

The illusion of stable fertility preferences

Maximilian W. Müller ¹, Joan Hamory ², Jennifer Johnson-Hanks¹ and Edward Miguel¹

¹University of California, Berkeley, ²University of Oklahoma

Fertility preferences have long played a key role in models of fertility differentials and change. We examine the stability of preferences over time using rich panel data on Kenyan women's fertility desires, expectations, actual fertility, and recall of desires in three waves over a nine-year period, when respondents were in their 20s. We find that although desired fertility is quite unstable, most women perceive their desires to be stable. Under hypothetical future scenarios, few expect their desired fertility to increase over time but, in fact, such increases in fertility desires are common. Moreover, when asked to recall past desires, most respondents report previously wanting exactly as many children as they desire today. These patterns of bias are consistent with the emerging view that fertility desires are contextual, emotionally laden, and structured by identity.

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Introduction

One of the most central and persistent questions in population science concerns when, how, and why fertility changes (Davis and Blake 1956; Coale 1973; Lee 1980; Caldwell et al. 1992). While contemporary research on rich countries has focused largely on below-replacement fertility (Morgan and Taylor 2006; Balbo et al. 2013), persistently high fertility in sub-Saharan Africa also remains a central topic of scholarship (Shapiro and Gebreselassie 2008; Moultrie et al. 2012). The literatures on below-replacement fertility in rich countries and persistently high fertility in much of sub-Saharan Africa are connected through a focus on reproductive preferences as pivotal to explaining change and variation in reproductive rates. Some scholars consider reproductive intentions to be the product of rational choice, a utility maximization calculation subject to a budget constraint (Schultz 1997; Becker 2009); others have argued that intentions are instead the product of social norms and cultural values, which can diffuse within and potentially across communities (Watkins 1990, 2000; Casterline 2001). The debate between these two positions has long been

heated (see discussions in Alter 1992; Pollak and Watkins 1993; Hirschman 1994; Mason 1997). However, the disagreement hides a more fundamental consensus: in both approaches, individual preferences are treated as the link between demographic outcomes and social, economic, and cultural forces. Understanding fertility differences and fertility change, therefore, requires an understanding of changing fertility preferences.

For this reason, reproductive preferences have been a vibrant subject of research over the past two decades (Agadjanian 2005; Johnson-Hanks 2005, 2007; Hayford and Morgan 2008; Rossier and Bernardi 2009; Iacovou and Tavares 2011; Trinitapoli and Yeatman 2011; Sennott and Yeatman 2012; Bachrach and Morgan 2013; Miller et al. 2013; Hartnett 2014; Testa and Basten 2014; Günther and Harttgen 2016; Marteleto et al. 2017; Hanappi et al. 2017; Bhrolcháin and Beaujouan 2019). In partial contrast to earlier literature that assumed the centrality of fertility preferences as a key mechanism for fertility difference and change, this recent literature asks fundamental questions about reproductive preferences themselves: *How are fertility preferences formed? When and how do they change? To what degree do they actually*

predict behaviour? When and when not? By building on and adding to this important body of work, this paper presents descriptive evidence from the Kenya Life Panel Survey (KLPS), a rich longitudinal data set with detailed educational, labour market, health, nutritional, demographic, and cognitive information. The KLPS tracked over 7,500 individuals from 1998 until 2014, as they grew from children into young adults. For the purpose of this paper, we make use of a subsample of 351 older girls with detailed information on reproductive preferences in three survey waves over a nine-year period starting in 2003–05, when most of the girls were 17–22 years old.

The KLPS data offer an excellent opportunity to understand the evolution of reproductive desires of young adult women in a low-income country. We show that fertility desires change considerably as teens enter early adulthood but that the respondents perceive their desires as stable, both in anticipation and in their memory. We find further that respondents underestimate how much their desires will change in future and that they especially underestimate *future increases* in their desired fertility. Interestingly, they also underestimate how much their desires have changed in the past, again particularly underestimating *past increases* in their fertility desires. These findings suggest that prospection biases (already well documented in consumer behaviour) and retrospection biases also apply to high-stakes fertility preferences. As such, we also add to the growing literature in demography that examines these biases—in particular in retrospective measures—in more detail (Bankole and Westoff 1998; Koenig et al. 2006; Jain et al. 2014; Smith-Greenaway and Sennott 2016; Trinitapoli and Yeatman 2018; Cleland et al. 2020, for a brief review). Finally, we find that desired and expected fertility are associated with subsequent fertility behaviour, again asymmetrically; in this context, individuals' expectations of bearing children within a certain time frame (of five years) are more often fulfilled than expectations of avoiding childbearing.

Taken together, the results support the emerging consensus in population science that fertility preferences are 'constructed' over time (in the terms of Bhrolcháin and Beaujouan 2019): as much a *response* to reproductive outcomes as their *cause*. Reproductive outcomes, therefore, are significantly shaped by context.

Literature review

Westoff and Ryder (1977) conducted perhaps the first study of the predictive power of reproductive

intentions, initially hoping to improve demographic forecasting. This seminal paper used data from white women interviewed in the United States (US) in 1970 and 1975, in the first 20 years of their first marriages. They found that 34 per cent of women who had said that they wanted another child had not borne one in the intervening five years, while 12 per cent of women who had said that they wanted no more had nonetheless given birth to an additional child. Overall, the 'inconsistency ratio' was 20.9 per cent over the five-year period. Although this is one of the lowest inconsistency ratios ever published (due largely to the selection of the sample), it was nonetheless too high to make intentions a useful addition to fertility forecasting.

The next quarter century saw an explosion of papers on the stability and predictive validity of reproductive intentions (e.g. Jones et al. 1980; Nair and Chow 1980; Morgan 1981, 1982; Vlassoff 1990; Bongaarts 1992; De Silva 1992; Tan and Tey 1994; Miller and Pasta 1995; Campbell and Campbell 1997; Bankole and Westoff 1998; Schoen et al. 1999, 2000; Symeonidou 2000; Quesnel-Vallée and Morgan 2003; Hayford and Agadjanian 2017; Trinitapoli and Yeatman 2018; see Cleland et al. 2020 for a review of this literature for Africa and Asia). The results of these studies were mixed, in part due to their varying research methods and in part to the different socio-economic contexts in which the studies were done. All the studies showed considerable change in stated intentions, although they differed in their interpretation of that change (Was it measurement error? Vague intentions? Changing circumstances? Changing valuation of the circumstances? Imperfect contraception and problems with implementing preferences?).

In this literature, as in fertility studies more broadly, there has been some divergence of work on developed (high-income) countries and less developed (low-income) countries. Studies in less developed countries have tended to stress that intentions do—at least somewhat—predict outcomes, despite the fact that the discordance between intentions and later outcomes has generally been larger than that found in developed countries. In this vein, Campbell and Campbell (1997) argued that fertility intentions had a measurable influence on future fertility behaviour in Botswana. De Silva (1992) found that nearly 30 per cent of women in a Sri Lankan survey reported outcomes discrepant with their stated intentions, just three years later. In Taiwan, Nair and Chow (1980) found that couples who wanted no more children experienced

significantly lower fertility than couples who wanted more, although over 30 per cent of the couples wanting no more did indeed bear a child over the three-year interval. Tan and Tey (1994) argued that Malaysian women's fertility was predicted by their stated intentions, whereas Vlassoff (1990) found no relationship between Indian women's reported desired family size and their fertility 10 years later. Reviewing this literature for Africa and Asia, Cleland et al. (2020) also pointed out that while most studies confirm a link from intentions to behaviour, this correspondence is far from perfect and varies measurably across samples.

The disparate findings of some of these studies are difficult to interpret, both because of the selection of samples and the structure of the questions. Most of the studies focused on young, fertile married women: exactly those most able to achieve their fertility desires. At the same time, most of these studies used a single question to assess intentions, asking: '*Do you want another child?*', with no temporal referent, no reference to the survival of the current child or sex of a future one, and no mention of alternative potential futures in which childbearing might be more or less desirable. Thus, many of the women whose behaviours are apparently 'inconsistent' may indeed be succeeding in fulfilling some set of reproductive intentions that are outside the frame of the researchers' questions, subject to constraints, and depending on context.

Since about 2000, interest in the topic of fertility preferences has diversified (see earlier citations). In largely accepting that preferences matter for outcomes but do not determine them, contemporary scholars have asked a wider range of questions: *How stable are preferences themselves? How are they formed, and what do they mean? How do gender relations, couple dynamics, health status, and other factors influence preferences, outcomes, or the degree to which preferences shape outcomes?* In contrast to the earlier work, these more recent papers have tended to emphasize uncertainty, indeterminacy, contingency, and ambivalence (see Sennott and Yeatman [2018] for one recent example). For example, Agadjanian (2005) used qualitative data from Mozambique to explore the common disjunction between stated fertility intentions and contraceptive use, drawing attention to gender dynamics and to the differences between social constructs of contraception and those of reproduction. Also using data from Mozambique, Hayford and Agadjanian (2017) showed that women's desire to stop childbearing is associated with their current number of children, marital dissolution, or changes

in their health. They pointed out that accounting for such reasons for changes in desires has the potential to improve our understanding of the predictive power of fertility preferences. Rocca et al. (2010) reported on a longitudinal study of Latino adolescents in San Francisco and showed that teens' reproductive intentions are quite unstable and do a poor job of predicting reproductive outcomes, even over a short time horizon. Teens with a positive pregnancy test in one wave were more likely to have said in the previous wave that they 'strongly did not' want to be pregnant than all other possible answers combined. Weitzman et al. (2017) expanded our understanding of time and ambivalence in reproductive intentions: by interviewing young women in Michigan weekly, they showed that even transient switches to intending a pregnancy were associated with both earlier sex and higher pregnancy rates, even for women who intended to avoid pregnancy in the vast majority of weekly survey rounds. Miller et al. (2013) showed that desire to avoid pregnancy and desire for pregnancy work independently and that only women with both a high desire to avoid pregnancy and a low desire for pregnancy in fact showed lower pregnancy rates compared with women who were actively seeking pregnancy and not avoiding it. Taken as a whole, this literature draws attention to the ways in which fertility intentions are both variable and internally contradictory and how they may or may not predict reproductive outcomes, depending on context.

Confronted with this rather frustrating empirical landscape, population theorists have sought to develop new models of reproductive preferences and actions with sufficient nuance to accommodate the observed uncertainty, ambivalence, and context-dependence. Timæus and Moultrie (2008, 2020) (see also Moultrie et al. 2012) have argued that we should recognize a wider range of the kinds of intentions that can underlie avoiding a current pregnancy: in addition to 'stopping' and 'spacing', they identified 'postponing' without specific intentions to return to childbearing in the future and 'curtailment' as 'parity-independent stopping' (Timæus and Moultrie 2020, pp. 268–9). Drawing on contemporary work in cognitive science, Bachrach and Morgan (2013) have gone further, arguing that reproductive preferences may not even exist except when prompted by specific situations: they are contextual, informed by schemas of childbearing, imbued with affect, and organized by identity. Bhrolcháin and Beaujouan (2019) came to much the same conclusion, proposing that fertility preferences are constructed, that is,

changeable, context dependent, and subject to framing effects. In many contexts, they argued, people hold no clearly articulated fertility preferences: ‘When called on either to state a preference, or to act on one, they look for clues and make inferences as to what they would like, and thus how to act, or what preference to declare. In other words, rather than reading off their preference from a stored memory, they construct a preference from available information’ (Bhrolcháin and Beaujouan 2019, p. 41).

This emerging consensus in fertility studies is consistent with related work in behavioural economics on non-fertility topics. In a variety of contexts, people tend to extrapolate current preferences to different future states of the world (Loewenstein et al. 2003), and evidence exists that this tendency applies to long-term decisions, such as whether to attend college (with something as minor as current weather, measured by cloud cover, altering prospective students’ probability of reporting that they intend to attend a school [Simonsohn 2010]) or which car to buy (Busse et al. 2015). In addition, a number of scholars have explored the consequences of unstable preferences that strongly depend on circumstances, showing that in these circumstances people cannot correctly anticipate future developments and their impact on their own preferences. For example, Kuziemko et al. (2018) illustrated these challenges for the case of first-time mothers in the US and the UK, who considerably overestimated their postnatal labour supply, both because motherhood was harder than they anticipated and because their interest in working declined. Odermatt and Stutzer (2019) similarly showed projection bias in individuals’ forecasts of their future life satisfaction following major life events, which underestimated adaptation to events such as marriage and widowhood. Although the literature on fertility preferences is rich enough terrain on its own that many fertility scholars do not cite literature on the broader questions of intentions and preferences more generally, fertility preferences in fact appear to work similarly to other kinds of preferences studied by behavioural economists, as Bachrach and Morgan (2013) and Bhrolcháin and Beaujouan (2019) have noted.

The great challenge in evaluating the theoretical claims that fertility preferences are contextual, schema-informed, emotion-laden, identity-related, and constructed in response to specific eliciting stimuli is one of data. To test these kinds of claims requires rich longitudinal studies, including questions about potential futures and remembered pasts: such questions have not typically been

included in the most commonly used fertility data sets for any low-income country, for example the Demographic and Health Surveys (DHS). This paper provides exactly that, with a rich longitudinal survey from Busia, Kenya, which include questions about prospecting and retrospection, as well as providing a detailed set of data about social, economic, household, educational, and health factors over nearly a decade.

Data and methods

Data

The analysis uses the KLPS, a longitudinal data set seeking to track and collect data from more than 7,500 individuals from Busia, a district in rural western Kenya. (Data from the KLPS project, as well as the data used for this paper, are accessible online via Harvard’s Dataverse: <https://dataverse.harvard.edu/>.) Starting in 2003, a representative sample of children who participated in a primary-school-based deworming programme (see Miguel and Kremer 2004) were chosen to take part in a panel data collection effort, with complete survey rounds (so far) in 2003–05, 2007–09, and 2011–14 (see Baird et al. 2008, 2016). The respondents were aged in their mid- to late 20s during survey Round 3, but in 1998 they were enrolled in grades 2–7 in 75 primary schools located in the Budalangi and Funyula divisions in southern Busia. The Primary School Deworming Project (PSDP)—launched by the non-governmental organization ICS in 1998—provided deworming medication to children enrolled in these schools, where enrolment totalled over 30,000 at the time.

Busia is a densely populated, rural farming region in western Kenya, north of Lake Victoria and adjacent to the Ugandan border. It is somewhat poorer than the national Kenyan average, and subsistence farming is common, with more than 50 per cent of respondents at KLPS Round 2 working on family farms for subsistence and only 1 per cent growing cash crops. Outside labour market opportunities for young people are scant, and while the majority of respondents complete primary school (grades 1–8), only half of male respondents and less than one-third of female respondents in our sample continue on to secondary education, which typically involves moving away from home.

KLPS respondents are usually interviewed in or near their home. Interviews are conducted by local enumerators, either in Swahili or in the local

language, mostly Luhya. The initial survey questions are drafted in English, then translated and adjusted to fit the context by the local survey team (including intensive testing of out-of-sample respondents) before being back-translated to ensure the original intent of the question is preserved. The interviews are quite thorough, covering questions around marriage and fertility, as well as labour market participation, earnings, consumption, health, education, political and religious attitudes, and migration experiences. These detailed interviews often last two to three hours in total. If respondents have moved out of the Busia area, survey enumerators travel across Kenya and Uganda to interview these migrants in the same way as those still in Busia. Tracking respondents in rural Africa and conducting in-depth interviews is time intensive, and a full survey round typically takes up to two years to be completed. As fewer respondents can be tracked and interviewed towards the later stages of each survey round, the survey team draws a random subsample (typically one-quarter) of those respondents not yet found and interviewed. This random subsample is tracked ‘intensively’ (both in terms of enumerator time and travel expenses) and the resulting additional observations are later reweighted, to reflect their representation of the subsample not successfully tracked initially and to maintain the representativeness of the overall sample. Throughout the paper, we use survey weights that adjust for this two-stage nature of KLPS tracking, and when using data from two survey rounds, we adjust by weights in the later survey round; for more details on the tracking strategy, see Baird et al. (2008) and Baird et al. (2016). In short, we follow the procedure also used for the Moving to Opportunity study in the US (Kling et al. 2007), calculating an effective tracking rate (ETR) as:

$$ETR = RTR + (1 - RTR) \times ITR, \quad (1)$$

where *RTR* denotes the initial ‘regular’ phase tracking rate and *ITR* denotes the ‘intensive’ phase tracking rate. The ETRs of the KLPS are above 80 per cent; these would be high rates in any context and are remarkably so, given the context, sample, and long time horizon.

We focus on the portions of the survey containing information on reproductive desires, actual fertility, and recall of past desires. While in KLPS Round 2 this information was collected for every participant, and again in Round 3 (with the exception of any recall-related questions), in Round 1 these detailed questions regarding reproductive preferences were

posed only to a subsample of young women involved in the main survey. In particular, in Round 1, a representative subsample of young women who in 1998 were in grades 4–7 (from the full sample of grades 2–7) were randomly selected to be asked these questions: 351 young women, most of whom were 17–22 years old at the time of KLPS Round 1 data collection in 2003–05 (with an average age of 19) participated in this sub-survey. Thus, for this subsample of 351 women, we can supplement KLPS Round 2 and 3 data on reproductive desires and outcomes with reproductive desires from Round 1 and detailed forecasts of how they would adjust their reproductive desires under 19 different scenarios. The detailed data on desires and forecasts from Round 1 can then be checked against these women’s actual reproductive histories over the next nine years. The data about their reproductive desires in Round 1 further allow us to make full use of the recall questions asked in Round 2, as we can verify women’s recalled reproductive desires in Round 2 against their actual past reproductive desires in Round 1. It is this richness of detailed prospective and retrospective measures combined with the long time horizon over which this subsample was tracked that makes us focus on what we term the ‘analysis sample’. The women in our analysis sample were interviewed as part of a representative subset of the older cohort of female KLPS respondents (in particular, females in grades 4–7 in 1998), and thus are 1.5 years older on average than the full sample of KLPS women. While 277 and 283 of these women were resurveyed in Rounds 2 and 3, respectively, 239 women participated in all three KLPS rounds. For some analyses presented in the supplementary material, we make use of all women from the full KLPS sample (of 7,500 men and women) that participated in Rounds 1, 2, and/or 3. We call the 3,083 women who participated in at least one of these survey rounds the ‘extended sample’.

Table 1 illustrates for which rounds which data are available, for both our analysis sample and the extended sample, and how many respondents there are for each round. Reproductive desires (i.e. the desired number of children at survey round *t*) are denoted by x_t (all observations are at the individual level, but we have dropped *i* subscripts for brevity). The existence of detailed baseline information on reproductive desires is the main reason why we focus on our restricted analysis sample rather than the extended sample respondents (who were not asked these questions). Actual fertility (i.e. the number of children born and alive by survey round *t*) is indicated by f_t . Recall of past fertility desires

Table 1 KLPS survey timing and data availability

		Round 1 (2003–05)	Round 2 (2007–09)	Round 3 (2011–14)
Analysis sample	<i>N</i> respondents (females)	351	277	283
	Median age	19	23	28
	<i>Data availability:</i>			
	Desires (x_t)	✓	✓	✓
	Recall ($x_{t-1 t}^R$)	–	✓	–
	Living children (f_t)	✓	✓	✓
Extended sample	<i>N</i> female respondents	2,343	2,506	2,575
	Median age	18	22	26
	<i>Data availability:</i>			
	Desires (x_t)	–	✓	✓
	Recall ($x_{t-1 t}^R$)	–	✓	–
	Living children (f_t)	✓	✓	✓

Notes: This table shows the timing of each KLPS survey round used in our analysis, the number of respondents interviewed and their median age, and the availability of key variables used in this paper. The analysis sample consists of 351 women who were interviewed in great detail about reproductive desires in KLPS Round 1 (see Data subsection for more details); 277 and 283 of these women were resurveyed in Rounds 2 and 3, respectively, and 239 were interviewed during all survey rounds. The extended sample consists of all 3,083 women interviewed in KLPS Rounds 1, 2, and/or 3.

Source: Authors' analysis of data from Kenya Life Panel Survey (KLPS).

for round $t - j$, as collected at round t , is denoted as $x_{t-j|t}^R$.

Reproductive preferences were collected in several different ways. We used a modified version of the DHS question for ideal family size as our measure of fertility desires: ‘*Today, if you could choose exactly, how many children in total would you like yourself or your partner to give birth to (including those who have already been born)?*’ The KLPS Round 1 also asked about expected childbearing over specific future time frames (specifically, two years and five years) and how the respondent thought her desires might change under a wide range of plausible future scenarios.

Methods

In order to gain a better understanding of reproductive desires, in this paper we provide a descriptive account of the reproductive desires and histories of Kenyan women over time horizons of three to nine years and report the results in the following section.

We start by showing the overall distribution of changes in the desired number of children by women in our analysis sample, for the time periods between KLPS Rounds 1 and 3 ($x_3 - x_1$), as well as for changes from Rounds 1 to 2 ($x_2 - x_1$) and from Rounds 2 to 3 ($x_3 - x_2$). The changes for women interviewed in all three survey rounds are presented later, in Figure 1, and for most respondents correspond to changes between ages 19 and 28 for the

long horizon and an additional observation in between at age 23–24. The results exclude women who gave non-numeric answers to the desired fertility question in one of the two survey rounds used for each graph and those who changed their desires by more than four children. This leaves 231 women. Observations are weighted using survey weights from the later survey round, adjusted for the two-stage tracking design of that round.

We proceed by showing the joint distribution of reproductive desires across survey rounds for women in our analysis sample later, in Figure 2, for all three combinations of two survey rounds. Women are included only if they were surveyed in all three rounds and gave numerical answers between ‘0’ and ‘8’. The size of bubbles is relative to the number of respondents with a given combination of desired children across two survey rounds, where observations are weighted by survey weights of the later survey round. The presented graphs allow us to examine the changes in more detail, for example assessing how common it is to desire three children in one survey round but then to desire two or four children in the next survey round. Are these changes pure noise or are they associated with observable life events and individual characteristics? We answer this question by showing differences in the nature of changes between KLPS Rounds 2 and 3 for various subgroups, such as unmarried and (newly) married women in our extended sample (see Figure A1 in the supplementary material). In order to assess whether women’s

reproductive desires hold predictive power about their subsequent reproductive outcomes, we regress the number of their children born between Round 1 and the later rounds on their desired number of additional children in Round 1 as follows:

$$f_t - f_1 = \alpha + \beta(x_1 - f_1) + \epsilon \quad (2)$$

for $t = 2, 3$, with f_i indicating individual i 's number of live children in survey round t and x_1 , their desired total number of children in Round 1. We conduct these regressions for all 236 women participating in all three survey rounds with numeric answers to the question on their desired fertility and information on their subsequent births. We also run the same regressions for those without any pregnancy by Round 1 (121 women) and those with at least one pregnancy by Round 1 (115 women). The results can be found later, in Table 3, where each column represents a separate regression, and this table also includes information on the average number of subsequent births between survey rounds and its standard deviation. After providing descriptive evidence on the (in)stability and predictive power of women's reproductive desires, and on life events and characteristics associated with changes in reproductive desires, we next turn to women's own perceptions with regard to the stability of their reproductive desires.

To that end, the KLPS survey was designed to investigate to what degree women can anticipate changes in their own preferences, as part of examining the experiential and cognitive basis of desires. In Round 1 of the survey, we posed a series of hypothetical scenarios known to be at least reasonably common in rural Kenya. The survey asked: *'In each situation, would you like to bear the same number of children, or a larger or smaller number?'* Women could answer 'more', 'same', or 'less' or indicate that they 'don't know'. In Figure 3, later, we plot the shares of the 351 women at baseline who expect to increase, decrease, or keep their desires stable under 19 hypothetical examples, such as improving or worsening finances or if all their children turn out to be female or male. Since almost no women responds 'don't know', these few answers are dropped: the maximum number of respondents answering 'don't know' is nine (to the scenario of being 'unable to find husband'), with at most three women stating 'don't know' for any of the other scenarios. The full list of scenarios is the following: (1) finances improve; (2) finances worsen; (3) pregnancies are difficult; (4) husband wants more children; (5) left alone with husband

(co-wife leaves); (6) marry soon; (7) husband takes another wife; (8) co-wife has many children; (9) become a junior co-wife; (10) no longer get along with spouse; (11) unable to find husband; (12) child fostered away; (13) all desired children are female; (14) all desired children are male; (15) a child dies in infancy; (16) receive a teen foster child; (17) receive three young foster children; (18) daughter-in-law gives birth; and (19) daughter gives birth. The questions applying to unmarried women only were asked to the subset of 227 unmarried women in the analysis sample. Observations are weighted using survey weights from Round 1, adjusted for the two-stage KLPS tracking design.

Finally, for women in our analysis sample, we evaluate their recalled desires in Round 2 against their actual desires in Round 1 and graph women's accuracy in recalling how their desires have changed (see Figure 4). The KLPS Round 2 survey included the following question: *'If I had asked you the same question three years ago, how many children in total would you have said you would like you or your partner to give birth to (including those who had already been born)?'* This question asked the respondents to remember or imagine what their past self would have said, thereby capturing their understanding of past changes in their own reproductive desires. While this question was asked to everyone participating in Round 2, for 277 women in our analysis sample information is also available on desires in Round 1 and we can thus assess recall accuracy. We do so by creating three measures of recall behaviour. First, we characterize whether a respondent's recalled desires imply that she recalls having lowered her desires, recalls not having changed her desires, or recalls having increased her desires over the past three years. Second, based on this recall measure, we code whether respondents correctly recall the *direction* of change in desires or whether desires remain unchanged. Third, we measure the stricter 'correct recall' variable as taking the value of '1' if a respondent exactly recalls how many children she desired in the past (and '0' otherwise). Formally, respondents correctly recall the direction in which they have changed their desires if $\text{sgn}(x_2 - x_{1|2}^R) = \text{sgn}(x_2 - x_1)$. The last two measures overlap only partly, as some respondents correctly recall the direction of the change but not the exact magnitude. Each group of women—those who experience lower ($N = 100$ women), unchanged ($N = 101$), or increased desires ($N = 76$) between Rounds 1 and 2—is represented by a bar in Figure 4, where the size of the bar captures the weighted share of women in each group. The shading in each

bar captures the correspondence between actual and recalled fertility desires in each group, as discussed further in the Results section. While not all respondents were interviewed exactly three years after their Round 1 interview, patterns are largely the same for those who were interviewed three, four, or five years after their Round 1 interview. We take this as evidence that this imprecision in the question is not driving the results.

Taken together, these descriptive results provide novel evidence on the nature of reproductive desires, their (in)stability, and women’s perceptions of their own desires.

Results

In all three rounds, over 90 per cent of the women in our analysis sample report between two and five desired children (see Figure A2(a), supplementary material, for the full distributions), and the mean does not change substantively over time nor differ substantively between our analysis sample and the extended sample of KLPS survey respondents as a whole (Table 2). Men report desiring about a quarter of a child more than women do (3.52 compared with 3.25; not shown), although—as is common across contexts and data sets—they begin parenthood at older ages than women (as also clearly visible in Figure A3, supplementary material). Desires in Round 1 are based on little individual experience; the average age of respondents is only 19 for the analysis sample and 18 for the extended sample, and only 26 per cent of women in the extended sample have had a child by that point (Table 2). Desires are also highly idealized, both in

the sense of conforming closely to statistical norms in Kenya (in the 2003 Kenya DHS, women reported an ideal family size of 3.9 on average, and the subset of women aged 15–19 reported a mean ideal family size of 3.6 [Central Bureau of Statistics Kenya et al. 2004]) and apparently being based on the assumption that everything in the future goes according to an optimal life plan. For example, when confronted with hypothetical scenarios (explained in greater detail later), most women do not expect their desired fertility to increase under positive scenarios (e.g. a positive household economic shock), but many do expect their desired fertility to fall under certain negative scenarios (e.g. a negative household economic shock). Moreover, when asked whether they would rather choose to have one child less or one child more than their desired number, 74 per cent of women say ‘less’ (not shown), suggesting that, at the point of elicitation, stated desires represent an upper bound of the number of desired children for most women. These look very much like the abstract, socially constructed ideals that Bhrolcháin and Beaujouan (2019) described for young people with limited personal experience of childbearing.

Although aggregate fertility desires remain mostly flat, there is considerable change at the individual level: between Rounds 1 and 3, 63 per cent of the analysis sample respondents change the number of children that they report desiring in their lifetime, and 20 per cent change by two or more children (as shown in Figure 1). For women from the extended sample, we see a similar level of variability between Rounds 2 and 3 (not shown). While the literature on fertility preferences in Africa and Asia has documented variability in women’s preferences

Table 2 Summary statistics for women in KLPS samples

Round	Analysis sample			Extended sample		
	1	2	3	1	2	3
Age	19.30	23.46	28.11	17.62	21.47	25.91
<i>N</i> desired children	3.46	3.29	3.39	N.A.	3.25	3.27
<i>N</i> living children	0.75	1.64	2.34	0.35	1.07	1.85
Parent	0.48	0.73	0.88	0.26	0.57	0.79
Married	0.43	0.67	0.80	0.24	0.50	0.72
Observations	239	239	239	2,343	2,506	2,575

Notes: The data shown for the analysis sample include only the 239 women interviewed for all survey rounds. The data shown for the extended sample include all individuals interviewed in the round listed at the top of the column. Weighted averages are presented here, where survey weights are adjusted to take into account the two-stage tracking design of the KLPS in each round. ‘Parent’ is an indicator taking the value ‘1’ if the individual has at least one living child. ‘Married’ is an indicator taking the value ‘1’ if the individual is married at the time of interview for the given survey round. Desired fertility at Round 1 was only gathered from individuals in the analysis sample, hence is N.A. (not available) for the extended sample.

Source: As for Table 1.

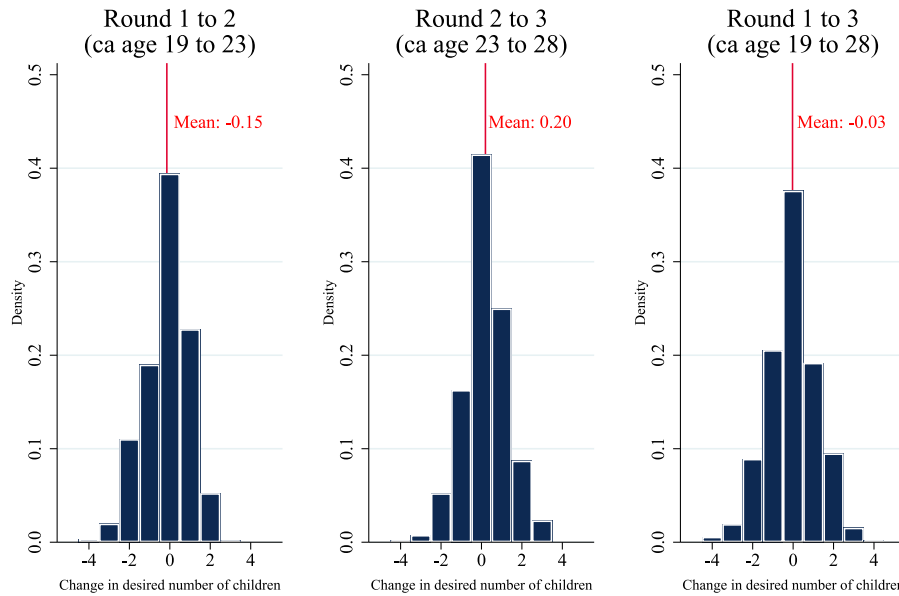


Figure 1 Distribution of changes in number of desired children between KLPS survey rounds

Notes: This figure plots the distribution of changes in fertility desires between KLPS survey Rounds 1 and 2 ($x_2 - x_1$), Rounds 2 and 3 ($x_3 - x_2$), and Rounds 1 to 3 ($x_3 - x_1$) for the 239 women of the analysis sample who were interviewed in all three survey rounds. Women who gave non-numeric answers to the desired fertility question in one of the two survey rounds used for each panel or who changed their desires by more than four children are dropped, leaving 231 women. Observations are weighted using survey weights from the later survey round, adjusted for the two-stage tracking design of that round. The vertical lines denote the average change in desires: -0.146 between Rounds 1 and 2, $+0.196$ between Rounds 2 and 3, and -0.029 between Rounds 1 and 3.

Source: Authors' analysis of data from Kenya Life Panel Survey (KLPS).

for stopping childbearing (Cleland et al. 2020), we hereby document that this variability extends to the intensive margin of how many children women and men desire. One advantage of focusing on the intensive margin is that it allows us to identify changes in desires at every point of each individual's reproductive history, even if they are still two or three children away from their desired family size. The pattern of aggregate stability and individual-level change that we find resembles the findings of Quesnel-Vallée and Morgan (2003) for the US; however, the social process underlying the result appears to differ. In the US, Quesnel-Vallée and Morgan found that fertility desires tend to move in a downward direction, with people eventually reporting desires at the level of fertility that they can realistically attain, and that changes in desires are more commonly towards the national level of total fertility than away from it (so that people who initially desire more than two are more likely to reduce their desires and those who initially desire fewer than two are more likely to increase). By contrast, in Busia, Kenya, we find that average reported desires across survey rounds fluctuate both downward and upward and that average reported desires slightly increase with respondent

age within survey Rounds 2 and 3 (see Figure A3, supplementary material), although the average result is driven mostly by the right tail (desires for five or more children): the median remains at three children in all three survey rounds, and the mode actually declines from four children (essentially national total fertility) in Round 1 to three children in Round 3 (see Figure A2(a), supplementary material). These patterns signal an increasing dispersion in reported desires: 23 per cent of our respondents change their desires towards the national total fertility of four, whereas 40 per cent change their desires away from four and 37 per cent report no change (Figure 2; Figure A2, supplementary material). The results in our sample are broadly similar to those presented in Askew et al. (2017) for the whole of rural Kenya, where wanted total fertility declined from 3.9 in 2003 to 3.4 in 2014. The difference in the direction of change between our data and theirs is likely the difference between period and age effects, although we cannot prove that conclusively.

The variability of individual fertility desires (as evident in Figures 1 and 2)—possibly due to life outcomes in rural Kenya being uncertain—does not, however, mean that reported desires or changes in desires are entirely chaotic or unstructured. When

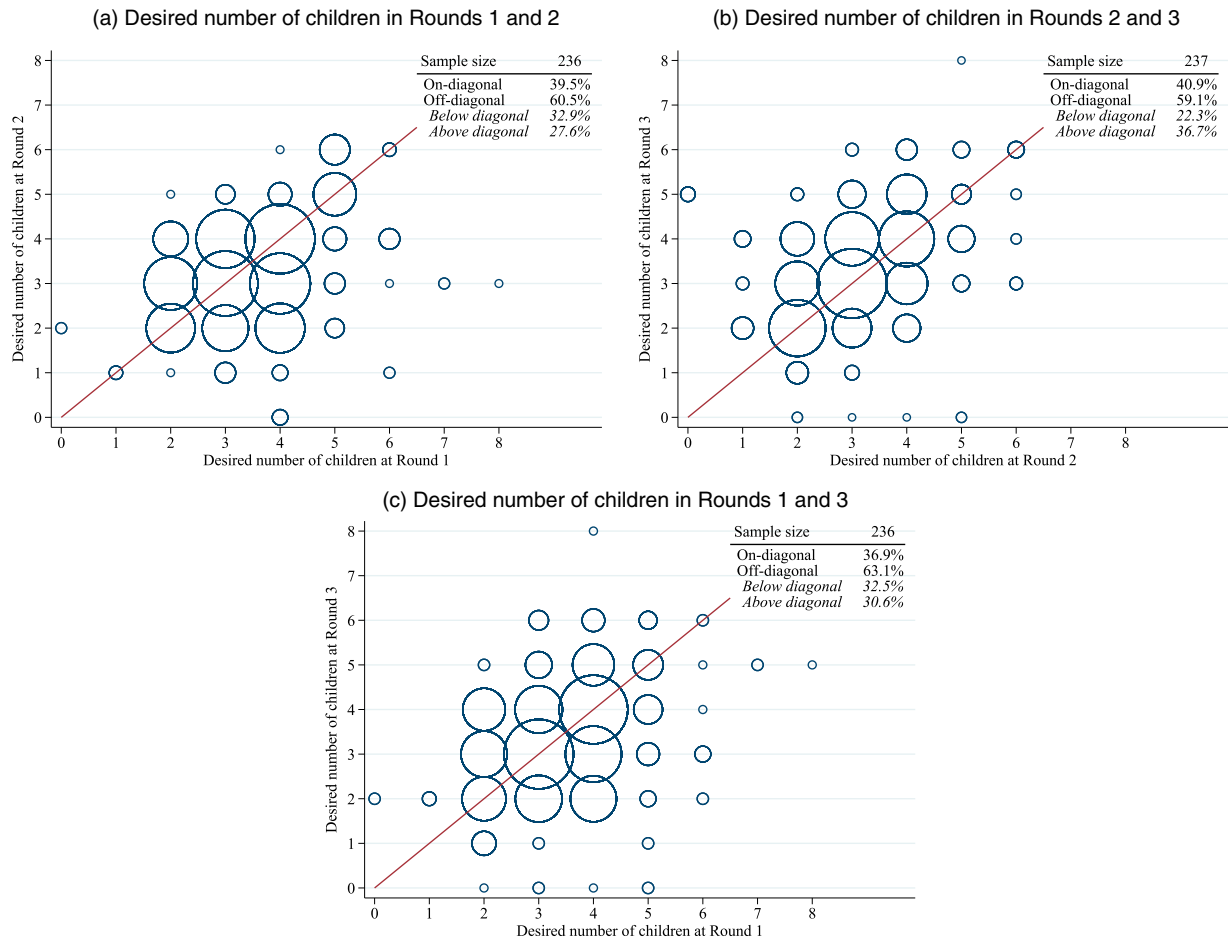


Figure 2 Distribution of desired number of children across KLPS rounds

Notes: These figures show the shares of women in the analysis sample who were interviewed in all three survey rounds for each combination of desired children in Rounds 1 and 2, Rounds 2 and 3, and Rounds 1 and 3 (as long as the number of desired children was eight or lower in both survey rounds). The size of the bubbles is relative to the number of respondents with a given number of desired children in two survey rounds, where observations are weighted by survey weights of the later survey round appropriately adjusted for the two-stage tracking design of the KLPS survey. For more details of changes in desires over time, see Table A1, supplementary material.

Source: As for Figure 1.

classifying women's individual histories of fertility desires over survey rounds, 88 per cent can be classified as following one of four main patterns: 20.4 per cent show stable desires, 16.6 per cent show 'vacillating' desires (defined shortly), 26.3 per cent show decreasing desires across rounds, and 24.8 per cent show increasing desires. (Note that 12 per cent of respondents do not fit neatly into this classification; refer to Table A1, supplementary material, for a detailed overview of fertility desires over all three survey rounds.) There seems to be some order and meaning in these changes and not just noise. The classification follows these rules: 'stable' consists of all women with the same desires across all three survey rounds ($x_1 = x_2 = x_3$); 'vacillating' comprises those with the same desires in survey Rounds 1 and 3, but a different desire in Round 2 ($x_1 = x_3 \neq x_2$);

'decreasing' encompasses all those with lower desires in survey Round 3 than 1 and desires in Round 2 that are in between ($x_3 < x_1$ and $x_3 \leq x_2 \leq x_1$); and 'increasing' consists of those with higher desires in Round 3 than in Round 1 and intermediate desires in Round 2 ($x_3 > x_1$ and $x_3 \geq x_2 \geq x_1$).

Many individual characteristics appear to be related to desires and changes in them, including motherhood, marriage status, and the sex composition of own children (see Figures A2 and A4, supplementary material, both based on the extended sample). For example, women who are married are somewhat more likely to increase their desired fertility (with 38.6 per cent increasing and 24.7 per cent decreasing their desires), while women who remain unmarried are more likely to decrease their desired

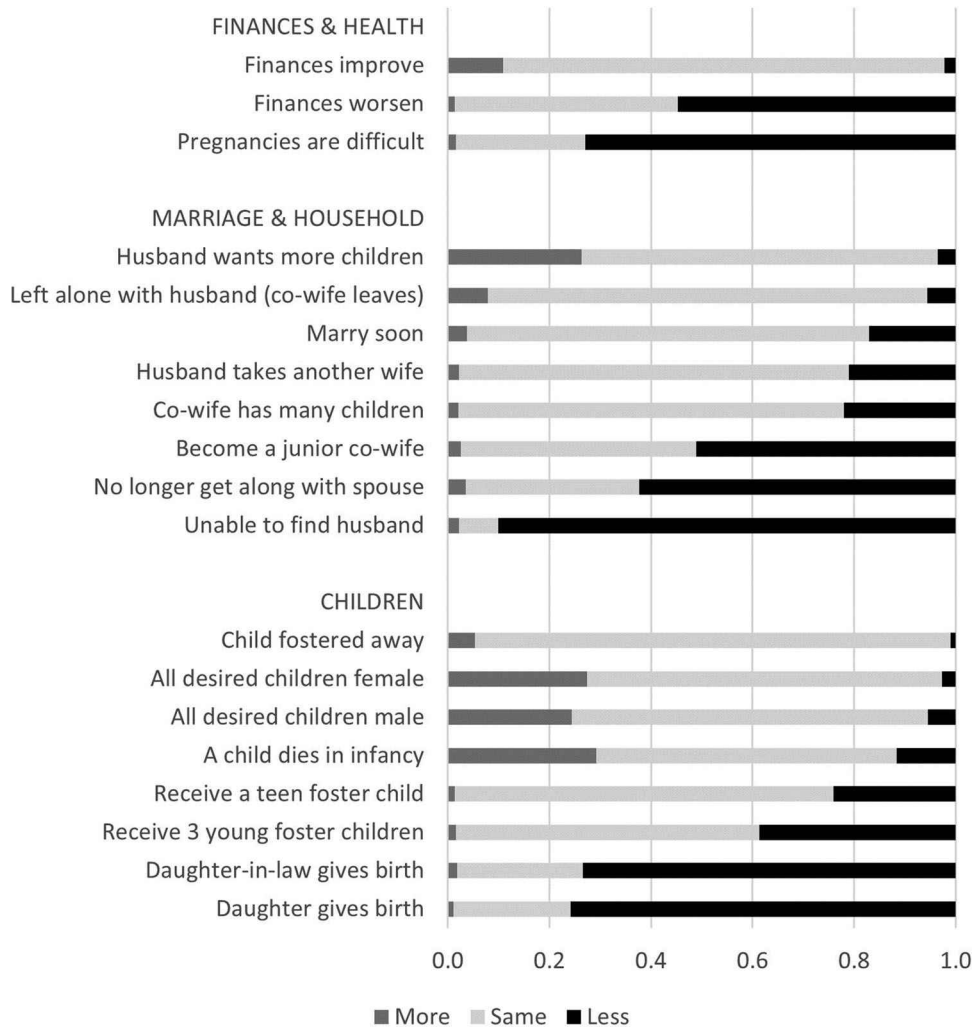


Figure 3 Women’s fertility expectations for 19 different scenarios: ‘In each situation, would you like to bear the same number of children, or a larger or smaller number?’

Notes: This figure portrays the share of women in the analysis sample ($n = 351$) who answered ‘more’, ‘same’, or ‘less’ for 19 hypothetical scenarios presented in the KLPS Round 1 survey. Respondents answering ‘don’t know’ to a specific question are dropped. The maximum number of respondents answering ‘don’t know’ is nine (for the scenario ‘Unable to find husband’). For all other scenarios, at most three women said they do not know. Answers are available only for the women included in the analysis sample (351 women). The questions applying only to unmarried women were asked of the subset of 227 unmarried women. Observations are weighted using survey weights from Round 1, adjusted for the two-stage KLPS tracking design.

Source: As for Figure 1.

fertility between survey Rounds 2 and 3 (with 32.9 per cent decreasing and only 27.6 per cent increasing their desires; Figure A1(a)). The average change in desires also differs significantly between these two groups, with already married women increasing desires by 0.11 children between survey Rounds 2 and 3 and unmarried women lowering desires by 0.04 children on average. The pairwise t-test indicates that this difference is significant at the 5 per cent level.

Similarly, for women in the extended sample who remain childless by their late 20s in Round 3, desired fertility is slightly more likely to be stable

over time than for women who bear children earlier (although a full 58 per cent of them still change stated desired fertility across survey rounds; Figure A1(b)). These results line up well with the finding by Hayford and Agadjanian (2017) that for women in Mozambique, changes in desire to stop childbearing are associated with life events, such as marital transitions. Characteristics of women and couple dynamics also matter, as we would expect, given the mutual endogeneity of desires, partner choice, and other aspects of women’s behaviour: women who (in Round 3) said that they had at least a joint say (rather than

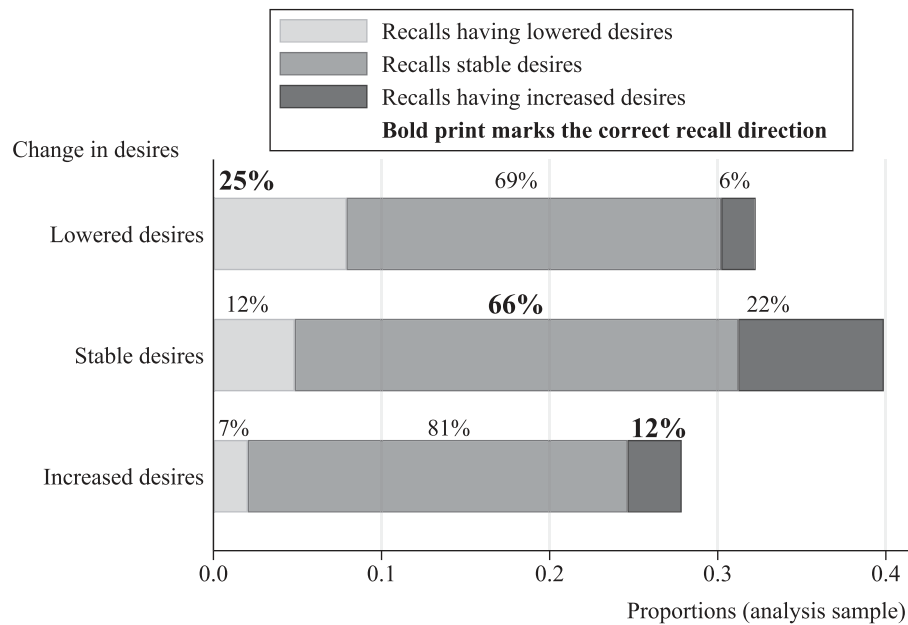


Figure 4 Recall patterns: women’s recalled direction of change in desires at KLPS Round 2 conditional on direction of actual change in fertility desires between Rounds 1 and 2

Notes: This graph plots the recalled direction of change in desires for all 277 women in the analysis sample interviewed in both Rounds 1 and 2, conditional on whether they had lowered their desires, shown stable desires, or increased their desires between survey Rounds 1 and 2. The graph uses Round 2 observation weights adjusted for the two-stage KLPS tracking design (which explains why the weighted shares represented in this figure differs from the number of observations reported in the text). The recalled direction of change in desires is constructed in the following way: an individual recalls having lowered her desires if $x_{1|2}^R > x_2$ (i.e. if she recalls a higher desire than she currently reports), having held stable desires if $x_{1|2}^R = x_2$ (i.e. if she recalls the same desired fertility as she stated in Round 2), and having increased her desires if $x_{1|2}^R < x_2$ (i.e. if she remembers a desired fertility that is lower than her current desired fertility). Women’s changes in desires are coded similarly: those whose desired fertility was higher in Round 1 than 2 have lowered their desires (i.e. $x_1 > x_2$), they held stable desires if the desired fertility was the same in both rounds ($x_1 = x_2$), and they have increased their desires if their stated desired fertility in Round 2 is higher than in Round 1 (i.e. $x_1 < x_2$). This graph indicates the proportions of women with lower, equal, or increased desires (from top to bottom) and for each group reports the share within this group who recall having lowered their desires, having held stable desires, or having increased their desires. For each group, the ‘correct’ recall direction is emphasized in bold colours. Note that those who lowered their desires are more than twice as likely to recall the direction of change correctly than those who increased their desires (25 vs 12 per cent, p -value = 0.025). Those who increased their desires in turn are more likely than those who lowered their desires to believe they have held stable desires (81 vs 69 per cent, p -value = 0.062), and even more so than those whose desires were actually stable (81 vs 66 per cent, p -value = 0.021). P -values from Fisher’s exact test and bootstrapped (with 1,000 draws) tests for decreasing vs increasing desires (using unweighted shares) are as follows: 0.122 and 0.071 for correct recall, 0.040 and 0.034 for recall direction, and 0.061 and 0.052 for recalling zero change.

Source: As for Figure 1.

less say than their partner) over whether to have another child were eight percentage points less likely to have increased their desired fertility and 13 percentage points more likely to have lowered it (results not shown). These differences in power dynamics within couples offer one potential reason behind the literature’s disparate findings on the predictive power of spousal fertility preferences (as summarized by Cleland et al. 2020), suggesting a potential role for these dynamics in accounting for differences in the importance of spousal preferences within and across populations.

Consistent with most studies of reported fertility intentions and later reproductive outcomes, we find an association between the two that is neither trivial nor overwhelming. We observe associations in two kinds of data. First, for women in our analysis sample, we regress their number of children born between Round 1 and Rounds 2 and 3 on their number of desired children (additional to their living children in Round 1; see Table 3). Higher fertility desires in Round 1 are associated with more additional children born by Round 3: reporting desiring one additional child is, on average, associated

Table 3 Regressions of actual fertility (number of additional children) on reproductive desires (desired number of additional children): women in Kenya

	<i>Dependent variable = Number of additional children between Round 1 and:</i>					
	Round 2	Round 3	Round 2	Round 3	Round 2	Round 3
	<i>All women</i>		<i>Pregnancies > 0 (at Round 1)</i>		<i>Never pregnant (at Round 1)</i>	
Desired number of additional children (at Round 1)	-0.002 (0.057)	0.188*** (0.052)	0.097 (0.083)	0.290*** (0.084)	0.159** (0.076)	0.330*** (0.105)
Mean additional children	1.068	1.815	1.368	1.973	0.745	1.659
SD	0.928	1.200	0.775	1.029	0.974	1.334
<i>N</i> women	236	236	115	115	121	121
<i>R</i> -squared	0.000	0.040	0.020	0.102	0.034	0.078

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Notes: The dependent variable, Number of additional children, denotes the number of children born after KLPS Round 1. We report results from the following regressions: $f_t - f_1 = \alpha + \beta(x_1 - f_1) + \epsilon$ for $t = 2, 3$. The sample comprises all women in the analysis sample who were interviewed in Rounds 1, 2, and 3. Two out of the 239 women gave non-numeric answers to the question on fertility desires, and one woman was missing information on actual fertility for Round 1, leaving a sample size of 236. By Round 1, 115 of these women had been pregnant at least once (Pregnancies > 0) and 121 had not (Never pregnant). Each column represents a separate regression. Regressions include no additional controls. Standard errors (in parentheses) are clustered at the baseline school level. Observations are weighted using survey weights from the later round, adjusted for the two-stage tracking design of the KLPS. The Mean and SD (standard deviation) rows show these respective measures for the number of additional children between Round 1 and later rounds.

Source: As for Table 1.

with bearing roughly 0.2 more children between Rounds 1 and 3. The same association for the two subgroups—women with at least one child by Round 1 and those without any children at Round 1—is around 0.3 additional children (see Table 3 for results). Since the average age for the analysis sample women in Round 3 is only 28 (Table 2), this would be consistent with a difference of at least half a child by menopause. Second, women who report expecting to have a child in the next two or five years are more likely to have one than women who report not expecting to have one. Over the next two years, women's expectations of having a child are strong predictors of having another child, with those expecting to have another child being twice as likely to actually have a child, at 59 per cent compared with 30 per cent (Table A2, supplementary material). The predictive power of their expectations over a time horizon of five years is more modest, however, with those expecting to have another child being 32 per cent more likely to actually have a child (79 per cent compared with 60 per cent). This shows that while expectations are predictive of actual fertility, the 'error rates' for women not intending to have a child are quite high: 30 per cent (60 per cent) of women not expecting to have a child in the next two (five) years end up having one.

These are young women, most of whom are less than halfway through their childbearing years by KLPS Round 3. And yet, 11.5 per cent of women

bear more children by Round 3 than they report desiring in Round 1, and another 23.4 per cent exactly reach their first-reported desires, with another 15 or so years of fecund life still ahead (results not shown). Without additional information, we cannot tell whether these additional children are unexpected (perhaps as the result of contraceptive failure) or due to respondents deciding that they want more children and acting on this change in preferences.

In order to examine whether such changes come as expected or unexpected, we present women's answers to the 19 hypothetical scenarios for which they were asked: 'In each situation, would you like to bear the same number of children, or a larger or smaller number?' For most scenarios, the vast majority of women say they would either want the same or a smaller number of children (Figure 3). The only scenarios in response to which at least 10 per cent of women would like to have more children are: improving household finances; all children being of the same sex; husband wanting more children; and a child dying in infancy. The latter most likely does not reflect an increase in desired family size but simply maintaining desired family size by giving birth to one more child. That said, only about 25 per cent of respondents expect to increase desired fertility where children are all the same sex or the husband wants more children, whereas 70 per cent do not expect to change desired fertility at all in

those scenarios. In comparison, in the case of worsening household finances, 55 per cent of respondents state that they would want to have fewer children, and even higher shares of women state that they would reduce desired fertility if they no longer got along with their spouse, if they were unable to find a husband, if their daughter (in law) gave birth, or if their pregnancies were difficult.

The patterns documented in Figure 3 suggest that women expect to respond asymmetrically to positive and negative life scenarios: they state that they would largely not update their desired fertility under positive scenarios, but would lower it under negative scenarios, such as the negative household economic shocks that are all too common in Kenya. This supports the idea as put forward in the Discussion that desires, especially at young ages, are statements of ideals: constructed in the context of the elicitation process and informed by experience, schemas, emotion, and identity. But note that respondents' initial forecasts that their desired fertility would be unchanging or even decreasing over time stand in contrast to the fact that desired fertility does change substantially across survey rounds for many respondents, and often in an upward direction: 30 per cent of women increase their stated desired fertility between Rounds 1 and 3 (Figure 1). Respondents' forecasts about how they would respond to particular scenarios also appear to understate how responsive their fertility would be: for instance, while 25 per cent of women in our analysis sample expect to increase their desired fertility if all children were the same sex (in the initial survey; Figure 3), 67 per cent (50 per cent) of women in the extended sample actually increase their stated desired fertility in a future survey round when they have borne only daughters (sons), and have reached, but not yet surpassed, their previously reported desired number of children (see Figure A4, supplementary material). Expectations about changes in future desired fertility also seem to be systematically inaccurate in cases where a woman's husband takes another wife: while respondents on average expect desired fertility to fall in this case, women in our data with no co-wife at Round 2 but with a co-wife by the Round 3 survey are ten percentage points more likely to show increased desired fertility than those with still no co-wife at Round 3 (results not shown).

Overall, respondents' inability to anticipate upward changes in desires therefore seems to stem both from underestimating the likelihood of increasing desires in response to certain scenarios (such as having daughters only) and from the possibility that while additional children often do not follow

increased fertility desires, higher stated desires often follow having additional children. Our interpretation of asymmetric expectations could change if there are scenarios that we may have missed in our survey for which women would anticipate upward changes in desires. We do not think, however, that the documented asymmetry is simply due to missing scenarios. First, some of the elicited scenarios encompass many more specific examples: for example, 'husband wants more children' could be seen as a reason for remarrying, or improving finances could be seen as covering improved job opportunities. Second, the comparison between improving vs worsening finances nicely illustrates this general asymmetry: while almost 60 per cent of women forecast lower desires in the case of worsening finances, only around 10 per cent expect to increase their desired fertility in the case of improving finances (Figure 3). This gives us more confidence that our scenarios do capture the general asymmetric nature of respondents' expected adjustments.

Despite the fact that many individuals' reported fertility desires change substantially over time, few individuals appear able to recall these changes when asked in later survey rounds (see Figure 4). We find that only about 30 per cent of respondents correctly recall their own past fertility desires exactly (not shown), and less than 40 per cent correctly recall even the direction of the change in their desired fertility over time. Moreover, while only 40 per cent of women do not change desires between survey Rounds 1 and 2, more than 70 per cent of women believe that they have not changed desires (weighted figures). This share is almost exactly the same for women in the extended sample. Among those women whose desired fertility changes across survey rounds, just 9 per cent are able to recall their earlier stated desired fertility correctly (and only 19 per cent recall the change in sign). Figure 4 presents women's recalled change in desires depending on having held stable desires or having lowered or increased them. While just 12 per cent of those whose stated desired fertility increases across survey rounds are able to recall the direction of this change over time, a much higher proportion (25 per cent) of respondents whose desired fertility falls over time are able to recall the direction of the change correctly. Moreover, women with increased desires are also more likely to believe they have not changed desires than women who lower their desires from survey Round 1 to 2 (and even more likely than those whose desires are actually stable). Recall is thus

strongly anchored at current fertility desires, and it is particularly so for those whose desired fertility increases over time.

Taking all this together, three empirical patterns stand out with respect to recall. First, recall of past fertility desires is inaccurate overall, with most respondents failing to recall their past desired fertility correctly. Second, this appears to be driven largely by recalled desired fertility being strongly anchored at current fertility desires. Third, this anchoring is most pronounced, and recall errors therefore most common, for women whose desired fertility increases over time. Given that most respondents believe they have not changed their desired fertility at all, current preferences may not only affect forecasts of future preferences (as in projection bias) but also perceptions of past preferences. This retrospection bias implies that many people find it difficult to imagine that they ever wanted to have a different number of children in the past, a pattern that could be driven by a desire for cognitive consistency over time. Cognitive consistency cannot, however, easily account for the asymmetric recall performance we document, in which those with rising desired fertility over time appear to have particular difficulty recalling their earlier desires.

Discussion and limitations

Discussion

Bachrach and Morgan (2013) argued that fertility intentions emerge over age, as people live through a variety of experiences and figure out who they are and what their lives are likely to yield. In the US, social institutions are strong and unified enough that fertility desires and outcomes converge as people age; in Busia, Kenya, people start out with relatively homogenous ideals, assuming an idealized life course. However, life in Kenya is subject to a much greater element of chance and variability, and as a result, as people age, their fertility desires and actual fertility diverge, consistent with Bachrach and Morgan's (2013) prediction. Increasing variability in reproductive desires and actual fertility is one of the many concrete consequences of the pervasive uncertainty of life in Africa that has long been described (e.g. Whyte 1997; Johnson-Hanks 2006; Cooper and Pratten 2014).

The women in our sample are young women aged around 28, most of whom are less than halfway through their childbearing years by KLPS Round 3. And yet, 11.5 per cent bear more children by

Round 3 than they report desiring in Round 1, and another 23.4 per cent exactly reach their first-reported desires with another 15 or so years of fecund life still ahead. Under conventional models of fertility behaviour, in which fertility outcomes are driven by explicit choices, this would mean either that these respondents later decide that they do in fact want more children and act on this change in preferences, or they have additional children unexpectedly, perhaps as the result of contraceptive failure. But in the constructed intentions perspective of Bachrach and Morgan (2013) and Bhrolcháin and Beaujouan (2019), this result is a straightforward consequence of young people starting out with vague and idealized desires—basically guesses about what 'successful people around here' would say—which then become increasingly conscious, concrete, and realizable as the young people grow into adulthood, marry, and begin childbearing. For some, that will mean having more children than they initially report desiring, because their desires were formed through the process of their actualization.

One striking feature of constructed intentions is that most people are unaware of their fluidity, emotional colouring, and context-dependence. Although we can imagine situations where people could articulate that their desires could easily change or that they are indifferent between having three, four, or five children, that is not the mental state described by a model of constructed preferences, nor is it what we find empirically. Overall, our data indicate that although experiencing meaningful changes in reproductive desires over time appears to be the norm rather than the exception among young Kenyans, most people believe their fertility desires to be held quite strongly and stably, both in the past and in the future.

So, respondents—possibly suffering from projection bias—seem to find it challenging to imagine changing their desires in the future, as well as difficult to imagine having changed desires in the past. Moreover, both in anticipation and retrospection, women tend to underestimate the extent of increases in fertility desires: at first they cannot imagine ever wanting more children than they currently desire, and once it has happened, they cannot imagine ever having wanted fewer children! While a desire for consistency cannot explain this asymmetry, self-identity could be at play and could drive asymmetric memory, similar to the patterns of 'asymmetric updating' (e.g. about own IQ) documented in the cognitive science and behavioural economics literatures. Kenya is a social context where controlled,

low fertility is symbolically associated with modernity and education, and so a perceived lack of control over fertility might be viewed negatively. In addition, the possibility of implying that current or future children might have been (or will be) undesired could appear as cruel to many and thus also drive them to rationalize these children as always having been desired. As such, our finding of asymmetric recall of past fertility desires is related to a recent study by Zimmermann (2020), who found asymmetric recall of own IQ test results a month after the test, a result driven by motivated reasoning. Further examples from laboratory settings include Eil and Rao (2011) and Mobius et al. (2011).

Three additional patterns in recall behaviour provide further suggestive evidence that active manipulation of memory is playing some role, too. First, those whose desired fertility rises over time are more likely than others to believe that their desired fertility has not changed at all (i.e. that they always wanted as many children as today). As shown in Figure A5 (supplementary material), this recall behaviour causes recalled excess fertility to be much lower than excess fertility when measured using respondents' actual past desires. Second, this asymmetry in recall is particularly strong for those who initially have children or are married at the time of KLPS Round 1 and is much weaker for others (see Figure A6, supplementary material). Both mothers and married women might be most likely to bear more children soon and thus to end up with more children than initially desired. Third, while those who lower their desires by two children rather than only one child are much more likely to recall having lowered their desires, there is no such difference for those who increase desired fertility by one vs two children, despite an increase by two children being potentially much more salient (as shown in Figure A7, supplementary material).

Our findings of biased memories of past desired fertility are consistent with other evidence of retrospective rationalization found in the literature on measuring unwanted births (e.g. Smith-Greenaway and Sennott 2016). Rackin and Morgan (2018), for example, also found much lower unwantedness using retrospective than prospective measures (9 vs 25 per cent of births). Retrospective rationalization thus seems to matter for measures of both fertility intentions and desires. The exact details of changes in retrospective reports likely depend on the sample, context, and circumstances of births. For example, for young mothers aged 18–24 in the US who were repeatedly asked about their first birth, Guzzo and Hayford (2014) did not find any

aggregate increases in reported wantedness over time. Note that in that sample, in the first interview after their first child, 60 per cent of women already reported their first birth as unintended.

An important shortcoming of using prospective measures of desired fertility as a benchmark for measuring undesired fertility is that it does not allow clean identification of the number of undesired children, because such measures are conflated by unanticipated changes in desires. Despite this important shortcoming, we think that capturing both without disentangling them is still informative, as we might be interested in whether family planning programmes reduce both unanticipated increases in desires and unwanted children combined. As such, contrasting retrospective with prospective measures of fertility desires allows us to understand to what extent people recall whether any children were undesired or whether they experienced unanticipated increases in desires. Our results hint at the possibility that respondents do not just struggle to declare children as unwanted *ex post*, but they also struggle to remember unanticipated increases in desires. Future research could try to understand the reasons and motivations behind inaccurate and biased memory in more detail and potentially contribute to overcoming some measurement issues in assessing whether children were desired or not. This, in turn, might facilitate more accurate analyses of the consequences of undesired births, similar to Smith-Greenaway and Sennott (2016).

Limitations

While the presented results and the discussion highlight the richness of our data set, the data and results are not without limitations. Given the ambitious undertaking of tracking thousands of respondents throughout their 20s, respondents are only interviewed every three to five years. As a consequence, we cannot easily narrow down when and why respondents change their desired family size. We can point to characteristics and life events associated with changes, but can neither prove nor claim clear causal relationships. In addition, our measurement of the desired number of children is subject to noise, and we cannot disentangle what share of changes in desires is due to noise and what share is due to real changes in desires. However, we see two key reasons why most increases in (stated) desires are unlikely to be due simply to noise and more likely due to genuine (possibly unexpected) changes: for one, women tend to state that they

would rather have one child less than one child more than their desired number of children. Second, when asked to forecast how they would change their desires under 19 different scenarios, very few women say that they would increase their desires under any scenario (but many forecast that they would lower their desires under certain scenarios). Since our sample does not cover all relevant ages, we can make statements only about young women in their 20s. At this point, we cannot therefore say whether fertility desires become more stable in women's 30s or whether actual and desired fertility continue to increase (unexpectedly).

The size of our analysis sample is on the small side compared with other studies in the literature. It is therefore important to note that the women selected for the analysis sample constitute a representative subsample of women in the whole KLPS and that the results do not vary significantly between the larger extended sample and the analysis sample where comparisons are possible. For this reason, the advantage of having detailed data on reproductive desires and expectations prevails over the disadvantage of a smaller sample. Our data allow us to track fertility desires and outcomes over a nine-year period in order to compare changes with expectations and assess women's recalled desires against their actual past desires. Ideally, some of these components will be replicated and extended to other contexts and larger samples. Forecasts are hard to evaluate as it is rare that only one aspect of life changes, and detailed evaluations of forecasts therefore ideally require detailed information from large samples. Finally, our measure of recall asked respondents to recall how many children they would have desired three years ago, despite respondents actually being interviewed three, four, or five years ago. Some of the inaccuracies in recall might stem from this imprecision, although our analyses suggest that it is unlikely our results would change much with a more precise question. Still, with the current data we can only describe respondents' retrospective perceptions and only speculate about potential reasons and motivations behind the observed inaccurate and asymmetric recall performance. Future studies can and should improve on this margin.

Conclusion

Demographers have long sought to make sense of fertility preferences, often working with a model of reproductive action based on the deliberative equilibrium of rational choice. Over the last 20 years, a

wide range of scholars have drawn attention to the inconsistencies and uncertainties of reproductive preferences and actions, especially in low-income countries. At the same time, scholars in behavioural economics and cognitive science have developed a rich theoretical framework for understanding human decision-making and action 'in the wild', noting not only consistent patterns of bias and rules of thumb, but also ways in which action is not decision-bound at all. Bringing together the empirical fertility literature with these new theoretical models, several scholars—notably, Bachrach and Morgan (2013) and Bhrolcháin and Beaujouan (2019)—have argued that reproductive preferences are constructed in response to specific contexts that elicit either a verbal articulation of an intention or a reproductively relevant action. Reproductive preferences in this framework are changeable, contextual, informed by schemas of childbearing, imbued with affect, and organized by identity.

In this paper, we used a rich multi-year panel data set including information on reproductive desires and outcomes among a population of young adults in western Kenya to evaluate the constructed preferences perspective. We found support for most of its elements. First, even in the context of a life domain as important as having children, desires varied substantially over time: across horizons of three to nine years, more than 60 per cent of respondents changed their stated desired number of children, and 20 per cent changed by two or more children. Second, we found that many women underestimated how strongly they would adjust their preferences to certain scenarios and mispredicted their own fertility behaviour over the next two to five years. For instance, when asked how they would react to scenarios such as getting married soon or all children being of the same sex, most responded that they would still like to have the same number of children. For a small number of negative scenarios, such as difficult pregnancies or worsening finances, sizeable shares asserted that they would prefer fewer children. However, opting to want more children was quite rare and never a majority response to any scenario posed.

Despite these asymmetric expectations, large shares of respondents showed both upward and downward changes in stated desired fertility between ages 18 and 28. For example, while around 27 per cent (24 per cent) of women expected their desired fertility to increase if all children ended up being girls (boys), 67 per cent (50 per cent) of those whose children all turned out to be daughters (sons) actually increased their desired number of children in future survey rounds. Young Kenyan adults who

had anticipated being largely indifferent to the sex of their children in fact ended up caring more than they had thought. We also found expectations to be incorrect in a more immediate way: when asked whether they expected to have another child in the next two or five years, sizable shares mispredicted their own behaviour: 30 (60 per cent) of women not expecting to have a child in the next two (five) years ended up having one. Together with increases in desired fertility across survey rounds, these patterns suggest that ex-post rationalization matters as well.

Third, we documented that very few women were able to recall past desired fertility from three years earlier: only 31 per cent correctly recalled what they had previously reported their desires to be, and just 9 per cent of those who had changed their stated desired fertility correctly recalled their previous report. Instead, most believed that they desired the exact same number of children three years earlier as they did at the current survey. This strong anchoring at current desires suggests that current preferences exert a strong influence not only on expectations of future desires but also on recall of past preferences. The pattern is strong enough that we should hesitate to infer cohort change when we observe an age pattern in the classic DHS question, ‘*If you could go back to the beginning of your reproductive life and have exactly the number of children you wanted, what number would that be?*’ Women’s memories of their own past desires are just not good enough for that question to work in the many of the ways it has been used.

Finally, we found that the anchoring at current preferences was asymmetric and particularly strong for those whose stated desired fertility was higher than previously. Given that this asymmetry was only present for married women and mothers, it appears that the difference does not stem mechanically from differences between upward and downward changes but rather from social identity and schemas of self, as people construct images of themselves and their families consistent with the kinds of lives they want to live and the kinds of people they hope to be. While the illusion of stable and effective preferences was held by many of our research subjects, we see no reason why we as researchers should share this illusion.

Notes and acknowledgements

1 Please direct all correspondence to Joan Hamory, University of Oklahoma, Room 158 CCD1, 308 Cate

Center Drive, Norman, OK, 73072, USA; or by Email: jhamory@ou.edu

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- 4 The data for this paper and the code to reproduce the analysis will be accessible online in Dataverse after publication.
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ORCID

Maximilian W. Müller  <http://orcid.org/0000-0003-0935-6401>

Joan Hamory  <http://orcid.org/0000-0002-0071-8683>

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