Fertility Preferences in Times of Crisis:
HIV Infection and Childbearing Intentions in Rural Malawi

Sara Yeatman
Population Research Center
Department of Sociology
University of Texas at Austin

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Introduction

The AIDS epidemic is prompting enormous social transitions in sub-Saharan Africa (SSA). While the direct effects of AIDS mortality and morbidity are relatively well documented, less attention has been given to the myriad of indirect consequences of the disease affecting individuals and affecting the social realities within which they make decisions. Nonetheless, some research has established that AIDS is influencing how people make decisions about entering and exiting unions (e.g., Reniers 2005; Watkins 2004), transforming the composition of and wealth flows within households (e.g., Baylies 2002; Deininger, Crommelynck and Kempaka 2005; Gregson, Mushati and Nyamukapa 2007; Hosegood et al. 2004), and altering investment patterns (e.g., Thornton 2005). The AIDS epidemic is also reshaping the context within which people in SSA are making choices about their childbearing. Early in the epidemic, the dominant fertility mechanism was biological, namely reduced fecundity in infected individuals. As the epidemic matures, however, the effects of earlier infections are playing a more visible role in present-day fertility decisions. As HIV testing and counseling improves across SSA, particularly in rural areas, the relationship between HIV and fertility is increasingly becoming a social, economic and cultural one.

There are a number of pathways through which HIV may affect fertility decision-making. Key among these is the premise that knowing your HIV status may alter your fertility preferences – your desire to have children. In SSA, finding out that you are HIV positive carries a multitude of associations, both with what you have learned about the disease through "official" channels, such as radio and the health system, and through "unofficial" channels such as a personal social network, observations in the community,

rumors and gossip. However, questions of how individuals apply this knowledge to their own lives and childbearing decisions remain unanswered for two main reasons. First, until recently few people in SSA were aware of their HIV status though many may have suspected they were HIV positive based upon a combination of symptomology and knowledge about their own – or their partners' – past sexual behavior (Anglewicz and Kohler 2005; Bignami-Van Assche et al. 2007; Zaba and Gregson 1998). AIDS had been identified primarily through social diagnosis rather than through HIV testing. Second, data limitations have prevented any inquiry into whether and how HIV positive and HIV negative individuals negotiate fertility differently, taking into account their pre-existing differences in fertility preferences.

This paper uses unique longitudinal data from rural Malawi, supplemented by insights drawn from in-depth interviews with a subset of these men and women, to explore if and how learning one's positive HIV status alters thinking about future childbearing. If there is indeed an association between knowledge of HIV infection and fertility preferences, the recent expansion of HIV testing facilities throughout this region can be expected to alter both fertility preferences and actual behavior by improving information. However, it is unlikely that such an effect is uniform across persons as the desires and societal pressures one faces with regard to childbearing vary considerably by gender and stage of the reproductive life course.

Literature Review

Current evidence suggests that, thus far, the principle effect of AIDS on individual fertility is biological – reduced ability to conceive and increased fetal loss in HIV positive

individuals (Nguyen et al. 2006; Ross et al. 2004). Antenatal clinic research estimates the fertility of HIV positive women to be 25 to 40 percent lower than HIV negative women, the majority of which is either biological or the result of unintentional behavior change (such as reduced coital frequency) (Zaba and Gregson 1998). Far less is known about how the epidemic affects fertility intentions, principally because there is little evidence that volitional behavior change due to HIV/AIDS has been sufficient thus far to cause a noticeable fertility impact at the individual or population level (Casterline 2002; Gregson et al. 2002; Lewis et al. 2004). Notwithstanding, there is a belief underlying research and policy such as that on the integration of family planning and HIV services that HIV positive individuals have different reproductive goals than HIV negative individuals.

Previous work on the association between HIV and fertility preferences has relied largely on hypothetical reports of uninfected persons or persons who are unaware of their own status (e.g., Baylies 2000; Moyo and Mbizvo 2004; Rutenberg, Biddlecom and Kaona 2000, see Moore et al 2006 for an exception). That little is known about the actual childbearing preferences of HIV infected persons has limited research in this area since the reality of motivation, concern and intention is likely quite different from abstract speculation thereof (Baylies 2000; Casterline 2002; Lewis et al. 2004; Moore et al. 2006; Rutenberg, Biddlecom and Kaona 2000; Setel 1995).

Despite their limitations, this prior research creates a picture of the conflicting theories on the relationship between HIV infection and fertility preferences. In regions where high fertility norms are almost universal and childbearing is central to female identity, there is some evidence that HIV positive women continue to desire more children (Aka-Dago-Akribi et al. 1999; Allen et al. 1993) and may even seek to increase

their fertility to counter higher levels of child mortality (Ntozi and Kirunga 1998; Temmerman, Chomba and Piot 1994) or to prove their health (PANOS Institute 1992). There has also been some speculation that HIV positive women may seek to shorten birth-spacing and produce children more quickly before the disease progresses (Gregson 1994; Setel 1995) though this has not been supported empirically.

In contrast, other theories and qualitative reports predict reduced desired fertility among HIV positive women for fear of transmitting the infection to future children (Gregson, Zhuwau, Anderson and Chandiwania 1997) or of childbearing worsening the disease for the mother (Baylies 2000; Rutenberg, Biddlecom and Kaona 2000). Additionally, insecurity about one's own lifespan given HIV infection may diminish fertility preferences because of concern about orphaning and providing for future and existing children (Baylies 2000; Gregson et al. 1997; Rutenberg, Biddlecom and Kaona 2000; Setel 1995). Less literature exists about how male fertility preferences in regions with high HIV prevalence change in response to HIV/AIDS. Scattered evidence (e.g. Moore et al 2006) suggests that men are less likely than women to want to cease childbearing as a result of HIV infection.

Research from large cross-sectional surveys have provided some insight (e.g., (DeRose 2006; Kalemli-Ozcan 2006; Lewis et al. 2004; Young 2005) but suffer from an inability to separate out potential endogeneity between the likelihood of HIV infection and fertility behavior and preferences. Observed differences in fertility or fertility intentions might reflect pre-existing differences among HIV positive and negative individuals rather than the affects of the disease.

Despite a limited role for behavioral changes in fertility associated with HIV/AIDS currently, such changes will be increasingly important for the region in the immediate future. The effects of earlier infections are only recently being felt in many high prevalence areas and, importantly, locally attributed to AIDS. In her discussion of the AIDS epidemic in rural Malawi, Watkins (2004) emphasizes the importance of the local attribution of deaths to AIDS in precipitating local reactions and strategies for responding to the epidemic. People discuss AIDS and offer advice to one another on ways to avoid the disease or to lessen its consequences if you are already infected. With the spread of HIV testing and counseling, such conversations have only increased and it is likely that childbearing preferences are actively being discussed and adjusted in response to people learning their HIV status.

This paper investigates whether people in rural Malawi alter their childbearing plans after discovering that they are HIV positive. Because preferences are easily separated from biological factors and are recognized as a sensitive measure of changing norms (Pritchett 1994), I focus on self-reported fertility preferences rather than fertility behavior or rates. I take a mixed methods approach, combining longitudinal survey data with in-depth interviews. The survey respondents include men and women of reproductive age who were interviewed both before and after being tested for HIV and counseled about their results. Four months after their final survey interview, I conducted in-depth interviews about fertility and related issues with of a subsample of these respondents.

Based on the qualitative reports from individuals in high prevalence communities above, I expect that individuals who find out they are HIV positive will reevaluate their

pre-existing fertility preferences and be more likely to want to stop having children. I expect that the strength of this effect will differ between men and women - in particular because of women's fears that pregnancy and childbirth will "bring out" the infection (e.g., Baylies 2000; Rutenberg, Biddlecom and Kaona 2000). Second, I hypothesize that the relationship between knowing that you are HIV positive and altering your fertility preferences will be strongest for women at later stages of their reproductive lives, because. women who already have a few children will be less conflicted by the natural and cultural desire to have children and more motivated by health fears than younger women who have not yet had many children themselves.

Study setting

Malawi offers a model site in which to explore the effects of HIV on childbearing preferences as both HIV prevalence and fertility preferences are among the highest in the world. In Malawi, as in most of 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. The combination of high HIV prevalence (14 percent of reproductive age Malawians are infected with HIV) and high fertility has resulted in over 100,000 AIDS-related deaths leaving over 500,000 AIDS orphans in Malawi (UNAIDS 2004), figures that will inevitably rise in the coming decade. Media and health campaigns have brought about vast increases in HIV knowledge in rural Malawi. Of particular relevance to this study, knowledge about the difference between HIV and AIDS has increased markedly since 2000 as has awareness

of antiretroviral medicines – which have been available at regional hospitals since mid 2005.

A series of Demographic and Health Surveys chart a shallow and gradual decline in actual and desired fertility in Malawi. In rural areas, the total fertility rate fell from 6.9 children per woman in 1992 to 6.4 in 2004 (National Statistical Office [Malawi] and ORC Macro 2005). The percent of rural women indicating a desire to stop childbearing rose sharply from 24.2 percent to 41.6 percent between 1992 and 2000 before plateauing over the next four years. A similar pattern occurred for ideal family size which fell from 5.1 children in 1992 to 4.1 and 4.2 children in 2000 and 2004 respectively (National Statistical Office [Malawi] and ORC Macro 1994, 2001, 2005).

Data and Methods

The present analysis draws upon two main data sources: survey data from the Malawi Diffusion and Ideational Change Project (MDICP) and in-depth interview data I collected in 2006 from a subsample of MDICP respondents.

MDICP is an ongoing panel survey (1998 (wave 1), 2001 (wave 2), 2004 (wave 3) and 2006 (wave 4)) of approximately 4,000 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 and permit an examination of fertility preferences following HIV testing and result dissemination.

Malawi is an ethnically diverse country and this diversity is well represented by the MDICP's three research sites: Balaka in the South is predominantly Yao, Mchinji in the Central region is dominated by Chewa. and Rumphi in the North is principally Tumbuka. The analyses include controls for each site in an effort to capture potential confounders conferred by differences in tribe as well as regional differences in the strength of family planning programs.

Fertility preferences

MDICP waves 2 and 4 contain modules on fertility preferences. Desire to continue childbearing was captured using the question: "(After the child you are expecting is born), would you like to have a(nother) child or would you like to stop having children?" 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 cant get pregnant and (e) too old.* The variable was coded such that "0" signified that the respondent did not want to have another child and "1" that the respondent wanted to continue childbearing. The sample was limited to respondents who responded that they either wanted a(nother) child or did not want a(nother) child. Respondents who responded that they were "too old", "spouse deceased" or "unable to get pregnant" in either year were dropped from the sample because of difficulty in classifying these responses *(N=295).*

HIV Testing

The key explanatory variable in the analysis is having learned that one is HIV positive. Wave 3 (2004) of the MDICP included a test for HIV and three other STIs. An oral swab

was taken from respondents in their homes and they were 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 (Thornton et al 2005).

For the sake of these analyses, respondents are assumed to not know their results prior to 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 each regional hospital (author's field notes). The rural setting of all three MDICP sites made HIV testing logistically and financially out of reach, except for very rare circumstances.

A respondent was considered to have found out they were HIV positive between 2001 and 2006 if they (1) tested positive for HIV in 2004 when they participated in the VCT portion of the 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.

Control variables

All analyses include basic controls for age, education, parity, marital status, site and sex (where appropriate).

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 separating men and women in the analyses. Additionally, information gleaned from in-depth interviews and the author's experience in rural Malawi suggests that fears related to being HIV positive and childbearing are gendered in nature.

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 linear controls. The female sample was restricted to women in their reproductive years; the analytic sample excludes women who were above age 45 in 2001.

Education: Education is measured as a binary variable with separate cut off points for women and men. Women are coded "1" if they have completed primary school and men, who are more likely to be educated, if they have some secondary school education.

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 in Malawi (Reniers 2005) and those who are separated or divorced from their partner or widowed will likely not remain in that state indefinitely. Marital status is dichotomized into currently married and formerly married for the analyses.

Region: All models include a series of dummy variables to control for region and capture some of the socio-cultural variation.

Methods

The final analytic sample consists of men and women who were interviewed in both 2001 and 2006. I constructed a time series panel dataset that consists of two records (2001 and 2006) for each respondent from the main MDICP survey. Knowledge of one's HIV status comes mainly (see above) from the MDICP 2004 dataset and was attached to each record.

A series of one-way fixed effects logit models with respect to time[1] allow me to explore the influence that learning one's HIV status has on individual fertility preferences. Fixed effects models control for unobserved characteristics within individuals (Meyer 1995) but still allow me to investigate how measured socio-demographic traits mediate this relationship.

Equation 1

$$Y = \beta_1 + \beta_2 Post + \beta_3 HIV + \beta_4 (Post \times HIV) + \beta_5 Z + \varepsilon$$

Where

Y = Desire to have another child for individual i
Post = 2006 survey data
HIV = Learned HIV positive between 2001 and 2006
Z = Other independent variables of interest

In interpreting the respective coefficients, $ß_2$ 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 and those who do not. $ß_4$ is the key inferential coefficient representing the impact that learning one is HIV positive between the two time periods has on fertility preferences; it is the effect remaining after controlling for the influence of time and the endogeneity between factors that may be related to both fertility preferences and being HIV positive.

A second version of the equation tests the hypothesis that the relationship between learning one's HIV positive status and fertility preferences differs for women across their reproductive life. I ask whether the mechanisms underpinning the relationship between HIV status and the desire to continue bearing children differ for women earlier and later

[1] Also referred to as a basic Differences in Differences model.

in their reproductive lives. To do this, I employ a series of interaction terms to preserve degrees of freedom but allow for different stories to be told (see equation 2 below).

Equation 2

$$Y = \beta_1 + \beta_2 Post + \beta_3 HIV + \beta_4 (Post \times HIV) + \beta_5 Inter + \beta_6 (Inter \times Post) + \beta_7 (Inter \times HIV) + \beta_8 (Inter \times Post \times HIV) + \beta_9 Z + \varepsilon$$

Where

Y = Desire to have another child
Post = 2006 survey data
HIV = Learned HIV positive between 2001 and 2006
Inter = Key independent variable hypothesized to have potential interactions
Z = Other independent variables of interest

Equation 2 should be interpreted similarly to equation 1 except that here $ß_4$ refers to the influence of learning one is infected with HIV for younger (or lower parity) women and $ß_4+ß_8$ refers to the influence for older (or higher parity) women.

Qualitative Data

In 2006, I directly supervised a group of experienced and well-trained Chichewa speaking interviewers in the collection of in-depth interviews with MDICP respondents in the Mchinji District of Central Malawi. Based on sex, age, HIV status and vicinity to town, I drew a stratified random sample of 48 MDICP respondents for the in-depth discussions about the role of HIV status in reproductive decision-making. Because HIV prevalence among Mchinji respondents in 2004 was 8 percent, I oversampled HIV positive individuals to ensure sufficient positive respondents for comparisons.

The interviews were designed to explore how rural Malawians who had recently learned their HIV status perceived the relationship between HIV/AIDS and childbearing. Interviewers were instructed to ask respondents about (1) family and fertility history; (2)

childbearing preferences and intentions; (3) perception of the relationship between HIV and childbearing; (4) specific HIV testing experience and its influence on childbearing decisions (if this did not already come up spontaneously under (3)); and (5) stories from the community about men or women who were HIV positive and either continued having children or ceased childbearing.

This analysis relies heavily upon the 8 interviews that were conducted with HIV positive women and the 5 interviews conducted with HIV positive men - focusing specifically on the discussion of how learning their HIV status influenced their thinking about childbearing. I did not disclose the respondent's HIV status to the interviewers prior to these interviews and instructed them not to elicit this information. All but two of the respondents initiated the disclosure of their HIV status to the interviewer during the course of the interview. The near universality of this acknowledgement is testament to the rapport interviewers successfully established with respondents as well as the complicated nature of stigma in rural Malawi – people do talk about their HIV status though they may be more likely to do so with a stranger than within their community.

---Table 1 about here---

Results

Table 1 presents descriptive characteristics of the analytic sample. In total, 673 women and 555 men each contributed two records of data--one in 2001 and one in 2006. Fifty-eight percent of women responded that they wanted to have another child or a child (if they had no children at the time of interview) in 2001. Five years later, only 32 percent of

these same women wished to continue bearing children. Men experienced a similar decline (54 percent to 35 percent) in their desire to bear a(nother) child after five years. Figure 1 illustrates the declining desire to continue childbearing with age. It also reveals a different age pattern in 2001 and 2006. At the younger end of the reproductive spectrum men and women in 2006 are more likely to want to stop childbearing. However, at the older ages, age-specific desire to continue childbearing is identical to that in 2001.

---Figure 1 about here---

Table 2 presents a crude picture of how the desire to continue childbearing changes within the same group of men and women over the five years between 2001 and 2006. The sample is separated by the key dependent variable, learning that one is HIV positive between 2001 and 2006. Respondents are further divided into earlier and later periods of reproductive life—first by age and then by parity. These cut points are set so that the groups stay the same over the five years. There is strong desire to continue childbearing among younger men and women in 2001. Among the older samples, persons who will subsequently learn they are HIV positive are more likely to want another child. Five years later, desire to continue bearing has declined over all and differences in the dependent variable have disappeared. The parity rows are slightly more difficult to interpret as the parity cutoff is based on 2006 parity rather than 2001 because this figure is more meaningful to later analyses. Still, we see a strong desire among women with fewer than three children to give birth again. In 2006 following HIV testing, men who

know that they are infected with HIV have a distinctly diminished desire to continue having children compared to other low parity men. While simple tables such as this are helpful in presenting a basic picture, clearly a more complex model that capitalizes on the panel structure of the data and controls for pre-existing characteristics is necessary.

---Table 2 about here---

One of the primary advantages of this analysis over previous studies is the ability to measure changes in respondents' fertility desires between 2001 and in 2006 using longitudinal data. Since both age and parity increase over time, decreasing one's ability and desire for more children, fertility preferences decline for almost everybody. I address this temporal change in preferences using controls for age and parity which change with time as well as with a separate control for time period that accounts for unmeasured differences that may affect reproductive intentions between 2001 and 2006. A dummy variable indicating that the respondent learned about their HIV positive status indicates whether or not there are baseline differences in fertility desires between persons who later learn that they are HIV positive and those who are either HIV negative or are positive but do not learn their status[2] (from here referred to as "known HIV positive" or simple "HIV positive" and "HIV negative" for simplicity). Finally, the interaction between the change in fertility preferences and learning one's HIV positive status shows whether and to what

[2] 25 respondents tested positive in 2006 but are considered in the comparison category in this analysis because they either were not tested prior to the interview in 2006 (majority) or were tested by MDICP or another group but did not receive their results. Detailed questions on HIV testing history as well as data from MDICP testing and returning for results in 2004 allow us to be fairly confident that these respondents do not *know* their HIV status though they may suspect that they are positive.

extent the decline in fertility preferences over time is amplified or reduced by knowledge of your HIV status.

While the overall sample size is large, the sample of HIV positive persons is (thankfully for humanitarian purposes) rather small (36 women, 15 men). While HIV prevalence in the 2004 MIDCP sample as a whole was 7 percent (Thornton et al. 2005), HIV positive persons were less likely to be interviewed again in 2006 because of increased mortality and morbidity and higher refusal rates. Because of the small number of HIV positive persons in the analytic sample, results should be interpreted with caution. Nonetheless, findings are robust to changes in model and the reduced odds of desiring another child are substantially lower among positive persons, if occasionally of borderline statistical significance.

---Table 3 about here---

The models reveal no net difference in fertility desires between HIV positive and HIV negative individuals prior to HIV testing. As expected, the desire to continue having children decreases over time. Age, living children and education also operate in the direction expected from the wealth of literature on fertility preferences. Mchinji residents are less than half as likely to want to continue childbearing as respondents of Balaka, where families tend to be larger and the population is noticeably denser. Male respondents in Rumphi are twice as likely as those in Balaka to want to continue childbearing, though no such difference is observed between the women of these districts.

Model 1 reveals that net of socio-demographic and geographic characteristics, women who learned that they were HIV positive between 2001 and 2006 are only one third as likely as those who are not infected to desire a subsequent birth. Interview data from these same HIV positive women reveal their deep concerns about the physical effects of pregnancy and childbirth on their health - as well as the potential health consequences for a new baby.

> Interviewer: How did your results change your thoughts?
> Respondent: They really changed me because they found me with the virus, so when I thought it wise, I thought that if I continue bearing that means the virus will starts its activeness soon.
> (29 year old woman, 2 children)

> I: After knowing your HIV status did you want to continue having children?
> R: I do not want to have another child but my spouse insists on having children. But I said no I already have a problem. I cannot continue taking medicine which will make me have children; maybe they will also add some disease in my body. Oo I can give birth to a weak child who will not live longer. And if the child is dead I will also be worried and I can die because of stress.
> I: Did your spouse agree with you?
> R: It is difficult for him to agree because he wants to have a child. So I just pretend as if I really want to have a child but I know for sure that I cannot have another child.
> I: Mmmh you pretend as if you also want to have a child?
> R: Mmmh but I do not want to have a child.
> (29 year old woman, 1 child)

I anticipated that the reduced desire to bear children would be greatest among women at later stages of reproduction---in other words, among older women with many children who survived early childhood. To test this hypothesis, Models 2 and 3 add an interaction term for women who are “older” (above age 35 in 2006) and women of high parity (4 or more children in 2006). While Model 1 accounts for differences in preferences that might exist because of differences in age or parity by controlling for

living children and age, the three-way interaction terms allow for a distinct fertility response to finding out one is HIV positive for older (Model 2) and high parity (Model 3) women. No new significant relationships emerge from these interactions. However, in Model 2 we see a substantial depressive effect for older HIV positive women suggesting that the reduced desire for another child seen in Model 1 is largely driven by these women.

The final two models look at the effect of learning one's HIV positive status on men. Model 4 is limited to the male sample alone. Though marginally significant, HIV positive men have dramatically reduced odds of wanting to have another child relative to men who are not infected. The impact of learning that one is HIV positive on the desire to have children for men is comparable to that found for women. The following quotes from HIV positive males in the sample illustrate this finding.

> R:….but we received this disease, so there is nothing we can do about childbearing; we just admire people….there is no reason to continue bearing if my body is damaged.
> (47 year old man, 8 children, only 1 child with his new wife)

> I: Mmmh. Fine now you said that you wanted four children here. But at the moment you have borne only three and one died.
> R: Mm
> I: What are your thoughts?
> R: My thoughts are that now it's over since I also contracted Kadeyo [meaning a small insect, here referring to HIV]. It won't be beneficial if I am to bear again.
> I: Why is that you cannot bear children again?
> R: Because I cannot care for those children. I can leave them very soon.
> I: Ohoo who told you that you can leave them very soon?
> R: I alone as I have been seeing how people die when they contract this disease.
> (42 year old man, 2 children)

Since the initial analyses reveal no significant difference in the patterns observed for men and for women, I analyze male and female respondents together, controlling for

sex, in order to increase statistical power. Model 5 shows a strong negative effect of learning one's HIV positive status on the desire to have another child. Overall, HIV positive respondents are less than one-third as likely to want to have another child as other respondents.

The finding of reduced fertility desires is consistent across sexes and across models. However, the fact that over 20 percent of men and women (not shown) who learn that they are infected with HIV still want to have children warrants some discussion as well. The qualitative data revealed some evidence of an overpowering desire to continue having children in spite of or perhaps regardless of being HIV positive. One respondent who tested positive for HIV in 2004 and returned to be counseled about her results did not reveal her HIV status to the interviewer.

> I: Mmm what did you do after hearing your HIV results?
> R: I did something.
> I: What did you do?
> R: I just said it is none of my business.
> I: I beg your pardon.
> R: I just left these aside; I have got nothing to do with this. The most important thing to me is I will still have children.
> (25 year old woman, 3 children)

The qualitative data reveal that HIV positive women in rural Malawi live with an internal conflict – they must choose between their fears about the disease harming them or their children physically and cultural pressures, both internal and externally imposed, to bear children. Such emotions are particularly strong among women who have not had any children (possibly because of the biological effects of HIV/AIDS). One 28 year old HIV positive woman and her husband who had been married for five years talked about being ostracized in their community – not because of their HIV status but because of their

inability to have a child that survived childbirth. While the former is a potentially private affliction (at least until symptoms become visible), the latter is an invariably public one, the shame of which extends beyond the couple themselves.

When asked how her HIV test results affected her thoughts on childbearing, she responded: “My understanding on childbearing is that whether I will have children or not let it be that’s how God created me.” Her response has an air of defeatism, as one might imagine from a woman who has been trying relentlessly to have children in this pro-natalist society. She would be delighted to have a child, and her HIV status is barely even a consideration in this decision.

Discussion

Panel data that can account for pre-existing fertility preferences permit us a clearer picture of the directionality and causal mechanisms underlying the relationship between HIV status and childbearing intentions in rural Malawi. Rural Malawians who learn that they are HIV positive are more likely than their peers to want to stop childbearing. This finding exists net of prior fertility preferences. In other words, when no one knew their HIV status, no difference in fertility intention existed after controlling for socio-demographic characteristics. However, five years later, those who learned that they were infected with *kachilombo* (a local term that literally means “small animal” but is commonly used to refer to the HIV virus) had substantially reduced desires to continue childbearing.

Despite strong theoretical grounds to expect this relationship to differ by gender, men and women are equally likely to want to stop bearing children following a positive

HIV test. The directionality and the approximate strength of this relationship are similar for both groups. However, the qualitative data reveal that the concerns motivating this change are actually quite different for men and for women. HIV positive women discussed issues of physical health as paramount; they repeated again and again the more hypothetical fears of the HIV negative women in our sample that the physical demands of pregnancy and childbirth elicit AIDS (generally meaning the physical symptoms) from this latent "small animal"-- HIV. Men, on the other hand, gave explanations that were less tied to the biological processes involved with pregnancy and childbirth. They are less concerned with the physical effects of childbearing on the health of the mother or the effects of the disease on the health of the child. Rather, men are more inclined to feel that having a child is "pointless" if they are infected with HIV. If the man himself will not live to reap the (economic or cultural) benefits of a child, why have that child?

Although I expected the relationship between being HIV positive and future fertility preferences to be strongest for women at later stages of their reproductive careers, I found only weak evidence to this effect. And to the extent that such evidence exists, age is a stronger determinant of reduced fertility desire for HIV positive women than parity.

HIV positive and HIV negative qualitative respondents often spontaneously brought up topics such as "these new medicines" (antiretroviral treatment) and "programs that doctors have now to protect babies" (Prevention of Mother to Child Transmission Clinics) that they hear about on the radio and are newly discussing within social networks. These innovations do not yet have a strong presence in communities and few people actually know someone who has used them successfully. Nonetheless, these

accounts suggest a future role for improved local knowledge and experience with ARVs and PMTCT in moderating fears about the effects of HIV and in mitigating desires to stop childbearing currently seen in these data.

This paper's findings are a function of the specific context and time from which they are drawn. Rural Malawi created a unique quasi-experimental setting where no one *knew* their HIV status prior to 2001 and where, in the MDICP sample, almost everyone *knew* their status in 2006. This unique scenario provides insight into what we can expect to occur as HIV testing and counseling spreads to other high HIV prevalence settings at similar stages in their fertility transitions. As HIV testing spreads to rural areas and as villages that were previously unaffected by the epidemic begin to feel the toll of the disease, desired fertility will continue to drop, prompting an increased demand for contraception and a sharp decline in the fertility of HIV positive individuals.

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								
Learnt HIV positive	n/a				0.06	0.23	0	1
INDEPENDENT VARIABLES								
Want a(nother) child	0.58	0.49	0	1	0.32	0.47	0	1
Age	31.37	7.14	15	45	36.37	7.14	20	50
Living children	3.60	2.02	0	10	4.55	1.93	0	10
Completed primary school	0.18	0.39	0	1	0.18	0.39	0	1
Currently married	0.95	0.22	0	1	0.93	0.25	0	1
Southern Region	0.36	0.48	0	1	0.36	0.48	0	1
Central Region	0.33	0.47	0	1	0.33	0.47	0	1
Northern Region	0.32	0.46	0	1	0.32	0.46	0	1
INTERACTION TERMS								
"Older"	n/a				0.51	0.50	0	1
"High parity"	n/a				0.47	0.50	0	1

N=673

Men 2001					**Men 2006**			
Variable	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
DEPENDENT VARIABLE								
Learnt HIV positive	n/a				0.03	0.16	0	1
INDEPENDENT VARIABLES								
Want a(nother) child	0.54	0.50	0	1	0.35	0.48	0	1
Age	38.87	9.69	16	72	43.87	9.69	21	77
Living children	4.38	2.66	0	15	5.38	2.55	0	19
Some secondary school	0.13	0.34	0	1	0.13	0.34	0	1
Currently married	0.98	0.14	0	1	0.97	0.16	0	1
Southern Region	0.28	0.45	0	1	0.28	0.45	0	1
Central Region	0.38	0.48	0	1	0.38	0.48	0	1
Northern Region	0.34	0.47	0	1	0.34	0.47	0	1

N=555

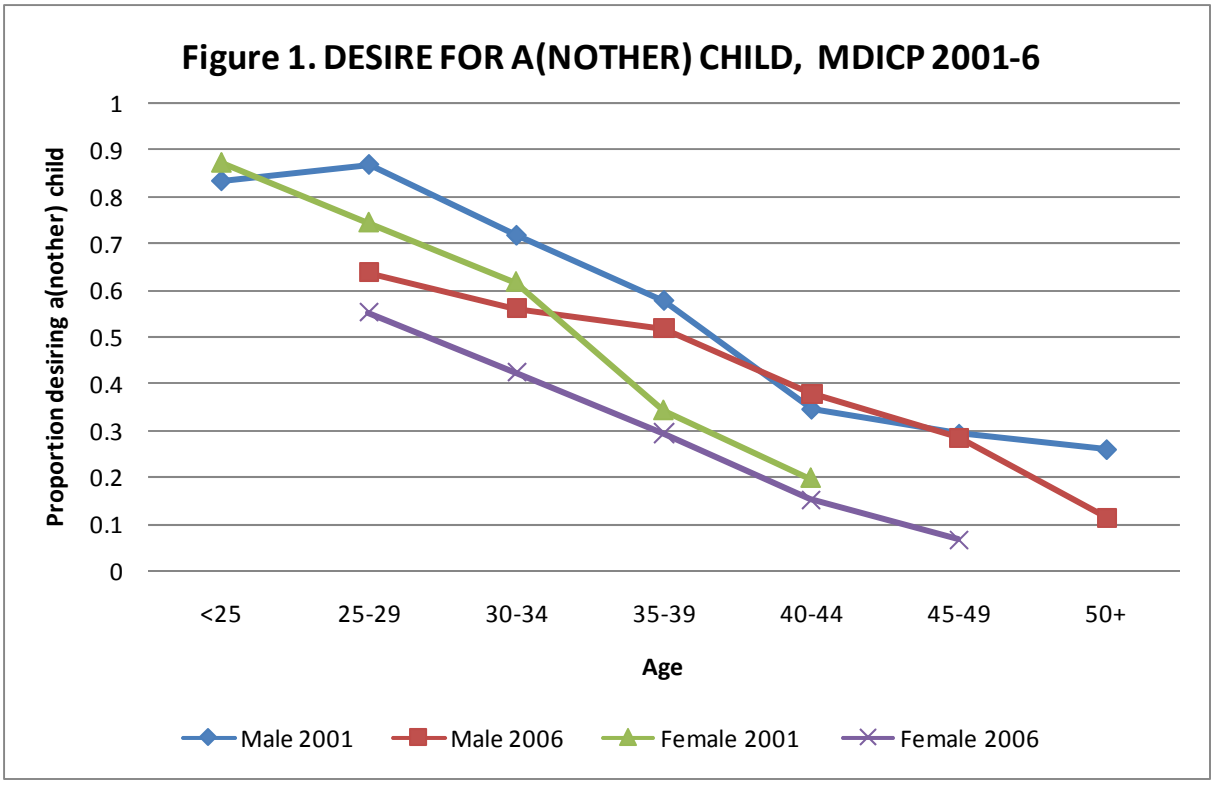

Table 2. DESIRE FOR A(NOTHER) CHILD BY 2006 HIV STATUS

	Women, % *(n)*				Men, % *(n)*			
	2001		2006		2001		2006	
	HIV+	Other	HIV+	Other	HIV+	Other	HIV+	Other
Younger[1]	80	80	45	50	86	72	14	50
	(20)	*(309)*	*(20)*	*(309)*	*(7)*	*(324)*	*(7)*	*(324)*
Older	58*	35*	5	16	38+	27+	13	14
	(19)	*(325)*	*(19)*	*(325)*	*(8)*	*(216)*	*(8)*	*(216)*
Low parity[2]	86	80	43	57	67	77	17*	66*
	(14)	*(186)*	*(14)*	*(186)*	*(6)*	*(122)*	*(6)*	*(122)*
High parity	60	48	16	22	56	47	11	27
	(25)	*(448)*	*(25)*	*(448)*	*(9)*	*(418)*	*(9)*	*(418)*

[1] "younger" refers to women under age 30 in 2001 and men under age 40 in 2001

[2] "low parity" refers to men or women who have 4 or more living children in 2006

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

Table 3. ODDS RATIOS FOR DESIRE TO HAVE A(NOTHER) CHILD, 2001-2006

	WOMEN ONLY			MEN ONLY	ALL
	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5
Age	**0.89** **	**0.90** **	**0.89** **	**0.93** **	**0.92** **
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)
Primary education	**0.56** **	**0.56** **	**0.56** **	**0.58** *	**0.55** **
	(0.11)	(0.11)	(0.11)	(0.13)	(0.08)
Living children	**0.63** **	**0.63** **	**0.63** **	**0.72** **	**0.67** **
	(0.03)	(0.03)	(0.04)	(0.03)	(0.02)
Married	1.39	1.44	1.39	0.50	1.06
	(0.42)	(0.44)	(0.42)	(0.24)	(0.25)
Central site	**0.40** **	**0.40** **	**0.40** **	**0.69** *	**0.50** **
	(0.07)	(0.07)	(0.07)	(0.13)	(0.06)
Northern site	0.82	0.82	0.82	**2.10** **	**1.25** +
	(0.15)	(0.15)	(0.15)	(0.41)	(0.16)
Learnt HIV+	1.09	0.76	1.17	1.32	1.24
	(0.45)	(0.46)	(0.99)	(0.83)	(0.42)
Post	**0.65** **	**0.64** *	**0.62** +	**0.74** *	**0.69** **
	(0.09)	(0.14)	(0.16)	(0.11)	(0.07)
Positive*post	**0.36** +	0.77	0.34	**0.16** +	**0.29** *
	(0.21)	(0.61)	(0.35)	(0.16)	(0.14)
"Older"		0.88			
		(0.25)			
Older*positive		1.84			
		(1.48)			
Older*post		0.94			
		(0.27)			
Older*positive*post		0.11			
		(0.16)			
High parity			0.99		
			(0.26)		
Hiparity*positive			0.90		
			(0.88)		
Hiparity*post			1.09		
			(0.34)		
Hiparity*positive*post			1.13		
			(1.45)		
Male					**2.32** **
					(0.26)
Log Likelihood	-658.54	-656.70	-658.46	-580.92	-1258.38
R^2	0.29	0.29	0.29	0.24	0.25
N (respondents)	673	673	673	555	1228

Literature Cited

Aka-Dago-Akribi, H., A. Desgrees du Lou, P. Msellati, R. Dossou, and C. Welffens-Ekra. 1999. "Issues surrounding reproductive choice for women living with HIV in Abidjan, Cote d'Ivoire." *7* 13.

Allen, S., A. Serufilira, V. Gruber, S. Kegeles, P. Vandeperre, M. Carael, and T. J. Coates. 1993. "Pregnancy and Contraception Use among Urban Rwandan Women after Hiv Testing and Counseling." *American Journal of Public Health* 83:705-710.

Anglewicz, P., and H.P. Kohler. 2005. "Overestimating HIV Infection: The Construction and Accuracy of Subjective Probabilities of HIV Infection in Rural Malawi." *University of Pennsylvania Working Paper*.

Baylies, C. 2000. "The impact of HIV on family size preference in Zambia." *Reproductive Health Matters* 8:77-86.

—. 2002. "The impact of AIDS on rural households in Africa: A shock like any other?" *Development and Change* 33:611-632.

Bignami-Van Assche, S., L. W. Chao, P. Anglewicz, D. Chilongozi, and A. Bula. 2007. "The validity of self-reported likelihood of HIV infection among the general population in rural Malawi." *Sexually Transmitted Infections* 83:35-40.

Casterline, John B. 2002. "HIV/AIDS and Fertility in Sub-Saharan Africa: A Review of the Recent Literature." edited by United Nations. New York.

Deininger, K., A. Crommelynck, and G. Kempaka. 2005. "Impact of AIDS on family composition, welfare, and investment: Evidence from Uganda." *Review of Development Economics* 9:303-324.

DeRose, L. F. 2006. "Higher community HIV prevalence predicts higher recent marital fertility in Kenya." *Paper presented at Annual Meeting of Population Association of America, Los Angeles*.

Gregson, S. 1994. "Will Hiv Become a Major Determinant of Fertility in Sub-Saharan Africa." *Journal of Development Studies* 30:650-679.

Gregson, S., P. Mushati, and C. Nyamukapa. 2007. "Adult mortality and erosion of household viability in AIDS-afflicted towns, estates, and villages in eastern Zimbabwe." *Jaids-Journal of Acquired Immune Deficiency Syndromes* 44:188-195.

Gregson, S., N. Terceira, M. Kakowa, P. R. Mason, R. A. Anderson, S. K. Chandiwana, and M. Carael. 2002. "Study of bias in antenatal clinic HIV-1 surveillance data in a high contraceptive prevalence population in sub-Saharan Africa." *Aids* 16:643-652.

Gregson, S., B. Zaba, and S. C. Hunter. 2002. "The impact of HIV-1 on fertility in Sub-Saharan Africa: causes and consequences." New York: UN Expert Group Meeting on Completing the Fertility Transition.

Gregson, S., T. Zhuwau, R. A. Anderson, and S. K. Chandiwana. 1997. "HIV and fertility change in rural Zimbabwe." *Health Transition Review*.

Hosegood, V., N. McGrath, K. Herbst, and I. M. Timaeus. 2004. "The impact of adult mortality on household dissolution and migration in rural South Africa." *Aids* 18:1585-1590.

Kalemli-Ozcan, S. 2006. "AIDS, Reversal of the Demographic Transition, and Economic Development." *NBER Working Paper No. W12181*.

Lewis, J. J. C., C. Ronsmans, A. Ezeh, and S. Gregson. 2004. "The population impact of HIV on fertility in sub-Saharan Africa." *Aids* 18:S35-S43.

Meyer, B. D. 1995. "Natural and Quasi-Experiments in Economics." *Journal of Business & Economic Statistics* 13:151-161.

Moore, A.M., C. Nakabiito, F. Mirembe, S.D. Singh, A. Bankole, L. Dauphinee, and E. Prada. 2006. "Childbearing decisions among HIV-positive women: results from a qualitative study in Kampala, Uganda." *Paper presented at Annual Meeting of Population Association of America, Los Angeles*.

Moyo, W., and M. T. Mbizvo. 2004. "Desire for a future pregnancy among women in Zimbabwe in relation to their self-perceived risk of HIV infection, child mortality, and spontaneous abortion." *Aids and Behavior* 8:9-15.

National Statistical Office (NSO) [Malawi], and Macro International Inc. 1994. "Malawi Demographic and Health Survey 1992." Zomba, Malawi and Calverton, Maryland, USA: National Statistical Office and Macro International.

National Statistical Office (NSO) [Malawi], and ORC Macro. 2001. "Malawi Demographic and Health Survey 2000." Zomba, Malawi and Calverton, Maryland, USA: National Statistical Office and ORC Macro.

—. 2005. "Malawi Demographic and Health Survey 2004." Calverton, Maryland: NSO and ORC Macro.

Nguyen, R. H. N., S. J. Gange, F. Wabwire-Mangen, N. K. Sewankambo, D. Serwadda, M. J. Wawer, T. C. Quinn, and R. H. Gray. 2006. "Reduced fertility among HIV-infected women associated with viral load in Rakai district, Uganda." *International Journal of Std & Aids* 17:842-846.

Ntozi, J.P., and C.T. Kirunga. 1998. "Family planning and HIV/AIDS in sub-Saharan Africa: challenges and strategies." *African Journal of Reproductive Health* 2:44-56.

PANOS Institute. 1992. "The Hidden Cost of AIDS: The Challenge of HIV to Development." London: PANOS Publications.

Pritchett, L. H. 1994. "Desired Fertility and the Impact of Population Policies." *Population and Development Review* 20:1-55.

Reniers, G. 2005. "Marital strategies for managing exposure to HIV in rural Malawi." *Paper presented at Annual Meeting of the Population Association of America, Philadelphia*.

Ross, A., L. Van der Paal, R. Lubega, B. N. Mayanja, L. A. Shafer, and J. Whitworth. 2004. "HIV-1 disease progression and fertility: the incidence of recognized pregnancy and pregnancy outcome in Uganda." *Aids* 18:799-804.

Rutenberg, N., A. E. Biddlecom, and F. A. D. Kaona. 2000. "Reproductive decision-making in the context of HIV and AIDS: A qualitative study in Ndola, Zambia." *International Family Planning Perspectives* 26:124-130.

Setel, P. 1995. "The effect of HIV and AIDS on fertility in East and Central Africa." *Health Transition Review* 5.

Temmerman, M., E. N. Chomba, and P. Piot. 1994. "Hiv-1 and Reproductive Health in Africa." *International Journal of Gynecology & Obstetrics* 44:107-112.

Thornton, R. 2005. "The Demand for and Impact of Learning HIV Status: Evidence from a Field Experiment." *Unpublished Manuscript*.
Thornton, R., A. Bula, K. Chavula, S. Bignami-Van Assche, and S. C. Watkins. 2005. "Reactions to Voluntary Counseling and Testing in Rural Malawi." *Malawi Diffusion and Ideational Change Project, Working Paper*.
UNAIDS. 2004. "2004 Report on the Global AIDS Epidemic." Geneva: Joint United Nations Programme on HIV/AIDS (UNAIDS).
Watkins, S. C. 2004. "Navigating the AIDS epidemic in rural Malawi." *Population and Development Review* 30:673-+.
Young, A. 2005. "The gift of dying: The tragedy of AIDS and the welfare of future African generations." *Quarterly Journal of Economics* 120:423-466.
Zaba, B., and S. Gregson. 1998. "Measuring the impact of HIV on fertility in Africa." *Aids* 12:S41-S50.