



Bucking social norms: Examining anomalous fertility aspirations in the face of HIV in Lusaka, Zambia



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ABSTRACT

In settings of high fertility and high HIV prevalence, individuals are making fertility decisions while simultaneously trying to avoid or manage HIV. We sought to increase our understanding of how individuals dually manage HIV risk while attempting to achieve their fertility goals as part of the project entitled HIV Status and Achieving Fertility Desires conducted in Zambia in 2011. Using multivariate regression to predict fertility patterns based on socio-demographic characteristics for respondents from facility-based and community-based surveys, we employed Anomalous Case Analysis (ACA) whereby in-depth interview respondents were selected from the groups of outliers amongst the survey respondents who reported lower or higher fertility preferences than predicted as well as those who adhered to predicted patterns, and lived in Lusaka ($n = 45$). All of the facility-based respondents were HIV-positive. We utilize the Theory of Conjunctural Action (TCA) to categorize domains of influence on individuals' preferences and behavior. Both community-based and facility-based right-tail respondents (outliers whose fertility intentions indicated that they wanted a/nother child when we predicted that they did not) expressed comparatively less control over their fertility and gave more weight to pressures from others to continue childbearing. Partner communication about fertility desires was greater among left-tail respondents (outliers whose fertility intentions indicated that they did not want a/nother child when we predicted that they did). HIV-positive right-tail respondents were more likely to see anti-retroviral therapies (ARTs) which prevent mother to child transmission of HIV as highly effective, mitigating inhibitions to further childbearing. Drug interactions between ARTs and contraceptives were identified as a limitation to HIV-positive individuals' contraceptive options on both sides of the distribution. Factors that should be taken into account in the future to understand fertility behavior in high HIV-prevalent settings include couples' communication around fertility and perception of the efficacy of ARTs.

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1. Background

The effect of HIV on fertility behavior as well as pregnancy preferences complicates reproductive decision-making, negotiation and behavior (Trinitapoli and Yeatman, 2011). Previous individual-based research from sub-Saharan Africa examining HIV status and fertility preferences has generally found HIV to have a depressing effect on fertility desires (Johnson et al., 2009; Kaida

et al., 2011). Qualitative work by Baylies in Zambia with respondents in households where long-term AIDS illness had been reported, found that not all of her respondents made a connection between AIDS and the number of children they wished to have (2000). Baylies identified some fertility preferences as “priority being placed on norms of masculinity, or on pleasure over risk” (p. 81), while for others, the connection between AIDS and fertility choices “remained an abstraction,” and some voiced a sense of

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fatalism (p. 83). The fear of orphaning children depressed some respondents' fertility desires. Yet despite stated preferences, lack of access to and use of family planning as well as poor couple communication and lack of trust stymied actualization of her respondents' fertility desires.

Social attitudes have been shown to stigmatize continued childbearing of individuals living with HIV/AIDS (PLWHA) (London et al., 2008). Using the same quantitative data as used in this analysis, Kavanaugh et al. (2013) found that when comparing stigmatizing attitudes towards childbearing among PLWHA in Zambia and Nigeria, Zambian respondents held more stigmatizing attitudes towards HIV-positive women continuing childbearing with men holding more stigmatizing attitudes than women. Therefore, while individuals seek to construct their families as they envision them, social attitudes may exhibit a preference for fertility limitation.

In 2007, Zambia had a total fertility rate of 6.2 (Central Statistical Office, Ministry of Health, Tropical Diseases Research Centre, University of Zambia, & Macro International Inc., 2009). Its HIV prevalence rate is 14.3% (Zambia National HIV/AIDS/STD/TB Council, 2012), and in Lusaka, the capital, it is even greater, at 21% (Central Statistical Office et al., 2009). As of 2009, only 22.8% of Zambians had taken an HIV test and received the results (Zambia National HIV/AIDS/STD/TB Council, 2012). In such epidemiological contexts, many individuals expose themselves or their partners to the risk of contracting (or transmitting) HIV in the process of attempting to conceive (Kaida et al., 2011).

Using the 2007 ZDHS, Bankole and colleagues found that individuals who are HIV-positive and who likely know their HIV status are half as likely to want more children than individuals who are HIV-negative and probably know their status (Bankole et al., 2011). Over 90% of HIV-positive patients aged 15+ years are accessing ARTs (Zambia National HIV/AIDS/STD/TB Council, 2012), but this is only among the less than a quarter of the population who have taken an HIV test and received their test results. Nationally, contraceptive prevalence, including traditional and modern methods, is 40% among married women, leaving an unmet demand for contraception of 14% in this population. Yet contraceptive use among HIV-positive individuals is somewhat higher. Compared to individuals who do not know their status, HIV-positive individuals have lower unmet need, are more likely to be using contraception, and are significantly more likely to have used a condom at last sex (Bankole et al., 2011).

Examining fertility preferences and enactment of those preferences in a context of high HIV demands a framework which is capable of ordering the many complex and competing influences relevant to this domain. Johnson-Hanks et al. (2011) Theory of Conjunctural Action (TCA) draws on multiple disciplines to provide insights into the myriad social drivers of demographic behavior, which is apt for a study of fertility decision-making taking place in conjunction with HIV management or avoidance. This domain of fertility and HIV is a site of "culturally dense" messages which can contradict one another as individuals sort out how to form their families (Johnson-Hanks et al., 2011). For example, childbearing norms have been found to contend with public health messages about reproduction post-HIV diagnosis (Agadjanian and Hayford, 2011). The relevance of various messages is individually-specific, dependent upon which governing rules of behaviors and actions individuals perceive are most relevant to themselves and how these rules relate to others. These rules are called *schemas* in the TCA. Tangible or intangible *materials* which are the embodiment of *schemas* together form *structures* which represent the recurrent patternings of social life (Johnson-Hanks et al., 2011).

Decision-making and behavior on contested domains takes place at what Johnson-Hanks et al. (2011) describe as sites of

conjunctures which can either be temporary or enduring where *structures* meet and an action occurs. Within this framework, a *construal* is the response to or resolution of a *conjuncture*. *Construals* are the actions which embody *schemas*, or, one could say, where *schemas* meet. This framework offers a way of identifying competing cultural demands, individual experiences, and actions that are a product of fertility desires as well as HIV infection or risk. See Fig. 1 for a visual representation of this framework.

Using data from Balaka, Malawi, Trinitapoli, Yeatman, and Furnas (2013) found malleability of fertility preferences in response to HIV using the Coombs Scale to identify underlying family size preferences in southern Malawi (see Trinitapoli et al. (2013) for greater detail on employing the Coombs Scale). Their application revealed that some individuals have fixed fertility preferences while others change their preferences (quantum and tempo effects) in response to the disease. Of all the social and economic conditions they tested, only the HIV-related factors had an effect on fertility preferences. Using the TCA, the authors demonstrate that these discrete typologies which capture the conjuncture of HIV and fertility point to individual reactions to structural inputs.

What are the relevant schemas that individuals are prioritizing to reach fertility decisions when HIV (or the risk of HIV) is present in Lusaka, Zambia? To increase our knowledge about fertility decision-making within the context of high HIV prevalence, and to further our understanding of the wide variation in fertility behaviors in response to HIV, we carried out a mixed methods study with women and men of reproductive age in Zambia. Following Pearce's (2002) Anomalous Case Analysis (ACA) methodology, we investigated issues associated with departure from predicted fertility desires among a sub-set of respondents in community-based and facility-based surveys that covered fertility and HIV. To select the sample for this component, we conducted separate multivariate logistic regressions on the data from the community and facility surveys, holding constant demographic predictors of fertility behavior, in order to identify individuals with anomalous fertility preferences (i.e. those whose fertility preferences were not consistent with predicted fertility preferences). We then carried out follow-up in-depth interviews with these cases as well as controls (i.e. those whose preferences matched the predicted) to better understand which schemas respondents felt were most relevant to their behavior. The complexity of interactions between HIV and fertility demanded the engagement of a theory (TCA) that could accommodate the coexistence of contradictory and competing schemas. Applying TCA to anomalous cases allows for an exploration of the differential use of various schemas which individuals are referencing when making fertility decisions in a high HIV context. Going beyond what the survey data alone could provide, the in-depth interviews carried out with anomalous cases explore reasons for respondents' expressed fertility preferences, respondents' decision-making about having children including the role of other influences (partner, family, and community), and respondents' implementation of those preferences through contraceptive use or nonuse. By investigating through narrative inquiry anomalous fertility-related preferences and behavior among both PLWHA and individuals of unknown HIV status in this high HIV context, we hope to elucidate the individuality of the interpretation of schemas specific to fertility preferences when HIV is present.

2. Methods

2.1. Anomalous Case Analysis

While survey research provides the power to identify patterns across large groups, qualitative methods are better at revealing new information and the richness of complex dynamics. Anomalous

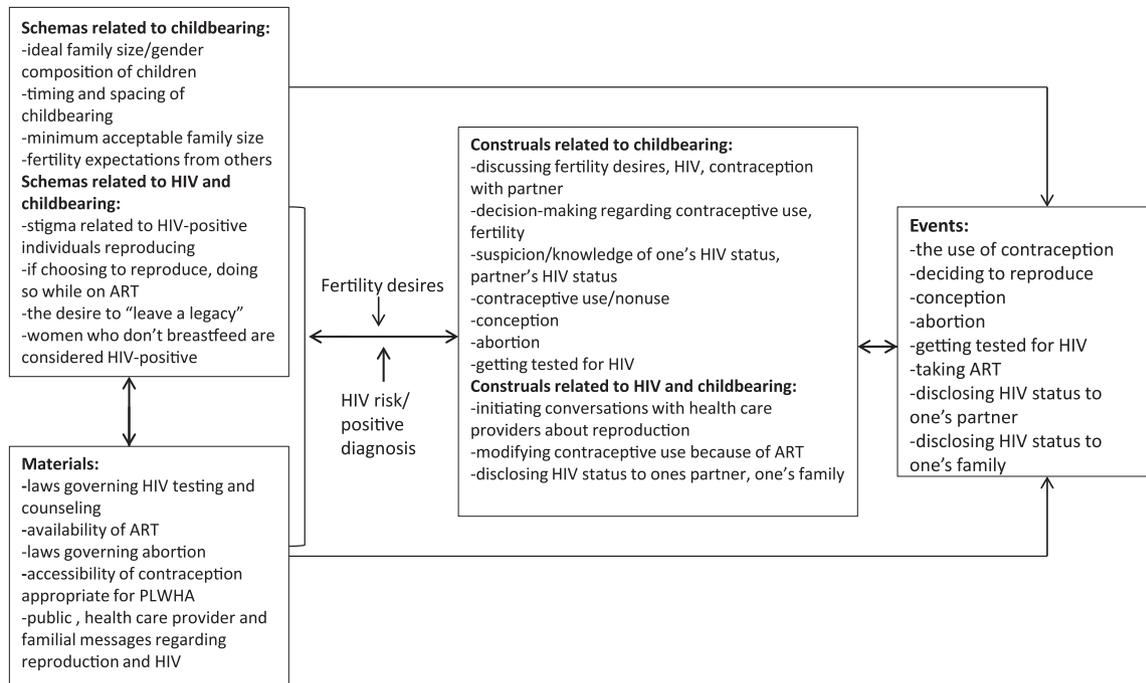


Fig. 1. Application of the Theory of Conjunctural Action to fertility preferences and behavior in a high HIV context: Lusaka, Zambia.

Source: Modified from Gipson JD. (2013). *Recognizing the complexity of fertility decision-making in the Philippines*. Presentation at the Population Association of America conference, New Orleans, Louisiana, USA.

Case Analysis (ACA) is a methodology that tries to employ the strengths of each where anomalous cases identified through logistic regression of survey data can identify individuals that do not adhere to predicted patterns. Qualitative follow-up interviews with these individuals can reveal additional factors that may not have been previously considered as important influences on the outcome of interest. A strength of ACA is to identify new independent variables to be incorporated in another iteration of the multivariate analysis that, when considered, can better specify quantitative models to explain the outcome of interest. Alternatively, the new findings generated from the qualitative interviews not yet included in the existing survey, may inform the construction of the next generation of surveys (Pearce, 2002). The exercise can be iteratively repeated to allow for continued refinement of the measurement of social behavior. After conducting surveys of reproductive aged men and women from the community as well as from HIV care and treatment facilities in three provinces in Zambia, we employed ACA to enrich our understanding of the relationship between HIV and fertility preferences and behavior in Zambia beyond what the survey data alone could provide. The study received Institutional Review Board approval from the Guttmacher Institute’s IRB as well as from the University of Zambia Biomedical Research Ethics Committee and the Zambian Ministry of Health’s Permanent Secretary’s office.

2.2. Selection of respondents

The design and implementation of the two surveys, one community-based and one facility-based, have been described in-depth elsewhere (Bankole et al., 2013; Moore et al., submitted for publication). In both surveys, the women were age 15–49 and the men were age 15–59. All of the respondents captured at facilities were PLWHA while community-based respondents were selected from household listings and may or may not have been HIV-positive. Survey respondents who gave consent to be re-

contacted were included in this sample. The percent who agreed to be recontacted for the whole country was 72% among women and 65% among men in the community-based survey, and 85% of women and 91% of men in the facility-based survey. Financial constraints demanded we only select outliers from one location—Lusaka. The final survey sample sizes from Lusaka were 502 women and 460 men in the community-based survey (of whom 8.6% of community-based women and 3.1% of community-based men reported being HIV-positive), and 52 women and 48 men in the facility-based survey (100% of whom were HIV-positive).

We selected the sample for follow-up by using multivariate logistic regression to predict responses to the question, “[After this pregnancy,] Would you like to have a/nother child or would you prefer not to have any (more) children?” The dependent variable was coded as 1 if the respondent wanted to have a/nother child, otherwise 0. Sociodemographic variables used to predict whether the respondent wanted to continue childbearing were age category, highest level of education achieved, union status, and number of living children at the time of the survey. Based on the distribution of the outcome of the regression, respondents were categorized as *left-tail respondents* (not wanting a/nother child when their sociodemographic characteristics predicted that they did), *predicted respondents* (wanting a/nother child when their sociodemographic characteristics predicted that they did or not wanting a child when their characteristics predicted they did not), and *right-tail respondents* (wanting a/nother child when their sociodemographic characteristics predicted that they did not).

While ideally, those categorized as outliers would fall two or more standard deviations from the mean (Pearce, 2002), due to non-variability in the data, the small facility-based sample as well as the fact that we only selected the respondents from Lusaka, we had to relax our definition of an outlier. (Other applications of this methodology have experienced the same problem, see Gipson et al. (2014)) We used the strictest selection criteria we could for each dataset that still guaranteed enough respondents for follow-up,

taking into consideration that we would lose some respondents to attrition and that some would not be willing to participate in the follow-up. For the women's community dataset, outliers fell 1.75 standard deviations (SDs) from the mean, while for the women's facility dataset, outliers fell 1.3 SDs from the mean. For the men's community dataset, outliers fell at 1.4 SDs from the mean, and for the men's facility dataset, outliers fell 1.0 SD from the mean. For purposes of this analysis, we refer to all of these respondents as outliers.

From the eligible respondents, we randomly selected enough cases resampling as necessary to reach a final sample of three left-tail outliers, three right-tail outliers and six predicted cases from each dataset for a sample of 48. When respondents were recontacted, the interviewer told him/her that s/he wanted to speak to him/her again in relation to the survey that s/he had participated in approximately a year ago on health and fertility desires. Written consent was obtained from each respondent before the in depth-interview was conducted. We achieved our target sample size for the outliers but among the predicted cases, we fell three cases short overall ($n = 45$). Table 1 shows the distribution of our final qualitative sample.

2.3. Data collection

Four interviewers, all of whom were interviewers on the surveys, conducted the in-depth interviews. They were trained on qualitative interviewer techniques, the tool, and recontacting strategies. Pilot interviews were conducted with male and female respondents in local languages outside the communities selected for the study. Based on feedback from the pilot interviews, the guides were modified before fieldwork began.

The in-depth interviews were carried out during the first half of 2011. The interviews covered the same topics as the surveys: fertility aspirations, contraceptive counseling and contraceptive use, and perceptions (and perpetration) of stigma and discrimination against PLWHA who have children. In addition, for the community-based sample, perceived risk of HIV was also discussed. For the PLWHA (facility-based) sample and for the few community-based respondents who self-identified as HIV-positive, additional topics of inclusion were: with whom they have chosen to share their diagnosis, and pregnancy experience(s) since being diagnosed HIV-positive including partners' reactions to pregnancy. Throughout, special attention was paid to how HIV and HIV risk influence fertility desires and decision-making.

Interviewers were gender-matched with the respondents. Interviewers reviewed each respondent's completed questionnaire prior to beginning the interview so that the interviewer could have in mind particular places to probe. However, respondents were not prompted on their results from the survey, and the filled questionnaire itself was not shown to the respondent. Interviews were audio-recorded and conducted in English, Nyanja and Bemba. Some interviews took place over two visits when the interviewer was not able to complete the interview in one sitting. Total interview time ranged from 38 to 114 min.

Table 1
Respondents' category and total number.

	Anomalous cases ^a	Predicted	Total
Women community	6	6	12
Men community	6	4	10
Women facility	7	6	13
Men facility	6	4	10
TOTAL	25	20	45

^a Anomalous cases were split evenly between left- and right-tail respondents.

Table 2
Demographic characteristics of the in-depth interview respondents.

	Community		Facility		Total
	Men	Women	Men	Women	
Would you like to have a/nother child?					
Want a/nother child	4	4	2	5	15
Want no more	6	7	5	5	23
Unsure/Undecided/Infertile	0	1	3	3	7
Total	10	12	10	13	45
Age of respondent					
15–24	2	4	0	1	7
25–34	2	1	0	7	10
35–44	5	5	8	4	22
45–49	1	2	2	1	6
Total	10	12	10	13	45
Highest level of education completed					
None or incomplete primary	0	3	1	2	6
Completed primary	7	9	8	10	34
Lower secondary or higher	3	0	1	1	5
Total	10	12	10	13	45
Is the respondent in a union?					
No	3	8	4	6	21
Yes	7	4	6	7	24
Total	10	12	10	13	45
Total number of living children					
0 children	2	3	0	2	7
1 child	0	1	1	2	4
2 children	2	2	2	4	10
3–4 children	2	2	6	4	14
5+ children	4	4	1	1	10
Total	10	12	10	13	45

2.4. Data processing and analysis

The interviews were transcribed by the interviewers verbatim in the language in which the interview was conducted. The interviewer then, when necessary, translated the interviews to English. Transcripts were reviewed by a supervisor who had read both the local language and translated transcripts. Clarifications were made with interviewers where information was ambiguous or missing; when necessary, interviewers recontacted respondents to obtain clarification.

Coding was done using NVIVO9 qualitative software (QSR International, Melbourne, Australia). Thematic codes had been constructed a priori from the primary themes in the interview guide. Two interviewers coded each transcript to increase inter-coder reliability. Once the data were coded, matrices for the nodes of greatest interest were developed as matrices allow for a visual representation and organization of the data by identifying prevalent themes, analyzing how often these themes emerge and among whom, i.e. whether the respondent had been chosen from the left, right or predicted portion of the distribution. The authors conducted the analysis separately for the community-based sample and the facility-based sample.

Most of the respondents in the qualitative sample were between 35 and 44 years old, their highest level of completed education was primary school, and most did not want any more children at the time of the survey. Just over half of the respondents were in a union. Seven had no children, 10 had two children, and 14 had 3–4 children (see Table 2). We identify quotes with the demographic characteristics of respondents used in the regression model as well as disclosure experience.

The analysis focuses on anomalous cases, comparing the data from the in-depth interviews from community and facility-based left-tail respondents and community and facility-based right-tail respondents in order to examine factors influencing the unpredictable fertility desires of unknown status (most likely HIV-negative) with those of PLWHA to help elucidate the complex schemas that shape fertility preferences. The discussion situates these anomalous fertility desires within the context of the prevailing fertility decision-making by comparing the outliers to the behaviors of the predicted cases. The results are analyzed within the framework of the Theory of Conjunctural Action.

3. Results

3.1. Desired number of children

In the community-based sample, most right-tail respondents ended up having more children than initially desired, ranging from one to five children above their original figure. Right-tail respondents mentioned that economic hardship made it difficult to have many children, but they were not motivated to reduce their fertility desires based on that. Other considerations such as perceptions of what are socially or religiously acceptable, or personal experiences that were highly influential, appeared to outweigh economic concerns in determining family size.

R(espondent): In my life I wanted to have only three children.

I(nterviewer): Now how many do you have?

R: Right now I have seven children.

I: What made you think of having three children and today you have seven of them?

R: It's death.

I: What has death done?

R: I lost my first born child when the child was just two months old. When this happened, people in the community were saying, "You see now, you wanted to have only one child, the child is dead." And so I thought that to bear only one child is sin, that's how I thought to myself. (Male, 41 years old, community-based, his and wife's HIV status unknown, completed grade 11, parity 7, married, right-tail)

In contrast, left-tail respondents reported a comparatively smaller desired number of children, and many reported they had reduced their desired number in light of economic conditions, settling on between two to three children. Reasons given related mainly to feeding and schooling children, which was perceived as more expensive than in the past.

When I look at life nowadays, things have changed. It is different from the years back. Nowadays livelihood has become very tough and also feeding, so if I add more children I might just bring more problems to myself. (Female, 22 years old, community-based, HIV-negative, does not know husband's HIV status, completed grade 7, parity 2, married, left-tail)

Some women from the left-tail of the distribution mentioned health reasons, including compromised health during pregnancy and the increased risk of contracting diseases in the labor ward with repeated visits, as reasons for decreasing their desired family size.

HIV diagnosis appeared to affect desired number of children in a similar direction for both left- and right-tail facility-based

respondents, with some respondents from each tail reporting reducing their desired number of children in light of their diagnosis. However, the number of children desired by right-tail respondents after this adjustment (ranging from 3 to 6 children) remained higher than that of left-tail respondents (ranging from 2 to 3). Moreover, most right-tail HIV-positive respondents still wanted more children after their diagnosis, whereas all but one left-tail HIV-positive respondent wanted to stop childbearing. The left-tail respondent who wanted another child was a 42-year-old man who had only a 24-year-old child. Although his desire to "leave a legacy" had been significantly curbed by his recent diagnosis, he did not see one child as sufficient:

R: Before I tested positive, I wanted five children but now I just want one more.

I: Why did you want to have five children?

R: I wanted to leave a legacy of having many children in our family.

I: Why have you reduced the number of children you wanted to two?

R: I am growing old and sick of AIDS and so I don't want to have many children.

I: This number of children [2], how did you arrive at this figure?

R: This number came in because I have only one child and so I want to have the second one. (Male, 42 years old, facility-based, he and his wife are HIV-positive and disclosed status to each other, completed grade 9, parity 1, married, left-tail)

This case supports the idea of a minimum threshold for acceptable family size, even among PLWHA. Only one (HIV-positive) respondent had no children and did not want any; all other respondents desired at least two children. As one respondent put it:

HIV has never reduced [childbearing desires] because even when people are not well and they have no child, they would still want to have children because to them it's a taboo not to have a child. (Male, 57 years old, facility-based, he and his wife are HIV-positive and disclosed status to each other, completed grade 9, parity 6, married, predicted)

Amongst HIV-positive respondents, many left-tail respondents named HIV as the major reason for decreasing their desired number of children. In contrast, amongst right-tail respondents, only one of seven accorded HIV a significant role in reducing their desired number; another cited it among other factors. Furthermore, right-tail HIV-positive respondents often voiced their confidence in the drugs that prevented mother to child transmission of HIV (PMTCT), whereas left-tail respondents made no mention of PMTCT as a factor they were considering in their decision-making about childbearing.

3.2. External influences on decision-making about childbearing

Communication within the couple about childbearing desires varied depending on whether the respondent was selected from the left-tail or the right-tail of the distribution. For both the community-based as well as the HIV-positive sample, respondents from the left-tail reported agreeing with their partner on a number of children prior to or upon achieving that number. In contrast, in the right-tail, respondents reported either not talking about family size with their partner, or not knowing their partner's desired number of children, as illustrated here by this HIV-positive male

who had three children at the time of the interview and hoped to have two or three more:

I: Does your current wife know the number of children you want to have?

R: No she doesn't know anything. [...]

I: Have you ever discussed on that matter with her?

R: No she doesn't know anything.

I: But do you know the total number of children your wife wants?

R: No, I don't know it. (Male, 40 years old, facility-based, he and his wife are HIV-positive and disclosed status to each other, completed grade 7, parity 3, married, right-tail)

Husbands were identified by female respondents on both sides of the distribution as one of the sources of pressure to have more children. Women generally related acquiescing or appeasing their male partners by having more children. Only a few women related attempts at influencing him to want fewer children.

I: If you disagreed on how many children to have with your partner, maybe he wants more or few, how can you resolve these different opinions?

R: You have to let him have the children he wants. It means he knows his financial status, but at least you have to try to control him to reduce the number if he wants too many, so that it is a reasonable number. (Female, 36 years old, community-based, does not know her HIV status or that of her partner, attended secondary school, parity 2, single, right-tail)

In addition to husbands, respondents from both parts of the distribution acknowledged that extended families were pressuring them to have a large(r) number of children. The same respondent quoted directly above explained:

I: Who within your family participates in the discussions about how many children you should have?

R: My late grandmother, she is the one who used to persuade me to have more children, that I can't have only two children, what if one dies? Then you remain with one. And so on. Even my mother tells me [to have more children].

Another respondent in the right-tail of the distribution described how the pressure from her in-laws to have a large family had pushed her to have the 10 children she has today:

R: Ok, when I just got married I was not able to have children for a long time, so my husband's family started stigmatizing me, and later I got pregnant and had a baby girl. That made me very happy such that I decided to have as many as I can, and I so did not mind them exceeding the number that I wanted.

I: From the time you got married, how soon did you want to get pregnant?

R: I wanted two years to pass before I get pregnant, but it was not possible because of my husband's family. They started talking about having a child when I was as early as five months in marriage. That's why when I started having children. I said, "God give me as many as you can until the time you will tell me to stop." (Female, 35 years old, community-based, HIV- negative but does not know her husband's status, never attended school, parity 10, married, right-tail)

However, many respondents (particularly in the left-tail) stated that this family pressure did not ultimately affect their childbearing decisions.

One left-tail HIV-positive male respondent described significant pressures from his family and community to have fewer children: he supported his extended family and so they implored him not to have too many children of his own lest he fail to support them. In addition, he was strongly influenced by advice he had received from a colleague on the benefits of having a small family:

These ideas, I got them from this white man I was working with at the airport, an accountant who told me that, "Don't have a lot of children, you will fail to support them. With us whites we only have one or two children. When we die, we leave each one with money in the bank. Why do you have a lot of children when you fail to support them and educate them?" I worked with that accountant for about 15 years, he is the one who told me not to have a lot of children before I got married, he actually told me the truth because we were working with some old fellows who had a lot of children, about 10 children each, and were failing to support them. [...] So I said to myself this is good and I copied this idea. (Male, 56 years old, facility-based, wife is HIV-negative, he disclosed his status to her, completed grade 10, parity 3, married, left-tail)

Although this respondent was HIV-positive, the reasons he gave for wanting a smaller family did not include his HIV status.

Left-tail respondents who wanted to stop childbearing after diagnosis tended to focus on health providers' advice to limit their childbearing, and on worries about their health and transmitting the virus to the baby.

I: From the time you were diagnosed HIV-positive, have you been pregnant?

R: Yes, I got pregnant.

I: At that time, you told me that you never wanted to get pregnant.

R: Yes, I did not.

I: What were the most important reasons you did not want the pregnancy at that time?

R: Mostly because of [my] CD4 [count]. The CD4 was supposed to be above 400 or 450, but mine was very low, and it took time to go up. [...] The providers talked to me about the dangers of getting pregnant with such kind of CD4 below 400. There were great chances of transmitting the virus to the baby. [...] The fears I had were that maybe the child was going to be born with HIV. I could hear people talk in the compounds, that when you're HIV-positive, and you are pregnant, you can't give birth to a healthy baby. Besides, you die too. (Female, 27 years old, facility-based, she and her husband are both HIV-positive and have disclosed their status to one another, completed grade 3, parity 2, married, left-tail)

This left-tail respondent refers directly to negative social reactions (albeit based on misinformation) to her pregnancy as a PLWHA. Similarly, several other left-tail respondents reported pressure from family members aware of their HIV status to stop childbearing.

In general, right-tail respondents saw fewer obstacles in their way to achieving the number of children they wanted: Neither HIV diagnosis nor health providers' recommendations to stop childbearing reduced the number of children they wanted. In sum,

external influences were not credited with lowering the number of children desired among right-tail respondents, HIV-positive or not.

3.3. Acting on fertility preferences: pregnancy planning and contraceptive experiences

As Kaida et al. (2011) found, childbearing desires among this sample were not easy to implement: many respondents ended up with more children than they had originally desired, and several reported an unintended pregnancy. Unintended pregnancies were more widespread among right-tail respondents from both subgroups. Almost all respondents indicated that they knew at least some forms of contraception, most frequently condoms and the pill (although they may not have known about a method of family planning at the time they experienced an unintended pregnancy).

Respondents described that they sometimes could not agree with their partner on contraceptive use. An HIV-positive respondent related how before learning her HIV status, she used to take the pill without her husband knowing.

R: [...] Sometime back, yes, I used to take [the pill] without him knowing.

I: Ok, why didn't you want him to know?

R: At that time, he wanted a baby [laughs] so much [laughs], so when he would find the pills he used to throw them away. (Female, 35 years of age, attended secondary education, parity 3, married, facility-based, she and her husband are both HIV-positive and have disclosed their status to one another, right-tail)

Women's covert contraceptive use may no longer be necessary following HIV diagnosis (and disclosure), especially if the couple is receiving HIV counseling as husbands may be more likely to accept contraception after HIV diagnosis.

Unintended pregnancies were reported more frequently in the facility-based sample. Some individuals only started family planning after they were diagnosed with HIV. The choice of contraceptive methods for PLWHA appeared to be driven by actual or perceived drug interactions between ARTs and certain contraceptive methods, as well as perceptions of the safety of long-term contraceptive use in general. Pills, in particular, were not seen as a viable method for HIV-positive women on ARTs. Injections and implants (progesterone-only hormonal contraception) and condoms were identified as more compatible with ARTs than birth control pills. Some HIV-positive respondents had negative personal experiences with hormonal contraception and others spoke about ARTs canceling out hormonal contraception.

So after I discovered that I was positive, then I was taking drugs, the ARVs [antiretrovirals]. They advised me that I shouldn't take [birth control] pills because of the Nevirapine. [...] They don't work well together ... the Nevirapine and the pill, because, the Nevirapine is very powerful [so] that it neutralizes the pill, the family planning pill. I used to take the pill. That's when I changed to injectables after they explained to me about the Nevirapine and the pill that they don't go well together. (Female, 35 years old, facility-based, she and her husband are HIV-positive and have disclosed their status to each other, attended secondary school, parity 3, married, right-tail)

Dual method use (condoms for HIV prevention and a hormonal method for pregnancy prevention) was reported more commonly

among facility-based (HIV-positive) respondents. It is noteworthy that no one in the left tail discussed dual method use.

4. Discussion

This application of Anomalous Case Analysis in Lusaka found revealing differences in the relevant structures and schema in place governing fertility decision-making in this high HIV-prevalence context. Among both HIV-positive and community-based respondents in the right-tail of the distribution, higher fertility desires seemed less affected by adverse economic or health conditions. They seemed less in control of their fertility desires than left-tail respondents based on the fact that even though they reported desiring a greater number of children, they reported more unintended pregnancies. They reported little discussion of childbearing desires within the couple, appeared to be more responsive to husbands' pressures to have more children (or perhaps they simply had more pronatalist husbands), and exhibited weaker planning behavior (as evidenced by more unintended pregnancies). For right-tail respondents with HIV, the advent of accessible PMTCT treatment appeared to have further neutralized the threat that HIV could have posed to their childbearing desires. In contrast, left-tail respondents were less likely to cite the effects of family pressure on their fertility decision-making, tended to voice more economic concerns about having a large family, and reported more discussion and agreement on the number of children to have within the couple. The PLWHA among the left-tail respondents were also more likely to cite medical advice about limiting childbearing. While left-tail respondents, perhaps more firmly in control of their childbearing and concerned about providing support, perceived HIV and providers' advice to end childbearing as an additional barrier discouraging them from having more children, right-tail respondents discussed HIV as another challenge to be overcome, along with economic difficulties and other health concerns. Interestingly, when discussion around family size did occur, there was very little discussion about HIV status and testing, both among right- and left-tail respondents in the community sample; respondents consistently voiced uncertainty over their partner's status, and women, in particular, expressed strong concerns about their husband's sexual behavior.

The predicted cases exhibited behaviors and attitudes covering the range between the right and left tails of the distribution, but they seemed to generally hew more closely to right-tail respondents. For instance, the childbearing desires of predicted cases did not seem to be dampened by economic hardship (although they acknowledged it made it more difficult to have children), or by health concerns, and those who were HIV-positive expressed faith in PMTCT. This provides evidence that among both right-tail and predicted cases, children are seen as a net benefit, and therefore, in the face of uncertainty about their future health, these individuals were more likely to want to continue to reproduce. In contrast, individuals on the left-tail of the distribution were more likely to perceive children as a net cost. While differences were not always distinct between the predicted cases and outliers, overall, outliers held exceptionally strong beliefs or had highly impactful experiences which differentiate them from their peers—on either side of the distribution.

Examining these results within the Theory of Conjunctural Action (TCA) allows us a framework within which to identify the individually experienced structures regarding childbearing relevant to this sample (Johnson-Hanks et al., 2011). Fig. 1 captures the schemas and construals influencing fertility preferences which emerged from our data (adopted from Gipson's (2013) application of TCA to Filipino youth). We expanded Gipson's (2013) framework by including HIV in the application of TCA. As is clear from the data,

and visualized in the figure, HIV is only one consideration individuals are taking into account when making fertility-related decisions, and depending on how individuals weigh the influence of HIV, its effects are visible to varying extents in their fertility desires or fertility-related behavior.

Relevant schemas, and the relative strength of different schemas, clearly vary across individuals, as Trinitapoli et al. also found (2013). We put forward that while the deep schemas may be consistent across our respondents, the shallow schema may differentiate right-tail from left-tail respondents (Johnson-Hanks et al., 2011). While some respondents perceived the cost of raising a family as a reason to limit family size, others did not experience it as a significant inhibitor. In general, left-tail respondents seemed to give relatively greater weight to external influences than right-tail respondents. Some schemas are contradictory (e.g. pressure from others to continue childbearing versus the perceived negative health effects from pregnancy) and respondents appeared to pick and choose schema across multiple domains to explain their fertility-related preferences and behavior. It is possible that in the face of conflicting schemas, individuals simply reference schemas which validate their childbearing behavior. Yet respondents' stated reasons should not be taken, necessarily, at face value. In his work in sub-Saharan Africa, Agadjanian (2005) concluded that economic concerns were employed as an "effective 'excuse'" to reduce family size without challenging traditional structures as it offers "a culturally acceptable justification for waiting until better times, even though no one knows when such better times will arrive and how exactly they will be better when (or if) they do" (p. 639). Further research is needed to unpack the relationship between schema and events, or behavior.

These data add to the body of evidence that schemas are different (or at least there are additional schemas) for PLWHA than for a community-based sample, and yet as ARTs turn HIV into a chronic disease, these structures are again shifting. These findings also highlight a lack of alternative, acceptable construals regarding childbearing in this social context—that there is a minimum acceptable family size that must be achieved for social approval, regardless of HIV status—a finding which is not new but nevertheless demands further identification, examination and specification in future work.

Limitations of this study include that due to the small sample size of respondents in Lusaka, we had to relax the definition of an outlier and include individuals closer to the mean than the methodology proposes. Furthermore, because the distance from the mean is different for the various surveys, we are comparing individuals who are not uniformly anomalous. Additionally, the HIV status of many community members is unknown as they have not been tested (or do not report being tested). Most of the respondents in the qualitative sample were between 35 and 44 years old. Ideally, we would have liked to have had younger respondents in our qualitative sample. Another limitation is that the reproductive strategies of PLWHA are presented without taking into account timing of HIV diagnosis. While we have information on disclosure in the current relationship, the interviews did not capture whether disclosure occurred in previous relationships in which fertility decisions may have been made. In addition, we did not explore fertility strategies among sero-discordant couples in particular. In addition, as this study is cross-sectional, we are unable to assess change over time such as the effects of union transitions, death of a child, or other significant changes on fertility desires (Yeatman et al., 2013). Lastly, while the dataset contains information on ART use, examining how ART influences fertility preferences fell beyond the scope of this analysis.

We must highlight the fluid nature of fertility preferences, and the shortcomings of measurements designed to capture these. Our respondents are anomalous in that their fertility preferences do not adhere to what their socio-demographic characteristics would predict. However, the relationship between preferences and actual behavior is not straightforward, and it is not to say that these anomalous cases will not ultimately exhibit reproductive or contraceptive behaviors more typical of their socio-demographic background. Fertility desires are not fixed and vary across time and in response to changing circumstances (Yeatman et al., 2013). Preference instability has been documented in various contexts (Debuur et al., 2002; Kodzi et al., 2010a,b; Hayford, 2009), particularly in response to life events such as a birth or economic hardship (Sennott and Yeatman, 2012), as illustrated in these interviews. The measurement of preferences as predictors of behavior is complicated by issues such as ex-post rationalization, by which couples will retrospectively report a child that was unwanted at the time of pregnancy as wanted (Baschieri et al., 2013; Speizer et al., 2013), or tendencies to report "ideal" preferences rather than preferences under the circumstances respondents actually live in (Bongaarts, 1990). Patterns of "perpetual postponement" whereby parents postpone the next child until a "better time" which never materializes may lead individuals to have unrealistically high fertility desires coexisting alongside smaller actual family sizes. This underachievement of fertility intentions has been documented mostly in post-transitional societies (Berrington, 2004; Morgan and Rackin, 2010), but our interviews suggest that it is also happening in Zambia. If preferences are dynamic with unclear relationships to behavior, respondents' anomalous preferences may not translate into anomalous behaviors, and their respective predictors may be different. However, fertility preferences, despite their instability, have been shown to retain predictive power in models of reproductive outcomes such as conception (Kodzi et al., 2010) or contraceptive use (Roy et al., 2008), suggesting the factors identified here may also influence behaviors.

One of the aims of Anomalous Case Analysis is to identify additional factors influencing the outcome that had not been considered in the initial survey. These variables can be included as covariates to improve the fit of the model if the information was collected, and if it was not collected, to identify variables that could be collected in future surveys, all with the aim of better predicting the outcome(s) of interest. Several variables have been highlighted in this analysis as potentially important predictors of childbearing desires in this population, but were not included in the original models. Some variables identified as important are already collected in national surveys such as the DHS. These include socioeconomic status (which respondents cite as affecting their ability to support large families), religion (with religious respondents more likely to feel the need to adhere to a religious norm regarding family size), partner's desired family size, who makes decisions on family size (husband, self, joint, in-laws, etc.), and husband's disapproval of contraceptive methods (which hindered women's ability to limit their fertility). Another important dimension that emerged from the interviews is the influence of one's social network, be it through frequent interaction with traditional extended families encouraging people to have more children, or with individuals from different cultures and backgrounds than the respondent advocating for limiting family size, such as the white colleague. Although it is difficult to sum these social interactions into discrete variables to be collected, area of residence (urban versus rural) appears as an important predictor, as it helps define the types of people in one's social network and the prevailing norms. Rural respondents may have a strong family network with fairly rigid fertility norms, while urban respondents may have a

more culturally and economically diverse social network with varying fertility norms.

Other variables not ordinarily collected in national surveys, that would require questions to be added to existing questionnaires, include respondents' perceptions of the minimum threshold of acceptable family size (which appears to set a lower limit for fertility desires), and *perceptions* of the number of children they are able to provide for (separate from their actual socioeconomic status). Another potential predictor relates to couples' communication on fertility decisions. Going beyond the question of who ultimately makes decisions on family size, the interviews highlighted the importance of communication on this matter as an end in itself: right-tail respondents often reported not knowing how many children their husband wanted, and not talking about it, whereas this was not true of left-tail respondents. This suggests that discussion within the couple may be beneficial in and of itself in enabling respondents to control their fertility. Other variables that should be collected in future surveys include providers' awareness of the need that some women have to use methods without their partners knowing including what they are willing to do to facilitate covert contraceptive use (which may enable women to have better control over their fertility), and perceptions of risk involved in pregnancy and childbirth, including whether the woman fears contracting diseases from the labor wards (as this may discourage women from seeking assisted deliveries, of particular importance for PLWHA). In high HIV prevalence settings, other potential predictors of fertility desires are HIV status, perceptions of the effectiveness of drugs to prevent mother-to-child transmission of HIV and risks they perceive in having a child, and beliefs about interactions between antiretroviral drugs and contraceptives. HIV status should ideally be collected through biomarkers like in the DHS (as self-reported status is of limited value). Other questions around social networks and experiences of gender inequality could also help elucidate the people who have the most influence in men's and women's lives. These findings need to be tested in other places in Zambia and sub-Saharan Africa to assess the extent to which the dynamics identified in this paper hold elsewhere as schemas of impact.

5. Conclusion

Using survey findings to help draw our sample for the in-depth interviews serves two purposes. It allowed us to: 1) examine in greater depth the perspectives of individuals who hold non-typical fertility preferences in a context of high HIV to understand how these individuals differed in their responses to their social environments; and 2) test the application of the Anomalous Case Analysis methodology in Lusaka, Zambia to learn more about fertility-related behavior in this high HIV-prevalence setting. Using the Theory of Conjunctural Action gave us a framework within which to categorize social influences on fertility desires among PLWHA, and thereby gain new insights into the individual negotiation of competing *schemas*. The findings generated by the application of ACA point to opportunities to address unwanted fertility, in particular, among individuals in the left-tail of the distribution, who desire fewer children than predicted. As actual fertility is higher than desired fertility for the country as a whole, addressing unwanted fertility in this group already motivated to reduce their fertility may be the most effective place to invest resources, especially among PLWHA since excess fertility within this group consumes a greater share of health care resources than excess fertility among women without HIV. Future work should take these findings into account when attempting to predict fertility preferences among populations with generalized HIV epidemics.

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