NOVA SCHOOL OF
BUSINESS & ECONOMICS

MSc Economics – Fall Semester

Gender Inequality and Information Gap on HIV Prevention: Evidence from a Randomized Field Experiment in Mozambique

Development Economics – Professor Pedro Vicente

Research Design

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December 2018

1. Introduction

1.1 Motivation

Mozambique is still today one of the poorest and least developed countries in the world, ranked 180th out of 189 countries in respect to the Human Development Index (HDI)[1]. Although the number of new HIV infections is declining, East and Southern Africa is the most affected region in the world. Within this region, Mozambique is the second country that most contributes to new HIV infections, right after South Africa *(see Graph 1).* Mozambique alone had about 130.000 new HIV infections in 2017 (63.000 of these were women and 18.000 were people with less than 14 years old)[2]. Young women represent one of the most vulnerable groups.

Gender inequality is deeply rooted in multiple spheres of the country, being HIV prevalence one of them. This indicator is much higher amongst young women than amid young men *(see Graph 2).* According to the World Bank, in Sub-Saharan Africa, young women are twice as likely to be infected with HIV when compared with young men. Recent data for Mozambique shows that in 2017, 5.2% of young women (aged between 15 and 24) were infected with HIV, compared with only 2.8% of young men[3].

Although in general comprehensive knowledge about HIV prevention is improving in Eastern and Southern Africa, one can see a very significant difference between young men and women in Mozambique: when comparing the periods between 2000-2008 and 2009-2015 it's observable that a larger percentage of both young men and women have comprehensive knowledge about HIV prevention in the most recent period. However, it is also evident that the gap between young men and women has increased *(see Graph 3).* Risky sexual behaviours are one of the roots of the HIV problem in Mozambique. When compared with other African countries, Mozambique has very low rates of condom use, for example. When comparing men and women within Mozambique, we see that the percentage of women that used a condom in the last sexual intercourse among people with multiple partners is about 2%, compared with about 30% of men *(see Graph 4).* Even when observing reported condom use in the last high-risk sexual intercourse, only around 34% of women reported using a condom (compared with 41% of men)[4]. Just by taking a quick look at the data we can perceive the extent to which HIV is an issue in Sub-Saharan Africa, and more specifically in Mozambique. The data also suggests

[1] United Nations Development Programme, Human Development Reports: Human Development Index and its components
[2] UNAIDS Data 2018
[3] The World Bank: World Development Indicators
[4] UNAIDS

that there's room for improving access to information, as well as reducing the enormous gender gap observed in what concerns HIV prevalence, by increasing access to information and mitigating risky sexual behaviours.

1.2 Literature Review

There's vast literature referring to the relevance of information in improving health behaviours. Dupas (2011) analyses multiple studies that support the belief that households are highly responsive to information on health risks, as well as to information on specific prevention techniques. There are also studies which suggest that households in developing countries often lack information on the returns of preventative behaviours (Dupas, 2011). The source and type of information might also be relevant. Another study by Pascaline Dupas looks at teenagers' responsiveness to HIV information in Kenya. She analyses the impact of two types of information: risk avoidance information (such as telling teenagers that they should not have sexual relationships in order not be infected with HIV) or risk mitigation (information on how teenagers can reduce the risk of infection, by for example using condoms and substituting away from older partners towards younger partners). The study concludes that sexual behaviour of teenagers is more responsive to information on risk reduction rather than on risk elimination. (Dupas, 2011). This study has important policy implications in what concerns the type of information that campaigns should focus on. When looking at the effectiveness of HIV information campaigns in rural Uganda, Damien de Walque (2004) concludes that there is a positive relationship with education, that is, more educated individuals are more responsive to HIV information campaigns, which is coincident with the existing behavioural analysis that shows that condom use and schooling levels are positively related.

Besides focussing on information, it might also be relevant to look at different types of incentives to the adoption of less risky sexual behaviours in order to reduce HIV and other sexually transmitted diseases prevalence. Conditional Cash Transfers (CCT) might be an option. There's a wide range of literature studying the effects of CCTs on multiple outcomes in developing countries, such as school attendance. Many programmes have been created that incentivize children's school attendance by conditionally transferring cash to the parents. Other studies have shown that CCTs related with school attendance have positive impacts in reducing sexual activity as well as teen pregnancy and early marriage (Baird *et al*, 2010). This suggests that interventions that do not target directly sexual behaviour changes can also be effective in generating them. Baird *et al* (2012) analysed the impact of CCTs for schooling on HIV and

other sexually transmitted diseases' rates in Malawi, finding that such programmes do reduce HIV prevalence on adolescent girls. The results of CCT programmes on sexual behaviours are not limited to specific countries in Sub-Saharan Africa. Studies that examine CCTs in other regions of the world also show positive results. One study, by Ranganathan and Lagarde (2012), looks at thirteen different CCT programmes in Latin-American countries and concludes that the programmes are indeed effective in modifying risky sexual behaviours and improving certain health outcomes.

Interventions that target teenage girls are seen as having a key role in fighting poverty in developing countries. Policies that target girls might have positive results influencing many outcomes, such as increasing wellbeing of not only the girls, but also the future generations (Baird *et al*, 2013). Some CCT programmes have been implemented targeting gender disparities, as is the case of a program in Punjab, Pakistan (Chaudhury and Parajuli, 2010). The results of these studies point to the potential of cash transfer programmes in improving teenage girls' lives, specifically in what concerns health, in developing countries.

Damien de Walque *et al* (2012) have associated conditional cash transfers with results on sexually transmitted diseases tests, in order to assess if cash transfer programmes might work as a prevention strategy to incentivize safe sex in Tanzania. The authors found that people do respond to this type of incentives and that high-value conditional cash transfers are more effective than low-value ones. As an aside, it is relevant to say that the decision to implement conditional or unconditional cash transfers is a relevant one: Baird, Mcintosh and Özler (2011) conducted an important randomized cash transfer experiment related to schooling in Malawi, which finds evidence suggesting that unconditional cash transfers are as effective as conditional ones, meaning that unconditional programmes might be cost-effective in improving school enrolment among young girls in similar contexts.

In a very recent piece of study, Damien de Walque and Christine Valente (2018) show experimental evidence that suggests that CCTs directly to children are nearly twice as effective as an "information only" treatment, as providing information to parents about their children's attendance. The study also finds that the combination between the information and cash transfer incentive improve significantly school performance (in this specific case, math test scores).

Although the studies presented here point to the effectiveness of both information and CCT programmes in improving various outcomes related to health behaviours, none of them compares the outcomes of those interventions on young girls. Therefore, the experiment we

propose tries to go a little bit further in analysing the outcomes of different policies, directed specifically at young girls, intended to reduce HIV incidence.

1.3 Research Questions

The research questions for this experiment are as it follows:

1. Can interventions aimed at reducing risky sexual behaviours of teenage girls be effective?
2. Do teenage girls respond to information on reducing risky sexual behaviours?
3. Do teenage girls respond to "conditional cash transfers" aimed at reducing risky sexual behaviours?

2. Methodology

2.1 Survey and Sampling Framework

The population this study aims to target is teenage girls in secondary schools in Mozambique. There are 154 districts in Mozambique, divided into 11 provinces *(see Figure 1)*. Considering this, and without being able to determine the exact number of secondary schools in each district by the time this research proposal was written, we would select one school from each district, plus two other schools from any large district (in order to have the same number of schools in each group), which would allow us to get a sample of 156 schools. From this secondary education schools any girl teenage girl (aged between 12 and 15 years old, which are the expected ages of teenage girls in secondary school) would be eligible. Not having access to the number of girls in each school or the number of schools we can't determine for sure how many teenage girls would be involved in this study.

To properly answer the research questions, we will conduct a Randomized Field Experiment. The treatment will be done at the school level. The school setting is convenient for this type of study since it is our belief that young girls wouldn't be able or available to attend sessions about sexual education, nor do the blood tests, if these did not take place in their school. The reason why the treatment will be at the school and not at the individual level is because we intend to avoid contamination between girls that are on the same school (but that then would be allocated to treatment or control groups). This way, within each school, either every teenage girl is being treated or none of them is being treated.

2.2 Experimental Design

Data shows us that there's a huge gap of information between young boys and girls in what concerns the risks of certain sexual behaviours and the possible ways to mitigate these risks. Considering this, we propose an experimental design that allows for the evaluation of the outcomes of two different policies that intend to reduce risky sexual behaviours of teenage girls in Mozambique. Information will be collected using two different approaches:

1. Teenage girls will answer an anonymous survey both at the beginning and at the end of the study. This survey will include multiple questions on sexual activity and behaviours, as well as on their beliefs about sexually transmitted diseases. The main goal here is to access the knowledge teenage girls have about HIV and risk behaviours. The reason why the survey is anonymous is not to inhibit girls from answering truthfully.
2. The girls will also perform an HIV test (blood test) both at the beginning and at the end of the experiment. Although what we mainly want to assess is the teenage girls' behaviour, it is important to recognize the limitations of self-reported data. Self-reported data might obviously suffer from reporting biases, even though in this experiment we try to mitigate these problems by conducting an anonymous survey. Besides that, some authors, such as Pascaline Dupas (2011), have found similar results between biological data and self-reported data.

The experimental design will consist in randomly allocating schools to either control or treatment groups as it follows:

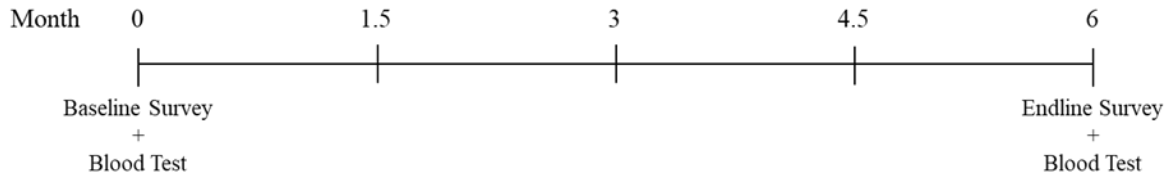
1. Control group will have 52 schools;
2. The first treatment group will also have 52 schools. In this group, girls will be subject to three separated sexual education classes, one every month and a half, as can be seen in the timeline below. These sexual education classes will consist on providing the girls with statistical information about the incidence of HIV in Mozambique, information about the risk behaviours and ways to reduce this risk (as substituting older partners for teenage boys) as well as information on prevention (condom use) and the importance of HIV testing.
3. The second treatment group will also have 52 schools. In this group the girls will not be subject to any kind of classes, they will instead be informed in the beginning of the experiment that they will receive a "gift" if their test results at the end of the

experiment show negative results for HIV. The fact that this kind of Conditional Cash Transfer is not exactly a cash transfer is because this way we can guarantee that the girls are the ones benefiting from what they earned. If we simply gave them money, most likely that money would be transferred to the family and they wouldn't see it as a reward on their behaviour. Instead, the "gift" will be a good that teenage girls naturally value, and that is not part of their typically owned goods. The goal here is that they receive a "luxury" good that they usually can't afford. In order to assess exactly which good the "gift" will be, we will conduct a pilot experiment with some girls, where they will be directly asked about which kind of gift they would most enjoy receiving.

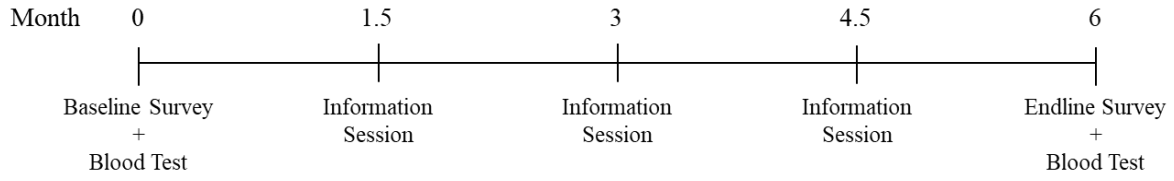
Each of the three groups will be subject to the anonymous survey as well as the blood test, both at the beginning (month 0) and at the end of the experiment (month 6). The timeline of the experiment is as it follows:

Figure 2 – Experiment Timeline

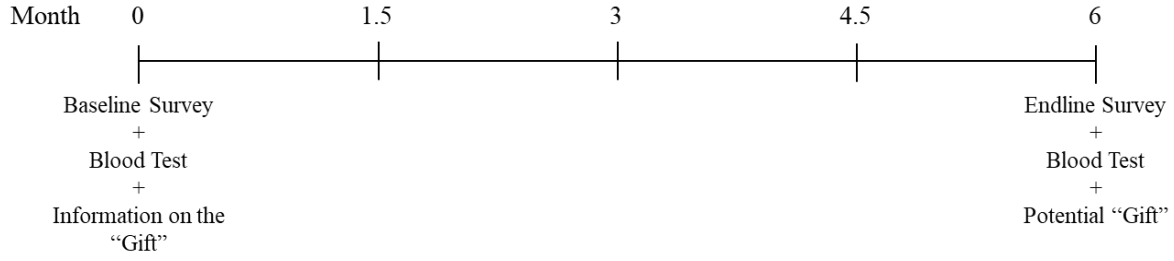
Control Group



Treatment Group 1 – Information



Treatment Group 2 – "Gift"



2.3 Estimation Strategy

Using the data from the experimental design, and considering that we have a randomized treatment, we could easily translate this into a simple Ordinary Least Squares (OLS) regression, using a difference in difference estimation. The causal effect can be obtained directly. The equation would be as it follows:

$$Y_i = \alpha + \beta_1 T_{\text{info}} + \beta_2 T_{\text{gift}} + \gamma \boldsymbol{X}_i + \varepsilon_i \quad (1)$$

The outcome of interest, Y_i, will be a "risk behaviour index" that will be used as a proxy for measuring HIV exposure. The index will be calculated based on the survey and will comprise measures like condom use, incidence of sexual relationships with risky partners, and other risk behaviours. There will be one "risk behaviour index" computation for each school in the experiment, that will be based in every individual survey, presenting therefore the average measure of each girl in that school. T_{info} is a dummy variable that takes the value 1 if the school belongs to the first treatment group (Treatment Information) or 0 otherwise. T_{gift} is a dummy variable that takes the value 1 if the school belongs to the second treatment group (Treatment "Gift") or 0 otherwise. β_1 and β_2 are the coefficients that measure the average effects of Treatment Information and Treatment "Gift" respectively, on the "risk behaviour index". $\boldsymbol{X}_i$ is a vector of control variables. Since it is plausible that secondary schools in different districts have different characteristics, we control for these characteristics, such as prevalence and incidence of HIV, average income of the district, average education level, school attendance rates, etc.

The results of this estimation procedure will then be compared with the results of the blood tests in order to verify any significant differences between self-reported and biological data. Furthermore, we will also analyse the condom use rate separately. Even though condom use is self-reported, we believe the use of contraception to be the most relevant measure of risk behaviour, and therefore, it makes sense to analyse it both in the general "risk behaviour index", as well as a separate indicator. With these three outcomes (the "risk behaviour index"; the blood tests that get us directly the HIV incidence; and the condom use rate) we believe to be in a good position to evaluate behavioural changes.

3. Policy Implications and Concluding Remarks

Some policy implications can be withdrawn from a study of this type. First, depending on the results, it would be possible to infer whether incentives aimed at changing individuals' behaviour are effective in indeed changing those behaviours, as well as decreasing the number of new HIV infections among young girls in Mozambique. Furthermore, under the conditions proposed by this research design it would be possible to understand whether information or CCT-like policies are more effective in reducing risk behaviours of young girls, which might be a relevant result for policy makers.

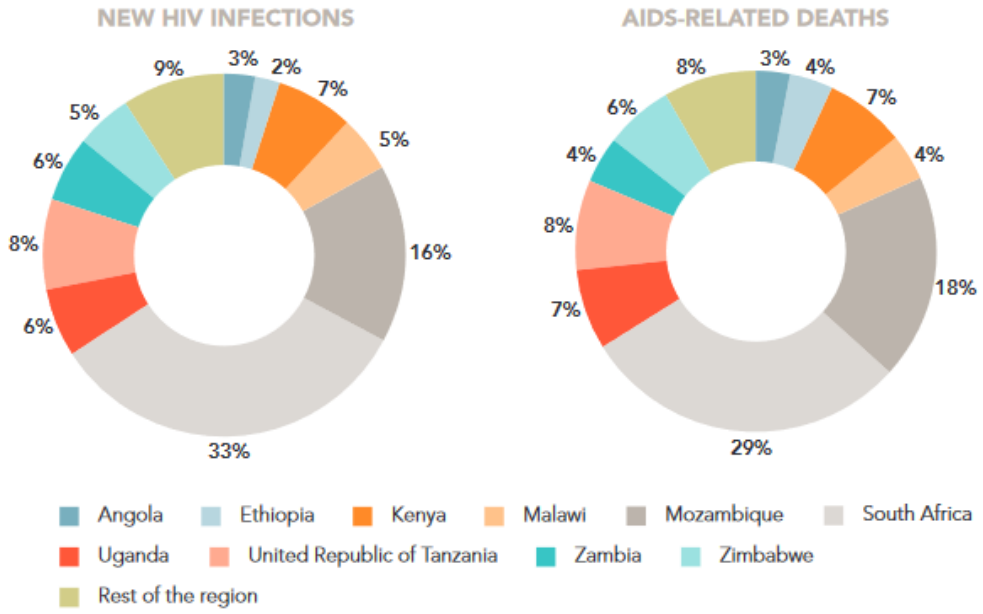
However, when doing policy analysis, it would also be important to study the cost effectiveness of these interventions, something that hasn't been proposed here. The feasibility of this proposal is robust, being the possible large cost of implementation the main drawback. The fact that this study involves the entire Mozambican territory and the realization of blood tests are some of the factors that contribute to increase implementation costs. One possible alternative to reduce the experiment implicit costs would be to restrict the territory under analysis to a smaller area in Mozambique. In order to better assess this possibility, we would need to have access to the distribution of schools across the country.

Moreover, it is pertinent to understand the limitations in terms of conclusions of this kind of study, since the timespan we propose is not long enough to evaluate whether each type of intervention can have better effects in the medium and long-terms. However, the main reason to choose such a short time period is because we believe that for one of the treatment groups (Treatment 2- "Gift"), a longer period wouldn't represent a real incentive for young girls to alter their behaviour, that is, if the promise of receiving something would only materialize many months later, they wouldn't be so incentivized to change their behaviour. Ideally, we would split the period of study into shorter periods and give incentives to teenagers every three or four months (as done by Damien de Walque *et al* (2012)). The problem with this is that it implies much higher costs since it would be necessary to perform blood tests every three or four months, which considerably increases the total cost of the experiment. Having said this, we believe the six-month period to be a good balance, not long enough for young girls not to care about the incentive, and not too short as that would imply performing blood tests more than twice.

Hopefully this study will contribute to the existing literature about gender inequality on HIV prevention, and perhaps provide a glimpse of the most effective policies which could be implemented in the future on similar contexts in developing countries.

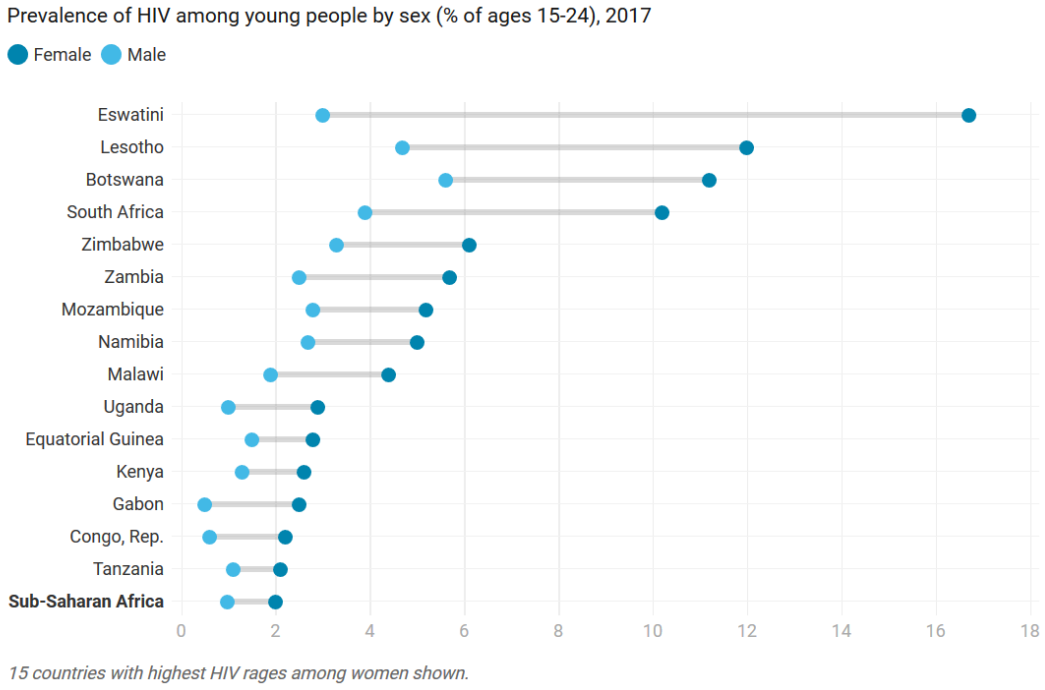
Appendixes

Graph 1 – Distribution of New HIV Infections and AIDS-Related Deaths by Country, Eastern and Southern Africa, 2017



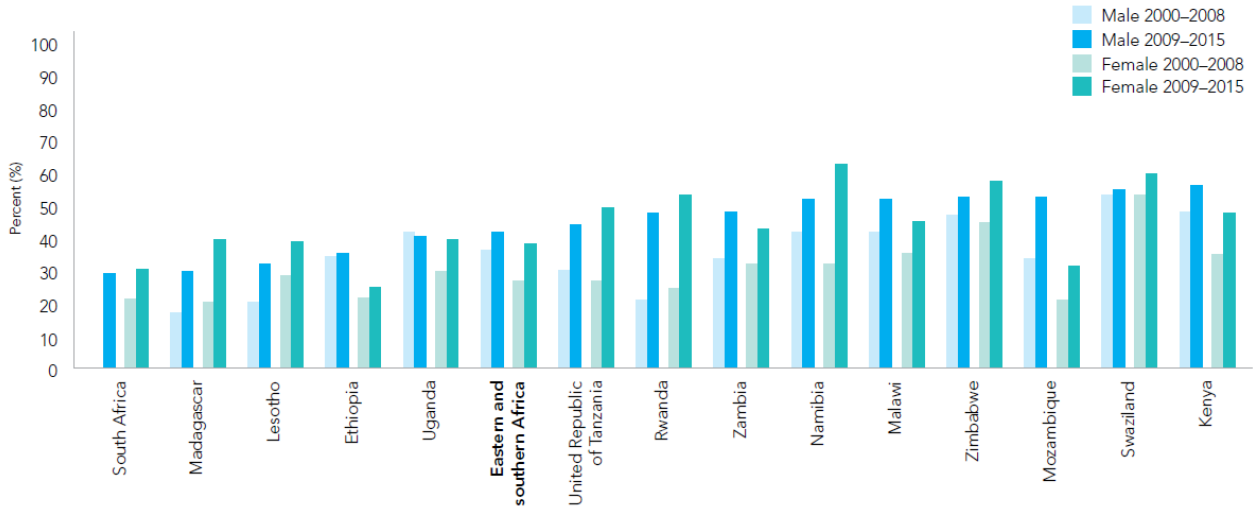
Source: UNAIDS 2018 estimates

Graph 2 – HIV Rates Among Sub-Saharan Africa's Youth



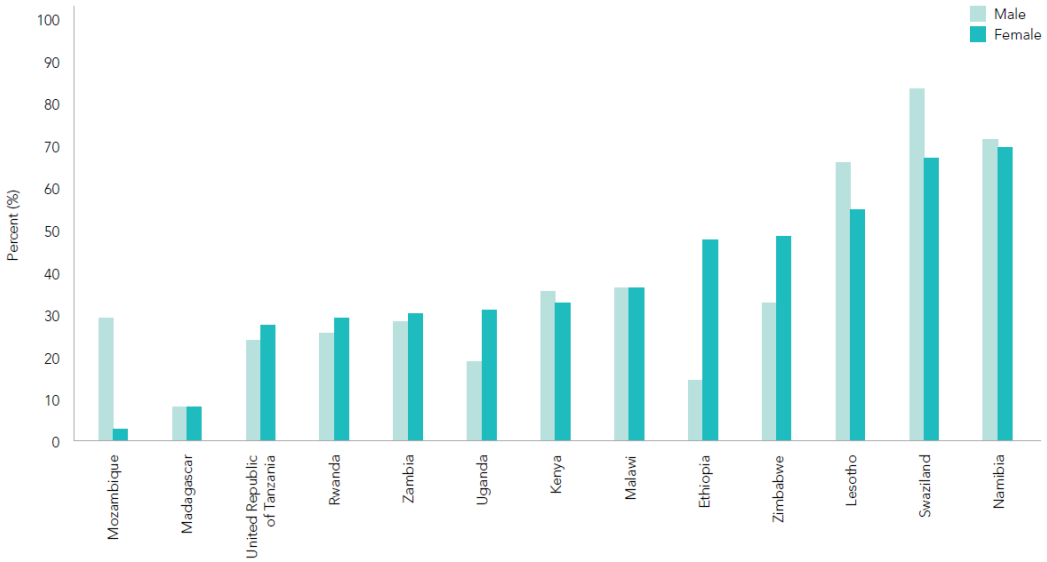
Source: World Development Indicators

Graph 3 – Comprehensive Knowledge of HIV Prevention Among Young People (Aged 15-24 Years), 2000-2015



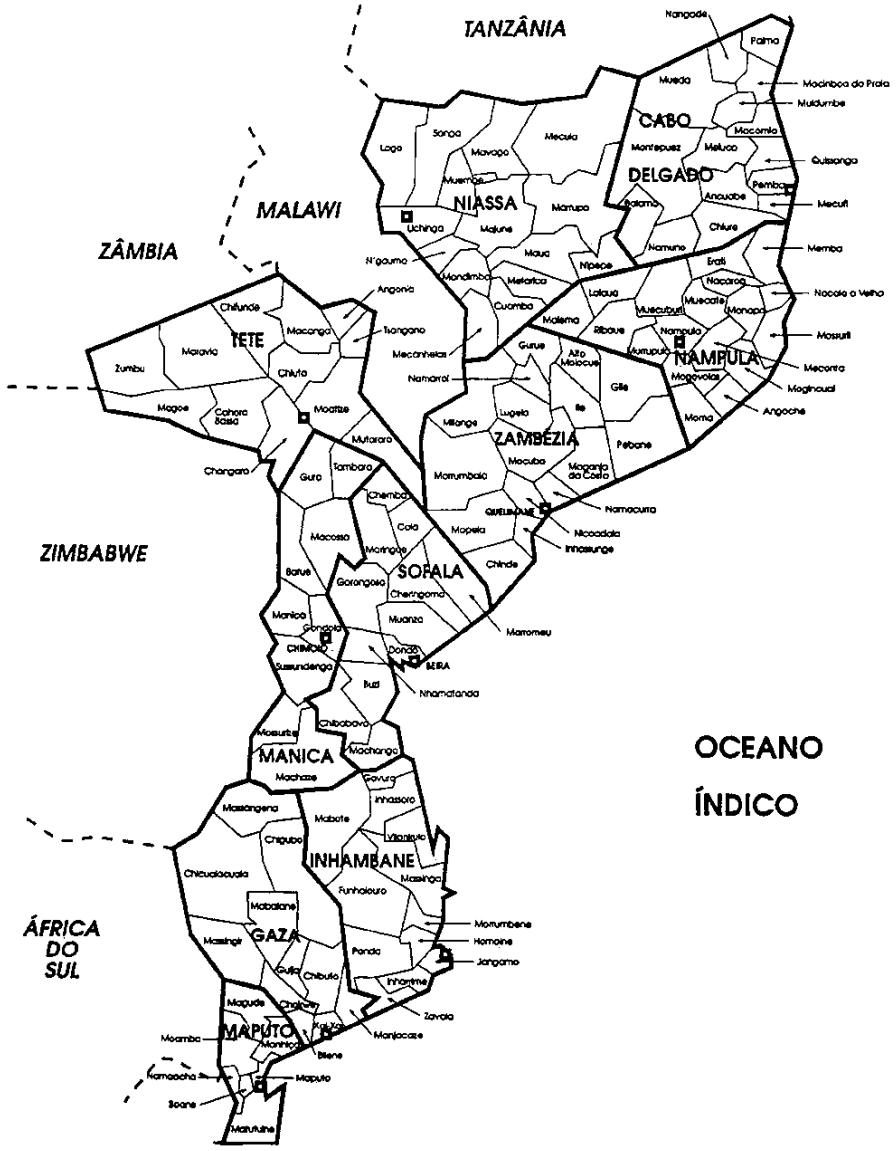
Source: Demographic and Health Surveys, 2000 - 2015

Graph 4 – Condom Use at Last Sexual Intercourse Among People with Multiple Partners, Select Countries in Eastern and Southern Africa, Most Recent Data, 2009 - 2015



Source: Population-Based Surveys 2009-2015

Figure 1 – Mozambican Districts and Provinces



Source: The New Zealand Digital Library

References

Baird, Sarah J., et al. *Girl power: cash transfers and adolescent welfare. Evidence from a cluster-randomized experiment in Malawi.* No. w19479. National Bureau of Economic Research, 2013.

Baird, S., Chirwa, E., McIntosh, C., & Özler, B. (2010). The short-term impacts of a schooling conditional cash transfer program on the sexual behavior of young women. *Health economics*, 19(S1), 55-68.

Baird, S., McIntosh, C., & Özler, B. (2011). Cash or condition? Evidence from a cash transfer experiment. *The Quarterly journal of economics*, 126(4), 1709-1753.

Baird, S. J., Garfein, R. S., McIntosh, C. T., & Özler, B. (2012). Effect of a cash transfer programme for schooling on prevalence of HIV and herpes simplex type 2 in Malawi: a cluster randomised trial. *The Lancet*, 379(9823), 1320-1329.

Chaudhury, N., & Parajuli, D. (2007). *Conditional cash transfers and female schooling: the impact of the female school stipend program on public school enrollments in Punjab, Pakistan.* The World Bank.

De Walque, D. (2004). *How does the impact of an HIV/AIDS information campaign vary with educational attainment? Evidence from rural Uganda.* The World Bank.

De Walque, D., Dow, W. H., Nathan, R., Abdul, R., Abilahi, F., Gong, E., ... & Majura, A. (2012). Incentivising safe sex: a randomised trial of conditional cash transfers for HIV and sexually transmitted infection prevention in rural Tanzania. *BMJ open*, 2(1), e000747.

De Walque, D., & Valente, C. (2018). Incentivizing school attendance in the presence of parent-child information frictions.

Dupas, P. (2011). Health behavior in developing countries. *Annual Review of Economics*, 3(1), 425-449.

Dupas, P. (2011). Do teenagers respond to HIV risk information? Evidence from a field experiment in Kenya. *American Economic Journal: Applied Economics*, 3(1), 1-34.

Ranganathan, M., & Lagarde, M. (2012). Promoting healthy behaviours and improving health outcomes in low and middle income countries: a review of the impact of conditional cash transfer programmes. *Preventive medicine*, 55, S95-S105.

UNAIDS, U. (2016). Prevention gap report.