"From Intentions to Behavior: How Does HIV Awareness Influence Fertility?"
Sarah Hayford and Victor Agadjanian, Arizona State University
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Extended abstract:

Evidence dating back to the early years of the African epidemic shows that HIV/AIDS

reduces fertility at both the individual and the population level. (See Kaida et al. 2006; Lewis et

al. 2004; Zaba and Gregson 1998 for reviews of this literature). Birth rates of HIV+ women have

been estimated to be 25-40% lower than those of uninfected women (Zaba and Gregson 1998).

Most of this reduction is attributable to biological and behavioral proximate determinants,

including lower fecundability and greater fetal loss among HIV+ women and lower coital

frequency among HIV+ couples due to illness (Lewis et al. 2004).

Recent research has focused on more distal attitudinal determinants of fertility among

HIV+ women. In the early years of the epidemic, few individuals knew whether they were

infected. Thus, the lower fertility of HIV+ women was unlikely to be the result of deliberate

decisions about childbearing (Terceira et al. 2003). More recently, however, expanded voluntary

testing programs have increased the number of HIV+ people aware of their serostatus at early

stages of infection. Among these people, HIV infection may affect fertility by influencing desires

and intentions for children. In addition, even people who do not know their status but suspect

they are HIV+ may modify their desire for children in response to fears about the disease.

This analysis adds to existing research on HIV and childbearing by examining the

relationship between perceived serostatus, fertility intentions, and fertility behavior. It moves

beyond much previous research by using longitudinal data to study how intentions predict later

behavior and how intentions evolve over time. Data come from southern Mozambique, a region

experiencing high HIV infection levels, high labor migration, high fertility, and rapidly

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expanding facilities for testing and treatment of HIV/AIDS. Two waves of data from a household-based survey are used to examine the relationship between perceived serostatus and fertility intentions in 2006 and their joint effects on fertility behavior by 2009. This extended abstract outlines the motivation for the study and provides preliminary results based on the first wave of data collection. Data from the second wave of the survey in 2009 have been collected but are not yet ready for analysis. These data will be available in mid-fall 2009; the analyses that will be conducted using these data are described in this extended abstract.

Background

Studies of fertility intentions among HIV+ individuals have found ambivalence and mixed results (Aka-Dago-Akribi et al. 1999; Baylies 2000; Cooper et al. 2007; Emenyonu et al. 2008; Moore et al. 2006; Nakayiwa et al. 2006). On the one hand, women express worry about the possibility of bearing HIV+ children, the impact of pregnancy on their own health, and what will happen to their children in the event of their death. On the other hand, individuals report a strong desire to bear and raise children, consistent with the high social value placed on children. The relative strength of these conflicting feelings varies according to individual and contextual factors. For instance, young women and low parity women are more likely to desire some additional children, but also more likely to reduce their intended lifetime fertility (Aka-Dago-Akribi et al. 1999; Emenyonu et al. 2008). Unmarried women express more confidence in their ability to stop childbearing than married women, who in many contexts report pressure from husbands to have children (Cooper et al. 2007).

The growing availability of anti-retroviral therapy (ART) and treatment to prevent mother to child transmission (PMTCT) has changed the social landscape for reproductive decision making in the context of HIV/AIDS. Improved access to treatment means that HIV+

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women and couples can expect longer periods of good health in which to bear and rear children, and better means of preventing vertical transmission increase the odds that HIV+ couples will have HIV- children. Given the relatively recent rollout of widespread ART and PMTCT programs in sub-Saharan Africa, empirical literature on how the changed environment affects reproductive decision-making is limited. Some evidence suggests that the availability of PMTCT and ART programs mitigate women's concerns about childbearing (Cooper et al. 2007; Emenyonu et al. 2008).

As HIV treatment has become more available, testing for HIV has also become more widespread. However, even in the absence of testing, people living in areas with high levels of HIV infection form opinions about the likelihood that they are or will become infected (Anglewicz and Kohler 2009; Bignami-Van Assche et al. 2007; Smith and Watkins 2005; Zaba and Gregson 1998). These subjective assessments of risk have been shown to be correlated with reduced fertility intentions in some settings (Baylies 2000; Yeatman 2009), although other studies suggest that perceived HIV risk is not associated with desires for children (Moyo and Mbizvo 2004; Rutenberg, Biddlecom, and Kaona 2000).

Little research has linked fertility *intentions* with fertility *behavior* among women who are or fear they may become HIV+. In many parts of sub-Saharan Africa, especially rural areas, effective contraceptives are not widely available or not widely accepted. Thus, women may have difficulty carrying out intentions to delay or stop childbearing. It is possible that women who want to avoid childbearing because of fears about HIV are more motivated to prevent conception than other women with similar fertility preferences. In addition, if women who worry about HIV infection have more frequent contact with medical facilities, they may have better access to effective contraception. This paper will test the hypothesis that women who are very worried

about HIV will be better able to carry out intentions to not have children than women who are not worried about HIV.

Setting

This analysis focuses on these questions through a study of fertility intentions and behavior in Mozambique, a country of some 20 million inhabitants located in southeast Africa. Data come from a representative survey of married women aged 18-40 conducted in July 2006 in the rural areas of four contiguous districts (total area 5900 square miles, population 625,000) of Gaza province in Southern Mozambique. (The survey is described in more detail in the data section below.) A former Portuguese colony that gained independence in 1975, Mozambique was battered by a civil war for the first decade and a half of its independent existence. Since the end of the war in 1992 and the deployment of economic structural adjustment programs in the early 1990s, the country has experienced remarkable macroeconomic growth. Yet with an average per capita annual income of $320, life expectancy of 42 years, and female literacy rate of 32%, Mozambique remains one of the poorest and least economically developed nations in the world (World Bank 2009).

Since colonial times, Mozambicans have worked in South African mines, and this legal migration flow continues to date (CEA/UEM 1997; Crush 2001; Crush et al. 1991; First 1983; Harries 1994). Partly due to the precariousness of agricultural production and partly because of Gaza's proximity to South Africa, the area of our study has historically had particularly high rates of male labor migration. In parallel to international migration, migration within Mozambique, particularly from rural to urban areas, has also been growing rapidly (Dow 1989; Jenkins 1993; Knauder 2000). Importantly, today both internal and international migratory moves often fall short of fulfilling the promise that generates them, as migrants rarely manage to

secure decently paying jobs at their destinations (de Vletter 2000). Yet despite drastically diminished returns, the migration flow continues unabated as rural economies continue to stagnate.

Changing migration regimes have been at the root of transformations of family, kinship, and gender systems. They have also played a significant role in the HIV/AIDS epidemic in sub-Saharan Africa. Although direct evidence linking migration to HIV/AIDS in Mozambique is lacking, higher seroprevalence levels around the transportation corridors and along international borders (Barradas and Arnaldo 2003; Barreto et al. 2002; Raimundo 2004) indirectly support this connection. Today, Mozambique is among the world's worst affected countries by the HIV/AIDS epidemic: the national adult prevalence rate among adults aged 15–49 increased from 8.2% in 1998 to 16.0% in 2007 (Ministry of Health 2008). In Gaza, estimated HIV prevalence rose from 19% in 2001 to 27% in 2007, the highest level of all of Mozambique's provinces (Ministry of Health 2005, 2008).

There is some evidence that fertility transition has begun in Gaza province. According to the most recent Demographic and Health Survey (DHS), conducted in 2003, virtually all women surveyed in Gaza reported knowing at least one modern method of contraception. At the time of the DHS, about 15% of women of reproductive age were using some form of modern contraception, primarily hormonal methods, and more than three quarters of non-users reported planning future use. Still, desired family size is high (median of 4.3 children), and contraception is largely used for spacing at low parities. Birth rates also remain high, with an estimated TFR in Gaza of 5.4 children per woman (Instituto Nacional de Estatística and Ministério da Saúde 2005).

Data and methods

Data

The sample for the individual survey was drawn from the population of married women aged 18-40 residing in 56 villages of four districts in southern Mozambique. In each district, 14 villages were selected with probability proportional to size. In each selected village (or randomly selected section thereof if a village was large), all households with at least one married woman were canvassed and divided into two groups—those with at least one woman married to a migrant and those with no such women. These two groups were used as separate sampling frames: from each of them 15 households were randomly selected. In each selected household a woman was interviewed (in households classified as migrant, a woman married to a migrant was interviewed). The resulting sample consisted of 1680 women (420 per district, 30 per village), more or less evenly split between women married to migrants and women married to non-migrants. The survey collected detailed demographic and socioeconomic information, including pregnancy histories, reproductive intentions, husband's migration history, and household material status, as well as information on HIV/AIDS awareness and prevention, women's social networks, and their gender attitudes. In parallel with the individual women's survey, a community survey was carried out in each of the villages included in the sample. The community survey focused on village economic and social life, out-migration, and HIV/AIDS issues. In addition, a survey was conducted in all maternal and child health facilities in the survey districts. This survey collected information on the services provided by the facilities, the number and characteristics of clinic staff, and selected organizational characteristics.

Measures of perceived HIV status

The primary independent variables of interest in this analysis are measures of the respondents' perceived risk of having or contracting HIV. We use two variables, subjective assessment of risk and medicalized knowledge of exposure.

To measure subjective risk, we assess how worried the respondent is about contracting HIV. This measure is constructed based on responses to two questions: "Are you very worried, a little worried, or not worried at all about the possibility of contracting the AIDS virus from your husband?" and a similar question asking about contracting the virus from another man. The primary division in responses is between women who were very worried and women who were not worried: few women (less than 5% of the sample) answered "a little worried" to these questions. The variables were therefore combined into a single dichotomous measure, with women who answered "very worried" to either of those questions assigned a value of 1 and all other women assigned a value of 0.

Given the relatively low level of testing in this sample in 2006 (see Table 1), worry about HIV infection is unlikely to be primarily determined by medical knowledge of HIV status. (Although women were not directly asked if they were HIV positive, responses indicating that they knew themselves to be HIV+ were recorded; only one woman in the sample reported that she was HIV+.) In similar settings, worry about HIV has been shown to be closely correlated with a more direct measure of perceived risk, such as questions about how likely a respondent thinks s/he is to be HIV positive (e.g., Smith 2003; Kohler, Behrman, and Watkins 2007). Compared to questions about likelihood of infection, the question about worry captures a more emotional component of perceived risk, which may be a stronger influence on behavior (Smith and Watkins 2005). Both of these subjective measures are associated with actual serostatus,

though there is some evidence that people tend to overestimate the likelihood that they are infected (Anglewicz and Kohler 2009; Kengeya-Kayondo et al. 1999; Yeatman 2009).

In addition to the subjective measure of worry, analyses also incorporate a dichotomous measure of whether the woman has ever been tested for HIV. This measure is treated as a moderator of the effect of worry about HIV: women who have been tested are assumed to be more sure of their status (either positive or negative), and thus the effect of worry will be stronger for these women. (The outcome of HIV tests was not recorded.) Having been tested may also be an independent indicator of worry, to the extent that women who are most concerned about HIV are most likely to be tested. In this context, however, a large proportion of testing takes place during prenatal consultations, and testing is recommended for all pregnant women. Having been tested is largely a product of the timing of childbearing (since testing was introduced only recently in this area, recent prenatal care is more likely to have included HIV testing) and geographic proximity to testing facilities.

Other independent variables

Worry about HIV is shaped by sociodemographic characteristics (Smith 2003; Smith and Watkins 2005). To account for differences between women who are very worried and women who are not worried, models control for characteristics likely to be associated with both perceived HIV risk and intentions for more children: age, parity, whether a woman is in a polygamous or monogamous marriage, education level, household wealth, husband's migration status, whether there is a family planning clinic in the village where the respondent lives, and the level of adult HIV mortality in the village.

Most of these variables are straightforward to measure; with three exceptions, they are taken directly from survey questions. First, household wealth is notoriously difficult to measure

in developing countries. We use a combination of variables measuring household resources: whether the household has electricity (from a generator or from the grid), whether anyone in the household owns cattle (a traditional measure of wealth in Mozambique), and an index variable indicating ownership of household goods (radio, television, bicycle, car or motorcycle). Second, the effect of men's migration status on both perceived HIV risk and fertility intentions is likely to vary depending on the husband's experience of migration. To capture some of this variation, husbands are classified as "successful" or "unsuccessful" migrants depending on their wife's response to a question about whether the household is better off or worse off since the husband migrated. Third, we use reports from the community survey to classify villages as "high" or "low" AIDS mortality villages. In each sampled village, a village leader (traditional authority, community leader, health worker, religious leader, etc.) was asked about conditions in the community, including the number of adults who died of AIDS or a disease that appeared to be AIDS in the past year. These reports, though subjective, reflect the degree to which AIDS is a visible cause of mortality in the community. They are used to classify villages into high and low mortality villages based on the median number of deaths reported (5 deaths in the past year).

Wave 1 analysis: dependent variable and models

The first stage of this analysis examines the relationship between level of worry about HIV infection and fertility intentions, both measured in 2006. The primary outcome variable for this analysis is whether a woman wants to have more children; analyses also examine timing preferences (desire to have another child within the next two years). Multinomial logit models are used to predict the likelihood of wanting to postpone childbearing or wanting to stop childbearing relative to wanting to have another child within two years or sooner. The primary independent variables are worry about HIV and whether the woman has ever had an HIV test.

Interactions between these variables are tested in order to assess whether finding out one's current serostatus moderates the impact of worry about HIV transmission on fertility intentions. In addition to perceived HIV risk, models include a range of sociodemographic controls as described above.

Results from this analysis are presented here.

Wave 2 analysis: dependent variable and models

Preliminary results show that women who are very worried about HIV do not have different fertility intentions than women who are less worried (see discussion of results below). The second stage of the analysis will examine the relationship between worry about HIV and fertility *behavior* in the three years following the first survey. Longitudinal data are used to assess whether women who are very worried about HIV are more or less likely to meet intentions to continue or postpone childbearing.

The primary outcome variable for this analysis is whether a woman had a birth between 2006 and 2009; logistic regression will be used to model this outcome. Key independent variables will be intentions in 2006 and worry about HIV in 2006 along with interactions between these two variables. In addition, models will also examine whether having been tested (either before 2006 or between 2006 and 2009) moderates the relationship between worry about HIV and fertility outcomes. Secondary analyses will examine changes in fertility intentions among women who did not have a child. All models will include control variables as described above. Additional independent variables may also be incorporated, such as self-reported health and access to HIV testing and treatment (as measured by geographic distance to health facilities providing these services; taken from the clinic survey).

Hypotheses to be tested include:

H1: Among women who do not want a child soon (those who want to delay at least two years and those who want to stop childbearing), women who are very worried about HIV infection will be more likely to meet intentions that women who are not very worried.

H2: Among women who want to continue childbearing in 2006, women who are very worried about HIV will be more likely to change their minds and want to stop childbearing in 2009.

H3: Among women who are not worried about HIV in 2006, those who become more worried between 2006 and 2009 will be less likely to have children between 2006 and 2009, regardless of intentions in 2006.

These analyses will be completed for the full version of the paper.

Preliminary results

Of the 1678 women surveyed in the first wave of data collection, 1356 (81%) were very worried about contracting the AIDS virus either from their husband or from another man (Table 1). The majority of these (1337; not shown) were worried about transmission from their husband. 300 women, or 18% of the sample, had been tested for the virus at least once. Among women who had been tested, 251 women (83%) were very worried about transmission. A chi-square test suggests that worry about HIV in 2006 and testing before 2006 are not significantly correlated (p=0.18)

Table 1 also shows the relationship between fertility intentions, worry about HIV, HIV testing experience, and selected sociodemographic characteristics. These bivariate statistics show little relationship between perceived HIV risk and desired future fertility. Of women who are very worried about HIV, 48% want to have children immediately or within two years and 26% want to stop childbearing. The corresponding figures for women who are not very worried are 47% and 26%. Women who have been tested for the virus are slightly less likely than women

who have not been tested to want children soon (43% vs. 49%). Since most HIV testing takes place in the context of prenatal care in this setting, this relationship may reflect more or more recent childbearing among women who have been tested.

As might be expected, age and parity are positively correlated with wanting to stop childbearing. Women with five or more years of education are also more likely to want no more children, as are women in poorer households.

Multivariate results are shown in Table 2. These results are from multinomial models comparing the log-odds of wanting to postpone childbearing and wanting to stop childbearing relative to wanting to have more children within two years or sooner. For each model, the first columns show coefficients and standard errors predicting wanting to postpone and the second columns show coefficients and standard errors for wanting to stop vs. wanting another child soon. Model 1 includes worry about HIV, experience with HIV testing, and control variables. In Model 2, an interaction between worry and testing is added.

In Model 1, neither worry about transmission of HIV nor having been tested for HIV is significantly related to intentions for future childbearing. Relationships between other sociodemographic characteristics and fertility intentions are largely consistent with bivariate results. Women with more children are significantly more likely to want to postpone childbearing and to want to stop childbearing relative to wanting to have more children soon. Several other variables predict wanting to stop childbearing but are not significantly associated with the desire to postpone relative to having children within two years. Women age 31 and older, women in polygamous marriages, and women whose husbands are not migrants are more likely to want to stop childbearing, while women living in wealthier households, as measured by the ownership of cattle, are less likely to want tostop childbearing. Education, in contrast, is

associated with desired fertility timing but not desire to stop. Both women with one to four years of education and women with five or more years of education are both more likely to want to postpone childbearing rather than have children within two years than women who have never been to school.

Model 2 adds a term representing an interaction between these two variables. This interaction term is not statistically significant in predicting either postponement or stopping childbearing relative to desiring children soon, and coefficients for control variables are unchanged. However, when the effect of testing on fertility intentions is allowed to vary according to level of worry about HIV, the main effect for having been tested approaches conventional levels of statistical significance (p=.08). This suggests that women who have been tested and are not very worried about AIDS – that is, women who likely tested negative – may be more likely to plan to postpone childbearing, although this relationship is not strong enough to be statistically significant in a sample this size.

Discussion

Results from the full paper linking intentions and behavior will contribute to scientific understanding of the impact of the HIV/AIDS epidemic on childbearing in sub-Saharan Africa and the mechanisms through which the epidemic affects fertility. More generally, the longitudinal analysis of fertility intentions and behavior will provide evidence regarding the role of intentions in shaping fertility behavior in a high-fertility context. These results, in turn, can be used to understand the ongoing process of fertility transition in sub-Saharan Africa and how the HIV/AIDS epidemic is shaping this transition.

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Table 1. Fertility intentions according to selected characteristics

	N	Percent of women who:		
		Want children soon	Want children later	Want no more children
All women	1678	48	26	26
Perceived AIDS risk				
Not very worried about HIV	322	47	27	26
Very worried about HIV	1356	48	26	26
Never tested for HIV	1375	49	25	26
Tested for HIV	300	43	29	28
Sociodemographic characteristics				
Age 18-20	267	64	29	7
Age 21-25	470	57	30	13
Age 26-30	469	49	25	27
Age 31+	472	29	22	50
No living children	247	76	17	7
1-4 living children	1064	52	30	18
More than 4 living children	367	17	19	64
Monogamous marriage	1323	49	27	24
Polygamous marriage	353	42	23	35
No formal schooling	446	52	22	26
1-4 years of school	760	45	26	29
5 or more years of school	469	49	30	21
Household possessions index=1	563	44	28	28
Household possessions index=2	546	47	25	28
Household possessions index=3	424	52	25	23
Household possessions index=4	145	54	21	24
No electricity in household	1442	47	26	27
Electricity in household	236	54	25	21
Household does not own cattle	1155	46	26	28
Household owns cattle	523	52	25	23
No religion	233	49	25	27
Catholic/mainstream Protestant church	460	43	28	29
Zionist church	548	50	25	24
Other religion	437	50	25	25
Husband not a migrant	1002	45	24	31
Husband successful migrant	338	54	28	19
Husband unsuccessful migrant	338	51	28	21
No family planning in village	869	45	27	28
Family planning available in village	809	51	25	25
Low AIDS mortality village	840	46	28	26
High AIDS mortality village	838	50	24	27

Data: Married women age 18-40 in 2006, Gaza Province, Mozambique. See text for details.

Table 2: Multinomial logit regression of fertility intentions on perceived HIV risk and other sociodemographic characteristics

	Model 1								Model 2							
	Want children in two or more years			Want no more children					Want children in two or more years			Want no more children			
	Vs. want children in two years or fewer			Vs. want children in two years or fewer					Vs. want children in two years or fewer			Vs. want children in two years or fewer			
	B	SE		B	SE				B	SE		B	SE		
Intercept	-0.87	0.34	*	-3.21	0.45	***			-0.95	0.35	**	-3.22	0.45	***	
Perceived HIV risk															
Very worried about HIV	-0.10	0.16		-0.14	0.18				0.00	0.17		-0.14	0.20		
Ever been tested for HIV	0.21	0.16		0.25	0.19				0.66	0.38		0.26	0.48		
Very worried x ever been tested									-0.55	0.42		-0.01	0.52		
Sociodemographic characteristics															
Omitted: age 20 and under															
Age 21-25	-0.09	0.18		0.08	0.29				-0.09	0.18		0.08	0.29		
Age 26-30	-0.37	0.21		0.20	0.29				-0.37	0.21		0.19	0.29		
Age 31 or over	-0.15	0.23		0.65	0.31	*			-0.14	0.23		0.65	0.31	*	
Number of living children	0.36	0.05	***	0.82	0.06	***			0.36	0.05	***	0.82	0.06	***	
In polygamous marriage	0.05	0.16		0.47	0.17	**			0.06	0.16		0.47	0.17	**	
Omitted: no education															
1-4 years of education	0.33	0.16	*	0.23	0.17				0.32	0.16	*	0.23	0.17		
5 or more years of education	0.47	0.18	*	0.29	0.21				0.46	0.18	*	0.30	0.21		
Household possessions index	-0.13	0.07		-0.06	0.08				-0.13	0.07		-0.06	0.08		
Household has electricity	-0.18	0.18		-0.40	0.22				-0.19	0.18		-0.39	0.22		
Household owns cattle	-0.08	0.14		-0.33	0.17	*			-0.07	0.14		-0.33	0.17	*	
Omitted: no religion															
Catholic or mainline Protestant	0.03	0.21		0.18	0.24				0.02	0.21		0.18	0.24		
Zionist	-0.13	0.20		-0.13	0.23				-0.13	0.20		-0.13	0.23		
Other religion	-0.14	0.21		0.04	0.24				-0.14	0.21		0.04	0.24		
Husband not a migrant	0.00	0.16		0.46	0.20	*			-0.01	0.16		0.46	0.20	*	
Omitted: husband successful migrant															
Husband unsuccessful migrant	0.12	0.19		0.39	0.24				0.11	0.19		0.39	0.24		
Family planning available in village	-0.11	0.12		-0.09	0.14				-0.11	0.13		-0.09	0.14		
High AIDS mortality village	-0.16	0.13		0.01	0.14				-0.15	0.13		0.01	0.15		

Data: N=1671 married women age 18-40 in 2006, Gaza Province, Mozambique. See text for details. *: $p<.05$; **: $p<.01$; ***: $p<.001$.