February 2008 • Vol.6 • No.2

vax

AIDS VACCINE BULLETIN • WWW.IAVIREPORT.ORG

Spotlight

Small loans: Big hopes

Can economic empowerment programs give women the skills and power to reduce their risk of HIV?

The shanty areas of Nairobi, Kenya are home to thousands of adolescent girls and young women, many of whom have migrated from rural areas. More than half of the girls aged 15 to 17 in these slums are living without parents and the vast majority are not attending school. Many are too poor to afford school fees, while others are forced to drop out of school to take care of extended family members affected by HIV/AIDS. The poorer and more isolated the girls, the higher their risk of HIV.

Here and in many other regions of the world, women have limited power to negotiate HIV prevention in their personal relationships. Intimate-partner violence, as well as poverty, is intricately linked to a higher risk of HIV throughout sub-Saharan Africa. A study in South Africa's Eastern Cape found that roughly 30% of young men reported perpetrating physical or sexual violence against their main sexual partner during the past year. These same men also engaged in significantly higher levels of HIV risk behavior than their non-violent peers.

Establishing gender equality in these communities is a priority, and this goes hand in hand with economic empowerment. "If young people have financial capacity, you would expect a stronger ability to negotiate sexual relationships," says Evelyn Stark, a microfinance specialist at the Consultative Group to Assist the Poor (CGAP). Empowering women economically could help them work their way out of poverty, gain independence, refuse unwanted sexual advances, and successfully negotiate condom use, contributing, some researchers hope, to an eventual reduction in HIV transmission.

One way to supply women with financial capacity and independence is through microfinance initiatives. The idea is to provide women with small loans, typically just a few hundred US dollars, which could provide the foothold they need to start small businesses. Microfinance programs have already provided economic opportunity for millions of women worldwide. Now a handful of researchers are testing the hypothesis that these programs can also foster an environment that empowers women in their sexual relationships. Female empowerment could create societal changes that could mobilize public awareness about AIDS and help stabilize the epidemic in sub-Saharan Africa, where 75% of all new HIV infections occur in females between the ages of 15 and 24.

Microfinance and HIV

Microfinance programs typically provide small loans, savings, or other financial products, including credit and insurance, to individuals who could not historically access loans because they lacked the types of collateral—land or personal savings—that banks and lending institutions require. In the 1970s, microlending emerged as a viable way to stimulate economic development among the poor. Since then it has been applied successfully throughout the world. The pioneer of this concept is Muhammad Yunus, founder of Bangaladesh's Grameen Bank and recipient of the 2006 Nobel Peace Prize.

In microfinance programs, loans can be provided directly to single individuals or to small groups of collective borrowers. Although there are many ways to run a microlending program, one of the most popular is based on the concept of "group lending," where borrowers pool their savings as collateral for a loan. Although the loans are given to individuals, it is the group that is ultimately held responsible for repaying them. The success of microfinance programs—repayment rates are typically well above 90%—depends in large part on the group pressure to repay the loans.

The earliest microfinance programs focused mainly on loans and less on training or education. But eventually it became more common to combine credit services with training on business development, literacy, and community-building skills so that loans could benefit the poorest people.

On the surface microfinance programs and HIV/AIDS programs seem to have little in common. But advocates of microfinance initiatives, especially in sub-Saharan African countries where AIDS is so shockingly prevalent, cannot ignore the connection. Loan programs suffer when participants or employees become ill or must leave their business to care for family members with HIV/AIDS.

The popularity of microfinance programs also makes them excellent venues for reaching people with messages about

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HIV prevention. In Mozambique, 32 microfinance programs involve an estimated 100,000 clients. "This is an incredible platform for a whole range of public health and HIV/AIDS interventions," says Guy Winship, who linked HIV/AIDS education and microfinance during his tenure as managing director of FINCA Uganda, one of the country's largest microfinance organizations. As a result, the US Agency for International Development (USAID) and other organizations are now supporting the integration of microfinance programs and HIV/AIDS education.

Women's empowerment

Educating women about HIV/AIDS is an important step, but many public health researchers hope that microfinance programs can go even further, helping women gain the self-esteem and negotiating power they sorely lack in their personal relationships.

Promoting female empowerment is the goal of an ongoing program in South Africa called the Intervention with Microfinance for AIDS & Gender Equity (IMAGE). Female empowerment involves acquiring knowledge and understanding of gender relations, developing a sense of self-worth and the right to control one's own life, gaining the ability to exercise bargaining power, and developing the ability to create a more just social and economic order. The IMAGE study combines gender-based health education conducted by Rural HIV and Development Action Research (RADAR), a collaborative program between the University of the Witwatersrand and the London School of Hygiene and Tropical Medicine, with microcredit provided by the Small Enterprise Foundation (SEF). "We wanted to pair microfinance with specific training on gender and HIV," says Julia Kim, a senior researcher with RADAR.

In the IMAGE study, women participated in a microfinance program where they received loans to help them start small businesses and routinely engaged in educational sessions that covered topics such as health care, gender relations, and HIV prevention. The project was designed as a randomized trial and researchers followed several thousand households over a two- to three-year period in Limpopo Province, a rural region of South Africa. After two years of follow up, researchers used questionnaires to evaluate the direct effect of the combined intervention on participants' economic well being, their levels of empowerment, and the rates of intimate partner violence. HIV risk was also assessed among female participants who were considered at highest risk—in this case, those younger than 35.

The results were encouraging. Researchers found that households that received loans and training improved their economic status as well as their level of empowerment, based on preset markers that included, among other things, self-confidence, willingness to challenge gender norms, autonomy in decision making, perceived contribution within their household, and status of their relationships. Furthermore, levels of intimate partner violence were reduced by 55% in households that received loans and training.

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>
> **Guy Winship**

Also, among women younger than 35, there was a significant increase in the number of women who received voluntary counseling and testing for HIV, higher levels of condom use with nonspousal partners, and improved communication about HIV/AIDS within their households, according to Kim.

Panacea?

Despite positive results, there is a concern that microfinance will be oversold as an intervention that can empower women, says Stephanie Urdang, of Rwanda Gift for Life. "If a woman can figure out with some support how to generate income," says Urdang, "then clearly she is in a much stronger position to resist violence, to be independent, to make her own choices. But sometimes people have seen this as a panacea—that all that women need is a leg up and once they've got an income, then they can move ahead and take control of their lives."

Indeed, microfinance programs alone do not always help reduce poverty. And even if they do empower women economically, this alone does not automatically enable women to control their own sexual and reproductive health. In some cases it may even make it more difficult.

This was apparent in one program, known as SHAZ (Shaping Health of Adolescents in Zimbabwe), that sought to empower young women in their sexual relationships through a microfinance program. In many cases, having income actually made girls in the SHAZ program subject to more sexual advances because it drew attention from men in the community. As journalist Helen Epstein wrote last year in her book, *The Invisible Cure*, "The researchers had not anticipated that their program to 'empower' these poor women was actually placing them right in the path of HIV."

Researchers found that the social networks established by the girls were what provided the most benefit, and many participants reported greater knowledge of safe-sex practices at the conclusion of the study. "It is not the money that empowers them," says Epstein. "It is the collective solidarity and support that they get from each other. That comes from them coming together either through a program that is organized, or spontaneously through a kind of social movement for women's rights."

A similar conclusion was reached by researchers involved in another microfinance program called Tap and Reposition Youth (TRY), which provided business education, mentoring, and small loans to young girls living in the slums of Nairobi. This program was a multiphase initiative undertaken by the Population Council and implemented by the Kenyan microfinance institution, K-Rep Development Agency (KDA).

Through churches and youth groups, the TRY program recruited 25 women between the ages of 16 and 22 to join five-person lending groups. Only 12% of participants lived with both parents, while others lived in single-parent households, were themselves head of the household, or lived with a boyfriend or husband. One-quarter of the girls reported having traded sex for

money, rent, or gifts. With increasing poverty, there is an increased likelihood that their first sexual experience was non-consensual, occurred at an earlier age, and did not involve a condom. "You have girls who have been involved in [HIV education] programs for a long time say, 'I had to have sex with my boyfriend without a condom because I needed to pay the rent,'" says Judith Bruce of the Population Council. "They have complete information, they are just economically vulnerable."

All participants received six days of training on business planning, life skills, and gender roles before they started contributing small amounts of money each week to a group savings account, which constituted collateral for a loan. After the loan was secured, each participant was allowed to take a portion of the money, ranging from US$40 to $200, on a rotating schedule to establish a small business such as a food stand.

The program got off to a strong start, but eventually repayment rates started to slip. Girls dropped out of the program to protect their savings. At one point, loan officers required an adult guarantor who pledged to repay the loan in case a girl defaulted. This had the unintended consequence of increasing the girls' vulnerability, rather than reducing it.

But this program also provided some benefit. "Given limitations, [the] findings are not conclusive. However, there are indications that among girls for whom microfinance is appropriate, it may result in greater negotiating ability within their relationships, including negotiating for safer and consensual sex," says Annabel Erulkar, of the Population Council, who worked on the TRY project.

While microfinance may not be a magic bullet for reducing HIV transmission, a combination of microfinance programs targeted at certain populations and others aimed broadly at changing societal norms could help alter the vulnerability of girls and young women. It is one more way researchers are attempting to impede the spread of the epidemic in sub-Saharan Africa.

Global News

Trial results presented at CROI

Results from two recently-conducted clinical trials of different prime-boost AIDS vaccine regimens were presented at the 15th Conference on Retroviruses and Opportunistic Infections (CROI), held February 3-6 in Boston.

The first trial, conducted by the HIV Vaccine Trials Network (HVTN) at multiple sites in the US, tested an immunization regimen consisting of two injections of a DNA candidate followed by two injections of a modified vaccinia Ankara (MVA) vector-based candidate, both developed at the Emory Vaccine Center and now licensed to the biotechnology company GeoVax. Both candidates contain fragments of HIV to stimulate an immune response against the virus, but neither can cause an HIV infection. Harriet Robinson, who recently left Emory to join GeoVax, presented results from this trial, known as HVTN 065.

Researchers evaluated the safety and immunogenicity of two different doses of the DNA and MVA-based candidates, each in 30 volunteers (see *VAX* August 2007 *Primer* on *Understanding Immunogenicity*). Researchers assessed the immune responses induced by the candidates two weeks after each injection of the MVA candidate. Based on these results, Robinson said the higher dose of the prime-boost combination will be tested further. In a second phase of this study, two groups of 30 volunteers will receive either a single injection of the DNA candidate followed by two injections of the MVA-based candidate, or three injections of the MVA-based vaccine candidate.

Researchers also presented data from another Phase I/II trial in Mbeya, Tanzania at CROI. This trial tested the safety and immunogenicity of the DNA and adenovirus serotype 5 (Ad5)-based candidates developed by the Vaccine Research Center (VRC), part of the US National Institute of Allergy and Infectious Diseases. This trial was conducted by the United States Military HIV Research Program and was one of a series of Phase I and II studies with the VRC's candidates in preparation for the originally-planned Phase IIb test-of-concept trial known as PAVE 100. The start of the PAVE 100 trial, however, was placed on hold after the results of the STEP trial were released (see *VAX* October-November 2007 *Spotlight* article, *A STEP back?*).

The majority of participants in this trial had high levels of anti-Ad5 antibody at the start of the trial, resulting from exposure to the naturally-circulating Ad5 virus. Yet all individuals mounted some level of HIV-specific immune responses following receipt of the Ad5 candidate. This indicates that pre-existing immunity to Ad5 did not completely mitigate immune response to the Ad5 vaccine candidate.

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VAX is a monthly bulletin from *IAVI Report*, the publication on AIDS vaccine research published by the International AIDS Vaccine Initiative (IAVI). It is currently available in English, French, German, Spanish, and Portuguese as a downloadable pdf file (www.iavireport.org) or an e-mail bulletin.

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How are statisticians analyzing the data from the STEP trial?

AIDS vaccine candidates are tested in randomized, controlled, double-blind clinical trials to evaluate their safety and to determine whether or not a specific candidate induces immune responses against HIV (see *VAX* October-November 2007 *Primer* on *Understanding Randomized, Controlled Clinical Trials*). Late-stage clinical evaluation—including both Phase IIb test-of-concept and Phase III trials—look specifically at the efficacy of a vaccine candidate based on its ability to protect an individual against HIV infection or provide some degree of partial efficacy (see *VAX* May 2007 *Primer* on *Understanding Partially-Effective AIDS Vaccines*).

All of these trials are carefully planned by biostatisticians using mathematical formulas to determine key factors related to the design of the trial, such as the total number of volunteers that must be enrolled. Before a trial begins, biostatisticians also set an analysis plan detailing the types of statistical calculations that will be performed on the data. This is critical to the interpretation of the final results.

Statistical significance

Once a trial is complete, researchers can compare the group of individuals who received the vaccine candidate to those who received an inactive placebo and see what effect, if any, the candidate had on either incidence of HIV infection or on certain markers of disease progression—such as the amount of virus in the blood, or viral load—in those individuals who were infected with HIV during the trial. If there is a difference between the two groups, statisticians can conduct a series of calculations to determine whether the difference was due to the vaccine candidate, or if it was merely the result of chance. This is referred to as determining the statistical significance of a result. A test of statistical significance provides a measure of credibility to the results. If the trial was designed and conducted properly, a statistically significant difference between the vaccine and placebo groups means the results were unlikely to have occurred by coincidence.

Trends

The STEP trial, which tested Merck's AIDS vaccine candidate known as MRKAd5 in a Phase IIb test-of-concept trial involving 3,000 volunteers, is an example of a clinical trial in which further statistical analysis is required. In November 2007 researchers reported that this vaccine candidate offered no benefit. Data analysis indicated there was no statistically significant difference between the number of HIV infections or viral load levels in individuals in the vaccine and placebo groups. In addition, the data actually showed a trend toward more HIV infections occurring in individuals who received the vaccine candidate. This was an unexpected result. The initial statistical analysis plan for the trial was not designed to measure this effect and therefore statisticians could not rely on typical tests of statistical significance to determine if the vaccine enhanced the risk of HIV infection or if the difference occurred merely by chance. This makes interpretation of the observed trend very complicated.

Stratification

Volunteers in AIDS vaccine trials are usually randomly assigned to either the vaccine or placebo group (see *VAX* October-November 2007 *Primer* on *Understanding Randomized, Controlled Clinical Trials*). This reduces the chance that variables, such as age, ethnicity, gender, or other baseline characteristics of the volunteers will impact the final results of the trial. After a trial is complete, researchers can look at the background characteristics of the volunteers and determine how well the trial was actually randomized.

Statisticians can also design a trial by randomizing volunteers based on a specific variable that they think may confound the results. In this process, known as stratification, a pre-specified number of volunteers with a previously-identified characteristic are randomly placed into the vaccine and placebo groups. In the STEP trial, volunteers were stratified based on their level of pre-existing immunity to the naturally-circulating cold virus (adenovirus serotype 5, or Ad5), which was used in a disabled form as the vector in this vaccine candidate (see *VAX* September 2004 *Primer* on *Understanding Viral Vectors*). Initial analyses showed that the trend toward a higher number of HIV infections in vaccine recipients was apparent in the sub-groups of volunteers who had pre-existing Ad5 immunity.

Multivariate analysis

More complex analyses were then conducted to see how other factors, in addition to pre-existing Ad5 immunity, influenced the observed results. These so-called multivariate analyses allow statisticians to analyze several variables simultaneously. The most relevant risk factor identified so far for the STEP trial was male circumcision status. Volunteers who received the vaccine candidate were four times more likely than placebo recipients to become HIV infected if they were both uncircumcised and had some degree of pre-existing Ad5 immunity.

According to the investigators of the STEP trial, the trend toward an association between circumcision status and the risk of HIV infection seemed to be as strong, if not stronger, than the trend toward an association between HIV infection and pre-existing immunity to Ad5. However, these results must be interpreted with caution since the multivariate analyses were not part of the original statistical analysis plan for this trial, and were only performed because of the unexpected results. This is called a 'post-hoc' analysis, or one done after the fact. Post-hoc analyses provide much less reliable information.

Investigators are now in the process of analyzing the STEP data based on other variables as well. Information collected from these analyses may help researchers develop hypotheses that can then be investigated further.