HIV Status and Fertility Intention: What Does Knowledge Have to Do With It?

Sara E. Yeatman

yeatman@prc.utexas.edu
Population Research Center
Department of Sociology
University of Texas at Austin

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ABSTRACT
Despite the extent of the AIDS epidemic in sub-Saharan Africa, one of the remaining regions with high actual and desired fertility, little is known about how it influences fertility preferences. In this paper, I employ a quasi-experimental design to explore how learning one's HIV status influences thinking about childbearing. Drawing on the case of rural Malawi, I use data over a unique period where no one "knew" their HIV status until HIV testing and counseling was offered door-to-door as part of a longitudinal study. However, in the absence of an HIV test, people are not oblivious to their HIV status; thus, I explore how "local" knowledge—or speculation—about one's HIV status interacts with biomedical knowledge to influence fertility preferences. I find a large depressive effect of learning one is HIV positive on the desire to continue childbearing, an effect that is greatest among those who are surprised by their HIV result

INTRODUCTION

The AIDS epidemic in sub-Saharan Africa is growing, not just in terms of infected individuals but also in the complexity and breadth of its consequences. The direct effects of AIDS mortality and morbidity are increasingly well documented, while less attention is given to the myriad of indirect consequences that the disease has on people who are infected or those who fear they are infected. An example of this is the complex relationship between HIV and fertility. Early in the epidemic the relationship was largely biological (Zaba and Gregson 1998; Gregson, Terceira et al. 2002; Lewis, Ronsmans et al. 2004), namely reduced fecundity among HIV positive women and men at later stages of infection (Nguyen et al. 2006). However, as the epidemic matures and the informational resources people have access to change, the relationship has the potential to become one of intention. In particular, the recent expansion in HIV testing and counseling services offers people information about their HIV status before the signs and symptoms of a more advanced infection emerge. As testing spreads, not only will those who are positive learn their status but, perhaps equally important, the majority of people tested—many of whom speculated they were infected—will learn that they are actually HIV negative. Prior to accessing an HIV test people are not unaware of their HIV. This speculation—if perceived as real—is likely to influence the way individuals plan for and make decisions about the future in a similar way to testing. The impact and relative importance of these two types of knowledge on childbearing decisions, however, is an open and empirical question.

In this paper, I employ a quasi-experimental design using longitudinal data from rural Malawi to examine how objective (biomedical) and subjective (local) HIV status shape the childbearing preferences of rural Malawians. Specifically, I ask: (1) Do men and women who learn they are HIV positive change their fertility preferences? (2) Do men and women who learn they are HIV negative change their fertility preferences? And, (3) How does prior conjecture about one's HIV status alter these relationships?

BACKGROUND

Malawi offers a model site in which to explore the effects of HIV on childbearing preferences as both HIV prevalence (12 percent of reproductive age Malawians are infected with HIV [MDHS 2004]) and fertility (a total fertility rate of 6.0 children per woman [MDHS 2004]) is among the highest in the world. In Malawi, as in most of sub-Saharan Africa (SSA), HIV is transmitted predominately through heterosexual sex and mother to child transmission and disproportionately affects women who constitute the majority of new infections, are economically dependent on men and are the primary care givers for orphans and the ill. Thus, understanding the relationship between HIV status and fertility is particularly important for designing effective reproductive health programs, avoiding vertical transmission and anticipating demographic shifts if potential changes in fertility intention lead to changes in behaviour.

HIV and fertility

There is little consensus about how rural Africans view the relationship between HIV and fertility (Rutenberg et al 2006). One of the most consistent findings from this literature is that once the signs and symptoms of HIV infection appear, people believe that infected individuals should stop having children (Baylies 2000; Rutenberg et al. 2000). However, there is not yet strong evidence from the region that those who are infected themselves want to stop having children. For example, there is no conclusive evidence that they are more likely to use contraception or to abstain from sex in an attempt to have fewer children (Rutenberg et al. 2006; Casterline 2002).

Few large studies have looked at the relationship between HIV status and fertility intentions and those that do tend to use simple cross-sectional approaches. There are, however, some exceptions that are informative and deserve attention. One study by Allen and colleagues (1993) in Rwanda found that in the two year period following HIV counseling and testing HIV positive women with four or more children were less likely to get pregnant than positive women with fewer children. This relationship existed net of other sociodemographic characteristics and did not emerge among HIV negative women. The finding suggests that women who learned they were positive still wanted to have children but that the strength of this motivation depended on how many children she already had. A randomized controlled study in Kenya and Tanzania designed to study changes following voluntary counseling and testing also looked at changes in pregnancy incidence between HIV positive and negative women accounting for prior fertility intentions (Forsyth et al. 2002). Six months after testing, HIV positive women who had not previously planned a pregnancy were more likely to be pregnant, while HIV positive women who had planned a pregnancy were less likely to be pregnant (Forsyth et al. 2002). While this is a somewhat confusing finding, it speaks to the potential for changes in fertility intentions as a result of new knowledge about HIV status.

What does it mean to be positive?

In Malawi, and throughout the AIDS-belt, people are aware that someone who is healthy-looking can be HIV positive[1]. Still, with people regularly caring for the sick and attending funerals (as many as three or four a month in rural areas, [Smith and Watkins 2005]), there is also good awareness of what an HIV infection ultimately means. Malawians generally consider AIDS to be necessarily fatal and underestimate the length of time between infection and illness (Watkins et al. 2007). Thus, if someone knows they are infected, they understand it to mean that they will become ill in the near future and will likely die fairly soon thereafter.

In the absence of HIV testing—and even where testing is available but not utilized—people living amidst a generalized epidemic are not unaware of their HIV risk. Individually

[1] Confirmed using Measure DHS' STATcompiler for all surveys within the last five year in Eastern and Southern Africa (accessed on September 27, 2007). www.statcompiler.com

and within social networks they speculate about their HIV status based on symptomology and knowledge of their own, and their partners', sexual behavior (Bignami Van-Assche et al 2007; Zaba and Gregson 1998; Smith and Watkins 2005). Watkins and colleagues (2007) describe the collective process through which HIV is locally diagnosed in rural Malawi. Generally, risk behavior in conjunction with medical signs is necessary for people within communities to reach a consensus that someone does indeed have HIV/AIDS. People apply this same epistemological process to themselves in determining their own likelihood of infection. Indeed, rural Malawians are strong in their convictions about their own infection. In the third wave of the Malawi Diffusion and Ideational Change Project (MDICP), the data used in the present analysis, over eighty percent of respondents assessed their own likelihood of infection while fewer than twenty percent responded that they did not know their likely status (Bignami Van Assche et al. 2007). Seventy one percent of these respondents were accurate in their subjective assessment, though people—and women in particular—tend to over rather than underestimate their risk of infection.

Despite the conviction and regularity with which people locally diagnose, there may still be something distinct about the result of a biomedical HIV test. First, an HIV test may be correctly assumed to provide more convincing results than local assessment—if people have trust in the Western medical system and in the process through which they are tested. Second, a test can make a definitive diagnosis within weeks of infection, improving upon the local diagnostic process. Third, if people overestimate their risk of infection, a test can disconfirm their fears. Most people who are tested find out they are negative; for someone who believes themselves to be infected, it may take years of health or a child growing up healthy (see Grieser et al. 2001) for them to gradually reassess their risk—something that can happen in minutes with an HIV test.

If HIV status—both positive and negative—affects desires and future intentions, then it is reasonable to expect that, even without a biomedical test, people are planning and acting based on subjective assessments of their HIV status. W.I. Thomas (1929) famously said in what is now known as the Thomas Theorem that "if men describe situations as real, they are real in

their consequences." In other words, what is perceived as real to an individual will affect that individual as if it were real. If people who are HIV positive want fewer children, and many rural Malawians believe strongly that they have HIV, it makes sense that they will act on this deeply held self-perception and reassess their childbearing. A biomedical HIV test, then, may confirm or disconfirm beliefs that might already be shaping reproductive intentions.

I hypothesize that childbearing preferences in rural Malawi are shaped by both biomedical and local diagnoses of HIV. I anticipate that a positive diagnosis will reduce childbearing desires while a negative diagnosis will have a small and opposite effect. I further expect the greatest impact of an HIV test on preferences to be among those who are surprised by their HIV result--as opposed to those for whom testing merely confirms what they already believed.

DATA AND METHODS

Data for this research come from three sequential waves (2001, 2004 and 2006) of the Malawi Diffusion and Ideational Change Project (MDICP)[2]. MDICP is an ongoing panel survey of approximately 3,500 men, women and adolescents in three districts of rural Malawi. The survey was designed to study the role of informal networks on family planning and contraceptive decision-making and on the diffusion of HIV knowledge and prevention strategies. Data contain detailed information on socio-demographic characteristics, fertility preferences, and a biomarker for HIV status collected in 2004.

In order to circumvent some of the limitations of previous work in this area, I take advantage of a unique situation in rural Malawi where no one *knew* their HIV status prior to 2004 although many respondents in the longitudinal sample suspected that they were HIV positive. In 2004, MDICP offered HIV testing and counseling to its respondents. Using data on fertility preferences from 2001 and 2006 (no measure for fertility preferences was included in the

[2] Malawi Diffusion and Ideational Change Project (PIs Susan Watkins, Hans-Peter Kohler and Jere Behrman). Detailed descriptions of the MDICP sample selection, data collection and data quality are provided in a Special Collection of the online journal Demographic Research that is devoted to the MDICP (e.g., Watkins et al. 2003) and on the project website: http://www.malawi.pop.upenn.edu/.

2004 survey), I can control for previous preferences to better isolate the impact that learning one is HIV positive or HIV negative has on subsequent preferences. I further explore how previous suspicion of one's HIV status mediates these relationships by adding an interaction for perceived likelihood of infection in 2001.

Antiretroviral medicines are slowly being rolled out across Malawi. However, at present in rural districts they are only available at district hospitals. All three MDICP sites have extremely limited access to district hospitals and while many MDICP respondents have heard rumors about "new medicines", very few have personal knowledge of someone on antiretroviral therapy. It is unlikely at the time of this study that knowledge of antiretroviral therapy or medicines to prevent the vertical transmission of HIV are influencing respondents' perceptions of the relationship between HIV infection and childbearing.

Measures

Fertility preferences: The 2001 and 2006 MDICP contain modules on fertility preferences. The dependent variable, desire to continue childbearing, was captured using the question: "(After the child you are expectsing is born), would you like to have a(nother) child or would you like to stop having children?" Fertility intentions as measured with this question are good predictors of future fertility and the least biased of standard preference measures (Thompson, McDonald and Bumpass 1990; Pritchett 1994; Bongaarts 1990). Response categories were not read aloud and included: (a) *have a(nother) child, (b) stop, no more/none, (c) partner deceased/left, (d) says she/wife can't get pregnant and (e) too old.* The variable was dichotomized such that "0" signified that the respondent did not want to have another child and "1" that the respondent wanted to continue childbearing. Respondents who responded that their partner was deceased or left or that they cannot have children were coded "0" while respondents who considered themselves too old were dropped from the sample[3].

[3] This coding algorithm was considered the best at distinguishing those who most desired to continue childbearing. However, various coding schemes were compared, such as dropping all responses except (a) and (b). Results did not change substantially using different coding rules.

HIV Testing: The key explanatory variables are learning you are HIV positive and learning you are HIV negative in the first and second sets of analyses, respectively. Respondents are assumed to have not received their HIV test result before 2001 – a reasonable assumption given that HIV testing was not available in rural Malawi until the end of 2004 when VCT centers were gradually rolled out to regional hospitals. The rural setting of all three MDICP sites made HIV testing logistically and financially out of reach except for in very rare circumstances prior to (and even following) this ongoing rollout.

Wave 3 (2004) of the MDICP included a test for HIV and three other STIs. Nurses collected oral swabs from consenting respondents in their homes. Respondents were then able to collect their results, and receive counseling and treatment for other STIs five to seven weeks later at tents set up in a central location (Anglewicz et al. 2005; Thornton et al. 2005). In 2004, the data have information on whether the respondent was tested, his/her result and whether or not he/she came back to receive the HIV result. Ninety one percent of respondents contacted agreed to be tested in 2004 and seventy percent returned to receive their test result (Thornton et al. 2005). Distance to the counseling tents and randomly assigned monetary incentives affected attendance at test centers (Thornton 2006). In the 2006 survey round, voluntary counseling and testing counselors followed up respondents after they were surveyed. The counselors asked a series of questions related to testing and then offered all consenting respondents counseling and HIV testing using rapid HIV blood tests. The brief survey included questions on prior testing experience, where and when you were tested before, and whether or not you received your result at that time.

Respondents were categorized as learning they were HIV positive between 2001 and 2006 if they either (1) tested positive for HIV in 2004 when they participated in the VCT portion of MDICP and received their HIV results or (2) tested positive for HIV in 2004, did not receive their results from MDICP but indicated in the 2006 questionnaire that they had been tested elsewhere between 2004 and 2006 and had received their results.

Respondents were categorized as learning they were HIV negative between 2001 and 2006 if they either (1) tested negative for HIV in 2004 when they participated in the VCT portion

of MDICP and received their HIV results or (2) tested negative for HIV in 2004, did not receive their results, indicated in 2006 that they had been tested and received their results elsewhere between 2004 and 2006, *and* tested negative again in 2006 so they could not have seroconverted.

Perceived HIV status: Subjectively assessed HIV status is captured through the question, asked in 2001, "In your opinion, what is the likelihood that you are infected with HIV/AIDS now?" Respondents were classified as either perceiving that they had no likelihood of infection or that they had some likelihood.

Control group: In the first set of analyses (learning you are HIV positive), the control group consists of panel respondents who were interviewed in 2001 and 2006 but who either tested negative for HIV or never received their HIV results in 2004. This includes HIV negative respondents, respondents whose HIV status is unknown and a few HIV positive respondents who never received their results[4]. I hypothesized at the outset that people who learned they were HIV positive would reduce their fertility desires. Thus, the bias introduced with such a motley control group—some of whom may not know that they are negative or may have seroconverted between 2004 and 2006—will if anything minimize the effect size on average rather than lead to an inaccurately large effect.

In the second set of analyses (learning you are HIV negative), the control group consists of panel respondents who were interviewed in 2001 and 2006 but who did not get their HIV results between 2004 and 2006 (and thus presumably ever). These analyses exclude all individuals who learned they were HIV positive. Refusing testing or not returning to get test results is not randomly determined. Nonetheless, using the differencing methodology, as long as the unobserved characteristics associated with these behaviors are not also associated with changes in fertility preferences over time, they remain a useful control group.

Control variables: All models include basic controls for age, education, parity, marital status, site and sex.

[4] This includes positive respondents who did not receive their HIV test results in 2004 and who reported in 2006 that they had not received their HIV result in the intervening period.

Sex: Many of the social and economic mechanisms that shape fertility preferences in the absence of HIV differ sufficiently for men and women to warrant running the analyses separately by sex.

Reproductive life course: Fertility preferences clearly vary by age and parity, together representing stage in the reproductive life course. Age and surviving children at time 1 and time 2 are included in the models as continuous variables. The female sample was restricted to women in their reproductive years, excluding women above age 45 in 2001. The MDICP adolescent sample was not added until 2004, so adolescents are not included in these analyses.

Education: Education is measured as a binary variable for having completed primary school.

Marital status: Because of the way the initial MDICP sample was drawn (ever married women and their spouses) and high levels of marriage in Malawi, the vast majority of respondents are married. Marriage is quasi-universal (Reniers 2005) and those who are separated, divorced or widowed will likely not remain in that state indefinitely. Current marital status is dichotomized into *married* and *formerly married* for the analyses.

Region: All models include a series of dummy variables to capture some of the socio-cultural variation across regions.

Methods

I employ difference in differences techniques to approximate the effect that learning one is HIV positive (negative) has on fertility preferences. I combine this technique with regression analysis to control for observables and thus minimize heterogeneity between the two groups (e.g. HIV positive and control). Typical panel data analyses fail to adequately account for secular changes that occur over time and influence the dependent variable. This is a particularly acute problem when dealing with a dependent variable that is highly age dependent, such as fertility preferences. Difference in differences models compare the group that is "treated" (e.g. learn they are HIV positive) to a control group who is "untreated" over a period where the "treatment" is introduced. Testing HIV positive is, of course, not a random event. Difference in differences modeling makes a weaker assumption than randomness. Instead, it assumes that

changes in the "treatment" and "control" group are constant over time (Meyer 1995). If there is no interaction between risks for being HIV positive and *changes* in fertility preferences over time, a reasonable assumption, then this estimation technique will be appropriate.

The general idea behind difference in differences is that the difference pre-testing is the "normal" difference between treatment and control groups ("normal" being in the absence of testing positive). The difference post testing is the "normal" difference plus the causal effect. The difference in these two differences, then, approximates the causal effect. Using two records for each individual (2001 "Pre" and 2006 "Post"), I estimate the difference in differences regression separately for men and for women. Whether or not the respondent learned they were HIV positive (or negative) between 2001 and 2006 is attached to each record.

Equation 1.

$$\ln[P_{it}/(1-P_{it})] = \beta_1 + \beta_2 Post_t + \beta_3 HIV_i + \beta_4 (Post_t \times HIV_i) + \beta_5 \mathrm{Re}gion_i + \beta_6 Z_{it}$$

The dependent variable is the log odds of the desire to have another child for individual i in year t. $ß_2$ identifies whether or not there are changes across respondents over the time periods net of other factors. $ß_3$ represents differences in the first time period between respondents who later learn they are HIV positive (negative) and those who do not. $ß_4$ captures changes in fertility preferences specific to those who learn they are HIV positive (negative); it is the effect remaining after controlling for the influence of time and prior differences in preferences between people who later learn they are HIV positive (negative) and those who do not. $ß_6$ adds a fixed effect to control for time-invariant differences in fertility by region. The Z vector controls for variables that will vary across individuals and over time that might also affect fertility preferences. Outcomes for the same individuals will be correlated due to their common dependence on time-invariant unobservables. I control for clustering and use robust standard errors to account for this correlation.

Table 1. Descriptive statistics for variables of interest, MDICP 2001-6

	Women 2001				Women 2006			
Variable	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Dependent variable								
Want a(nother) child	0.53		0	1	0.28		0	1
Independent variables								
Learned HIV positive	0.05		0	1	0.05		0	1
Learned HIV negative	0.66		0	1	0.66		0	1
Some likelihood of infection	0.15		0	1	0.15		0	1
High worry about infection	0.46		0	1	0.46		0	1
Age	31.90	7.26	15	45	36.9	7.26	20	50
Living children	3.60	2.09	0	10	4.54	1.98	0	10
Completed primary school	0.18		0	1	0.18		0	1
Currently married	0.94		0	1	0.91		0	1
Southern Region	0.34		0	1	0.34		0	1
Central Region	0.34		0	1	0.34		0	1
Northern Region	0.32		0	1	0.32		0	1

N=899

	Men 2001				Men 2006			
Variable	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Dependent variable								
Want a(nother) child	0.50		0	1	0.31		0	1
Independent variables								
Learned HIV positive	0.03		0	1	0.03		0	1
Learned HIV negative	0.64		0	1	0.64		0	1
Some likelihood of infection	0.25		0	1	0.25		0	1
High worry about infection	0.36		0	1	0.36		0	1
Age	40.31	10.73	16	78	45.31	10.73	21	83
Living children	4.60	2.82	0	15	5.5	2.68	0	19
Completed primary school	0.38		0	1	0.38		0	1
Currently married	0.98		0	1	0.97		0	1
Southern Region	0.29		0	1	0.29		0	1
Central Region	0.36		0	1	0.36		0	1
Northern Region	0.35		0	1	0.35		0	1

N=622

RESULTS

The analytical sample consists of 899 women and 622 men who were interviewed by MDICP in both 2001 and 2006. Table 1 presents descriptive characteristics of the sample. HIV prevalence for this rural longitudinal sample is relatively low—six percent for women and three percent for men. Because the MDICP sample was drawn from a random population of ever-married women in 1998, the sample tends towards the later ages of reproduction. The mean age for women in 2001 is 32 and the mean age for men is 40.

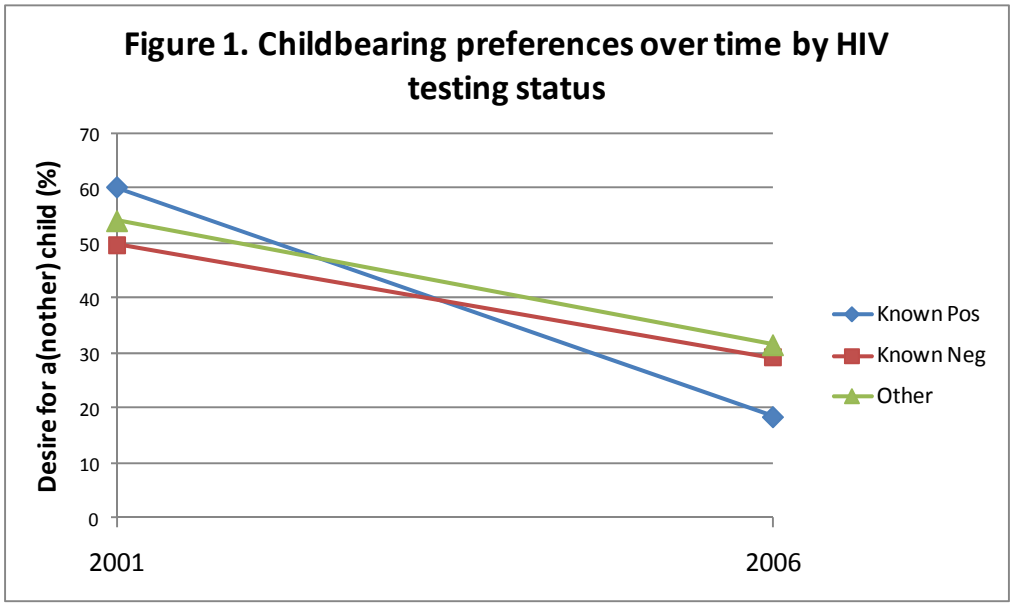
Figure 1 illustrates changes in the percentage of respondents who want to continue childbearing between 2001 and 2006. Respondents are divided into three groups, those who learn they are HIV positive between 2001 and 2006, those who learn they are HIV negative between 2001 and 2006 and those who do not receive their HIV test results[5]. There is a clear secular decline over the five year period that, without controlling for time varying or time invariant sociodemographic characteristics, is similar for respondents who learn they are HIV negative and those who did not receive a test result. In contrast, respondents who learned they were positive have a notably steeper declining slope over the period, suggesting a strong relationship between knowing you are HIV positive and the desire to have more children.

Learning one is HIV positive

While such bivariate relationships are informative, when testing for an *effect* of HIV testing on fertility preferences, it is important to examine changes over time that control for sociodemographic characteristics and pre-existing differences in preferences. Table 2 presents odds ratios, converted from difference in differences logistic regression coefficients that are able to do just that. I begin with a series of analyses exploring how learning that one is HIV positive between 2001 and 2006 impacts the desire to have more children. Model 1 is the base model that combines men and women while controlling for sex. The second model adds sociodemographic controls to limit the influence of differences between those who learn they are positive and the

[5] More precisely, this group consists of respondents who I cannot confidently categorize as belonging to either alternative group.

control group that might be associated with both risk of HIV infection and fertility preferences. Because I hypothesized that the relationship would differ for men and women, the subsequent models explore differences in the relationship between HIV and fertility preferences by sex.



The first row, "Learned HIV+", refers to differences in fertility preferences between HIV positive individuals and others *prior* to HIV testing. Across all models there are no significant differences in fertility preferences between the two groups. The second row, "Post", reflects changes in fertility preferences over time. As expected, five years later in their reproductive lives, both men and women increasingly want to cease childbearing. Age, number of surviving children and education operate in the direction expected from the wealth of literature on fertility preferences. Residents of the Central Region have lower odds of wanting to continue childbearing than respondents in the Southern Region, where families tend to be larger and the population is noticeably denser. Male respondents in the Northern Region have twice the odds of wanting to continue childbearing as those in the south, though no such difference is observed among women in these areas. These differences may be due to the different family systems across regions. The North is predominately patrilocal, meaning that children stay with their

Table 2. Desire for a(nother) child, odds ratios converted from logistic regression coefficients, difference in differences models Learning one is HIV positive, MDICP 2001-6

	ALL			WOMEN ONLY		MEN ONLY	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Learned HIV+	1.44	1.18	1.18	1.32	0.91	1.72	1.92
Post	**0.41** **	**0.70** **	**0.70** **	**0.36** **	**0.68** **	**0.48** **	**0.74** *
Positive*post	**0.37** **	**0.34** **	**0.36** *	**0.49** +	0.48	**0.18** *	**0.12** *
Likely			0.94				
Likely*Learn HIV+*post			0.78				
Male	1.00	**2.96** **	**2.98** **				
Age		**0.90** **	**0.90** **		**0.87** **		**0.92** **
Primary education		**0.78** *	**0.78** *		**0.67** *		**0.80**
Living children		**0.72** **	**0.72** **		**0.70** **		**0.75** **
Married		**1.51** +	**1.50** +		**1.89** *		0.61
Central site		**0.51** **	**0.51** **		**0.41** **		**0.72** +
Northern site		1.09	1.09		0.76		**2.00** **
Pseudo R^2	0.04	0.26	0.26	0.05	0.29	0.03	0.25
N (respondents)	1521	1521	1521	899	899	622	622

Note: significantly different from comparison category at **p<0.01; *p<0.05; +p<0.10

fathers, whereas the South and Central Regions are largely matrilocal and children tend to stay with the mother's family. Additionally, polygamy is more common in the North, so men may want to continue childbearing with their higher order wives.

The interaction ("Positive*post" row) between learning you are HIV positive and the post-testing time period isolates the impact of a positive diagnosis on subsequent fertility preferences. In the combined model, men and women who learn they are HIV positive have one-third the odds of wanting to continue childbearing as they would be expected to have. The relationship is generally similar for women and for men (Models 5 and 7, respectively), although the effect size is larger for men—a finding confirmed through sub-group analysis. Women have half the odds of wanting to have another child, a finding that is only of borderline significance because of the limited sample of HIV positive individuals. Men, on the other hand, have substantially and significantly reduced odds of wanting to have another child after learning they are HIV positive.

As discussed earlier, in the absence of HIV tests people do not live in a vacuum where they are unaware of their HIV status. If fertility preferences change following an HIV test as shown above, then they might also be expected to change as a result of this speculation. Model 3 tests this hypothesis. Because the sample of HIV positive men is fairly small, this model uses the pooled dataset, controlling for respondents who thought it likely they were HIV positive in 2001 and interacting this subjective assessment with learning you were HIV positive and the later time period. These additions do little to change the model suggesting that prior speculation about being HIV positive does not substantially influence the relationship between an HIV positive diagnosis and subsequent childbearing intentions.

Learning one is HIV negative

In a generalized epidemic where people are more likely to overestimate their risk of infection and there is a high base level fear of becoming infected, the surprise of testing HIV negative could also be expected to alter childbearing strategies. Table 3 presents a series of difference in differences models exploring how learning you are HIV negative affects the desire

Table 3. Desire for a(nother) child, odds ratios converted from logistic regression coefficients, difference in differences models Learning one is HIV negative, MDICP 2001-6

	ALL			WOMEN ONLY			MEN ONLY		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Learn HIV-	0.83	0.85	0.85	0.81	0.85	0.85	0.86	0.88	0.89
Post	**0.39** **	**0.63** **	**0.63** **	**0.36** **	**0.63** *	**0.63** *	**0.43** **	**0.63** *	**0.63** *
Negative*post	1.07	1.15	1.06	1.00	1.11	1.11	1.20	1.27	1.03
Likely			0.83			0.90			0.96
Likely*Learn HIV-*post			**1.58** *			1.00			**2.12** *
Male	1.00	**2.87** **	**2.88** **						
Age		**0.90** **	**0.90** **		**0.87** **	**0.88** **		**0.92** **	**0.93** **
Primary education		**0.81** *	**0.81** +		**0.71** +	**0.71** +		0.81	0.80
Living children		**0.71** **	**0.71** **		**0.69** **	**0.69** **		**0.75** **	**0.74** **
Married		**1.57** +	**1.57** *		**2.07** **	**2.06** *		0.63	0.59
Central site		**0.52** **	**0.52** **		**0.42** **	**0.42** **		**0.72** +	0.78
Northern site		1.04	1.04		0.69	0.70 *		**1.97** **	**2.06** **
Pseudo R^2	0.04	0.26	0.26	0.05	0.29	0.29	0.02	0.25	0.25
N (respondents)	1456	1456	1456	850	850	850	606	606	606

Note: significantly different from comparison category at **p<0.01; *p<0.05; +p<0.10

to continue childbearing. In contrast to the previous set of regressions, the control group here is simply individuals who have not received the results of an HIV test.

There is a slight but insignificant increase in the desire to have children among respondents who received a negative test result ("Negative*post" row). Models 3, 6 and 9 control for perceived likelihood of infection and add an interaction with learning you are HIV negative and the post period. Men who are surprised by testing negative—in other words, men who thought they might have HIV—had twice the odds of wanting to continue childbearing as would otherwise be expected. This relationship was not mirrored among the women in the sample. For women, testing negative, regardless of prior speculation about their HIV status, had no effect on the desire to have more children.

DISCUSSION AND CONCLUSION

The consequences of an AIDS epidemic to the extent of that in sub-Saharan Africa extend beyond biological impacts on mortality, morbidity and fecundity. Increasingly, the epidemic is altering the context within which critical life decisions, such as those about childbearing, are made. This paper uses longitudinal data from a mature rural Malawian sample collected over a timely period where virtually no one knew their HIV status prior to door-to-door testing as part of data collection. Both subjective ("local") and objective (biomedical) knowledge can shape fertility preferences. However, an HIV positive diagnosis has a larger impact on future childbearing plans than do the more malleable and graduated levels of self-perception. People who test positive—and men in particular—dramatically reduce their desire to continue childbearing regardless of prior speculation about their HIV status.

Despite the common practice of community discussion of HIV risk and self-diagnosis, this study finds no cross-sectional association between perceived likelihood of infection and fertility preferences. When exploring these relationships over time, however, an important interaction emerges. Men who suspect that they are HIV positive but discover they are HIV negative increase their desire to continue fathering children. In other words, when an HIV test confirms a man's self-assessment that he is at low risk for infection, it does not impact his childbearing decisions. However, when an HIV test disconfirms his fears about his own

infection, it does affect his childbearing calculus. This suggests that men are factoring their perceptions of risk into decisions about childbearing and that when they discover they are HIV negative, sometimes seemingly against all odds, they have a renewed lease on life. A recent analysis of in-depth interviews with a subsample of MDICP respondents, found that men see childbearing in the face of an HIV infection as pointless because they anticipate their early death (Yeatman 2007). It could follow that men who are surprised by being HIV negative discredit the risk of infection and begin to anticipate years of health. This response is similar to that found by Thornton (2007). She found that rural Malawians who learned they were HIV negative increased the amount of money they planned to save. Here, men invest in their future, not by saving money for future agricultural production but by desiring more children—the benefits of which accrue for men over the long rather than short term.

Female childbearing intentions are more robust to both fears about and actual HIV infection. Rural Malawian women who learned they were HIV negative had a similar desire to continue childbearing as women who did not receive their results. Even those who suspect they were HIV positive prior to being tested did not use this information to reshape their childbearing plans as the men did. And, although after they are biomedically diagnosed with HIV women increasingly want to stop childbearing, this finding is significantly weaker for women than for men.

Rural Malawians, for whom childbearing remains central, reduce their fertility preferences after a positive HIV test in anticipation of the symptoms and consequences they associate with HIV and AIDS. This reaction no doubt reflects the utter familiarity they have with the disease nowadays—everyone has seen neighbors, friends and cousins go through the various stages of illness and can easily associate their infection with a similar progression. There is something unique about an HIV positive test that prompts more dramatic changes in childbearing intentions than subjective assessments alone. This may have to do with how "real" these perceptions and local diagnoses seem to respondents. While there is evidence that these local processes are relied on for strategies to avoid infection (Watkins et al. 2007; Smith and Watkins 2005), they do not seem sufficiently powerful—where symptoms have yet to emerge—

to alter strongly held reproductive norms and desires, such as those of women in rural sub-Saharan Africa.

While situated in a unique scenario in rural Malawi, the implications of these findings extend beyond this particular case. HIV testing is rapidly spreading throughout sub-Saharan Africa and even extending into many rural areas. All evidence indicates this trend will continue and people will increasingly discover their infections early in their reproductive lives. The findings of this paper suggest that, in light of this new source of information, people in the region will plan to have fewer children or want to stop having children. With this, the desire for effective, locally acceptable and readily available contraceptives will also increase. How these changes in fertility preferences are translated into changes in behavior remains an open and empirical question. However, if couples do increasingly limit their childbearing because of HIV/AIDS, in the high fertility, high HIV prevalence context of rural SSA, it will have large demographic, epidemiological and reproductive health implications.

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