 2016 and/or 2017; then receive cash incentive (E700 per year) ▶ Sit for the annual exam at the end of the year; then receive cash incentive (E700 per year) **Education incentive for initiating and completing a short course of any kind:** ▶ Initiate attendance at short course during 2016 and/or 2017 through proof of payment; then receive cash incentive (E700 per course) ▶ Complete the short course; then receive cash incentive (E700 per course)
STUDY CONTROL ARM: NO EDUCATION INCENTIVE	**STUDY ARM 3: RAFFLE ONLY** ▶ If randomly selected for STI screening and participant tests negative for Trichomonas Vaginalis and Syphilis; then possible incentive through raffle prize draw (E1 000 per raffle)	**STUDY ARM 4: CONTROL** ▶ **No education incentive** ▶ No participation in raffle

3.3 Sample Frame and Sampling Strategy

Study Population: The Impact Evaluation aimed to enroll 4,400 AGYW who were aged 15 to 22 at enrolment into the study. Participants were enrolled into the study ensuring that 50% of the study population were in school or other form of education at the time of baseline (ISAB), and 50% were out of school or other form of education at baseline (OOSAB).

Sampling: The sampling was designed to achieve the following across the study arms: (a) 80% from rural enumeration areas (EAs) and 20% from urban EAs. In each of these groups and in the treatment and control arms, 50% had to be in some form of education at baseline, and 50% had to be not in some form of education at baseline.

For the first stage of sampling, the EAs were stratified by urban vs rural status, and restricted to larger female populations and higher population densities; they were then assigned to the education incentive arm or control arm via a spreadsheet and random number generator, as depicted in Figure 4a. 166 EAs were selected. Control and incentive arm EAs that were geographically adjacent were identified and replaced with further random selection of other EAs. Through geospatial analysis, it was determined which of these EAs were adjacent to the EAs where the Deputy Prime Minister's (DPM) OVC Financial Incentive study was being implemented (see Figure 4b). Where selected Sitakhela Likusasa EAs were adjacent to EAs for the DPM OVC study, these EAs were replaced with other randomly-selected EAs too.

For the second stage of sampling, households within selected EAs were then randomly selected using a geographic information system (GIS). This process includes overlaying the selected EA map over Google Earth and pinning the GPS location of identified households. To gain a further understanding of what girls were in each household, household listings were done for the chosen EAs. Within each EA, 13 AGYW who were enrolled in school and 13 AGYW not enrolled in school were enrolled from each EA.

Since the total number of AGYW selected among the 166 EAs did not yield the targeted 4,300 AGYW, additional EAs were selected (293 EAs were selected in total). An additional 127 EAs were added to ensure there was enough urban and out of school AGYW enrolled in the study. These additional EAs were also randomized to the financial incentive study arm or the control study arm via a spreadsheet and random number generator. The same replacement process as for the first 166 EAs was followed to ensure that (a) financial incentive arm EAs and control arm EAs were not adjacent ant (b) that neither financial incentive arm EAs nor control arm EAs were adjacent to the EAs where the Deputy Prime Minister's (DPM) OVC Financial Incentive study was being implemented.

In these EAs, a detailed household listing was done. Through this census based approach, additional AGYW were identified to be enrolled. The two main reasons for having to use additional EAs were 1) difficulty of enrolling out of school AGYW, and 2) difficulty recruiting urban AGYW. Figure 4b shows the final list of EAs selected.

Figure 4a. Randomization of education financial incentive and control EAs

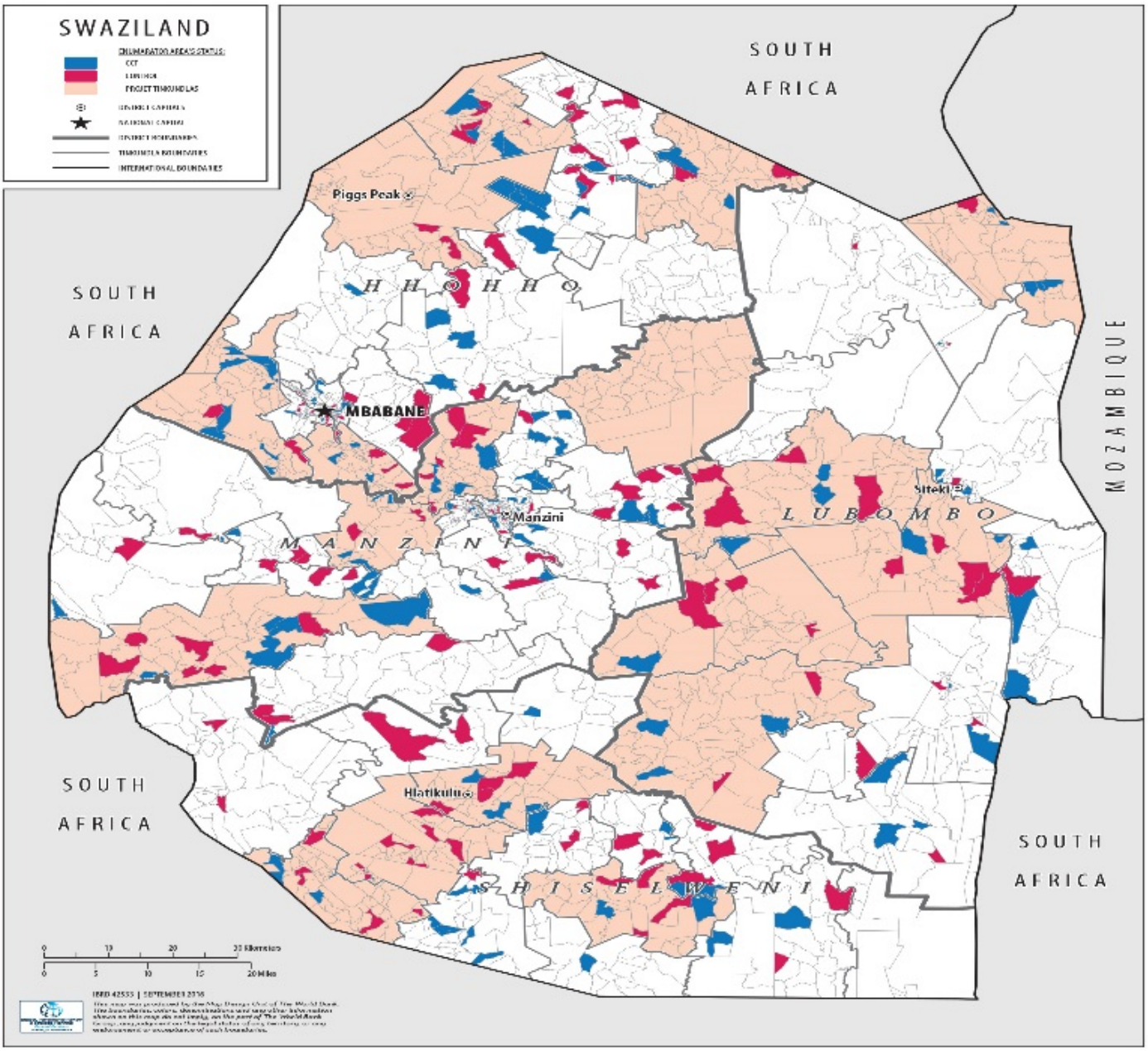
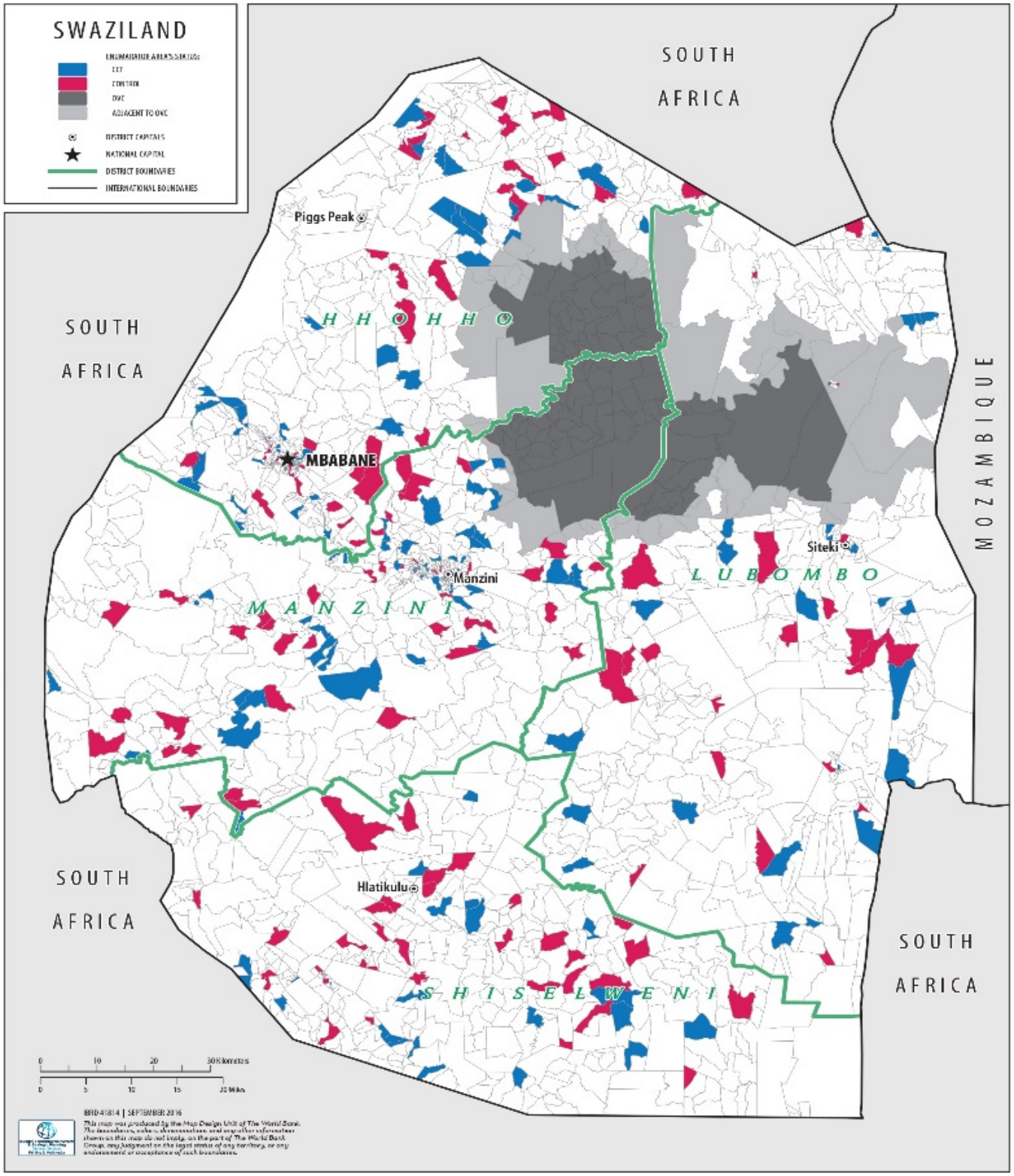


Figure 4b. Sitakhela Likusasa EAs versus DPM OVC-Financial Incentive Study EAs



4 Baseline Data and Analysis Objectives

4.1 Purpose of the Baseline Behavioral and Biological Data Collection

The baseline enrolment survey and data collection effort was designed to be used as a cross-sectional survey to be administered as part of study enrolment. Its purpose was to understand demographic, educational, and HIV and curable STI indicators that are valuable to understand the study population before implementing the intervention related to the Sitakhela Likusasa Impact Evaluation.

4.2 Baseline Behavioural Questionnaire

The baseline questionnaire consists of 16 sections. The sections include: 1) Demographics; 2) Household Roster; 3) Household Characteristics; 4) Education; 5) Sexual Behavior and Fertility; 6) Marriage/ Unions; 7) Sexual Relationship Power Scale; 8) HIV/AIDS and STIs; 9) Contraceptives; 10) Lifestyle/ Risk Behaviors; 11) Employment and Earnings; 12) Needs and Expenditures; 13) Service Delivery; 14) Preferences; 15) Interview Section Note; and 16) Research Arm. Embedded within the baseline questionnaire are routine questions asked by the Swaziland Central Statistics Office (CSO) which provide the CSO with valuable demographic information about adolescent girls and young women. Also, embedded within the baseline questionnaire are questions requested to be asked by the President's Emergency Plan for AIDS Relief (PEPFAR) in relation to the DREAMS program. The questions from PEPFAR consist of knowledge about current PEPFAR-funded programs like savings groups, the Ematie Ekwewela (Stepping Stones) program, and mobile sexual health and reproductive HIV services. Findings from these questions can be found as Table A1 in the appendix of this report.

4.3 Baseline Data Analysis Objectives

The purpose of the baseline data analysis was to ascertain the following information about the study population:

1. **Report baseline demographic characteristics**
   - Generate a descriptive analysis of baseline characteristics which include: age, locality, school history, sexual behaviour, HIV and sexual practices knowledge, household structure, conditions, and assets

2. **Report study level school enrollment, and investigate characteristics and factors associated with school enrollment at baseline**
   - Observe characteristics of those enrolled in school at the time of the interview

3. **Report study level HIV and STI prevalence, and investigate relationships between background characteristics of participants, and HIV and STI status at baseline**
   - Report study level HIV, *trichomonas vaginalis* (TV) and syphilis prevalence, and access to HIV services
   - Test for factors associated with HIV, *trichomonas vaginalis* (TV) and syphilis infection

4. **Using behavioral economics to understand the risk profiles of the study population at baseline**

5. **Check for balance within and between study arms**
   - Present the cascade of HIV negative persons at baseline enrolled into the study

- Assess the distribution of study participants by different characteristics: urban versus rural, and in-school versus out-of-school within/between each of the study arms (control, incentive only, raffle only, and incentive and raffle)
- Check for balance within and between study arms

5 Baseline Analysis Results

5.1 Demographic characteristics

5.1.1 Age and locality (Table 2a and 2b)

A total of 4,863 adolescent girls and young women between the ages of 15 to 22 years were surveyed at baseline. Age was evenly distributed among all the participants: each age category had between 8% and 16% of the sample. The mean age of the baseline sample was 18.22 years (standard deviation [SD]: ± 2.24). The study protocol called for 70% of participants to be from rural EAs and 50% of the study participants to be enrolled in school. The baseline data showed that 78.7% of the surveyed participants resided in rural EAs, and 48.1% of respondents were enrolled in school at the time of the survey. Only 21.3%, and not hypothesized 30.0%, were from urban areas because urban AGYW were harder to find and recruit than rural AGYW. There were significant differences (p-value <0.05) when comparing urban versus rural demographic characteristics where urban areas had: younger participants, attained higher grades, more individuals never having had sexual intercourse, more individuals with multiple sexual partners, fewer individuals who had sexual intercourse with regular partners, fewer AGYW who have ever given birth, more AGYW with circumcised partners, fewer individuals who knew all three HIV methods of mother-to-child transmission, fewer individuals who do not know that a healthy looking person can have HIV, fewer AGYW who have heard of age mixing, more AGYW who have fathers who are alive, more female-headed households, fewer siblings, and fewer AGYW who are currently married or in a union.

There were significant differences (p-value <0.05) when comparing those enrolled in school to those not enrolled in school where those enrolled in school were younger, attained a higher grade, more never had sexual intercourse, more did not have sexual intercourse before the age of 15, there was less sexual partner age mixing, fewer sexual partners, more regular sexual partners, fewer condoms used if having multiple partners, fewer received a gift in exchange for sexual intercourse, fewer had given birth, fewer had circumcised partners, fewer had HIV and sexual practices knowledge, fewer had mothers alive, more had fathers alive, more had more sibling, and none were married.

5.1.2 Sexual behavior characteristics (Table 2a and 2b)

52.7% of the AGYW surveyed at baseline had their sexual debut. 15.9% of AGYW who had sexual intercourse in the past 12 months, had sexual intercourse with an individual more than 10 years older than themselves. 39.7% of sexually-active AGYW identified with exchanging money or gifts for sexual intercourse. The mean age of first pregnancy among those who have given birth is 17.94 years (SD: ± 1.76).

5.1.3 HIV and sexual practices knowledge (Table 2a and 2b)

Almost all (96.7%) of AGYW surveyed at baseline had heard of AIDS, and 62.2% knew all three HIV methods of mother-to-child transmission of HIV (pregnancy, labor and delivery, and breastfeeding). More individuals had heard of age mixing (67.6%) and transactional sexual intercourse (71.0%).

5.1.4 Household structure, conditions and assets (Tables 2a, 2b, and 3)

More AGYW had mothers (78.4%) compared to fathers (62.4%) who were still alive at the time of the baseline survey. Power within each household also resided predominately with males where 29.1% of households were headed by females. The average number of siblings per AGYW was 1.70 (SD: ± 1.63). Very few (4.6%) AGYW were married or in a union at baseline. Over 60% of respondents had electricity in their home, a stove, radio, television, and refrigerator. 93.1% of respondents had a mobile phone, but less than 20% had piped water. Most AGYW (>67%) did not have a bicycle, motorcycle, car/truck or a tractor. Most (>78%) AGYW families owned a house, agricultural land or farm livestock.

5.2 School enrollment, and investigate characteristics and factors associated with school enrollment at baseline

5.2.1 Characteristics of those enrolled in school at the time of the interview (Table 4)

2,337 AGYW were enrolled in school at the time of the interview. Most (83.1%) of the respondent who were attending school missed more than 2 days of school and 44.7% of individuals who attended school were punished 1 or 2 times per school term. Classroom size tended to be larger where 69.4% of AGYW had more than 35 pupils in their classroom. 88.0% of AGYW also self-reported to having good to very good/ excellent teachers. There was a strong (>99.0%) personal importance of going to school and getting good marks among the respondents. Over 60% of the respondents took more than 30 minutes to get to school, and more than 60% of the respondents walked. Very few (3.4%) had a bicycle or car. Most (81.9%) individuals did not spend more than E10 on traveling to school.

Table 2a. Characteristics of adolescent girls and young women in Swaziland

Characteristics	All Surveyed Participants (N=4863)	All Enrolled Participants (N=4389)		Study sub-arm comparison U=R p-value	All Enrolled Participants (N=4389)		Study sub-arm comparison ISAB=OOSAB p-value
		Urban (U) (N=1036)	Rural (R) (N=3827)		[a] Enrolled-in-School (ISAB) (N=2337)	Not [a]Enrolled in-School (OOSAB) (N=2526)	
Age in years (mean (SD))	18.22 (2.24)	18.05 (2.18)	18.25 (2.29)		18.08 (2.20)	18.08 (2.20)	
15 years (n (%))	779 (16.0%)	163 (15.7%)	616 (16.1%)	**<0.01**	693 (89.0%)	86 (11.0%)	**<0.01**
16 years (n (%))	594 (12.2%)	142 (13.7%)	452 (11.8%)		473 (79.6%)	121 (20.4%)	
17 years (n (%))	628 (12.9%)	150 (14.5%)	478 (12.5%)		405 (64.5%)	223 (35.5%)	
18 years (n (%))	612 (12.6%)	148 (14.3%)	464 (12.1%)		281 (45.9%)	331 (54.1%)	
19 years (n (%))	634 (13.0%)	123 (11.9%)	511 (13.4%)		194 (30.6%)	440 (69.4%)	
20 years (n (%))	636 (13.1%)	109 (10.5%)	527 (13.8%)		143 (22.5%)	493 (77.5%)	
21 years (n (%))	592 (12.2%)	123 (11.9%)	469 (12.3%)		98 (16.6%)	494 (83.4%)	
22 years (n (%))	388 (8.0%)	78 (7.5%)	310 (8.1%)		50 (12.9%)	338 (87.1%)	
School history							
Highest grade attained							
Grade 1-7 (n (%))	1156 (23.8%)	191 (18.4%)	965 (25.2%)	<0.01	550 (47.6%)	606 (52.4%)	<0.01
Form 1-6 (n (%))	3581 (73.6%)	794 (76.6%)	2787 (72.8%)		1700 (47.5%)	1881 (52.5%)	
Year 1-5 (n (%))	126 (2.6%)	51 (4.9%)	75 (2.0%)		87 (69.0%)	39 (31.0%)	
[b]Time travelled to school >30 minutes (n(%))	832 (36.4%)	175 (29.9%)	657 (38.6%)		-	-	
Sexual behaviours							
Never had sexual intercourse (n (%))	2301 (47.3%)	558 (53.9%)	1743 (45.5%)	**<0.01**	1785 (77.6%)	516 (22.4%)	**<0.01**

Characteristics	All Surveyed Participants (N=4863)	All Enrolled Participants (N=4389)		Study sub-arm comparison U=R p-value	All Enrolled Participants (N=4389)		Study sub-arm comparison ISAB=OOSAB p-value
		Urban (U) (N=1036)	Rural (R) (N=3827)		[a] Enrolled-in-School (ISAB) (N=2337)	Not [a]Enrolled in-School (OOSAB) (N=2526)	
Sexual intercourse before age 15 (n (%))	144 (3.0%)	31 (3.0%)	113 (3.0%)	0.99	43 (29.9%)	101 (70.1%)	**0.01**
Sexual partner age mixing (n (%))	68 (15.9%)	16 (19.8%)	52 (15.0%)	0.29	5 (7.4%)	63 (92.6%)	**0.04**
Sexual intercourse multiple partners (n (%))	148 (7.0%)	52 (13.5%)	96 (5.6%)	**<0.01**	45 (30.4%)	103 (69.6%)	**<0.01**
Sexual intercourse non-regular partner (n (%))	1929 (39.7%)	352 (34.0%)	1577 (41.2%)	**<0.01**	404 (20.9%)	1525 (79.1%)	**<0.01**
Condom used with last partner if multiple partners (n (%))	92 (62.2%)	36 (69.2%)	56 (58.3%)	0.19	34 (37.0%)	58 (63.0%)	**0.03**
Received money in exchange for sexual intercourse (n (%))	568 (27.5%)	95 (25.3%)	473 (28.0%)	0.39	95 (16.7%)	473 (83.3%)	0.11
Received a [c]gift in exchange for sexual intercourse (n (%))	104 (5.0%)	24 (6.4%)	80 (4.7%)	0.12	37 (35.6%)	67 (64.4%)	**<0.01**
Ever given birth (n (%))	1331 (52.0%)	178 (37.2%)	1153 (55.3%)	**<0.01**	83 (6.2%)	1248 (93.8%)	**<0.01**
Age of first pregnancy (mean (SD))	17.94 (1.76)	17.71 (1.79)	17.98 (1.75)		17.69 (1.74)	17.96 (1.76)	0.70
Last sexual partner circumcised (n (%))	782 (42.3%)	171 (52.6%)	611 (40.1%)	**<0.01**	163 (20.8%)	619 (79.2%)	**<0.01**
HIV and Sexual Practices Knowledge							
Heard of AIDS (n (%))	4702 (96.7%)	999 (96.4%)	3703 (96.8%)	0.60	2245 (47.7%)	2457 (52.3%)	**0.02**
Knows all three HIV methods of mother-to-child transmission (n (%))	3025 (62.2%)	615 (59.4%)	2410 (63.0%)	**0.03**	1335 (44.1%)	1690 (55.9%)	**<0.01**

Characteristics	All Surveyed Participants (N=4863)	All Enrolled Participants (N=4389)		Study sub-arm comparison U=R p-value	All Enrolled Participants (N=4389)		Study sub-arm comparison ISAB=OOSAB p-value
		Urban (U) (N=1036)	Rural (R) (N=3827)		[a] Enrolled-in-School (ISAB) (N=2337)	Not [a]Enrolled in-School (OOSAB) (N=2526)	
Does not know that a healthy-looking person can have HIV (n (%))	4092 (84.1%)	846 (81.7%)	3246 (84.8%)	**0.01**	1915 (46.8%)	2177 (53.2%)	**<0.01**
Heard of age mixing (n (%))	3278 (67.6%)	663 (64.3%)	2615 (68.5%)	**0.01**	1503 (45.9%)	1775 (54.1%)	**<0.01**
Heard of transactional sex (n (%))	3429 (71.0%)	703 (68.7%)	2726 (71.6%)	0.07	1596 (46.5%)	1833 (53.5%)	**<0.01**
Household structure							
Mother alive (n (%))	2806 (78.4%)	591 (80.3%)	2215 (77.9%)	0.16	1369 (48.8%)	1437 (51.2%)	**<0.01**
Father alive (n (%))	2610 (62.4%)	595 (66.0%)	2015 (61.5%)	**0.01**	1366 (52.3%)	1244 (47.7%)	**<0.01**
Female-headed household (n (%))	1592 (32.7%)	419 (40.4%)	1173 (27.6%)	**<0.01**	739 (46.4%)	853 (53.6%)	0.11
Number of siblings (mean (SD))	1.70 (1.63)	1.50 (1.44)	1.76 (1.67)	**0.04**	1.79 (1.62)	1.62 (1.64)	**<0.01**
Currently married or in union (n (%))	115 (4.6%)	12 (2.6%)	103 (5.1%)	**0.02**	0 (0.0%)	115 (100.0%)	**<0.01**

Table 2a footnotes:

[a]Enrolled in school: This variable corresponds to if an individual said she was enrolled in school at the time of the interview regardless of study arm

[b]Time travelled to school: How long does it take the AGYW to travel from their house to school regardless of the time of day in minutes. Not answered by those not enrolled in school.

[c]Received a gift in exchange for sexual intercourse: gifts are those other than cash

P-value are generated to show if there was a significant difference in Reponses between urban versus rural, and comparing enrolled in school and not enrolled in school; significant observation (Chi-square p-value <0.05) are **bolded**

Responses of “Don’t know,” “Refuse to answer,” and “Not Applicable” are not included in this table. Missing values due to skip patterns are also not included in this table.

Column totals and percentages were calculated for locality, and row totals and percentages were calculated for in-school versus out-of-school

Table 2b. Characteristics of adolescent girls and young women in Swaziland and by study randomization group

Characteristics	All Surveyed Participants (N=4,863)	All Enrolled Participants (N = 4,389)		Study sub-arm comparison I=IR (p-value)	All Enrolled Participants (N = 4,389)		Study sub-arm comparison R=C (p-value)
		Incentive only (I) Sub-arm (N=994)	Incentive and raffle (IR) sub-arm (N=1,012)		Raffle Only sub-arm (R) (N=1,072)	Control sub-arm (C) (N=913)	
Age in years (mean (SD))	18.22 (2.24)	18.25 (2.28)	18.10 (2.25)		18.10 (2.25)	18.05 (2.18)	-
15 years (n (%))	779 (16.0%)	183 (16.8%)	181 (16.9%)	0.24	206 (17.7%)	175 (16.4%)	0.55
16 years (n (%))	594 (12.2%)	127 (11.7%)	137 (12.8%)		156 (13.4%)	138 (12.9%)	
17 years (n (%))	628 (12.9%)	137 (12.7%)	140 (13.1%)		157 (13.5%)	155 (14.5%)	
18 years (n (%))	612 (12.6%)	134 (12.3%)	149 (13.9%)		136 (11.7%)	153 (14.3%)	
19 years (n (%))	634 (13.0%)	125 (11.5%)	146 (13.6%)		148 (12.7%)	142 (13.3%)	
20 years (n (%))	636 (13.1%)	151 (13.9%)	125 (11.7%)		139 (12.0%)	126 (11.8%)	
21 years (n (%))	592 (12.2%)	139 (12.8%)	123 (11.5%)		133 (11.4%)	104 (9.7%)	
22 years (n (%))	388 (8.0%)	92 (8.4%)	70 (6.5%)		87 (7.5%)	75 (7.0%)	
Locality							
Rural (n (%))	3827 (78.7%)	841 (77.3%)	827 (77.2%)	0.97	938 (80.7%)	839 (78.6%)	0.20
Urban (n (%))	1036 (21.3%)	247 (22.7%)	244 (22.8%)		224 (19.3%)	229 (21.4%)	
School history							
[a]Enrolled in school (n (%))	2337 (48.1%)	545 (50.6%)	523 (48.8%)	0.56	611 (52.6%)	535 (50.1%)	0.24
Highest grade attained							
Grade 1-7 (n (%))	1156 (23.8%)	215 (19.8%)	258 (24.1%)	**0.02**	251 (21.6%)	271 (25.4%)	0.11
Form 1-6 (n (%))	3581 (73.6%)	835 (76.7%)	787 (73.5%)		884 (76.1%)	772 (72.3%)	
Year 1-5 (n (%))	126 (2.6%)	38 (3.5%)	26 (2.4%)		27 (2.3%)	25 (2.3%)	
[b]Time travelled to school >30 minutes (n(%))	832 (36.4%)	201 (37.3%)	191 (37.1%)	0.95	217 (36.5%)	178 (34.4%)	0.48
Sexual behaviours							
Never had sexual intercourse (n (%))	2301 (47.3%)	524 (48.2%)	545 (50.9%)	0.21	615 (52.9%)	510 (47.8%)	**0.02**
Sexual intercourse before age 15 (n (%))	144 (3.0%)	28 (2.6%)	26 (2.4%)	0.99	31 (2.7%)	31 (2.9%)	0.94

Characteristics	All Surveyed Participants (N=4,863)	All Enrolled Participants (N = 4,389)		Study sub-arm comparison I=IR (p-value)	All Enrolled Participants (N = 4,389)		Study sub-arm comparison R=C (p-value)
		Incentive only (I) Sub-arm (N=994)	Incentive and raffle (IR) sub-arm (N=1,012)		Raffle Only sub-arm (R) (N=1,072)	Control sub-arm (C) (N=913)	
Sexual partner age mixing (n (%))	68 (15.9%)	3 (9.7%)	1 (6.7%)	0.73	3 (14.3%)	3 (5.5%)	0.20
Sexual intercourse multiple partners (n (%))	148 (7.0%)	28 (6.1%)	29 (6.8%)	0.69	25 (5.6%)	31 (6.6%)	0.52
Sexual intercourse non-regular partner (n (%))	1929 (39.7%)	417 (38.3%)	390 (36.4%)	0.36	417 (35.9%)	417 (39.0%)	0.12
Condom used with last partner if multiple partners (n (%))	92 (62.2%)	20 (71.4%)	23 (79.3%)	0.49	13 (52.0%)	19 (61.3%)	0.49
Received money in exchange for sexual intercourse (n (%))	568 (27.5%)	114 (25.7%)	121 (28.9%)	0.37	125 (28.3%)	117 (25.7%)	0.44
Received a [c]gift in exchange for sexual intercourse (n (%))	104 (5.0%)	28 (6.3%)	20 (4.8%)	0.40	18 (4.1%)	25 (5.5%)	0.39
Ever given birth (n (%))	1331 (52.0%)	289 (51.2%)	266 (50.6%)	0.83	274 (50.1%)	283 (50.7%)	0.84
Age of first pregnancy (mean (SD))	17.94 (1.76)	18.09(1.66)	17.82(1.66)	0.16	18.06(1.83)	17.98(1.79)	0.20
Last sexual partner circumcised (n (%))	782 (42.3%)	180 (44.4%)	159 (42.5%)	0.59	163 (41.7%)	160 (40.4%)	0.71
HIV and Sexual Practices Knowledge							
Heard of AIDS (n (%))	4702 (96.7%)	1051 (96.6%)	1037 (96.8%	0.77	1121 (96.5%)	1035 (96.9%)	0.56
Knows all three HIV methods of mother-to-child	3025 (94.1%)	657 (93.2%)	658 (95.2%)	0.62	710 (93.8%)	676 (94.3%)	0.29

Characteristics	All Surveyed Participants (N=4,863)	All Enrolled Participants (N = 4,389)		Study sub-arm comparison I=IR (p-value)	All Enrolled Participants (N = 4,389)		Study sub-arm comparison R=C (p-value)
		Incentive only (I) Sub-arm (N=994)	Incentive and raffle (IR) sub-arm (N=1,012)		Raffle Only sub-arm (R) (N=1,072)	Control sub-arm (C) (N=913)	
transmission (n (%))							
Does not know that a healthy looking person can have HIV (n (%))	4092 (86.1%)	931 (87.5%)	922 (88.2%)	0.73	968 (85.5%)	876 (83.6%)	0.42
Heard of age mixing (n (%))	3278 (67.6%)	754 (69.5%)	727 (68.2%)	0.52	768 (66.4%)	708 (66.3%)	0.94
Heard of transactional sex (n (%))	3429 (71.0%)	778 (71.8%)	752 (70.6%)	0.53	807 (69.9%)	736 (69.6%)	0.88
Syphilis and *Trichomonas vaginalis* status							
Syphilis (n (%))	3 (0.1%)	0 (0.0%)	1 (0.1%)	0.31	0 (0.0%)	0 (0.0%)	-
Trichomonas vaginalis (n (%))	42 (0.9%)	5 (0.5%)	8 (0.7%)	0.39	7 (0.6%)	5 (0.5%)	0.67
Household structure							
Mother alive (n (%))	2806 (78.4%)	643 (79.3%)	623 (80.3%)	0.62	697 (81.0%)	601 (77.3%)	0.07
Father alive (n (%))	2610 (62.4%)	568 (61.3%)	576 (62.5%)	0.62	649 (64.7%)	594 (65.1%)	0.87
Female-headed household (n (%))	1592 (47.9%)	356 (47.0%)	366 (49.8%)	0.47	384 (47.3%)	322 (45.2%)	0.14
Number of siblings (mean (SD))	1.70 (1.63)	1.68 (1.59)	1.71 (1.60)	0.64	1.80 (1.66)	1.67 (1.64)	0.10
Currently married or in union (n (%))	115 (4.6%)	98 (15.7%)	97 (16.7%)	0.15	96 (15.8%)	98 (16.4%)	0.11

Table 2b footnotes:

[a]Enrolled in school: This variable corresponds to if an individual said she was enrolled in school at the time of the interview

[b]Time travelled to school: How long does it take the AGYW to travel from their house to school regardless of the time of day in minutes.

[r]Received a gift in exchange for sexual intercourse: gifts are those other than cash

P-value are generated to show if there was a significant difference in Reponses between study arms; significant observation (p-value <0.05) are **bolded**

Responses of "Don't know," "Refuse to answer," and "Not Applicable" are not included in this table. Missing values due to skip patterns are also not included in this table.

Table 3. Frequency distribution of participants housing conditions and assets by study randomization group

Housing Conditions and Assets	All Surveyed Participants (N=4,863)	All Enrolled Participants (N = 4,389)		Study sub-arm comparison I=IR (p-value)	All Enrolled Participants (N = 4,389)		Study sub-arm comparison R=C (p-value)
		Incentive only Sub-arm (N=994)	Incentive and raffle (IR) sub-arm (N=1,012)		Raffle Only sub-arm (R) (N=1,072)	Control sub-arm (C) (N=913)	
Electricity in home (n (%))	3257 (67.0%)	758 (69.7%)	698 (65.2%)	0.054	799 (68.8%)	719 (67.5%)	0.45
Piped water (n (%))	1072 (19.6%)	200 (18.4%)	204 (19.0%)	0.66	303 (26.1%)	258 (24.2%)	0.44
Stove (n (%))	3274 (67.4%)	764 (70.2%)	727 (67.9%)	0.24	770 (66.3%)	716 (67.2%)	0.30
Radio (n (%))	3472 (71.4%)	775 (71.2%)	771 (72.0%)	0.70	843 (72.5%)	778 (73.0%)	0.33
Television (n (%))	2946 (60.6%)	697 (64.1%)	650 (60.7%)	0.11	717 (61.7%)	656 (61.5%)	0.34
Refrigerator (n (%))	2972 (61.2%)	698 (64.2%)	634 (59.2%)	**0.02**	730 (62.9%)	662 (62.1%)	0.92
Mobile phone (n (%))	1004 (93.1%)	1013 (93.1%)	1002 (93.6%)	0.68	1082 (93.1%)	1004 (94.1%)	0.37
Bicycle (n (%))	507 (10.4%)	108 (9.9%)	122 (11.4%)	0.27	114 (9.8%)	120 (11.3%)	0.44
Motorcycle (n (%))	90 (1.9%)	17 (1.6%)	19 (1.8%)	0.70	24 (2.1%)	18 (1.7%)	0.80
Car/ truck (n (%))	1563 (32.2%)	361 (33.2%)	351 (32.8%)	0.59	392 (33.7%)	342 (32.1%)	0.41
Tractor (n (%))	322 (6.6%)	78 (7.2%)	71 (6.6%)	0.62	80 (6.9%)	80 (7.5%)	0.86
Owns house (n (%))	3920 (90.3%)	879 (89.6%)	875 (89.0%)	0.06	952 (90.8%)	814 (91.1%)	0.92
Agricultural land (n (%))	3796 (78.3%)	837 (77.6%)	819 (76.8%)	0.30	934 (80.4%)	841 (78.7%)	0.38

Table 3 footnotes:

P-value are generated to show if there was a significant difference in Reponses between study; significant observation (Chi-squared p-value <0.05) are **bolded**

Table 4. Descriptive characteristics of school enrolment in AGYW in Swaziland

Characteristics	Of those who responded
Classroom	
>2 days school missed last year	83.1% (1943/2337)
How often Punished at School	
1 or 2 times per school term	44.7% (873/1954)
1 to 5 times per week	3.9% (76/1954)
>5 times per week	5.4% (105/1954)
Number of pupils in class	
16-25 pupils	6.1% (142/2313)
26-35 pupils	22.1% (511/2313)
36-45 pupils	34.2% (790/2313)
>45 pupils	35.8% (827/2313)
Quality of teachers making lessons as perceived by the student taking the interview	
"Poor/fair"	12.0% (279/2333)
"Good"	42.9% (1000/2333)
"Very good/ excellent"	45.1% (1053/2333)
Receive food at school	90.1% (2106/2337)
Preferences	
Personal importance of going to school	99.6% (2321/2331)
Personal importance of good marks at school	99.5% (2323/2334)
Parents importance of AGYW education	99.4% (2308/2323)
Travel to School	
>30 minutes to travel to school	63.6% (1455/2287)
Method of getting to school	
Walk	65.3% (1496/2291)
Bicycle or car	3.4% (78/2291)
Bus	31.3% (716/2291)
Other	2.1% (47/2291)

Table 4 footnotes: Responses of "Don't know," "Refuse to answer," and "Not Applicable" are not included in this table. Missing values due to skip patterns are also not included in this table.

5.3 HIV and STI prevalence, access to HIV services, and relationships between background characteristics of participants, and HIV and STI status at baseline

5.3.1 HIV, Trichomonas Vaginalis and Syphilis prevalence (Table 5a and 5b, and Figure 5)

The confirmation of an HIV positive individual was based on the Swaziland country guidelines using the Determine HIV ½ Rapid Test and the Uni-Gold rapid test for confirmation. The baseline prevalence of HIV among AGYW was 8.21% (398/4,847). 16 individuals refused HIV testing who took the baseline survey. The qualification of a *Trichomonas vaginalis* positive test was based on the Swaziland country guidelines using the OSOM® Trichomonas Rapid Test. The baseline prevalence of *Trichomonas vaginalis* was 0.84% (42/4,863). The confirmation for a syphilis positive test was based on the Swaziland country guidelines using the Syphilis 3.0 Rapid Test. The baseline prevalence of syphilis was 0.06% (3/4,863). There was a larger proportion of AGYW HIV positive who were out of school (12.49% [314/2,515]) compared to those enrolled in school (3.60% [84/2,332]). Additionally, there was a larger proportion of AGYW who were HIV positive in rural areas (8.65% [330/3,814]) compared to urban areas (6.58% [68/1,033]). Persons who tested positive for HIV were referred. Persons who tested positive for STIs were provided with free treatment and a referral for their sexual partners to also get tested.

Table 5a. Prevalence of HIV, syphilis, and *Trichomonas vaginalis* among AGYW in Swaziland

Laboratory-confirmed STI	Number (n)	Prevalence % (n/N)	Prevalence among ISAB	Prevalence among OOSAB	Prevalence among AGYW in rural areas	Prevalence among AGYW in urban areas
HIV	398	8.21 (398/4,847) *	3.60 (84/2,332)	12.49 (314/2,515)	8.65 (330/3,814)	6.58 (68/1,033)
Both HIV and Syphilis	2	0.04 (2/4,847)	0.00 (0/2,332)	0.08 (2/2,515)	0.05 (2/3,814)	0.00 (0/1,033)
Both HIV and *Trichomonas vaginalis*	15	0.31 (15/4,847)	0.09 (2/2,332)	0.52 (13/2,515)	0.24 (9/3,814)	0.58 (6/1,033)
Trichomonas vaginalis	42	0.84 (42/4,863)	0.34 (8/2,337)	1.35 (34/2,526)	0.73 (28/3,827)	1.35 (14/1,036)
Syphilis	3	0.06 (3/4,863)	0.00 (0/2,337)	0.12 (3/2,526)	0.08 (3/3,827)	0.00 (0/1,036)
Both Syphilis and *Trichomonas vaginalis*	0	0.00 (0/4,863)	0.00 (0/2,337)	0.00 (0/2,526)	0.00 (0/3,827)	0.00 (0/1,036)

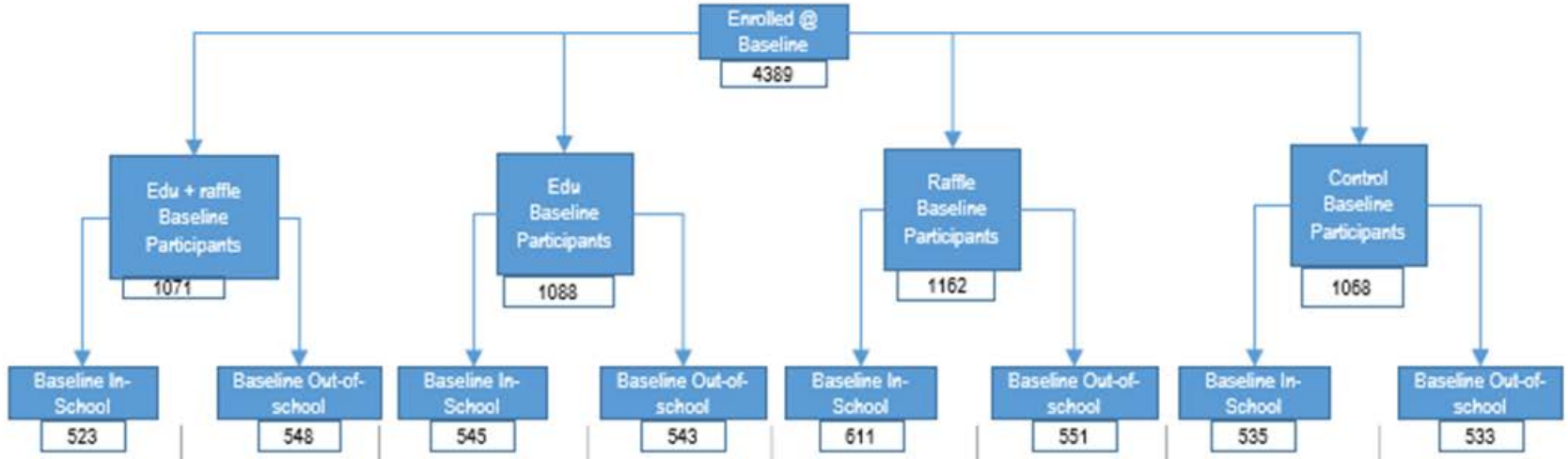
Table 5a footnotes: *16 individuals refused to be tested for HIV

Table 5b. HIV prevalence by age, schooling status at baseline and location among AGYW in Swaziland

Self-reported age at baseline	OOSAB % (n/N)	ISAB % (n/N)	Rural % (n/N)	Urban % (n/N)
15 years	9.41 (8/85)	1.73 (12/693)	2.76 (17/615)	1.84 (3/163)
16 years	10.74 (13/121)	2.97 (14/472)	4.66 (21/451)	4.23 (6/142)
17 years	7.24 (16/221)	3.46 (14/405)	5.03 (24/477)	4.03 (6/149)
18 years	6.38 (21/329)	2.86 (8/280)	5.19 (24/462)	3.40 (5/29)
19 years	11.62 (51/439)	6.19 (12/194)	10.98 (56/510)	5.69 (7/123)
20 years	15.65 (77/492)	6.38 (9/141)	13.55 (71/524)	13.76 (15/109)
21 years	14.43 (71/492)	11.34 (11/97)	14.56 (68/467)	11.48 (14/122)
22 years	16.96 (57/336)	8.00 (4/50)	15.91 (49/308)	15.38 (12/78)

*16 individuals refused to be tested for HIV

Figure 5. Prevalence of HIV, syphilis, and *Trichomonas vaginalis* among AGYW in Swaziland by study arm and study sub-arm



	Baseline In-School	Baseline Out-of-school	Baseline In-School	Baseline Out-of-school	Baseline In-School	Baseline Out-of-school	Baseline In-School	Baseline Out-of-school
# and % trich positive	5 0.96%	29 5.30%	4 0.73%	0 0.00%	4 0.65%	18 3.27%	5 0.93%	16 3.00%
# and % syphilis positive	0 0.00%	1 0.18%	0 0.00%	0 0.00%	1 0.16%	1 0.18%	0 0.00%	1 0.18%

Table 6. HIV services access for adolescent girls and young women in Swaziland

Characteristics	All Surveyed Participants (N=4,863)	All Enrolled Participants (N = 4,389)		Study group comparison I=IR (p-value)	All Enrolled Participants (N = 4,389)		Study group comparison R=C (p-value)
		Incentive only Sub-arm (N=994)	Incentive and raffle sub-arm (N=1,012)		Raffle Only sub-arm (N=1,072)	Control sub-arm (N=913)	
Heard of teen clubs (n (%))	1027 (21.7%)	262 (24.6%)	213 (20.3%)	**0.02**	242 (21.3%)	227 (22.0%)	0.70
Part of teen clubs (n (%))	168 (16.5%)	36 (13.8%)	36 (17.1%)	0.34	38 (15.8%)	38 (16.7%)	0.79
Heard of teenage support groups for young people living with HIV (n (%))	859 (18.0%)	214 (20.0%)	172 (16.3%)	**0.03**	197 (17.3%)	190 (18.3%)	0.55
Condom distribution in your community (n (%))	1704 (43.6%)	366 (42.8%)	356 (42.5%)	0.91	419 (44.3%)	396 (44.6%)	0.90
Rural Health motivator in your community (n (%))	3390 (93.8%)	737 (92.7%)	776 (93.8%)	0.36	796 (94.1%)	745 (94.5%)	0.69
Ever have a mobile clinic (n (%))	1004 (23.7%)	236 (25.1%)	213 (23.2%)	0.34	231 (23.1%)	231 (24.2%)	0.57

Table 6 footnotes:

Responses of “Don’t know,” “Refuse to answer,” and “Not Applicable” are not included in this table. Missing values due to skip patterns are also not included

P-value are generated to show if there was a significant difference in Reponses between study arms; significant observation (chi-square p-value <0.05) are **bolded**

5.3.2 Access to HIV services (table 6, on previous page)

Less than 22% of AGYW surveyed at based line had heard of teen clubs, were part of a teen club, or heard of teenage support groups for young people living with HIV. A higher percentage of AGYW (43.6%) had condom distribution within their community, and almost all (93.8%) of AGYW had a rural health motivator in their community. However, only 23.7% of AGYW ever had a mobile clinic in their community.

5.3.3 Factors associated with HIV infection (Table 7)

A cross-sectional analysis was performed for baseline data, examining determinants of HIV infection using bivariate logistic regression, with random effects to adjust for intra-cluster correlation. The analysis is unweighted and does not account for the sampling factors of having 70% of the sample from rural areas and 30% from urban areas, nor does the analysis account for 50% of AGYW being enrolled in school and 50% not enrolled in school. A p-value of <0.05 was quantified as a significant difference for the bivariate analysis. Factors that were significantly associated with HIV infection at baseline were older age, living in a rural community, not being enrolled in school, and lower grade attainment (grade versus form). Sexual behaviors and knowledge that were significantly associated with HIV infection included having sexual intercourse, age mixing (sexual partner >10 years older in the last 12 months), sexual intercourse with multiple partners (>1 sexual partner) over the last twelve months, sexual intercourse with non-regular partners (non-cohabiting and not in a union), ever given birth, comprehensive knowledge of mother-to-child HIV transmission (pregnancy, labor and delivery, and breastfeeding), heard of transactional sex, and were *Trichomonas vaginalis* positive. Household factors that were significantly associated with HIV infection included AGYW whose mothers were not alive, fathers who were not alive, had less siblings and AGYW who were married or in a union.

5.3.4 Test for factors associated with Trichomonas vaginalis infection (Table 8)

A cross-sectional analysis was performed for baseline data, examining determinants of *Trichomonas vaginalis* infection using univariate logistic regression, with random effects to adjust for intra-cluster correlation. The analysis is unweighted and does not account for sampling factors of having 70% of the sample from rural areas and 30% from urban areas, nor does the analysis account for 50% of AGYW being enrolled in school and 50% not enrolled in school. A p-value of <0.05 was quantified as a significant difference for the univariate analysis. Factors that were significantly associated with *Trichomonas vaginalis* infection at baseline were older age, not being enrolled in school, and lower grade attainment (grade versus form). Sexual behaviors and knowledge that were significantly associated with *Trichomonas vaginalis* infection included having sexual intercourse, sexual intercourse with multiple partners (>1 sexual partner) over the last twelve months, sexual intercourse with non-regular partners (non-cohabiting and not in a union), receiving money in exchange for sexual intercourse and participants who were HIV positive.

Table 7. Factors associated with HIV infection in AGYW in Swaziland

Factors	OR (95% CI)	p-value
[a]Age in years		
15 years	1	
16 years	1.81 (1.01-3.26)	**0.049**
17 years	1.91 (1.07-3.39)	**0.028**
18 years	1.90 (1.06-3.38)	**0.031**
19 years	4.19 (2.50-7.01)	**<0.01**
20 years	5.96 (3.62-9.81)	**<0.01**
21 years	6.13 (3.71-10.12)	**<0.01**
22 years	7.11 (4.22-11.98)	**<0.01**
Locality		
Rural	1	
Urban	0.74 (0.57-0.98)	**0.032**
School history		
Not [b]enrolled in school	1	
[b]Enrolled in school	0.26 (0.20-0.34)	**<0.01**
[c]Highest grade attained		
Grade 1-5	1	
Form 1-6	0.59 (0.48-0.74)	**<0.01**
Year 1-5	0.52 (0.25-1.10)	0.085
<30 minutes to travel to school	1	
>30 minutes to travel to school	0.96 (0.60-1.52)	0.85
Sexual behaviours		
Had sexual intercourse	1	
Never had sexual intercourse	0.21 (0.16-0.27)	**<0.01**
Sexual intercourse after age 15	1	
Sexual intercourse before age 15	1.54 (0.99-2.40)	0.055
No partner age mixing	1	
Sexual partner age mixing	2.64 (1.36-5.12)	**<0.01**
Sexual intercourse no with multiple partners	1	
Sexual intercourse multiple partners	1.90 (1.26-2.88)	**<0.01**
Sexual intercourse with regular partner	1	
Sexual intercourse non-regular partner	3.24 (2.61-4.02)	**<0.01**
Condom not used with last partner if having multiple partners	1	
Condom used with last partner if multiple partners	0.60 (0.27-1.34)	0.22
Did not receive money in exchange for sexual intercourse	1	
Received money in exchange for sexual intercourse	1.14 (0.86-1.51)	0.36
Received gift in exchange for sexual intercourse	0.86 (0.46-1.60)	0.63
Never given birth	1	
Ever given birth	1.45 (1.17-1.88)	**<0.01**
>15 years old for first pregnancy	1	
<15 years old for first pregnancy	1.73 (0.81-3.71)	0.16
Last partner not circumcised	1	

Factors	OR (95% CI)	p-value
Last sexual partner circumcised	0.96 (0.73-1.25)	0.76
HIV and Sexual Practices Knowledge		
Has not heard of AIDS	1	
Heard of AIDS	1.11 (0.61-2.01)	0.74
Does not know all three modes of mother-to-child transmission	1	
Knows all three modes of mother-to-child transmission	1.41 (1.13-1.76)	**<0.01**
Knows that a healthy-looking person can have HIV	1	
Does not know that a healthy-looking person can have HIV	0.97 (0.73-1.27)	0.80
Has not heard of age mixing	1	
Heard of age mixing	1.12 (0.90-1.40)	0.31
Has not heard of transactional sex	1	
Head of transactional sex	1.48 (1.16-1.89)	**<0.01**
Syphilis and *Trichomonas vaginalis* status		
Does not have syphilis	1	
Has syphilis	22.47 (2.03-248.35)	**0.01**
Does not have *trichomonas vaginalis*	1	
Has *Trichomonas vaginalis*	6.41 (3.38-12.16)	**<0.01**
Household structure		
Mother deceased	1	
Mother alive	0.50 (0.39-0.65)	**<0.01**
Father deceased	1	
Father alive	0.64 (0.51-0.79)	**<0.01**
Male-headed household	1	
Female-headed household	1.05 (0.84-1.30)	0.67
Number of siblings		
No siblings	1	
1 sibling	0.56 (0.42-0.75)	**<0.01**
2 siblings	0.64 (0.47-0.86)	**<0.01**
>2 siblings	0.71 (0.55-0.92)	**0.01**
Not currently married or in union	1	
Currently married or in union	1.91 (1.21-3.03)	**<0.01**

Table 7 footnotes:

Adjusted odds model was run with only those factors that had a p value >0.05 in bivariate analyses

Significant observation (p-value <0.05) are **bolded**

[b]Enrolled in school: This variable corresponds to if an individual said she was enrolled in school at the time of the interview

Responses of “Don’t know,” “Refuse to answer,” and “Not Applicable” are not included in this table. Missing values due to skip patterns are also not included in this table

Table 8. Factors associated with *Trichomonas vaginalis* infection in AGYW in Swaziland

Factors	OR (95% CI)	p-value
[a]Age in years		
15 years	1	
16 years	1.97 (0.32-11.84)	0.46
17 years	5.01 (1.06-23.69)	**0.042**
18 years	4.50 (0.93-21.72)	0.061
19 years	4.34 (0.90-20.96)	0.068
20 years	5.58 (1.20-25.91)	**0.028**
21 years	3.31 (0.64-17.12)	0.15
22 years	1.01 (0.10-11.11)	0.98
Locality		
Rural	1	
Urban	1.86 (0.98-3.54)	0.06
School history		
Not enrolled in school	1	
[b]Enrolled in school	0.25 (0.12-0.55)	**<0.01**
[c]Highest grade attained		
Grade 1-5	1	
Form 1-6	0.41 (0.22-0.76)	**<0.01**
Year 1-5	0.51 (0.67-3.82)	0.51
[d]>30 minutes to travel to school	1.75 (0.44-7.03)	0.43
Sexual behaviours		
Had sexual intercourse	1	
Never had sexual intercourse	0.12 (0.04-0.32)	**<0.01**
Did not have sexual intercourse before age 15 years	1	
Sexual intercourse before age 15 years	1.44 (0.44-4.73)	0.55
No sexual partner age mixing	1	
Sexual partner age mixing	2.44 (0.73-8.17)	0.15
Did not have sexual intercourse with multiple partners	1	
Sexual intercourse multiple partners	3.70 (1.58-8.69)	**<0.01**
Sexual intercourse with regular partner	1	
Sexual intercourse non-regular partner	5.66 (2.79-11.85)	**<0.01**
Condom not used with last partner if multiple partners	1	
Condom used with last partner if multiple partners	0.44 (0.094-2.046)	0.29
Did not receive money or gifts in exchange for sexual intercourse		
Received money in exchange for sexual intercourse	2.49 (1.21-5.13)	**0.01**
Received gift in exchange for sexual intercourse	2.73 (0.78-9.58)	0.12
Never given birth	1	
Ever given birth	0.92 (0.49-1.75)	0.81
>15 years for first pregnancy	1	
<15 years for first pregnancy	1.86 (0.24-14.33)	0.55
Last sexual partner not circumcised	1	

Factors	OR (95% CI)	p-value
Last sexual partner circumcised	1.02 (0.48-2.18)	0.95
HIV and Sexual Practices Knowledge		
Not heard of AIDS	1	
Heard of AIDS	0.68 (0.16-2.85)	0.60
Does not know all three HIV methods of mother-to-child-transmission	1	
Knows all three HIV methods of mother-to-child transmission	0.99 (0.53-1.85)	0.97
Knows that a healthy looking person can have HIV	1	
Does not know that a healthy-looking person can have HIV	0.53 (0.26-1.05)	0.07
Never heard of age mixing	1	
Heard of age mixing	1.20 (0.61-2.35)	0.60
Never heard of transactional sex	1	
Heard of transactional sex	1.15 (0.58-2.30)	0.69
Syphilis and HIV status		
Syphilis negative	1	
Syphilis positive	-	-
HIV negative	1	
HIV positive	6.41 (3.38-12.16)	**<0.01**
Household structure		
Mother dead	1	
Mother alive	0.65 (0.28-1.50)	0.31
Father dead	1	
Father alive	0.80 (0.41-1.57)	0.60
Male-based household	1	
Female-headed household	1.27 (0.68-2.37)	0.46
Number of siblings		
No siblings	1	
1 sibling	1.01 (0.45-2.26)	0.99
2 siblings	0.81 (0.32-2.05)	0.66
>2 siblings	0.88 (0.39-1.97)	0.76
Not currently married or in union	1	
Currently married or in union	0.55 (0.08-4.05)	0.56

Table 8 footnotes:
Adjusted odds model was run with only those factors that had a p value >0.05

Significant observation (p-value <0.05) are **bolded**

[b]Enrolled in school: This variable corresponds to if an individual said she was enrolled in school at the time of the interview

Responses of “Don’t know,” “Refuse to answer,” and “Not Applicable” are not included in this table. Missing values due to skip patterns are also not included in this table

5.4 Risk taking behaviour of the study population at baseline (Table 9a, 9b and 9c)

Three different games were used to better understand risk taking and delayed gratification preferences of the study population. These games helped understand the risk-taking tendencies seen within the study population.

- The **first game** compared option A receiving 50 emalangeni in one week which did not increase incrementally between scenarios; versus option B receiving 50 emalangeni in 4 weeks which did increase incrementally by 5 emalangeni between scenarios. Details of the scenarios and respective options are described in more detail in appendix table C1. Results from the first game (Table 9a) showed that the cumulative probability of selecting option A for all the scenarios was 0.25. Each 5 emalangeni increase resulted in an average of 274 individuals switching from option A to option B. The greatest percentage change occurred in scenario 11 when 26% of individuals switched from option A to option B.

- The **second game** compared option A receiving 500 emalangeni in one week which did not increase incrementally between scenarios; versus option B receiving 500 emalangeni in 4 weeks which did increase incrementally by 50 emalangeni between scenarios. Details of the scenarios and respective options are described in more detail in appendix table C2. As per Table 9b, the results from the second game showed a lower cumulative probability of selecting option A (0.20). With each 50 emalangeni increase resulted in an average of 292 individuals switched from option A to option B where the greatest percentage switch from option A to option B was scenario 11 (38% switched).

- The **third game** had two alternatives: the first alternative was receiving a fixed amount of money (option A). The second alternative was participating in a lottery where you have 50% chance of winning 500 emalangeni and 50% chance of winning nothing. Details of the scenarios and respective options are described in more detail in appendix table C3. In the third game 22.6% of individuals started at option A in scenario 1 and 78.9% chose option A for scenario 15 (see Table 9c). The opposite trend was seen for option B. 77.4% of individuals chose option B in scenario 1 and 21.1% of individuals chose option B for scenario 15. The results of the three games demonstrate risk adverse behavior.

The first game identified 20% of the sample as strongly risk adverse (refusing to change options regardless of the increased marginal benefit), the second game identified 25% of the population as strongly risk adverse, and the third game identified 21.1% of the population as strongly risk adverse. The first game identified 24% of the sample as strongly risk taking (willing to choose an option with less certainty of greatest benefit), the second game identified 23% of the population as strongly risk taking, and the third game identified 22.6% of the population as strongly risk taking.

Table 9a. Risk-taking tendencies explained by preferences (Game A)

	Number of participants at the start of each scenario	Number of participants selecting option B	Probability of selecting B for each scenario	Probability of selecting A for each scenario	Cumulative probability of selecting A for all the scenarios
Scenario 1	4,863	1,159	0.24	0.76	1.00
Scenario 2	3,704	519	0.14	0.86	86.0
Scenario 3	3,185	459	0.14	0.86	0.74
Scenario 4	2,726	271	0.10	0.90	0.67
Scenario 5	2,455	390	0.16	0.84	0.56
Scenario 6	2,065	166	0.08	0.92	0.51
Scenario 7	1,899	238	0.13	0.87	0.45
Scenario 8	-	-	-	-	-
Scenario 9	1,562	153	0.10	0.90	0.40
Scenario 10	1,409	71	0.05	0.95	0.38
Scenario 11	1,338	349	0.26	73.9	0.28
Scenario 12	989	122	0.12	87.7	0.25
[a]Median (min-max) amount needed to switch from option A to option B after scenario 12	E2,000 (100-1,000,000)				

Table 9a footnotes:

*99 selected B and no selections for A scenario 8; coding error in CAPI

Switch from A to B: mean Emalangeni (E) to switch from A to B if not done by scenario 12

[a]Those that answered E50 or below were excluded (n=5)

Table 9b. Risk-taking tendencies explained by preferences (Game B)

	Number of participants at the start of each scenario	Number of participants selecting option B	Probability of selecting B for each scenario	Probability of selecting A for each scenario	Cumulative probability of selecting A for all the scenarios
Scenario 1	4,863	1,131	0.23	0.77	1.00
Scenario 2	3,732	517	0.14	0.86	0.86
Scenario 3	3,215	435	0.14	0.86	0.74
Scenario 4	2,780	222	0.08	0.92	0.69
Scenario 5	2,558	363	0.14	0.86	0.59
Scenario 6	2,195	117	0.05	0.95	0.56
Scenario 7	2,078	233	0.11	0.89	0.49
Scenario 8	-	-	-	-	-
Scenario 9	1,735	129	0.07	0.93	0.46
Scenario 10	1,606	104	0.06	0.94	0.43
Scenario 11	1,502	565	0.38	0.62	0.27
Scenario 12	937	239	0.26	0.74	0.20
[a]Median (min-max) amount needed to switch from option A to option B after scenario 12	E2,000 (100-1,000,000)				

Table 9b footnotes:

*110 selected B and no selections for A scenario 8; coding error in CAPI

Switch from A to B: mean Emalangeni (E) to switch from A to B if not done by scenario 12

[a]Those that answered E50 or below were excluded (n=5)

Table 9c. Behavioral economics explained by preferences (Game C)

	Option A (n (%))	Option B (n (%))
Scenario 1	1,100 (22.6%)	3,763 (77.4%)
Scenario 2	1,672 (34.4%)	3,191 (65.6%)
Scenario 3	2,050 (42.2%)	2,813 (57.8%)
Scenario 4	2,229 (45.8%)	2,634 (54.2%)
Scenario 5	2,711 (55.6%)	2,152 (44.3%)
Scenario 6	2,843 (58.5%)	2,020 (41.5%)
Scenario 7	3,073 (63.2%)	1,790 (36.8%)
Scenario 8	-	-
Scenario 9	3,440 (70.7%)	1,423 (29.3%)
Scenario 10	3,480 (71.6%)	1,383 (28.4%)
Scenario 11	3,562 (73.3%)	1,301 (26.8%)
Scenario 12	3,569 (73.4%)	1,294 (26.6%)
Scenario 13	3,790 (77.9%)	1,073 (22.1%)
Scenario 14	3,781 (77.8%)	1,082 (22.3%)
Scenario 15	3,835 (78.9%)	1,028 (21.1%)

Table 9c footnote: *1,742 selected B and no selections for A for scenario 8

5.5 Enrolment into the study and balance between study arms

5.5.1 Balance within the study arms (Figures 6a and 6b)

At baseline, the study was to enroll ~4,400 HIV negative AGYW aged 15-22 years of age. Sampling had the objective of having 30% of the sampled population from urban areas, and 70% sampled from rural areas. Additionally, 50% of the study population was to be currently attending school, and 50% of the study population was to not be currently attending school at baseline. To achieve the desired number of participants enrolled required a multi-stage cluster-sampling scheme using enumeration areas as a sampling frame to reach the desired number of AGYW to be enrolled in the study at baseline. 166 EAs were initially chosen and randomized to either receive the financial incentive for school enrollment and attendance, or not to receive the financial incentive. Additional EAs were selected (127 EAs) beyond the 166 EAs because the 166 EAs were not able to achieve the goal of having 50% of the study population attending school at baseline, and 50% of the study population not attending school at baseline. When the baseline questionnaire was administered, 50% of those in the financial incentive group were allocated to be part of the STI screening raffle group, and 50% of those in the group not receiving the financial incentive were allocated to be part of the STI screening raffle group.

Figures 6a and 6b outline the screening and enrollment cascade at baseline. At baseline 6,055 individuals were screened of which 4,863 participated in the baseline survey. Among the 4,863 baseline participants, 398 individuals tested positive for HIV, 16 refused HIV testing, 28 individuals were on ART, and 32 individuals tested HIV negative, but did not give consent to be enrolled into a study arm. This left 4,389 AGYW to be randomized within the 4 study arms (control group and education incentive group, with 50% of participants within each of these arms. 2, 220 AGYW were assigned to the incentive arm and 2, 2169 AGYW were assigned to the control arm. Figure 6b further shows that within the control sub-arm, 913 were assigned to the control only arm and 1,072 were assigned to the raffle only sub-arm. Within the education incentive study arm, 994 were assigned to the educational incentive only sub-arm and 1,012 were assigned to the educational incentive and raffle sub-arm. At enrollment, 50.4% were in school.

Across the study arms ~80% of the individuals were from rural EAs and ~20% were from urban EAs, Table 10.

5.5.2 Balance between study arms (Table 10)

Chi squared tests were run to compare the characteristics of educational incentive only versus educational incentive and raffle, and raffle only versus control group, to ensure each study arm was similar at baseline. This comparison was done for Table 2c., Table 3 and Table 7. A p-value of <0.05 was quantified as a significant difference between study arms. In table 2c, only highest grade attained was significantly different when comparing the education incentive versus education incentive plus raffle, and the only factor that was significantly different between the raffle only and control groups was never having had sexual intercourse. There were no significant differences seen in Table 3 when comparing the STI raffle only group to the control group. Also, in Table 7, there were no any significant differences when comparing the education incentive group to the education incentive plus raffle group, nor the STI raffle only group to the control group.

Figure 6a. Baseline screening cascade

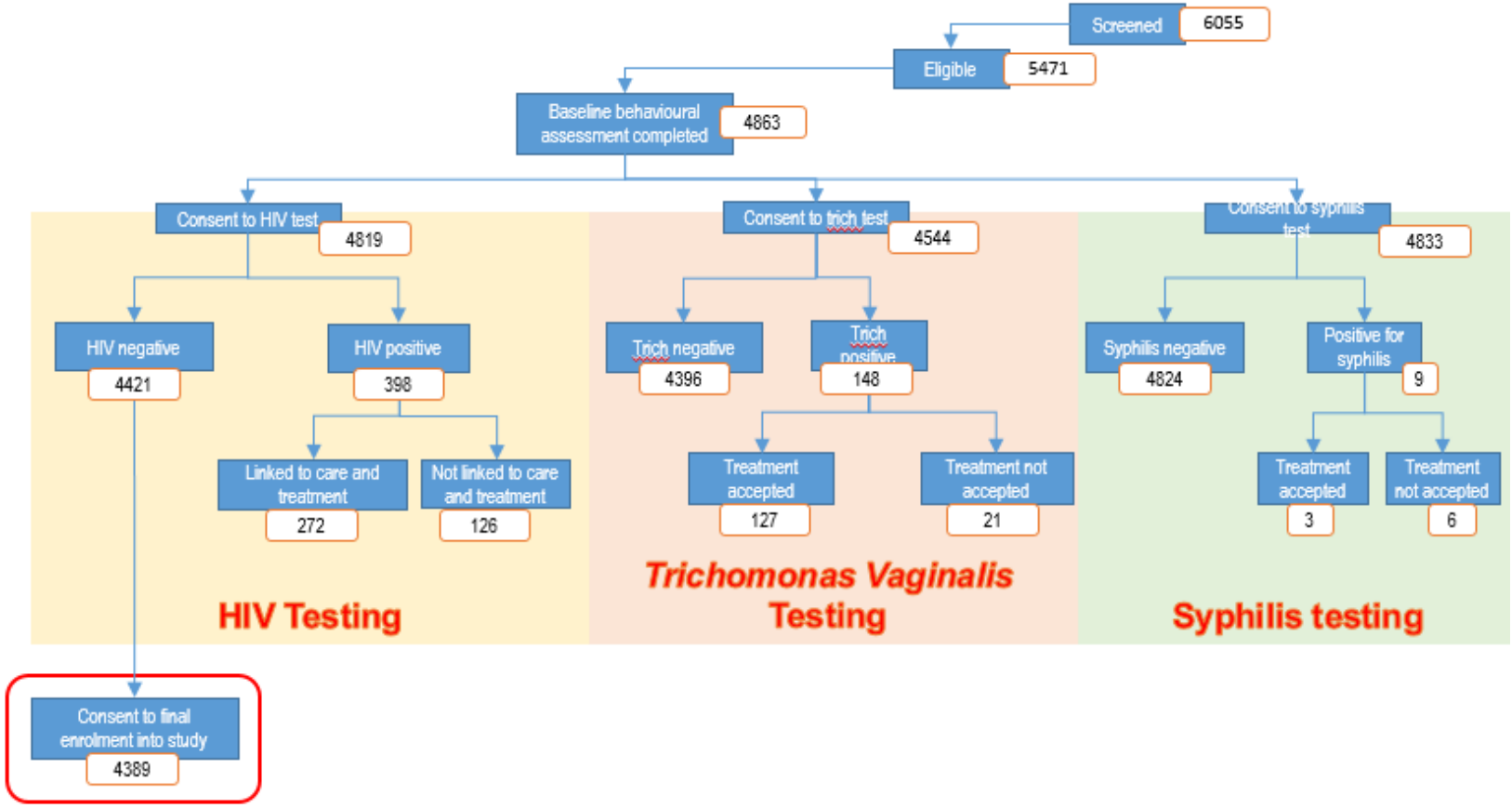


Figure 6a. Baseline enrollment cascade

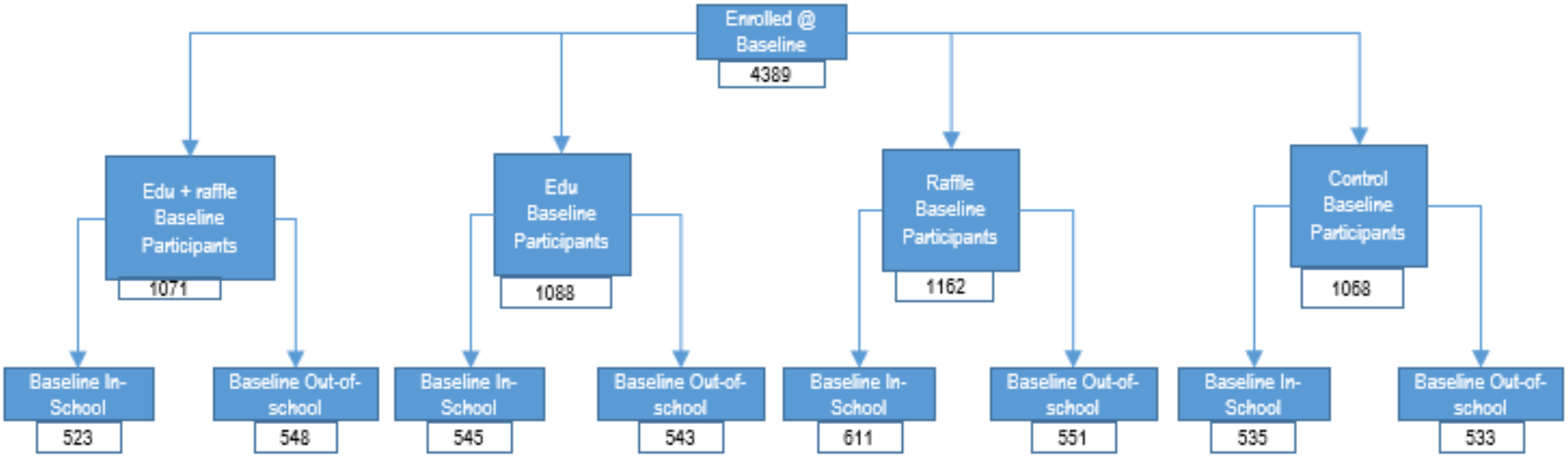


Table 10. Balance between study arms

Items	Total		Control		Incentive Only		Raffle and Incentive		Raffle Only	
	Number	%	Number	%	Number	%	Number	%	Number	%
EAs										
Rural EAs	239	81.6%	116	80.0%	120	83.9%	121	82.9%	114	80.9%
Urban EAs	54	18.4%	29	20.0%	23	16.1%	25	17.1%	27	19.2%
AGYW enrolled										
AGYW from rural EAs	3,590	82.0%	861	80.6%	896	82.4%	875	81.7%	958	82.4%
AGYW from urban EAs	799	18.0%	207	19.4%	192	17.6%	196	18.3%	204	17.6%
AGYW in school										
AGYW from rural EAs in school	1,731	78.2%	410	76.6%	428	78.5%	413	79.0%	480	78.6%
AGYW from urban EAs in school	483	21.8%	125	23.4%	117	21.5%	110	21.0%	131	21.4%
AGYW not in school										
AGYW from rural EAs not in school	1,859	85.5%	451	84.6%	468	86.2%	462	84.3%	478	86.8%
AGYW from urban EA not in school	316	14.5%	82	15.4%	75	13.8%	86	15.7%	73	13.2%

6 Strengths and limitations of baseline data collection

6.1 Composition of data collection teams

22 research teams were composed to carry out the baseline survey. A team included a nurse (team leader), 2 HIV Testing and Counseling (HTC) Counsellors, and 2 research assistants. The team composition included consideration for the roles and responsibilities of the team members and gender. In a team, there was no more than 2 males. There were 4 supervisors, 2 supervisors were assigned to 5 teams each while the other two supervisors were assigned 6 teams each.

6.2 Baseline data collection strengths

Participants from 293 EAs were surveyed during baseline data collection. The study protocol called for 4,400 AGYW to be enrolled into the impact evaluation. A total of 4863 AGYW were surveyed and 4,389 were enrolled into the study at baseline. Weekly feedback meetings were held and all identified issues regarding field work operations were resolved during these meetings. All supplies and equipment were always available for the data collection teams. Community leaders and local authorities gave full support in the implementation of the study in their communities. All HIV positive participants were referred to health facilities for linkage to care. All STI positive participants were treated on-site and were followed-up to re-test them for trichomonas vaginalis and syphilis. Only participants negative for these 2 STIs could be enrolled in future raffle rounds. All participants gave informed consent, assent or received parental consent before the start of the survey, and clinical testing.

6.3 Baseline data collection challenges

Data collection was based on the 2007 Census with the assumption that the study would be able to enroll and achieve the target within the 166 selected EAs. However, due to the high mobility of the target population, this was not achieved. More prominently, the out-of-school population were difficult to find and enroll. This led to the selection of an additional 127 EAs needed to complete study enrollment.
Data collection was done using SurveyToGo. At the inception of baseline data collection, data collection teams faced challenges using the tablets. One significant issue occurring at baseline was errors in skip patterns. Skip patterns were turned off during the survey and were accounted for during the baseline data analysis. Additionally, internet connection posed a challenge in some areas of the country because survey forms could not be uploaded in real time. These records were eventually sent once a more reliable internet connection was established.

7 Discussion and Conclusions

Good internal validity: The Sitakhela Likusasa Impact Evaluation successfully enrolled the required number of participants into the study. There is balance between the study arms and sub-arms, which is important for internal validity of study results. When comparing the Sitakhela Likusasa Impact Evaluation to other recent cash incentive studies on HIV prevention, the Sitakhela Likusasa Impact Evaluation maintained similar qualities in terms of balance between study arms. Only one category had more than 5% difference between study arms.

Good external validity: At baseline, the Sitakhela Likusasa Impact Evaluation analysis provides an in-depth view of the demographics, AGYW HIV and other STI prevalence, factors associated with HIV and other STI infections, characteristics of AGYW going to school, factors demographic and sexual

characteristics associated with school enrollment, and an understanding of risk-taking behaviour of the study population at baseline. These results compare well with other similar surveys done over comparable time periods and for similar populations in Swaziland, suggesting that the study will have good external validity, as illustrated by these points:

- The Swaziland HIV Estimates and Projections Report of 2015 estimated HIV prevalence to be 6% and 8% among females aged 15-19 and 20-24 years respectively (2) The baseline survey found that 8.2% of 15-22 year old females surveyed tested positive for HIV, which is in line with these data.

- In the MICS 2014, it was estimated that age mixing occurred in 15% of sexually active young adults aged 15-24 years. In the Sitakhela Likusasa baseline survey, a similar level of 15.9% of sexually active AGYW aged 15-22 reported that they engaged in age-disparate sex.

- The median age of sexual debut in Swaziland in the MICS 2010 was 17 years and the median age of sexual debut in this survey was also 17 years.

- Also, contributing to a HIV prevalence of over 8% is the low use of condoms among AGYW who had more than one sexual partner in the last 12 months. Only 62.2% reported use in the baseline study which was like the MICS 2010 survey where 66% of women aged 15-49 years used condoms when having more than one sexual partner in the last 12 months.

<u>Contribute to global knowledge on HIV and cash transfers:</u> Because of these significant differences between the Sitakhela Likusasa Impact Evaluation and these other two studies, it can be concluded that this study will contribute new global knowledge.

- At baseline **RESPECT** enrolled 2,399 individuals where 50.2% were females and the mean age was ~27.5 years. 10.4% of those enrolled achieved an education level above primary school. Most of the individuals enrolled were married (74.7%). 12.4% of individuals at baseline tested positive for trichomonas, 1.7% tested positive for syphilis and 3.5% tested positive for HIV. Compared to the Sitakhela Likusasa Impact Evaluation more individuals were enrolled, all are females, the mean age was 18.2 years, more (~76%) had education levels above primary school but only 4.6% were married or in a union because the surveyed population was on average ~10 years younger.

- **SIHR** (Schooling, Income and Health Risk) Study (Malawi) enrolled 1,328 individuals where all participants were females, mean age was 15.2 years, 23.5% ever had sexual intercourse, 2.8% were ever pregnant, the median age of sexual debut was 15.8 years, 85% had a mother alive, 72.9% had a father alive, 31.3% lived in a female-headed household, 59.3% had a radio, 18.1% had a television, 57.8% had access to a mobile phone, 12.5% had electricity and 34.6% had piped water where they lived. The Sitakhela Likusasa Impact Evaluation has more individual enrolled, an older population, had fewer participants with mother's alive, fewer participants with father's alive, more lived in female headed households, more had radios, more had televisions, more had access to mobile phones, more had electricity, and fewer had piped water.

- The **Lesotho Study** to reduce STI and HIV incidence enrolled 3,039 individuals where 68.6% were females, mean age was 23.5 years, 49.1% were not married or in a union, 40.0% had some secondary education and 38.0% were risk loving. The Sitakhela Likusasa Impact Evaluation has more individuals enrolled, more females, a younger population, fewer individuals married or in a union, more individuals with some secondary education and less were risk loving.

- **CAPRISA 007** enrolled 2,949 individuals, 52.8% were females, mean age was 16.8 years, mean age at sexual debut was ~15 years, 31.1% were sexually active and HIV prevalence was 4.2%. The Sitakhela Likusasa Impact Evaluation has more individuals enrolled, a slightly older study population, were older at first sexual debut, has more are sexually active participants and a higher HIV prevalence at baseline.

- **HPTN 068** enrolled a total of 2,533 participants with the median age of 15 years, 3.2% tested HIV positive, 8.9% were ever pregnant, 26.6% ever had sexual intercourse, 6.6% had sexual intercourse before the age of 15 years, 19.7% had a sexual partner over 5 years older, 14.2% engaged in transactional sexual intercourse, 19.2% had concurrent sexual relationships, 9.8% reported sexual abuse, and 6.6% of those enrolled in school missed more than 5 days of school. At baseline, ever being pregnant, ever having sexual intercourse, early age debut, sexual intercourse with a sexual partner over 5 years older and engaging in transaction sexual intercourse were all significantly (p-value <0.05) associated with HIV infection when holding all other factors constant. Sitakhela Likusasa Impact Evaluation has an older participant population, more AGYW testing positive for HIV, a similar number were ever pregnant, fewer individuals had sexual intercourse with older partners, fewer individuals had concurrent sexual partnerships, more reported sexual abuse, and more individuals missed more days of school. Similar factors were significantly associated (p-value <0.05) with HIV infection including ever having sexual intercourse and sexual intercourse with an older sexual partner.

This gives confidence in the sample and allows for the potential impact to be compared against other programs.

Relevance of the Sitakhela Likusasa intervention: Many of the study participants achieved Forms 1-6 (73.6%), but only 2.6% attained education above Form 5 or 6. Higher education attainment was associated with a 74% reduced risk of HIV infection and a 75% reduction of risk of *Trichomonas vaginalis* infection. Once AGYW are enrolled in school there is a personal importance of going to school as 99.6% of enrolled AGYW viewed going to school as important and 99.5% of AGYW enrolled in school also thought it was important to achieve good marks. Potential barriers which may affect students staying in school are some of the sexual behaviour of the population which include age mixing, sexual intercourse with more than 1 partner in the last 12 months, and having sexual intercourse with non-regular partners. Additionally, risk taking behavior may play a role in HIV and STI infection. The incremental benefit of each additional E5 or E50 resulted in 274 and 292 individuals changing their behavior respectively. Therefore, the incentives paid for school attendance and remaining STI free can have an impact in behaviour.

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Appendix A: Field Staff for Sitakhela Likusasa

NURSES AND HTC COUNCELLORS

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Bhekiwe Simelane
Bongani Simelane
Bongekile Khumalo
Bongekile Nsoko
Bongiwe Dlamini
Bongiwe Mhlanga
Bongiwe Simelane
Bongumenzi Hlophe
Bongumenzi Mdluli
Bonsile Simelane
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Cavan Sibanda
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Dumsile Thwala
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Mantombi Mdluli
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Mbali Shungube
Mbali Sifundza
Mbuso Sithole
Mcebo Gadlela
Menzi Ndzimndze
Mfundo Zondo
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Mlungisi Gumede
Mphile Msimango
Mpumelelo Mamba
Nana Nsingo
Ncamsile Shongwe
Ncedile Dlamini
Ncobile Motsa
Njabuliso Malindzisa
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Nkosinathi Dlamini
Nokwanda Lokotfwako
Nolwazi Fakudze
Phetsile Zwane
Philile Dlamini
Philile Mnisi
Nomcebo Masimula
Nomkhosi Magagula
Nomphumelelo Shabalala
Nomvula Ndzabandzaba
Nonhlanhla Cele
Nonhlanhla Dlamini
Nonophile Dlamini
Nothando Hlophe
Nothando Malaza
Ntokozo Ndlovu
Ntombikayise Vilakati
Phetsile Motsa
Eugene Mabuza
Fakazile Shabalala
Fisiwe Sukati
Fortunate Ndwandwe
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Selby Mkhwanazi
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Sihle Dlamini
Silindile Mkhwamubi
Simanga Magagula
Sindi Mlambo
Sindi Shongwe
Siphelele Mavuso
Siphenduliwe Lukhele
Sithembiso Dlamini
Zamokwakhe Shongwe
Zanele Magagula
Ayanda Ntjingila
Bagezile Vilakati
Bongiwe Makhubu
Brian Mabuza
Cebile Sibisi
Celenhle Masina
Feziwe Makhubu
Gugu Mavuso
Hlengiwe Dlamini
Hloniphile Mpanza
Jabulile Dlamini
Jabulile Lukhele
Lavumisa Mnisi
Lindelwa Manana
Lindelwa Zulu
Lindokuhle Matsebula
Lomalungelo Dlamini
Lungelo Dlamini
Mantombi Zikalala
Marcus Hlophe
Philile Simelane
Phumlile Desouza
Phumzile Msibi
Pinky Dlamini
Sabelo Dlamini
Sakhile Nkambule
Sakhile Phiri
Thandekile Shongwe
Themba Shabangu
Thembi Simelane
Thembinkosi Mabuza
Thobile Ngwenya
Tholakele Dlamini
Thulile Makhubu
Vuyani Mdluli
Vuyisile Sibandze
Xolile Dlamini
Xoliswa Simelane
Yenziwe Themba
Nomathemba Gama
Nomathemba Mamba
Nombuso Mamba
Nomfundo T Dlamini
Nomfundo T Gamedze
Nomphumelelo Matsebula
Nompumelelo Matsebula
Nomshado Dlamini
Nomvula Mdluli
Nondumiso Msibi
Nontobeko Fakudze
Nosimilo Nkabinde
Nosipho Thwala
Nosisa Mlambo
Noxolo Dludlu
Nozipho Vilane
Nqobile Mashinini
Nqobile Sikhondze
Ntsetselelo Tsabedze
Phetsile Kunene
Sithokoziso Nkumane
Skhanyiso Masuku
Smanga Magagula
Sphenduliwe Lukhele
Sphesihle Zwane
Sphiwe Dlamini
S'thembile Ngwenya
Tenele Dlamini
Tenele Seyama
Tengetile Magagula
Tengetile Shongwe
Ruth Gamanya
Zinhle Siyaya
Zinhle Zwane
Zodwa Mavuso
Emanuel Simelane
Nokuthula Matimakhulu
Confidence Mthembu
Zamokuhle Jele
Temahlubi Dlamini
Temalangeni Dlamini
Tenele Nxumalo
Tengetile Mkhonta
Thandeka Dlamini
Thandeka Lukhele
Thandeka Nhlengetfwa
Themba Mbuli
Thembela Nkambule
Vumile Baraca
Wandile Dlamini
Xolile Sibisi
Yoliswa Bhembe
Zandile Langwenya
Zethu Dlamini
Zinhle Dlamini
Zwelakhe Nsibande
Siboniso Matsenjwa
Siboniso Mkhatshwa
Sicelo Dlamini

DRIVERS

Banele Dlamini
Bhekinkosi Shololo
Celimphilo Ngwenya
Dumisa Mabilisa
Dumisani Mndzebele
Goowill Maseko
Mabandla Mziyako
Malungisa Dlamini
Mbongeni Dube
Mcebo Dlamini
Melusi Khanyile
Mlungisi Dube
Mthobisi Ncongwane
Musa Lukhele
Nhlanhla Dlamini
Nhlanhla Mnkomo
Nkosinathi Dlamini
Nkosiphile Dlamini
Nkululeko Dlamini
Nkululeko Mamba
Nkumbulo Shabangu
Phila Matsebula
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Sabelo Simelane
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Sandile Dlamini
Sanele Malinga
Sanele Shabangu
Sibonelo Tsela
Sicelo Nhleko
Sifiso Mngometulu
Sifiso Simelane
Sikhumbuzo Mhlanga
Thabiso Dlamini
Themba Simelane
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Thokozani Zulu
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Thulani Ndaba
Vusi Mbuyisa
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Appendix B: DREAMS Program Variables in Baseline Survey

Table A1. USAID added variables

Baseline Survey Questions	All Baseline Participants (n (%))
Heard of savings groups in community	
Never heard	2744 (94.7%)
Worth	71 (2.5%)
Dreams savings group 1	19 (0.7%)
Dreams savings group 2	5 (0.2%)
Dreams savings group 3	4 (0.1%)
Other savings group	54 (1.9%)
Participated in any saving groups	
Never participated	2744 (97.8%)
Worth	46 (1.6%)
Dreams savings group 1	9 (0.3%)
Dreams savings group 2	2 (0.1%)
Dreams savings group 3	5 (0.2%)
Other savings group	0 (0.0%)
Heard about Ematje Ekwewela (Stepping Stones) program	105 (2.2%)
Ever participated in Ematje Ekwewela (Stepping Stones) program	11 (10.5%)
Ever used mobile sexual health and reproductive HIV services	
Never used	3950 (81.5%)
HIV testing and counselling	547 (11.3%)
Point of care	11 (0.2%)
TB screening	4 (0.1%)
Sexual transmitted infection screening	62 (1.3%)
Condom provision	272 (5.6%)

Appendix C: Behavioural economics preferences – description of games

Table C1. Behavioral economics game 1 details

	Option A: Receive in 1 week	**Option B: Receive in 4 weeks**
Scenario 1	*50 Emalangeni*	*50 Emalangeni*
Scenario 2	*50 Emalangeni*	*55 Emalangeni*
Scenario 3	*50 Emalangeni*	*60 Emalangeni*
Scenario 4	*50 Emalangeni*	*65 Emalangeni*
Scenario 5	*50 Emalangeni*	*70 Emalangeni*
Scenario 6	*50 Emalangeni*	*75 Emalangeni*
Scenario 7	*50 Emalangeni*	*80 Emalangeni*
Scenario 8	*50 Emalangeni*	*85 Emalangeni*
Scenario 9	*50 Emalangeni*	*90 Emalangeni*
Scenario 10	*50 Emalangeni*	*95 Emalangeni*
Scenario 11	*50 Emalangeni*	*100 Emalangeni*
Scenario 12	*50 Emalangeni*	*105 Emalangeni*

Table C2. Behavioral economics game 2 details

	Option A: Receive in 1 month	**Option B: Receive in 2 months**
Scenario 1	*500 Emalangeni*	*500 Emalangeni*
Scenario 2	*500 Emalangeni*	*550 Emalangeni*
Scenario 3	*500 Emalangeni*	*600 Emalangeni*
Scenario 4	*500 Emalangeni*	*650 Emalangeni*
Scenario 5	*500 Emalangeni*	*700 Emalangeni*
Scenario 6	*500 Emalangeni*	*750 Emalangeni*
Scenario 7	*500 Emalangeni*	*800 Emalangeni*
Scenario 8	*500 Emalangeni*	*850 Emalangeni*
Scenario 9	*500 Emalangeni*	*900 Emalangeni*
Scenario 10	*500 Emalangeni*	*950 Emalangeni*
Scenario 11	*500 Emalangeni*	*1000 Emalangeni*
Scenario 12	*500 Emalangeni*	*1050 Emalangeni*

Table C3. Behavioral economics game 3 details

	Option A (Fixed Amount)	Option B (Lottery)
Scenario 1	Emalangeni 0	Emalangeni 0 with 50% probability Emalangeni 500 with 50% probability
Scenario 2	Emalangeni 25	Emalangeni 0 with 50% probability Emalangeni 500 with 50% probability
Scenario 3	Emalangeni 50	Emalangeni 0 with 50% probability Emalangeni 500 with 50% probability
Scenario 4	Emalangeni 75	Emalangeni 0 with 50% probability Emalangeni 500 with 50% probability
Scenario 5	Emalangeni 100	Emalangeni 0 with 50% probability Emalangeni 500 with 50% probability
Scenario 6	Emalangeni 125	Emalangeni 0 with 50% probability Emalangeni 500 with 50% probability
Scenario 7	Emalangeni 150	Emalangeni 0 with 50% probability Emalangeni 500 with 50% probability
Scenario 8	Emalangeni 175	Emalangeni 0 with 50% probability Emalangeni 500 with 50% probability
Scenario 9	Emalangeni 200	Emalangeni 0 with 50% probability Emalangeni 500 with 50% probability
Scenario 10	Emalangeni 225	Emalangeni 0 with 50% probability Emalangeni 500 with 50% probability
Scenario 11	Emalangeni 250	Emalangeni 0 with 50% probability Emalangeni 500 with 50% probability
Scenario 12	Emalangeni 275	Emalangeni 0 with 50% probability Emalangeni 500 with 50% probability
Scenario 13	Emalangeni 300	Emalangeni 0 with 50% probability Emalangeni 500 with 50% probability
Scenario 14	Emalangeni 325	Emalangeni 0 with 50% probability Emalangeni 500 with 50% probability
Scenario 15	Emalangeni 350	Emalangeni 0 with 50% probability Emalangeni 500 with 50% probability