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## Uncertain intentions: Social change and non-numeric fertility preferences in rural Mozambique

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“Uncertain intentions: Social change and non-numeric fertility preferences in rural Mozambique”

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**Abstract:** In many high-fertility countries, and especially in sub-Saharan Africa, substantial proportions of women give non-numeric responses when asked about desired family size. Classical demographic theory interprets responses of “don’t know” or “up to God” as evidence of fatalistic attitudes toward childbearing. Alternatively, these responses can be understood as meaningful reactions to uncertainty about the future. Following this latter approach, we use data from rural Mozambique to test the hypothesis that non-numeric responses are more common when uncertainty about the future is greater. We expand on previous research linking child mortality and non-numeric fertility preferences by testing the predictive power of economic conditions, marital instability, and adult mortality. Results show that uncertainty related to adult and child mortality and to economic conditions predicts non-numeric responses, while marital stability is less strongly related.

Childbearing intentions are at the center of traditional demographic understanding of the transition from high to low fertility. Coale’s (1973) classic formulation of the preconditions for fertility transition postulates that birth rates will decline only when reproduction enters “the calculus of conscious choice”—that is, when childbearing becomes a subject about which women can form and articulate desires and preferences. More specifically, Coale’s precondition has been interpreted to require the formation of precise numeric goals for completed fertility (van de Walle 1992). Women who do not express numeric intentions when asked how many children they want—who give non-numeric responses such as “up to God,” or who are unable to give any response—are considered to be less advanced along the path to low fertility.

Past demographic research has noted the widespread absence of quantitative goals for completed family size in high-fertility contexts, especially in sub-Saharan Africa (e.g., Casterline and El-Zeini 2007; Feyisetan and Casterline 2000; Pritchett 1994). These responses have sometimes been interpreted more broadly as evidence of a general fatalism with regards to

individual control over demographic outcomes or of a lack of cognitive capacity for quantitative reasoning (e.g., Lloyd and Ivanov 1988; McCarthy and Oni 1987; van de Walle 1992). As early as Caldwell's (1976) "restatement" of transition theory, however, demographers have argued that non-numeric fertility preferences can be rational responses to uncertain conditions. Under this framework, fertility transition occurs not when individuals undergo a shift in outlook or cognitive capacity, but when social conditions change to allow for individual control. This school of thought is best developed, both theoretically and empirically, in analyses of the relationship between infant and child mortality rates and fertility behavior (LeGrand, Koppenhaver, Mondain, and Randall 2003; Lloyd and Ivanov 1988; Montgomery 1998, 2000; Sandberg 2005). The relationship between fertility intentions and other forms of social and demographic uncertainty have been little theorized (but see LeGrand et al. 2003: 389-394) and less analyzed.

This analysis expands previous research on fertility intentions by examining the relationship between non-numeric family size preferences and multiple aspects of social and demographic uncertainty. Data for the analysis come from Mozambique, a country in sub-Saharan Africa experiencing rapid economic transformation, high levels of labor migration, and high rates of HIV infection—and a country where many women give non-numeric responses to survey questions about desired family size. Consistent with previous research, we find that non-numeric preferences are more common where child mortality rates are high. In addition, we find that other elements of social uncertainty, including HIV mortality and household economic and migration status, predict non-numeric responses.

### **Fertility intentions in high-fertility contexts**

Early surveys in high-fertility contexts prompted concern about the utility of asking questions about intentions and preferences. In countries that had not yet undergone the transition to controlled fertility, demographers hypothesized that childbearing was not normally the subject of individual decision-making. Under these conditions, it was unclear whether women would be able to formulate intentions or to consider childbearing goals under hypothetical conditions. Some researchers feared that respondents would simply answer “don’t know” or “as many as God sends” to questions about desired family size, reducing the utility of the data generated by these questions.

Despite these theoretical concerns, empirical research has found a strong (though imperfect) correspondence between reported fertility intentions and reproductive behavior. Both the relatively straightforward question of whether a woman wants to have more children and more complicated questions about ideal and desired number of children have been shown to predict behavior. At the national level, the reported desire to stop bearing children is positively correlated with contraceptive use and negatively correlated with both current and later birth rates (Westoff 1990). Desired family size explained more than 90% of cross-national variation in fertility in DHS countries in the 1980s and early 1990s (Pritchett 1994). At the individual level, reported intention to stop childbearing is positively correlated, and desired family size negatively correlated, with the use of modern contraceptives (e.g., Bhargava 2007; Guilkey and Jayne 1997; Lutalo et al. 2000). Research examining the relationship between fertility intentions and childbearing at the individual level is relatively rare in sub-Saharan Africa, probably at least in part because of the difficulty of collecting longitudinal data that can link preferences at one point in time with later fertility. In one exception to this pattern, fertility desires in urban Nigeria in the 1980s were found to be strongly predictive of behavior: couples where both members wanted

more children were about 6 times more likely to have a birth within two years than couples where neither member wanted more children (Bankole 1995).

Non-numeric responses to questions about desired fertility are common in much of sub-Saharan Africa, with 10% of women or more reporting non-numeric preferences in 9 of 26 countries in the most recent round of Demographic and Health Surveys.<sup>1</sup> The question of how to interpret these responses is important in predicting fertility and measuring policy-relevant characteristics such as unmet need for contraception. Methodologically-focused research has proposed varied answers to this question. In some cases, non-numeric responses are treated as measurement error and efforts are made to estimate the “true” underlying quantitative preferences of women who give these responses.<sup>2</sup> In empirical tests of this approach in Guatemala and North India, non-numeric responses do not appear to represent a desire for very large families but are more consistent with the hypothesis that non-numeric responses are randomly distributed across all fertility preferences (Jensen 1985). Other approaches accept non-numeric responses at face value, without attempting to attribute a quantitative desire to women who give these responses, and examine the sociodemographic characteristics associated with non-numeric preferences. In Nigeria, women with no education and women with few children were more likely to report non-numeric preferences than more educated women and women further along in their childbearing careers (McCarthy and Oni 1987). Education has also been found to be associated with numeric responses in Costa Rica (Riley, Hermalin, and Rosero-Bixby 1993).

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<sup>1</sup> According to tables produced using the DHS StatCompiler, <http://www.statcompiler.com/>, viewed July 24, 2009.

<sup>2</sup> This approach has also been applied to uncertain or “don’t know” responses to the question of *whether* women want to continue childbearing (Becker and Sutradhar 2006). Here, we concentrate on responses to questions about *number* of children.

In general, these methodologically-focused studies equate non-numeric responses with fatalistic attitudes and assume that numeric preferences represent a more advanced stage along the path of demographic transition. A more theoretically-driven series of studies examines this assumption and theorizes the conditions under which numeric preferences emerge, particularly those related to child mortality (Agadjanian 2005; Castle 2001; LeGrand et al. 2003; Lloyd and Ivanov 1988). Where child mortality rates are high, it is difficult to predict how many children will survive; even parents with clear preferences for numbers of surviving children will have difficulty planning births to meet their goals. Non-numeric responses are a logical response to this type of uncertainty (Lloyd and Ivanov 1988; Montgomery 1998, 2000), and child mortality rates have been shown to predict non-numeric responses (Sandberg 2005). Other types of uncertainty, notably economic instability and concerns about parental health, have been proposed as predictors of non-numeric preferences but not empirically tested (Agadjanian 2005; Johnson-Hanks 2007; LeGrand et al. 2003). This paper moves toward more formal hypothesis generation and testing of these proposed relationships.

### **Social and economic uncertainty in sub-Saharan Africa**

Recent work on fertility intentions in sub-Saharan Africa points to the complexity of childbearing desires given the highly unstable conditions in modern African countries (e.g., Agadjanian 2005; Cooper et al. 2007; Johnson-Hanks 2005, 2006, 2007; LeGrand et al. 2003). Health and mortality rates in the region improved rapidly in the post-colonial period, stalled in the 1990s, and turned for the worse as the HIV/AIDS epidemic swept southern and eastern Africa. Structural adjustment policies shifted the course of economic development, removing government-sponsored social safety nets. Across much of the continent, political regimes gain and lose power under unpredictable circumstances, and armed conflict further disrupts social and

economic functioning. Fast-growing cities, widespread internal and international migration, and technological innovations such as the spread of cell phones all contribute to massive changes in social structures and relationships. Given these multiple layers of instability and change, individuals have difficulty predicting the likely course of their lives, and may feel little sense of control over future developments. Reporting childbearing preferences of “however many God sends” may be a logical response to local conditions rather than an expression of a more general sense of fatalism.

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

Since colonial times, Mozambicans have worked in South African mines, and this legal migration flow continues to date (CEA/UEM 1997; Crush 2001; Crush et al. 1991; First 1983; Harries 1994). Partly due to the precariousness of agricultural production and partly because of Gaza’s proximity to South Africa, the area of our study has historically had particularly high

rates of male labor migration. Political and economic changes associated with the civil war and with the subsequent post-conflict transition have amplified international migration, and Mozambicans have come to constitute the largest migrant group in South Africa (Adepoju 2003). In parallel to international migration, migration within Mozambique, particularly from rural to urban areas, has also been growing rapidly (Dow 1989; Jenkins 1993; Knauder 2000). Importantly, today both internal and international migratory moves often fall short of fulfilling the promise that generates them, as migrants rarely manage to secure decently paying jobs at their destinations (de Vletter 2000). Yet despite drastically diminished returns, the migration flow continues unabated as rural economies continue to stagnate.

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

There is some evidence that fertility transition has begun in Gaza province. According to the most recent Demographic and Health Survey (DHS), conducted in 2003, virtually all women surveyed in Gaza reported knowing at least one modern method of contraception. At the time of the DHS, about 15% of women of reproductive age were using some form of modern

contraception, primarily hormonal methods, and more than three quarters of non-users reported planning future use. Still, desired family size is high (median of 4.3 children), and contraception is largely used for spacing at low parities. Birth rates also remain high, with an estimated TFR in Gaza of 5.4 children per woman (Instituto Nacional de Estatística and Ministério da Saúde 2005).

### **Analytic approach**

Given the rapid and large-scale social changes that have taken place in Mozambique over the past two decades, it would be fair to conclude that all decisions are made under high levels of uncertainty about the future. This social uncertainty could affect childbearing goals and plans in many ways. For instance, uncertainty about the future might lead individuals to postpone or forego having children. Blossfeld argues that very low fertility in Europe is driven by the uncertainty introduced by incomplete globalization (e.g., Blossfeld and Hofmeister 2006; Blossfeld, Mills, and Bernardi 2006). Qualitative research in Maputo, Mozambique's capital, suggests that "waiting" has emerged as a fertility response to unstable economic conditions in Mozambique as well (Agadjanian 2005). However, given the continued high birth rates in Gaza province, postponement appears not to be a universal reaction to uncertainty in Mozambique. Social instability might also lead to indecision about whether or not to continue childbearing. In exploratory analyses of this issue, we examined responses to the question of whether women wanted more children. "Don't know" responses to this question were rare (less than 5% of the sample) and appeared to be primarily determined by age and parity. We focus on a third possibility, that uncertainty might make it more difficult for women to form quantitative preferences for future childbearing. This mechanism would result in higher levels of non-numeric response where conditions were more uncertain. This analysis follows previous research

(Riley, Hermalin, and Rosero-Bixby 1993; Sandberg 2005) in examining the determinants of non-numeric preferences among women who report that they want more children, focusing on the impact of uncertainty about the future.

We have no direct measures of individual women's perceptions of the predictability of their own life course or their own level of control over future events. Instead, we consider three dimensions of uncertainty that can be measured using standard sociodemographic variables. First, we measure the resources women can call upon to deal with possible changes. Women with more resources (both economic and human capital, i.e. education) will be (and will perceive themselves to be) better able to react to subsequent changes in social and economic conditions.

**Hypothesis 1:** Women living in more economically secure households will be less likely to give non-numeric responses about their childbearing plans.

Second, we assess the stability of marital relationships. The vast majority of childbearing in rural Mozambique takes place within marriage. Children are traditionally understood to belong to a marriage, and often remain with the father or his extended family in cases of separation. Thus, decisions about future childbearing are tied to assessments of marital outcomes. In recent decades, however, rural marriage has undergone considerable changes. While formal marriage through civil registry or religious ceremony has remained rare, the bridewealth marriage, once the mainstay of the patrilineal marital system, has eroded. Increasingly, bridewealth payments are delayed until well after the start of marriage or are forgone altogether (in our sample, no bridewealth was paid for sixty percent of respondents). The weakening of traditional systems of support without a concomitant rise in new support mechanisms has led to an increase in the perceived instability of marriage. In areas of massive labor outmigration marriages have become particularly unstable, as men's migration and

prolonged absence weaken the marital bond and often lead to marital dissolution. We predict that uncertainty regarding the future of a marriage will increase difficulty in predicting future childbearing. **Hypothesis 2:** Women who perceive their relationship with their husband as insecure will be more likely to give non-numeric responses about how many children they want to have.

Finally, we incorporate measures of child and adult mortality. Demographic theory draws strong ties between birth rates and levels of infant and child mortality: birth rates will fall only when parents can feel confident that the children they have will survive to adulthood. More generally, uncertainty about child survival makes it difficult to make plans for future childbearing. Given the difficulty of forming objective estimates of child mortality, it is likely that people make judgments about the probabilities of future child survival based on their own observations of child mortality in their surroundings. **Hypothesis 3a:** Women living in communities with higher child mortality will be more likely to have non-numeric fertility preferences.

The connection between adult mortality and fertility intentions is less well theorized. Worries about individual mortality may limit fertility if people fear leaving orphaned children behind or, alternatively, may increase birth rates if people are eager to leave a lineage behind them. A growing literature on the impact of the HIV epidemic on fertility finds some support for both of these possibilities (e.g., Aka-Dago-Akribi et al. 1999; Baylies 2000; Cooper et al. 2007; Rutenberg, Biddlecom, and Kaona 2000). We propose that higher perceived risk of HIV mortality will lead to more uncertainty about future health and reproductive capability. Again, perceptions of mortality are likely based on observation of one's own community and social networks, rather than on formal measures. **Hypothesis 3b:** Women who know people who have

died of AIDS and women living in areas of high HIV mortality will have higher proportions of non-numeric fertility preferences.

## **Data and methods**

### *Data*

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

### *Dependent variable*

The dependent variable is constructed based on a series of questions about future childbearing desires. All women were asked whether they would like to have more children at

any point in the future. Women who responded in the affirmative to this question were then asked how many children they would like to have. The primary dependent variable in this analysis is a dichotomous variable defined only for women who want more children.<sup>3</sup> Women who give a numeric response to the question about how many children are assigned a value of zero for the dependent variable, while women who give any non-numeric response (including “don’t know,” “as many as God will send,” and “depends on husband”) are assigned a value of one.

Descriptive tables show the proportion of women who want to continue childbearing; these tables address the question of what factors influence the decision to stop having children. For comparative purposes, we also present multivariate models examining the determinants of wanting more children and the determinants of desired family size for women with numeric preferences. However, our primary focus in this research is on the process of forming numeric intentions, rather than decisions on whether or not to have another child.

### *Independent variables*

The key independent variables in this analysis operationalize three components of uncertainty described in the analytic approaches section above: access to resources, marital stability, and child and adult mortality. Access to resources is measured primarily at the household level. We include three measures of household wealth: whether the household has electricity (either from the grid or from batteries or generator), whether the household owns

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<sup>3</sup> In exploratory analysis, we estimated selection models simultaneously analyzing the probability of desiring more children and the probability of reporting non-numeric preferences conditional on wanting more. Results showed low correlation between the two models, indicating that selection based on wanting more children does not bias the estimated coefficients for non-numeric response. We therefore report results from the independent model. Results from the selection models are available on request.

cattle, and an index of household material possessions. The index is scored from one to four and reflects household ownership of key items (radio, bicycle, and motorcycle or car). Women's education level (no education, 1-4 years of education, 5 or more years of education) can also be interpreted an indicator of access to economic and social resources.

Men's migration can be a crucial determinant of their wives' access to resources. But male migration can also have a strong impact on the marital relationship depending on migration economic outcomes. Whereas successful migration, i.e., migration that results in a steady flow of remittances, may reduce the strain induced by spousal separation, unsuccessful migration may further amplify this strain. To capture this variability in migrant experience, we use a measure that combines whether the woman's husband was currently a migrant with a subjective assessment of whether this migration has improved household economic conditions. This migration measure represents both access to resources and marital stability. As a second measure of perceived marital stability, we also include a variable for whether the respondent thinks (either knows or suspects) that her husband is sleeping with another woman.

Perceived level of child mortality is operationalized as a continuous variable representing the proportion of women in the community who report at least one child death. This information is taken from the birth history section of the survey, which collects complete fertility history and information about whether each child is still living. For each woman in the community, a dichotomous variable was constructed indicating whether the woman had ever experienced the death of a child. These variables were averaged for the 30 women in each sample community in order to create a community-level measure of child mortality.

Perceptions of AIDS mortality are used to index variation in adult mortality. At the individual level, we measure respondents' sense of local health conditions through the number of

people they know who have died of AIDS. This measure is a continuous variable. Village-level health conditions are represented by the number of people in the village who died of AIDS in the year prior to the survey. Community-level data were collected in each village from a key informant, such as a village administrator, health worker, religious leader, etc. The number of AIDS deaths is based on the perception and knowledge of this informant and is impressionistic rather than a precise measure of mortality. We therefore divided villages into high AIDS mortality (five or more deaths) and low AIDS mortality (fewer than five deaths) based on the median level of AIDS deaths reported.

In addition to these measures of uncertainty, we include control variables commonly used in studies of fertility in sub-Saharan Africa: age, parity, whether a woman is in a polygamous marriage, religious affiliation, and local access to modern contraception. We have no a priori hypotheses about the relationship between these control variables and the likelihood of giving non-numeric responses. In addition, all models control for interviewer effects by including dummy variables indicating which of 12 interviewers working for the project conducted the interview. (In the interest of conserving space, these coefficients are not displayed in results tables.) Although the proportion of non-numeric responses did vary significantly across interviewer, controlling for interviewer did not affect other associations, and all reported coefficients are robust to controls for interviewer effects.

### *Methods*

We use logistic regression to model the likelihood of giving a non-numeric response to a question about future childbearing plans. Because the data were collected using a two-stage sampling procedure, and to reflect variation across villages in socioeconomic and demographic conditions, we use multi-level modeling to both correct standard errors for clustering within

villages and obtain estimates of village-level effects. We estimate a two-level model with a random intercept, specifically:

$$\log[p_{ij} / (1 - p_{ij})] = \beta_j + \beta_1 x_{1ij} + \dots + \beta_k x_{kij} , \quad (1)$$

$$\beta_j = \beta_0 + \beta_1 x_{1j} + \dots + \beta_q x_{qj} + \alpha_j . \quad (2)$$

The level one equation (1) describes the probability  $p_{ij}$  that a woman  $i$  living in village  $j$  will give a non-numeric response when asked how many children she wants, conditional on a series of individual characteristics ( $x_{1ij}$ , ...,  $x_{kij}$ ).  $\beta_j$  represents the intercept in this equation; the  $j$  subscript indicates that each village has a unique intercept. This intercept is determined (equation 2) based on a population intercept  $\beta_0$ , a set of measured community characteristics, and a random variable  $\alpha_j$ .

## Results

We first briefly describe the general context of fertility intentions in this sample of women from southern Mozambique. Table 1 shows the proportion of women who want more children, the proportion of those women who provide non-numeric responses for the number of children wanted, and the average number of children wanted among women giving numeric responses, along with variation in these figures according to key independent variables. Most women in the sample—married women age 18-40—want to have more children. About 20% of the women who want more children give non-numeric responses when asked how many more they want; of those who give numeric responses, the average number of children desired is 3.5.

### TABLE 1 ABOUT HERE

As might be expected, the proportion of women who want more children declines with both age and parity. Women with five or more years of education are more likely to want additional children than women with less education; this relationship is slightly surprising, and may stem from cohort differences in educational attainment. Fewer women in polygamous

marriages (59%) than women in monogamous marriages (72%) plan to continue childbearing. Other sociodemographic characteristics are not strongly associated with the desire to continue childbearing. Notably, having an easily accessible family planning clinic is not associated with the desire to stop childbearing—72% of respondents who live in a village with a family planning clinic want more children, compared to 68% of respondents in a village without. Household economic status does not predict childbearing desires either, with the exception of husband's migration status: Women married to migrants are more likely to intend to keep having children (78% and 74%) than women married to non-migrants (64%).

Among women who report that they want more children, both sociodemographic characteristics and economic and demographic uncertainty appear to be associated with non-numeric responses. Older women and less educated women are more likely to give non-numeric responses. These associations are consistent with earlier research arguing that non-numeric responses are an indicator of pre-transition attitudes toward childbearing. In addition, women who attend Catholic or mainline Protestant churches have much lower rates of non-numeric response (12%) than women who attend Zionist churches (24%) or who report having no religious affiliation (30%). To the extent that Catholic and mainline Protestant churches represent Western values and ideologies, this relationship may also support the idea that non-numeric responses stem from a pre-transition outlook on fertility. However, the presence of a family planning clinic in the village does not seem to encourage quantitative thinking about fertility; 23% of women living in villages with clinics nearby provide non-numeric responses, compared to 18% of women living in villages without clinics.

For the most part, the associations between economic and mortality conditions are consistent with the hypothesis that non-numeric responses are more common when conditions

are more uncertain. Women living in households with electricity are about half as likely to give a non-numeric response than women living in households without electricity (10% vs. 22%), and women whose economic conditions have been improved by their husband's migration are less likely to give non-numeric responses than other women. Both community levels of child mortality and community levels of adult AIDS mortality are positively associated with non-numeric responses about future childbearing. The relationship between individual perception of AIDS mortality and non-numeric response appears to be curvilinear. Both women who know no one who has died of AIDS and women who know 4 or more people are more likely to give non-numeric responses than women who know a few people (22% vs. 15% vs. 22%). In addition, women who know or suspect that their husband is sleeping with another woman, a likely indicator of perceived marital instability, are less likely to give non-numeric responses than women who believe their husbands are faithful.

Overall, these bivariate relationships provide some support for an association between perceptions of uncertainty and the formation of numeric intentions for future childbearing. In order to understand the joint relationships between these variables, we proceed to multivariate analysis. Results are shown in Table 2.

#### TABLE 2 ABOUT HERE

The first column in Table 2 shows the determinants of reporting non-numeric fertility intentions among women who want more children. These results confirm some associations between economic and demographic conditions and non-numeric fertility intentions shown in the bivariate results. The second and third columns in Table 2 show predictors of wanting more children and of the number of children desired by women with numeric preferences. These results are largely consistent with previous theory and research on fertility in sub-Saharan Africa;

we include them primarily for comparative purposes and discuss results only where relevant to the primary hypotheses.

Hypothesis 1, linking economic resources and non-numeric preferences, is largely supported. Women living in households with electricity are much less likely to give non-numeric responses ( $B = -0.84$ ). In addition, women whose husbands are unsuccessful migrants have about 60% higher odds of reporting non-numeric preferences ( $OR = \exp(0.48) = 1.6$ ) than wives of successful migrants or wives of non-migrants. Education is also a strong predictor of numeric responses. Theoretically, these results would also be consistent with the argument that non-numeric preferences are simply the equivalent of very high desires for children. To the extent that education and household resources are indicative of greater progress toward fertility transition, they would be associated with lower desired family size and fewer non-numeric responses. In this population, however, education is not significantly associated with wanting more children (columns 2 and 3), and women living in households with more resources are *more* likely to want to continue childbearing (column 2). That is, education and economic resources are not associated with progress toward fertility transition. Furthermore, after accounting for other socio-demographic characteristics, age and parity are not significantly associated with non-numeric fertility intentions, but do predict the desire to continue childbearing and the number of additional children desired (columns 2 and 3). On the whole, these results suggest that non-numeric plans for further childbearing are not simply an expression of high desired fertility.

Results show less support for hypothesis 2, relating marital instability and uncertain fertility preferences. The association between unsuccessful migration and non-numeric response can be interpreted as supporting hypothesis 2. However, the relationship between husband's infidelity and non-numeric preferences is statistically significant ( $p < .001$ ) in the opposite

direction as predicted: women who know or suspect infidelity are *less* likely to give non-numeric responses. It may be that this measure is a poor indicator of perceived marital stability.

Alternatively, marital stability may have different effects on fertility plans than other forms of uncertainty; column 2 shows that women who suspect infidelity are less likely to want more children ( $B=-0.30$ ), i.e., they are more likely to want to stop childbearing. Further research is necessary to determine which of these conclusions is appropriate.

Both adult AIDS mortality and child mortality are positively associated with non-numeric fertility intentions, as hypothesized. The proportion of women in the community who have experienced the death of a child is strongly and positively associated with giving a non-numeric response ( $B=3.02$ ) (hypothesis 3a). Individual perceptions of AIDS mortality are also positively correlated with uncertain fertility intentions (hypothesis 3b), although the magnitude of this correlation is small ( $B=0.05$ ).<sup>4</sup> Community levels of AIDS mortality are not significantly associated with uncertain intentions. This relationship is not statistically different from 0 even when individual perceptions are not included in the model (results not shown); the bivariate relationship between community AIDS mortality and non-numeric preferences shown in Table 1 appears to be an artifact of other community characteristics.

## **Conclusions**

This analysis tested three hypotheses based on the argument that non-numeric preferences for family size in rural Mozambique are shaped by women's uncertainty about their future. Results indicate support for the hypothesis that economic stability, measured by the

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<sup>4</sup> Because bivariate statistics suggested a non-linear relationship between individual perceptions of AIDS mortality and the likelihood of non-linear responses, various curvilinear specifications were tested in exploratory analysis. A linear relationship was found to fit the data best.

availability of resources, reduces the odds of reporting non-numeric preferences (hypothesis 1). In addition, uncertainty regarding child survival, as measured by community level of child mortality, is predictive of non-numeric responses, confirming hypothesis 3a, and individual perceptions of adult HIV/AIDS morbidity predict non-numeric family size preferences, though only weakly, supporting hypothesis 3b. However, there is little evidence for the impact of marital stability on certainty in fertility preferences (hypothesis 2).

This approach poses measurement challenges, both in using what is essentially a lack of preferences as a dependent variable and in assessing individual perceptions of uncertainty. Notably, the weakest results of this analysis are those testing the hypothesis regarding marital uncertainty, the construct that uses the least direct measures. Further research is needed to determine how best to operationalize social uncertainty at the individual level. Still, this analysis demonstrates that theoretically meaningful predictors of non-numeric preferences can be identified using existing survey data.

The implicit alternative to the hypotheses tested here is that non-numeric fertility preferences are, indeed, an expression of a fatalistic approach to childbearing and an indication of slow progress toward fertility transition. Some results could be construed as supportive of this alternative hypothesis—for example, more educated women and women who belong to Catholic or mainstream Protestant churches are less likely to give non-numeric responses. However, neither age nor parity is significantly associated with non-numeric preferences. In addition, factors such as having an unsuccessful migrant husband or knowing people who have died from AIDS, which are not associated with demographic transition according to standard frameworks, do predict non-numeric responses in directions consistent with theory.

Overall, then, these results lend additional support to theories linking social uncertainty and non-numeric fertility preferences. This conceptualization of non-numeric fertility preferences does not contradict earlier assumptions that uncertain intentions result when fertility is outside of individual control. However, under this framework uncertain intentions represent a rational response to structural conditions, rather than a lack of cognitive capacity to formulate intentions. A logical question for further research is whether this approach to interpreting non-numeric preferences leads to better understanding of the connection between non-numeric intentions and subsequent fertility behavior. A follow-up survey was recently completed, and future analyses will examine the subsequent fertility behavior of women who reported non-numeric fertility intentions in this survey.

These results also illustrate the utility of extending the scope of fertility research to consider uncertainty around intentions as well as intentions themselves, an approach that has potential applications across multiple substantive areas. For instance, this approach might help in conceptualizing emerging research on the impact of the HIV epidemic on fertility preferences. The mixed results generated by existing empirical studies may be better understood by considering how the epidemic shapes individual control and predictability of future reproduction than by asking whether HIV prevalence increases or decreases desire for children. More generally, studying the determinants of non-numeric preferences provides a way of moving beyond outcomes to think about the process of formation of fertility intentions and their transformation into reproductive behavior.

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Table 1: Fertility intentions according to selected sociodemographic variables

	N	Proportion wanting more children	Of those wanting more children:	
			Proportion giving non- numeric response	Average response among those giving number
All women	1678	0.69	0.20	3.5
<b>Sociodemographic variables</b>				
Age 20 and under	267	0.90	0.17	3.4
Age 21-25	470	0.84	0.18	3.7
Age 26-30	469	0.68	0.21	3.5
Age 31 and over	472	0.44	0.28	3.0
No education	446	0.69	0.27	2.9
1-4 years of education	760	0.66	0.22	3.2
5 or more years of education	469	0.75	0.12	4.2
Monogamous marriage	1323	0.72	0.20	3.5
Polygamous marriage	353	0.59	0.20	3.2
Parity				
No living children	247	0.90	0.19	4.5
1-3 living children	1064	0.77	0.20	3.1
4+ living children	367	0.31	0.25	4.0
No family planning services in village	869	0.68	0.18	3.6
Family planning services available in village	809	0.71	0.23	3.4
Religious affiliation				
No religion	233	0.70	0.30	3.0
Catholic/mainline Protestant	460	0.66	0.12	3.8
Zionist	548	0.71	0.24	3.4
Other Christian religion	437	0.70	0.18	3.4

Table 1, continued

<b>Household conditions</b>				
Material possessions index = 1	563	0.67	0.23	2.7
Material possessions index = 2	546	0.68	0.17	4.3
Material possessions index = 3	424	0.73	0.21	3.5
Material possessions index = 4	145	0.72	0.19	2.9
No electricity in household	1442	0.68	0.22	3.3
Electricity in household	236	0.77	0.10	4.2
Doesn't own cattle	1155	0.68	0.20	3.3
Owens cattle	523	0.72	0.21	3.9
Husband is not a migrant	1002	0.64	0.21	3.3
Husband is a migrant and:				
Life is better since husband migrated	338	0.78	0.15	4.1
Life is worse since husband migrated	338	0.74	0.24	3.1
Doesn't suspect husband	1140	0.70	0.23	3.6
Suspects husband is sleeping with another woman	538	0.67	0.15	3.2
<b>Mortality conditions</b>				
Level of child mortality in village				
<25% of mothers experienced child death	570	0.69	0.14	3.2
25%-35% of mothers	629	0.67	0.22	4.3
>35% of mothers	299	0.72	0.25	3.0
Number of people known who died of AIDS				
0	843	0.68	0.22	3.2
1-3	480	0.73	0.15	4.3
4 or more	299	0.67	0.22	3.0
Low AIDS mortality village	840	0.69	0.17	3.2
High AIDS mortality village	838	0.69	0.24	3.7

See text for further description of data and variables.

Table 2: Effects of social uncertainty on intentions for future childbearing

	Non-numeric response			Want more children			Number of additional children desired		
	Coefficient	S.E.		Coefficient	S.E.		Coefficient	S.E.	
Population intercept	-1.67	0.58	**	2.76	0.50	***	4.12	0.39	***
Variance, village-level random intercept	0.03	0.08		0.00	0.07		0.01	0.03	
<b>Sociodemographic variables</b>									
<i>Age 20 and under (omitted)</i>									
Age 21-25	0.00	0.24		-0.07	0.26		0.01	0.15	
Age 26-30	0.04	0.27		-0.41	0.26		0.06	0.17	
Age 31 and over	0.48	0.30		-0.84	0.27	**	-0.03	0.21	
<i>No education (omitted)</i>									
1-4 years of education	-0.11	0.19		0.01	0.16		0.11	0.14	
5 or more years of education	-0.54	0.25	*	-0.05	0.20		-0.22	0.16	
Polygamous marriage	-0.27	0.22		-0.38	0.16	*	-0.36	0.15	*
Number of living children	0.05	0.07		-0.65	0.05	***	-0.55	0.05	***
Family planning services available in village	0.26	0.18		0.02	0.14		-0.16	0.12	
<i>No religion (omitted)</i>									
Catholic/mainline Protestant	-0.84	0.28	**	-0.18	0.23		-0.13	0.19	
Zionist	-0.20	0.23		0.02	0.21		0.03	0.18	
Other Christian religion	-0.68	0.26	**	-0.28	0.22		0.00	0.19	
<b>Household conditions</b>									
Material possessions index	0.01	0.09		0.05	0.07		0.07	0.06	
Electricity in household	-0.84	0.28	**	0.45	0.21	*	0.09	0.15	
Owns cattle	0.21	0.19		0.18	0.15		-0.05	0.13	
Husband is not a migrant	0.05	0.22		-0.51	0.18	**	0.11	0.14	
<i>Life is better since husband migrated (omitted)</i>									
Life is worse since husband migrated	0.48	0.25	+	-0.43	0.22	+	0.06	0.16	
Suspects husband sleeping with another woman	-0.74	0.20	***	-0.30	0.14	*	-0.06	0.12	

	Non-numeric response			Want more children		Number of additional children desired	
	Coefficient	S.E.		Coefficient	S.E.	Coefficient	S.E.
<b>Mortality conditions</b>							
% of mothers in village reporting a child death	3.02	0.99	**	1.17	0.78	0.34	0.68
Number of people known who died of AIDS	0.05	0.03	*	0.03	0.02	0.01	0.02
High AIDS mortality village	0.27	0.22		-0.05	0.17	-0.07	0.14
-2 log likelihood							

Column 1: N=1117 women who reported wanting more children with non-missing values for independent variables. Logistic regression. Column 2: N=1618 women with non-missing data on all independent variables. Logistic regression. Column 3: N=890 women who reported numeric preferences for more children with non-missing values for independent variables. Linear regression. All models also include controls for interviewer effects (coefficients not shown). See text for details on data and measures. All columns: 56 villages, village-level random intercept. +:  $p < .1$ ; \*:  $p < .05$ ; \*\*:  $p < .01$ , two-tailed tests.