Stability in Intentions to Stop Childbearing: Evidence from Rural Mozambique

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Abstract (165 words): In much of sub-Saharan Africa, birth rates are high and individual circumstances are unstable. Given these conditions, some demographers argue that women have difficulty forming long-term fertility plans and thus challenge the utility of reported desires to stop childbearing. But despite these challenges, intentions to stop childbearing have predictive power. We propose that a better assessment of both the empirical and theoretical relevance of fertility intentions requires understanding how intentions change in response to individual circumstances. This paper uses three waves of survey data collected in rural southern Mozambique to study stability and change in the desire to stop childbearing. We apply fixed-effects models to assess the degree to which changes in fertility intentions are shaped by changes in demographic factors, household economic conditions, and health status, controlling for stable individual characteristics. Results suggest that measures of fertility intentions are meaningful, even in unstable high-fertility contexts, and provide further support for the "moving target" model of intentions that has been proposed for low-fertility settings.

Fertility intentions are central to demographic theories of the transition from high to low fertility. According to Coale's (1973) seminal formulation, fertility will decline when childbearing falls within "the calculus of conscious choice"– that is, when fertility becomes something that individuals can make deliberate decisions about. Other formulations of demographic transition theory focus on the content of fertility intentions, rather than their formation. For example, Caldwell's restatements (1976, 1980) revolve around explanations for why people might want few rather than many children. Although there is variation in theoretical scope and emphasis, most demographic theories adopt some version of a "target" model of fertility, under which women (or couples) have a relatively stable desired family size, plan to stop childbearing once they reach that target, and are able to implement their plans with some degree of success. The transition to controlled fertility is assumed to be a transition to this model.

The relevance of the target model of fertility control in sub-Saharan Africa has been questioned. Given the unpredictability of social, economic, and demographic outcomes in the region, it may be difficult for women to make long-term plans for fertility. In contexts of economic or marital uncertainty, women may prefer to "wait" – sometimes indefinitely – for the next child rather than express clear desires to stop childbearing altogether (Agadjanian 2005; Timaeus and Moultrie 2008). Women's reported intentions to stop childbearing and desired family size do not always align with each other or with evidence of parity-specific control (Johnson-Hanks 2007). Where fertility decline has taken place in the region, it appears to take place via longer birth intervals and contraceptive use for spacing across all parities, rather than through parity-specific control (Caldwell, Orubuloye, and Caldwell 1992; Cohen 1998). But despite these conceptual challenges, intentions to stop childbearing have empirical meaning: they predict individual-level fertility and contraceptive behavior, at least in the short term, and are

associated with change over time and cross-national variation at the aggregate level (e.g., Bankole 1995; Bongaarts 1992; Hayford and Agadjanian 2012; Kodzi, Johnson, and Casterline 2010; Westoff 1990). In order to understand fertility change in sub-Saharan Africa, it is necessary to study both the contexts where target models of fertility hold and the limitations of these models.

In this paper, we use data from three waves of survey data collected in rural southern Mozambique to study stability and change in the desire to stop childbearing. With a few key exceptions, past research on the determinants of intentions to stop has been cross-sectional. Yet the target model of fertility is inherently a life course model, and a full understanding of the empirical and conceptual utility of the model requires longitudinal data. We used fixed-effects models to study the association between changes in demographic, economic, and health conditions and changes in the desire to stop childbearing. Results show some broad support for the target model of fertility, but provide more evidence for fertility intentions as a "moving target" that evolve in response to individual circumstances.

The intention to stop having children

Descriptive analyses of intentions[1] to stop having children in high-fertility contexts confirm that these intentions are broadly consistent with the target model of fertility: older women and women with more children are more likely to report wanting to stop childbearing (Westoff and Bankole 2002). Education and urban residence are also positively associated with the desire to

[1] Conceptually, fertility intentions differ from fertility desires. In practice, the distinction between these terms is not always maintained by demographers or recognized by the subjects of demographic research; the theoretical differences between "intentions" and "desires" is particularly difficult to uphold in practical conditions that include translation of survey items into local languages and substantial social distance between researchers, interviewers, and subjects. We use the terms interchangeably in describing previous theory and research.

have no more children (Bankole 1995). Yet reported intentions to stop childbearing in sub-Saharan Africa also show substantial mismatches with a strict target model of parity-specific fertility control. Johnson-Hanks (2007) uses data from 18 Demographic and Health Surveys carried out in sub-Saharan African between 1994 and 2001 to compare fertility intentions and past reproductive histories among women at the end of their childbearing years. Johnson-Hanks finds that aggregate patterns of past childbearing are virtually identical for women who say they want to stop childbearing and women who report that they want more children and concludes that the classic demographic distinction between "natural" and "controlled" fertility does not hold in this context. Johnson-Hanks argues that women form short-term plans based on their immediate circumstances and that these plans are frequently modified in response to changes in circumstances.

The possibility that fertility plans change in response to social, demographic, and economic conditions does not negate the validity of fertility intentions as a concept. In fact, research in low-fertility contexts has proposed a "moving target" model of fertility that incorporates both the potential for change in desires for children and the meaningfulness and predictive power of measures such as desired family size and intentions to stop childbearing (Lee 1980; Morgan 2001; Hayford 2009). Accounting for the influence of changing conditions on fertility intentions is particularly important for understanding African fertility because a central criticism of the relevance of intentions to stop having children in sub-Saharan Africa has been the unpredictability of social, economic, and demographic outcomes in the region (e.g., Agadjanian 2005; Johnson-Hanks 2006, 2007; LeGrand et al. 2003). Given these multiple dimensions of instability and change, individuals have difficulty predicting the likely course of their lives, and may feel little sense of control over future developments. In this context, making

long-term plans for childbearing is difficult, and the possibility of holding stable desires to stop having children is called into question.

However, the moving target model has only rarely been applied to studies of preferences in high-fertility contexts; this lapse is particularly strong in sub-Saharan Africa, in part because of the limited availability of longitudinal data to examine changes in fertility intentions. Key exceptions to this pattern use longitudinal data from Malawi and from Ghana to illustrate the contribution of changing individual and household circumstances to changes in fertility intentions. For example, Yeatman (2009a, 2009b) uses two waves of survey data from Malawi to examine the impact of learning one's HIV infection status on fertility intentions. She demonstrates that the impact of learning one's HIV status depends on whether the biomedical test results are different from previous subjective assessments of HIV risk – that is, that change in fertility intentions is produced by *change* in understanding of HIV risk. Sennott and Yeatman (2012) use data from young women in Malawi to analyze changes in desired fertility timing over a twenty-month period. (Because the women in the sample are at the beginning of their reproductive career, Sennott and Yeatman do not study intentions to stop childbearing.) Reproductive events and changes in economic status have the most consistent impact on changes in fertility intentions, while changes in relationship and health status have less consistent associations. Kodzi and colleagues use eight waves of survey data from Ghana to examine complex patterns of changes in fertility intentions (Kodzi, Casterline, and Aglobitse 2010; Kodzi, Johnson, and Casterline 2012). Analyses of the desire to stop childbearing show that past reproductive events, predictions of economic outcomes, and subjective evaluation of the costs of childbearing (both financial costs and costs to mother's health) all influence fertility intentions (Kodzi, Johnson, and Casterline 2012). Analyses incorporating a wider range of possible

intentions (including desired timing as well as undecided responses) found that changes in preferences were largely consistent with desired family size and births between waves; these analyses did not include changes in economic conditions or other non-demographic factors (Kodzi, Casterline, and Aglobitse 2010). Debpuur and Bawah (2002), studying stability of intentions across two survey waves in Ghana, employ a somewhat wider range of individual characteristics associated with change (education, religion, child mortality, contraceptive use), but did not have access to measures of household economic conditions.

The present analysis

Setting

This paper extends the literature on the stability of fertility intentions in sub-Saharan Africa by studying the impact of changing economic and household circumstances as well as individual sociodemographic characteristics on the stability of women's intentions to stop childbearing. The data used in this analysis were collected in rural areas of Gaza province in southern Mozambique between 2006 and 2011. (Details of data collection are provided in the following section.) The primary economic activity in the area is subsistence agriculture, but frequent droughts make yields unpredictable. Many households supplement resources with remittances from male labor migrants to neighboring South Africa, but these returns, too, have become uncertain as regulated and institutionalized migration to work in mines has been replaced by undocumented migration and informal labor (de Vletter 2007). Perhaps in part because of the high levels of male migration, Gaza has the highest HIV prevalence level of any province in Mozambique, with an estimated adult prevalence level of 25% in 2009 (Ministry of Health 2010). Although HIV is highly visible at the social level, individual-level health outcomes are unpredictable. HIV-positive individuals are not identifiable in the early stages of

infection, and rapid changes in the availability of testing and treatment mean that the long-term prognosis after infection is variable and uncertain. Thus, the study area might be considered "typical" of sub-Saharan Africa in the level of instability of social, economic, and demographic conditions.

Hypotheses

Based on previous empirical work on changes in fertility intentions in sub-Saharan Africa, as well as theoretical developments of the "moving target" model of fertility, we propose the following hypotheses related to the desire to stop childbearing in this setting.

According to a strict target model of fertility, or a classic demographic understanding of parity-specific control, the intention to stop childbearing is determined only by a woman's fixed desired family size and the number of living children she has. Thus, our most basic hypothesis is as follows:

H1: Having more living children will increase the likelihood of wanting to stop childbearing.

Moving-target models of fertility agree that having more children should increase the likelihood of being satisfied with one's family size. However, these models propose that desired family size is not fixed, but changes according to a woman's circumstances. Relevant circumstances include the availability of economic resources, marital status (including perceived marital stability), and health. Thus, consistent with moving target models of fertility, we hypothesize that:

H2: Women who experience divorce or separation will be more likely to want to stop childbearing than women in stable marriages.

H3: Declines in household economic conditions will be associated with an increased likelihood of wanting to stop childbearing, net of the number of living children.

H4: Women who experience or predict a worsening in their health will be more likely to want to stop childbearing than women in good health.

Support for hypothesis 1 could indicate support for either classic target models or moving target models of fertility. Support for hypotheses 2, 3, and 4 would constitute support for a moving target model and evidence against classic target models of fertility.

Data and methods

Data

Data come from three waves of a population-based survey of rural ever-married women of reproductive age conducted in 56 villages of four contiguous districts (total area 5900 square miles, population 625,000) of Gaza province in southern Mozambique. The survey collected detailed demographic and socioeconomic information, including pregnancy histories, reproductive intentions, husband's migration history, household economic status, and HIV/AIDS awareness and prevention. Questions were largely, but not perfectly, comparable across waves. The first wave of data collection surveyed 1678 married women age 18-40 in June-July 2006. In each district, 14 villages were selected with probability proportional to size, and approximately 30 women were interviewed in each village. Households were randomly selected in each village, with stratified sampling to produce equal numbers of women married to migrants and non-migrants, and eligible women were randomly sampled within households. In June-July 2009, the survey team attempted to relocate and reinterview all women from the original sample, regardless of current marital status or residence. To maximize retention, followup data collection efforts were carried out in October 2009 and in June-July 2010. In all, 1408 women from the original sample (84%) were reinterviewed. A refresher sample was randomly selected to replace

women lost to attrition, for a total sample in 2009 of 1868 women[2]. In 2011, all women interviewed in either 2006 or 2009 – including women from the original sample who were not located in wave 2 as well as women from the wave 2 refresher sample – were eligible for the third wave of data collection. As in 2009, the primary data collection took place in June-July, with followup data collection efforts a few months later and one year later to seek out women not reached in the main data collection. Including additional sample refreshment, a total of 1937 women were interviewed in 2011. Overall, 1239 women from the 2006 sample (74% of the total) were relocated and interviewed in the third wave. 1828 women were interviewed at least twice, and 1591 women were interviewed in both wave 2 and wave 3. The analytic sample depends on the specific analysis. Some descriptive analyses are limited to women who were interviewed in all three waves; the primary multivariate analysis includes women interviewed at least twice; and supplementary multivariate models analyze women who were interviewed in both wave 2 and wave 3. All descriptive and multivariate analyses exclude women with missing data on the outcome variable or on any predictor variables. Sample sizes for each analysis are listed in the appropriate table.

Methods

We begin with descriptive analyses of aggregate and individual patterns of change across survey waves in the intention to have no more children. We provide bivariate statistics showing the association between the number of living children and the desire to stop childbearing, and we present statistics showing the prevalence of changes in demographic, economic, and health conditions between survey waves. We calculate the prevalence of changes by cross-tabulating

[2] Because of the timing of interviews for the refresher sample and followup data collection waves, the total sample size in 2009 was larger than the sample size in 2006.

variables measured in one survey wave with their value at the next survey wave.

Multivariate analyses use logistic regression models to estimate the association between these conditions and the intention to stop childbearing. Because we are primarily interested in the impact of *changes* in circumstances on *changes* in intentions, we apply fixed-effects models (Allison 2005). Fixed-effects models pool data from multiple waves of data collection and treat each person-wave of data as a single observation "nested" within each woman. To account for the non-independence of multiple observations of the same woman, fixed-effects models incorporate a unique predictor variable for each woman. This predictor is treated as a stable variable accounting for all time-invariant woman-level characteristics, both measured and unmeasured. The effect of this variable is not directly estimated. Instead, by comparing multiple observations from the same woman, the effect of the fixed variable "drops out" of the equation. In essence, the effect of changing characteristics is estimated by comparing women at one time point to themselves at a different time point. Because of this structure, fixed-effects models cannot directly estimate the effect of time-invariant characteristics, although they control for these variables. In addition, fixed-effects models can only use information from women who are observed at multiple waves and experience change in the outcome variable across waves. These models are inefficient in the use of data, but provide unbiased estimates without making assumptions about correlations between measured and unmeasured characteristics.

Measures

The dependent variable in this analysis is a measure of whether women wanted to stop childbearing. All women were asked "Would you like to have (more) children in the future, even if it is not right away?" (That is, the survey asked about positive intentions for more children.) Women who were pregnant at the time of the survey were asked about the desire for more

children after the birth of the child they were carrying. Response options were yes, no, and don't know. Women who responded "no" were considered not to want more children.

Because fixed-effects models control for all stable characteristics, we do not include controls for education, marital duration at baseline, or age at baseline. Models do include a control variable for survey wave in order to account for the effects of aging. We examine the impact of changes in demographic factors, economic conditions, and health status on reproductive preferences. Demographic factors include the number of living children and marital status. The first wave of the survey was limited to married women; women could experience marital dissolution and, in some cases, remarriage between the first and second and second and third waves.

Economic conditions are measured using two primary variables. First, an index of household possessions measures the household's access to cash and durable goods. The household wealth index, constructed based on exploratory analyses and ethnographic observation in the study area, indicates whether the household owns selected consumer goods (radio, bicycle, car or motorcycle) and takes on possible values of 1 (respondent's household owns none of the selected goods), 2 (household owns a radio only), 3 (household owns a radio and a bicycle), or 4 (household owns a car or motorcycle). Second, we include a dichotomous indicator of whether the household owns cattle, a traditional medium of wealth in this context. In 2009 and 2011, but not in 2006, women were also asked to provide a subjective report of whether their household was economically better off, worse off, or about the same as other nearby households. We estimate supplemental models using only data from the second and third survey waves and include this measure in those models. In addition to questions about marital status and household wealth, we also account for husband's migration status. Based on our previous research in the

area, we distinguish between "successful" and "unsuccessful" migrants as judged by women's perceptions of the level of support received from her migrant husband. Women with migrant husbands were asked whether their household was better off, worse off, or the same since their husband had migrated. "Successful" migrants are those whose wives report that the household is better off. This variable captures both economic conditions and women's perceptions of marital quality and stability. Women with non-migrant husbands and unmarried women are combined in the reference category for this variable.

To account for changes in health status, we measure women's worry about HIV. We focus on HIV because it is the most salient single factor affecting adult health in this context. Women were asked how worried they were about contracting HIV from their husband or another man; possible responses were very worried, a little worried, and not at all worried. Because of the distribution of responses, we dichotomize answers as very worried or not very worried. In the 2009 and 2011 survey waves, women were also asked about their perceived risk of being HIV-positive (possible, impossible, don't know) and about their overall self-rated health (good vs. poor or so-so). These questions were unfortunately not asked in the 2006 survey, but we include these measures in models for 2009 and 2011 only.

Results

Descriptive results

The average age in the sample was 27.8 years in wave 1 (not shown); for most women, there were three years between wave 1 and wave 2 and two years between wave 2 and wave 3, for a total of five years spanned by the three survey waves. Average parity and distribution of intentions to stop childbearing across the three waves of data collection are shown in Table 1; these statistics only include women who were interviewed in all three survey waves. In 2006, the

average woman had 2.5 living children, and about 28% of women wanted no more children. As might be expected, both parity and the desire to stop childbearing increased across survey waves, with a larger increase between waves 1 and 2 than between waves 2 and 3, likely because of the longer time span. By wave 3, the average woman had 3.6 living children, and just over half of the sample reported wanting no more children. The aggregate increase in reported intention to stop childbearing is substantial – from 29% to 51% – given the relatively short time period covered, the relatively young age of the sample, and the fact that the average number of living children increased by only about one child per woman over the three survey waves. In all three survey waves, the average number of living children was higher among women who wanted to stop childbearing than among women who wanted more children.

<Table 1 about here>

While aggregate intentions to stop childbearing increased monotonically across waves, individual trajectories of change showed more variation. Table 2 presents the distribution of women across individual patterns of change. For this table, we label trajectories that exhibit only a shift from wanting more children to not wanting more children as "target model" trajectories. These trajectories follow the pathway predicted by target models of fertility, where women meet a reproductive goal and enter a stable state of wanting no more children. Women who report wanting to stop childbearing and then subsequently report wanting more children are described as "reverse" trajectories (i.e., trajectories that involve a reversal of the intention to stop childbearing). Note that these trajectories are not necessarily inconsistent with the target model of fertility: A transition from wanting to stop childbearing to wanting more children could be consistent with a target model of fertility if a woman following this trajectory experienced the death of a child, a fairly common event in this context (see Table 3). However, reverse

trajectories differ from the simplest form of the target model and thus invite further exploration.

<Table 2 about here>

The target-model trajectories are the most common patterns. The largest proportion of women, 36%, wanted more children at all three survey waves; the next largest group, about 19%, wanted to stop childbearing at all three survey waves. In total, just over one in four women in the sample experienced a transition to wanting no more children that was not reversed during the period under study, about 13% between waves 1 and 2 and about 15% between waves 2 and 3. A minority of women go through reverse transitions. These women reported wanting to stop childbearing at one or two waves but later wanted more children. Although target-model trajectories are the modal pattern in this sample, our results also imply a high level of instability in the desire to stop childbearing. Of women who reported in the first survey wave that they wanted no more children, about one third changed their minds at least once by the third survey wave (reverse trajectories / women who wanted to stop at wave 1 = (39 + 24 + 53) / 343 (table 1) = 0.34).

Trajectories that are consistent with the target model in terms of the direction of change in intentions are also consistent with classic demographic theories in terms of their association with women's number of living children. Women who wanted more children in all three waves had the lowest average number of living children at both wave 1 and wave 3, while women who wanted to stop childbearing in all three waves had the highest average number of living children. These trajectories are not necessarily consistent with fertility behavior during the study period, however – on average, women who wanted to stop childbearing at all three waves had slightly *more* additional children between wave 1 and wave 3 than women who wanted to have more children at all three waves (1.1 vs. 1.0). (Note that this difference might represent differences

either in additional births or in child mortality, or both.) Reverse trajectories show associations with parity that are not readily interpretable.

Before presenting multivariate analysis of factors other than fertility that are associated with change in the intention to stop childbearing, we first briefly describe the prevalence of between-wave changes in demographic, economic, and health conditions that might predict changes in fertility intentions (Table 3). In general, there were fewer changes between 2009 and 2011 than between 2006 and 2009, probably because there was less time elapsed between the later two survey waves. By far the most common between-wave change is having another child – nearly three quarters of women in the sample had a child between the 2006 and 2009 survey waves, and more than half had a child between the 2009 and 2011 waves. Fewer women experienced a child death (11.7 % between 2006 and 2009; 7.9 % between 2009 and 2011). The most common change in economic conditions between waves was an improvement in the household possessions index – 36.7% of women gained household possessions between the first two survey waves, and 40.9% between the second and third survey waves. Fewer women reported a decline in the household possessions index. The subjective measure of economic well-being, in contrast, showed a decline between the second and third survey waves, suggesting that women's perception of their household's economic stability may not correspond with objective measures. Substantial minorities of women reported becoming less worried about contracting HIV from their husband (41.2% and 32.9%). Smaller proportions of women, between 5 and 10%, experienced other types of changes between waves.

<Table 3 about here>

Multivariate results

Table 4 shows results from fixed-effects models of the intention to stop childbearing.

Model 1 includes data from all three waves; Model 2 uses data from only waves 2 and 3 and includes a larger set of variables. The coefficients produced by fixed-effects models are estimated by comparing differences across waves, but interpreted in the same way as cross-sectional coefficient estimates. For example, the coefficient for the number of living children in Model 1 is 0.62, which means that a one unit increase in the number of living children is associated with an increase of 0.62 in the log-odds (odds ratio = exp(0.62) = 1.9) of wanting to stop childbearing. This result also implies that the death of a child (a decrease in the number of living children) would be *negatively* associated with wanting to stop childbearing. Thus, hypothesis 1 is supported. Marital dissolution is also associated with an increased likelihood of wanting to stop childbearing, as proposed by hypothesis 2.

<Table 4 about here>

However, we find only very weak support for hypothesis 3, regarding the association between household economic conditions and wanting to stop childbearing. The coefficients for both the household wealth index and cattle ownership are negative in sign, as predicted, but small and not statistically significant. In Model 2, which uses only data from waves two and three of the survey, we test a measure of subjective perceptions of household economic conditions. This coefficient was also negative and larger in magnitude, but still did not reach conventional levels of statistical significance (p=.15). In exploratory analyses, we used the consumption of meat, chicken, or fish and the material that the roof of the house was constructed from as additional measures of economic status; none of these measures were significantly associated with the desire to stop childbearing, even when included in models alone. We did find weak evidence that women married to successful migrants were less likely to want to stop childbearing. The coefficient for this measure was relatively large, negative, and within range of

conventional levels of significance in some specifications (p=.06, Model 1). Women are more likely to perceive their migrant husbands as successful if the household is doing well economically. Thus, this variable is partly a measure of economic resources. However, it also captures the husband's commitment to the household of origin, and by extension the marriage, so it is not purely an economic measure.

Hypothesis 4 also received mixed support. Being very worried about HIV is not significantly associated with wanting to stop childbearing (Models 1 and 2), and perceived HIV risk is not associated with fertility intentions (Model 2), suggesting that concerns about HIV are not a major driver of fertility intentions. However, women with better self-rated health were significantly less likely to want to stop childbearing (Model 2). Thus, it appears that good health increases women's desire to have children, but concerns about HIV are not the main determinant of actual or perceived health.

Fixed-effects models control for all stable individual characteristics, both measured and unmeasured. In particular, if women do have a fixed target family size, as proposed in the target model of fertility intentions, this target would be accounted for in the fixed-effects models. That is, the models examine whether a woman wants to stop childbearing conditional on the number of living children she has and her desired family size. A strict interpretation of the target model of fertility would imply that no other characteristics should be associated with the desire to stop childbearing. These models do show significant coefficients, and adding additional variables beyond the number of living children significantly improves model fit (based on comparison with a model including only the number of living children, not shown). Thus, our overall results show that a pure target model is not sufficient for understanding the desire to stop childbearing in this context.

Discussion and conclusions

Demographers have frequently expressed concern about the utility of survey measures of fertility intentions in sub-Saharan Africa, particularly measures of long-term plans like the desire to stop childbearing. These concerns are driven in part by inconsistencies between survey measures of fertility intentions and contraceptive behavior, and in part by qualitative research showing high levels of unpredictability, uncertainty, and ambivalence in men's and women's understandings of their reproductive futures. In this research, we used longitudinal survey data collected in rural areas of southern Mozambique – a region rife with the social and economic uncertainty that challenges fixed fertility plans – to examine the stability of women's desires to stop childbearing and the degree to which instability is patterned in predictable ways.

Our results show substantial instability in the reported desire to stop childbearing. Of women who wanted to stop childbearing in the first survey wave (27.8% of the sample), about one third of those interviewed in the next two waves reported at least once that they wanted more children. However, we also find that most women in the sample show trajectories of fertility intentions that are consistent with classic demographic models. Furthermore, changes in fertility intentions are patterned in ways consistent with demographic theories; women are more likely to want to stop childbearing when they have more children or experience marital dissolution, and less likely to want to stop childbearing when they experience the loss of a child or are in better health.

Some models suggest that improvements in household economic status might increase women's desire for children. For the most part, however, our results do not indicate a strong relationship between economic conditions and fertility intentions. Our measures may not capture the true degree of instability in the availability of economic resources. The associations that were

largest in magnitude in our models were with subjective perceptions of the household's economic standing, rather than objective measures of durable goods; it is possible that more detailed questions about women's perceptions of economic conditions would yield stronger associations with the desire to stop childbearing. For example, Kodzi and colleagues (2012), using longitudinal data from Ghana, find that women's predictions of future household conditions are associated with the desire to stop childbearing.

This paper focuses primarily on the internal validity of survey measures of fertility intentions – whether survey questions about fertility intentions produce responses that are consistent over time and consistent with other survey measures. We do not address another key aspect of measurement, the predictive power of the measure. In other research using the same data, we find that the desire to have no more children measured at wave 1 is strongly but imperfectly associated with childbearing between waves 1 and 2 (Hayford and Agadjanian 2012).

On the whole, longitudinal analyses of fertility intentions and behavior in rural southern Mozambique show that survey measures of the desire to stop childbearing in this context neither neatly follow or completely diverge from the standard target model of fertility intentions. A better match between survey data and demographic models can be achieved by apply the moving target model of fertility, a widely applied framework for understanding fertility intentions in low-fertility contexts (cf. Hayford 2009, Morgan 2001), rather than the stricter target model. Although qualitative research shows that attitudes toward childbearing in sub-Saharan Africa are complex and nuanced, these attitudes, or at least their basic contours, can be productively analyzed using survey data, particularly longitudinal data.

In considering the possible distinctiveness of attitudes toward childbearing in sub-

Saharan Africa, it is worth noting that fertility intentions in low-fertility contexts also reflect ambivalence and uncertainty. In the United States, for example, low-income men and women describe reacting to "unwanted" pregnancies with joyful anticipation, while in the U.K. between one third and one half of women (depending on the definition used) express uncertain intentions about future childbearing (Edin and Kefalas 2005; Edin and Nelson 2013; Ní Bhrolcháin and Beaujouan 2011). Neither instability nor ambivalence therefore constitutes a distinctly African set of attitudes toward fertility. African contexts may display particularly high levels of social and economic uncertainty, as proposed by some scholars, although economic uncertainty has also been cited as a driver of demographic behavior in Europe (see, e.g., Kreyenfeld, Andersson, and Pailhé 2012). Certainly, health systems, transportation infrastructure, and social systems in sub-Saharan Africa form substantial barriers to contraceptive use (Sedgh et al. 2007), which may make it more difficult to carry out fertility intentions in sub-Saharan African than in other settings. In any case, consideration of the possible distinctiveness of African fertility patterns seems more fruitfully directed at social systems and external factors rather than the interior processes through which fertility intentions are formed.

References

Agadjanian, V. 2005. "Fraught with ambivalence: Reproductive intentions and contraceptive choices in a sub-Saharan fertility transition." *Population Research and Policy Review* 24 (6): 617-645.

Allison, P. D. 2005. *Fixed Effects Regression Methods for Longitudinal Data*. Cary, NC: SAS Institute.

Bankole, A. 1995. "Desired fertility and fertility behaviour among the Yoruba of Nigeria: a study of couple preferences and desired fertility." *Population Studies* 49 (2): 317-328.

Bongaarts, J. 1992. "Do reproductive intentions matter?" *International Family Planning Perspectives* 18 (3): 102-108.

Caldwell, J. C. 1976. "Toward a restatement of demographic transition theory." *Population and Development Review* 2 (3-4): 321-366.

Caldwell, J. C. 1980. "Mass education as a determinant of the timing of fertility decline." *Population and Development Review* 6 (2): 225-255.

Caldwell, J.C., I. O. Orubuloye, and P. Caldwell. 1992. "Fertility decline in Africa: A new type of transition?" *Population and Development Review* 18 (2): 211-242.

Coale, A. J. 1973. "The Demographic Transition." Pp. 53-72 in *International Population Conference, Liege*. Liege, Belgium: International Union for the Scientific Study of Population.

Cohen, B. 1998. "The emerging fertility transition in sub-Saharan Africa." *World Development* 26 (8): 1431–61.

Debpuur, C. and A. A. Bawah. 2002. "Are reproductive preferences stable? Evidence from rural northern Ghana." *Genus* 58 (2): 63-89.

de Vletter, F. 2007. "Migration and development in Mozambique: poverty, inequality and survival." *Development Sourthern Africa* 24(1): 137-153. \

Edin, K. and M. Kefalas. 2005. *Promises I Can Keep: Why Poor Women Put Motherhood Before Marriage*. Berkeley: University of California Press.

Edin, K. and T. J. Nelson. 2013. *Doing the Best I Can: Fatherhood in the Inner City*. Berkeley: University of California Press.

Hayford, S. R. 2009. "The evolution of fertility expectations over the life course." *Demography* 46 (4): 765-783.

Hayford, S. R. and V. Agadjanian. 2012. "From desires to behavior: Moderating factors in a fertility transition." *Demographic Research* 26 (20): 511-542.

Johnson-Hanks, J. 2006. *Uncertain Honor: Modern Motherhood in an African Crisis*. Chicago: University of Chicago Press.

Johnson-Hanks, J. 2007. "Natural intentions: Fertility decline in the African Demographic and Health Surveys." *American Journal of Sociology* 112 (4): 1008-1043.

Kodzi, I. A., J. B. Casterline and P. Aglobitse. 2010. "The time dynamics of individual fertility preferences among rural Ghanaian women." *Studies in Family Planning* 41 (1): 45-54.

Kodzi, I. A., D. R. Johnson, and J. B. Casterline. 2010. "Examining the predictive values of fertility intentions among Ghanaian women." *Demographic Research* 22 (30): 965-984.

Kreyenfeld, M., G. Andersson, and A. Pailhé. 2012. "Economic uncertainty and family dynamics in Europe: Introduction." *Demographic Research* 27(28): 835-852.

Lee, R. D. 1980. "Aiming at a moving target: Period fertility and changing reproductive goals." *Population Studies* 34 (2): 205–226.

LeGrand, T., T. Koppenhaver, N. Mondain, and S. Randall. 2003. "Reassessing the insurance effect: A qualitative analysis of fertility behavior in Senegal and Zimbabwe." *Population and Development Review* 29 (3): 375-403.

Ministry of Health. 2010. *Inquérito Nacional de Prevalência, Riscos Comportamentais e Informação sobre o HIV e SIDA (INSIDA), 2009. Relatório final.* Maputo, Mozambique: Ministry of Health.

Morgan, S. P. 2001. "Should fertility intentions inform fertility forecasts? The direction of fertility in the United States." Washington, DC: U.S. Census Bureau.

Ní Bhrolcháin, M. and E. Beaujouan. 2011. "Uncertain fertility intentions in Britain, 1979-2007." *Vienna Yearbook of Population Research* 9: 99-129.

Sedgh, G., R. Hussain, A. Bankole, and S. Singh. 2007. "Women with an unmet need for contraception in developing countries and their reasons for not using a method." New York: Guttmacher Intstitute. Occasional Report No. 37. http://www.guttmacher.org/pubs/2007/07/09/or37.pdf

Sennott, C. and S. Yeatman. 2012. "Stability and change in fertility preferences among young women in Malawi." *International Perspectives on Sexual and Reproductive Health* 38 (1): 34-42.

Singer J. D. and J. B. Willett. 2003. *Applied Longitudinal Data Analysis: Modeling Change and Event Occurrence*. New York: Oxford University Press.

Timaeus, I. M. and T. A. Moultrie. 2008. "On postponement and birth intervals." *Population and Development Review* 34 (3): 483-510.

Westoff, C. F. 1990. "Reproductive intentions and fertility rates." *International Family Planning Perspectives* 16 (3): 84-89, 96.

Westoff, C. F. and A. Bankole. 2002. *Reproductive Preferences in Developing Countries at the Turn of the Century*. DHS Comparative Reports No. 2. Calverton, MD: ORC Macro.

Yeatman, S. 2009a. "The impact of HIV status and perceived status on fertility desires in rural Malawi." *AIDS and Behavior* 13(supplement): S12-S19.

Yeatman, S. 2009b. "HIV infection and fertility preferences in rural Malawi." *Studies in Family Planning* 40 (4): 261-276.

Table 1. Number of living children and fertility intentions across survey waves

		W1	W2	W3
Women who want to stop childbearing				
	N	343	523	606
	%	28.7	43.7	50.7
Average number of living children				
	All women	2.5	3.2	3.6
	Women who want to stop childbearing	3.7	4.2	4.5
	Women who do not want to stop childbearing	2.0	2.5	2.7

N=1196 women interviewed in all three survey waves with non-missing data for intentions.

Table 2. Trajectories of fertility intentions across survey waves

	N	%	W1 parity	W3 parity
Target-model trajectories				
More-More-More	430	36.0	1.5	2.5
More-More-Stop	151	12.6	2.4	3.8
More-Stop-Stop	175	14.6	2.7	4.2
Stop-Stop-Stop	227	19.0	4.3	5.4
Reverse trajectories				
More-Stop-More	97	8.1	2.1	3.3
Stop-More-More	39	3.3	2.2	2.9
Stop-Stop-More	24	2.0	2.9	4.2
Stop-More-Stop	53	4.4	3.0	4.2

N=1196 women interviewed in all three survey years with non-missing data for intentions.
"More" indicates wants more children; "stop" indicates wants to stop childbearing.

Table 3. Between-wave changes in individual and household characteristics

	2006 wave – 2009 wave	2009 wave – 2011 wave
Women interviewed in two adjacent waves	1367	1108
Demographic change		
Birth	73.6	56.0
Child death	11.7	7.9
Marital dissolution	10.5	4.0
New marriage	--	2.0
Change in husband's migration status		
Becomes successful migrant	14.7	11.2
Becomes unsuccessful migrant	13.8	10.4
Change in economic conditions		
Increase in household possessions index	36.7	40.9
Decrease in household possessions index	11.8	8.5
New cattle ownership	10.4	9.1
Loss of cattle ownership	7.9	5.6
Household becomes better off than other nearby households	--	20.4
Household no longer better off than other nearby households	--	64.2
Change in health status		
More worried about HIV	8.8	16.2
Less worried about HIV	41.4	32.0
Transition to good self-rated health	--	65.7
Transition to poor/so-so self-rated health	--	18.2

Women who were interviewed in two adjacent waves of data collection, non-missing data on all measures. Percent of women in each category.

Table 4. Fixed-effects models of fertility intentions as predicted by demographic, economic, and health conditions

	Model 1: All waves			Model 2: Waves 2 and 3		
	b	SE		b	SE	
Number of living children	0.62	0.10	***	0.62	0.17	***
Not married	0.57	0.28	*	0.84	0.42	*
Household wealth index	-0.01	0.08		0.00	0.11	
Household owns cattle	-0.22	0.19		-0.04	0.28	
Household better off than nearby households	--	--		-0.30	0.21	
Husband is a successful migrant	-0.31	0.17	+	-0.27	0.24	
Husband is an unsuccessful migrant	-0.14	0.17		-0.12	0.25	
Very worried about contracting HIV	-0.10	0.12		-0.17	0.16	
Perceived risk of being HIV+: possible	--	--		0.06	0.22	
Perceived risk of being HIV+: don't know	--	--		-0.26	0.22	
Good self-rated health	--	--		-0.46	0.20	*
2009 survey wave	0.53	0.14	***	--	--	
2011 survey wave	0.73	0.18	***	0.21	0.13	
N (observations)	5291			3607		
N (women contributing)	697			409		
-2 Log likelihood	1087.5			502.2		

Women who were interviewed in at least two survey waves (Model 1) or in waves 2 and 3 (Model 2) with non-missing data on outcome and predictor variables.+: p<.10; *: p<.05; **: p<.01; ***, p<.001.