"A Close Examination of the HIV/Fertility Timing Linkage: Age- and Cohort Specific Fertility Spacing's Correlation with Cohort Specific HIV Prevalence"

Stacy E. Sneeringer, Ph.D., Wellesley College
Trevon D. Logan, Ph.D., The Ohio State University and NBER

Speculation abounds as to how HIV/AIDS interacts with fertility in African countries. A virtual morass of behavioral and medical mechanisms can lead to positive or negative correlations between HIV prevalence and fertility, and these can correlations may work in opposite directions at the individual and aggregate levels. Regardless of this unclear linkage, a host of new research relies on presumed mechanisms to discuss how HIV will affect Africa's economic growth and social development. A further extension of these mechanisms is the relationship between HIV prevalence and fertility timing in African countries. This project exploits the variation in HIV prevalence across time, countries, and age cohorts to better understand the interaction between HIV and fertility timing, and to examine whether any changes in fertility timing accompanying HIV will affect African development and child outcomes. It will provide a much more detailed description of the stage in a woman's child-bearing years in which HIV has the most impact, thereby elucidating which of the various mechanisms are at play.

The suggested mechanisms relating HIV and fertility can be broadly characterized as behavioral, biological, and accounting. Each of these mechanisms has a natural extension to fertility timing. The behavioral mechanisms describe how women of child-bearing age respond to HIV. One suggestion is that women who are HIV-positive or who are worried about HIV contraction may decide to have fewer children, or spacing their births farther apart to see how children fare before having another. This "protection" response leads to a positive correlation between HIV and fertility timing. Another behavioral model suggests that women see higher child mortality related to HIV and therefore have more children to increase the chance that more will live to adulthood. This "insurance policy" mechanism would yield a negative correlation between HIV and fertility timing.

A biological linkage between HIV and fertility is another mechanism through which the two rates may be related. HIV-positive women may have longer spaces between births because they are biologically less able to conceive, usually because immunosuppression leads to accompanying sexually transmitted infections. This would lead to a positive correlation between the HIV and fertility timing on both individual and aggregate levels.

The third mechanism relating HIV and fertility can be characterized as "accounting," and yields different predictions on individual and aggregate levels. In this scenario, death due to HIV leads to sample selection regarding who gives birth, leading to higher or lower fertility rates in the aggregate. Seropositive women may have longer spacing due to the biological mechanism above, but they are also more likely to die, possibly leaving higher fertility women in the population. This would cause the total fertility rate to increase. Alternatively, we may believe that sexually active women might be both more likely to die and to have more children, so if they do not first give birth to several children, a lower

TFR results. Another distinction arises in the consideration of available sexual partners. Age groups with high fertility also have higher HIV rates. Assuming people couple within age groups, higher HIV-related death rates may reduce the availability of partners. This could lead to lower fertility amongst a normally high-fertility group, yielding lower fertility in the aggregate.

Relating age-specific fertility spacing with HIV prevalence will elucidate which of the above mechanisms is at play. A period's HIV rate will be experienced by all individuals across the age spectrum. However, some age groups' fertility may be more affected by HIV prevalence than others.' Younger women are more likely to be infected; if we see their (time- and age-adjusted) fertility spacing negatively responding to HIV, while that of older, less-likely-to-be-infected women does not respond, this provides support for increased fecundity or a behavioral "protection" response.

Constructing cohort-specific fertility rates and relating these to HIV prevalence at different age periods will elucidate when in the age distribution HIV has the most impact on fertility. If HIV prevalence is strongly and positively correlated with fertility spacing in the early years, this suggests a biological or "protection" behavior. Likewise, a negative correlation with early-age fertility spacing suggests "insurance" behavior.

Our project uses individual data from every publicly available Demographic and Health Surveys and Service Provision Surveys of African countries to examine whether the fertility spacing of specific age groups are differently affected by HIV, and to track how cohort fertility spacing is affected by HIV. Going beyond the recent DHS surveys, which test women for HIV status, we use the sentinel test results for HIV from 1980 onward in Sub-Saharan Arica, which are HIV tests of women in each African country by year and by region. This allows us to estimate HIV prevalence among pregnant women for the entire scope of the epidemic so far (1980-2006), allowing us to investigate whether or not the fertility response to HIV has changed over time, and to see if the response is different in countries and regions with high and low HIV prevalence. This work allows us to see the scope of the relationship between HIV and fertility spacing for the whole of the continent over the last quarter century.

Our results suggest that the relationship between HIV and fertility spacing is negative. Controlling for country, cohort, and country-region fixed effects, we find that fertility spacing is lower when the cohort-specific fertility rate is high. While this aggregate relationship does rule out several existing theories of the relationship between HIV and fertility, we are able to distinguish between some of the remaining theories that are consistent with our aggregate results by considering specific countries and cohorts whose fertility behavior is predicted by the relevant theories.