Selective Memory around Big Life Decisions

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Abstract

Selective memory can lead people to mistake life outcomes as what they always wanted. Using data on past fertility desires from a panel tracking fertility preferences and actual fertility for 3,936 Kenyans from their early twenties to their thirties, I provide monetary incentives to remember and to be reminded of past desires. I find that: (i) 29% of respondents have more children by their thirties than once desired; (ii) despite incentives, especially respondents with excess fertility misremember past desires in the direction of current fertility and do not want to be reminded of them, consistent with motivated memory; (iii) selective memory affects the intergenerational transmission of fertility preferences.

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1 Introduction

How do people learn from personal experiences? A growing literature shows that motivated cognition can drive what people learn or do not learn from personal experience and feedback (Bénabou and Tirole, 2016). Evidence suggests that systematically biased beliefs can arise from biased belief updating (Eil and Rao, 2011; Mobius et al., 2011), information avoidance (Oster et al., 2013; Gottlieb, 2014) and selective memory (Zimmermann, 2020; Huffman et al., 2019; Chew et al., 2020). As hypothesized by Bénabou and Tirole (2002), people are not only susceptible to mechanical distortions of memory (Mullainathan, 2002; Bordalo et al., 2017; Enke et al., 2020), but might actively use selective memory to achieve desirable beliefs. However, while most personal experiences span years, most studies on motivated reasoning are over short time horizons and typically based on lab experiments in high-income countries. An open question is, do these findings of biased and motivated memory extend to long-term memory of important life experiences in the field and to low-income countries?

In this paper, I study selective memory of personal experiences in the context of fertility desires and outcomes over the span of a decade. The paper also examines the implications of motivated memory for the reliability of retrospective survey questions. For these purposes, I provide field evidence on the evolution and memory of fertility desires and actual fertility for a sample of 3,936 Kenyan women and men over ten to eleven years from their early twenties on. I combine data from two survey rounds a decade apart that are part of a larger panel study following an initial deworming study by Miguel and Kremer (2004).

In the panel, respondents were first asked about their desired number of children and their current number of children in survey round 2 when they were around 22. They were asked the same questions ten to eleven years later in survey round 4 such that I can compare their current desires and number of children to their past desires. In addition, in round 4 respondents were asked to recall how many children they desired when they were interviewed for survey round 2. To examine whether inaccurate recall is due to insufficient effort or respondents' inability or unwillingness to recall their past desires, I randomized whether respondents were given monetary incentives to recall their past fertility desires. Finally, I offered respondents the opportunity to find out how many children they desired in survey round 2 and randomized whether this offer was coupled with monetary incentives to take up the information. This variation provides a test of whether respondents find certain memories undesirable.

This paper makes six contributions. First, I document that changing one's reproductive desires over a decade is the norm rather than the exception in this context and that realized fertility frequently deviates from initial reproductive desires; 73% changed their desires, 33%

of them by two children or more. Upward revisions occur for 54% and downward revisions for 18% of respondents. Moreover, 33% of women and 25% of men have more children than desired a decade ago. Another 27% (20%) of women (men) have reached their desired family size, with years of residual fertility ahead of them. These patterns illustrate why fertility in Kenya is a well-suited context to study how memory affects learning from experience in important life domains. First, desired and actual fertility can be compared across a large number of people because it is quantifiable, sufficiently standardized, and meaningful to everyone. Second, it provides continuous measures of desires and outcomes with extensive heterogeneity in both. Third, individuals have imperfect control over outcomes that are consequential and irreversible.

Second, I elicit respondents' recollections of their past fertility desires and find that 34% correctly remember their past desires, 43% overestimate, and 23% underestimate their past desires. I estimate that, on average, recalled desires are a convex combination of current and past desires, with a weight of only 40% on true past desires. Memory is biased towards current desires and particularly so for those with excess fertility, i.e., those with more children than once desired: they are 13 percentage points less likely to correctly remember their past desires than those without excess fertility.

Third, the experiments I designed to estimate the mechanisms behind biased memory provide evidence consistent with selective forgetting and information avoidance. Financial incentives improve memory of past fertility desires for those without excess fertility, but not for those with excess fertility. This asymmetry is specific to the context of fertility since financial incentives improve memory equally for both groups on a neutral recall question to remember Kenya's vice president in the year of their round 2 interview. This is not caused by a lack of effort, as both groups spend more time thinking about both recall questions when incentivized. Those with excess fertility cannot easily access their past desires and may have forgotten them.

Fourth, those with excess fertility show signs of costly information avoidance when offered information about their past fertility desires. To study costly information avoidance I randomized whether respondents were offered information about their past desires with our without additional financial incentives to take up the offer. Financial incentives strongly increase take-up for those without excess fertility, but less so for those with excess fertility. A share of respondents with excess fertility thus avoids information about their past reproductive desires despite foregoing money by doing so. This is especially pronounced for those who did not remember their past desires and those with many children, suggesting that biased memory and information avoidance are driven by related motives.

Fifth, I find that respondents' memory becomes worse the more (initially) undesired

children they have and the older these children get. At the same time, full rationalization appears to become harder as well, as respondents are less likely to remember all of their children as always desired the more initially undesired children they have. Additional time to consider the information offer also helps respondents with excess fertility to ignore or forget the offer. These results complement those by Zimmermann (2020) and Huffman et al. (2019), showing selective memory over shorter and longer time horizons of minutes and years.

Finally, I examine the relationship between distorted memory and the intergenerational transmission of fertility preferences. On average, overestimating past desires is associated with advising adolescents to have .56 children more than those not overestimating recommend. These recommendations are more strongly correlated with respondents' remembered desires than with their current desires, past desires, and beliefs about local family size norms. Similar psychological concerns may thus shape both biased memories and advice.

The paper is most closely related to the literature on motivated reasoning, particularly to biased memory and belief updating.[1] It contributes by showing that motivated memory extends to important experiences in the field and in low-income countries. I find that memory of past desires is biased in the direction of life outcomes and that this is partly motivated, consistent with theories of ex-post rationalization (Eyster et al. (2021)). This could lead people to overestimate how much control they have over their own lives and to underestimate the importance of external influences. Relatedly, selective memory has been shown to help with achieving desirable beliefs and suppressing unwanted memories (Anderson and Levy, 2009), but at the cost of accurate beliefs (Gödker et al., 2020). Selective memory has also been shown to help maintain (over-)confidence (Zimmermann, 2020; Huffman et al., 2019; Chew et al., 2020), a positive self-image (Mischel et al., 1976; Saucet and Villeval, 2019) and potentially optimism and mental health (Korn et al., 2014).

In addition, I also provide evidence for a potential implication of motivated memory. It might bias the advice people give.[2] This paper shows a case where biased advice is associated with biased retrospection, implying that such advice need not always be beneficial for its receiver. Moreover, biased memory may lead younger generations to uphold existing institutions or norms. This could contribute to cultural persistence (Alesina et al., 2013; Bisin and Verdier, 2001, 2011), groupthink in organizations (Bénabou, 2013), and the cultural

[1] Facing new information, people update asymmetrically (Eil and Rao, 2011; Mobius et al., 2011; Schwardmann and Van der Weele, 2019) or avoid the information altogether (Oster et al., 2013; Gottlieb, 2014). In addition to motivated beliefs, individuals may also make motivated errors (Exley and Kessler, 2019).

[2] Advice from experienced individuals could be particularly helpful for big life decisions (Gilbert, 2009). These are costly to undo, infrequent with limited personal experience, but require forecasting of future state-dependent utility which people struggle with (Loewenstein et al., 2003; Kuziemko et al., 2018).

transmission of traits (Dessi, 2008). In the extreme, it might lead to the persistence of harmful traditions like female genital mutilation (Gulesci et al., 2021) as those who underwent the traditional procedure act as its gatekeepers (Bellemare et al., 2015).

Finally, the paper holds positive and negative news for survey design. The positive news is that survey panel data can be used to study selective memory as well as its determinants and implications. The growing availability and longevity of survey panels thus offers an opportunity to study memory in various contexts. The negative news is that selective memory can bias answers to retrospective questions and thus lead to biased results.[3] This is important because many survey questions require some retrospection, e.g., an estimated 30% to 50% for the 2019 PSID survey. Many papers rely on retrospective data such as self-reported past earnings, for important topics like the returns to migration (Hendricks and Schoellman, 2018). To give an example, a retrospective question about past fertility desires, as in Demographic and Health Surveys (DHS), captures only 50% of those with actual excess fertility in my sample. This can also bias analyses of the correlates of excess fertility (Pritchett, 1994). Women in my sample are 8.9 percentage points (42%) more likely than men to have more children than desired, but the estimate based on DHS-type retrospective data is 12.5 percentage points (85%). Using panel data to document which types of questions suffer most from selective memory and testing for ways to reduce memory biases is thus an important step to improve survey methodology (Meyer et al., 2015).

The remainder of the paper is structured as follows. Section 2 introduces the panel data set and the context. Section 3 provides an overview of women's and men's changing fertility desires and family formation over time. I describe respondents' memory of their past reproductive desires in section 4. Section 5 examines the mechanisms of memory, section 6 its dynamics. In section 7, I discuss alternative explanations behind selective memory before I turn to possible implications of biased memory in section 8. I conclude in section 9.

2 Data and Context

In this section, I introduce the Kenyan Life Panel Survey (KLPS), the "recall module" embedded in the fourth survey round of the KLPS and the experimental survey components I use. The fourth survey round of the KLPS was launched in September 2018 and completed in fall 2021. The Kenyan Life Panel Survey is a longitudinal dataset that contains educational, health, demographic, labor market, and other information for nearly 10,000 Kenyan adults, spanning from their time in primary school up through adulthood. The "recall module" asks respondents to remember information from the time of their second round interview that

[3]See De Nicola and Giné (2014) or Arthi et al. (2018) for examples of inaccurate recall data.

was conducted between 2007 to 2009, ten or eleven years before their round 4 interview.

The sample of interest for this project are the 3,936 individuals who participated in survey round 4 (KLPS-4) and survey round 2 (KLPS-2) and have information on their reproductive desires in both rounds. These are 1968 women and 1968 men who on average are 33 to 34 years old at the point of interview (see table 1 for summary statistics). Respondents average almost 3 children by survey round 4 and had about 2 children since survey round 2. At the time of survey round 2 when they were around 22 to 23, respondents had achieved ca. 8 years of schooling which corresponds to finishing primary school. In this sample, around half of all male and a third of all female respondents continued to secondary school. All respondents originally attended primary school in Busia, a densely settled farming region in western Kenya bordering Lake Victoria. Busia is somewhat poorer than the national average and so are the respondents' median annual household earnings of around $500 (2017 US-$). The sample includes respondents who have migrated and left Busia since the initial studies.

The relevant part of the KLPS sample comprises individuals who participated in a previous randomized NGO program providing deworming medication to primary school students during 1998-2003 (known as the Primary School Deworming Program, or PSDP; see Miguel and Kremer (2004) for the initial study of this program). This project focuses only on participants of the PSDP initially surveyed in KLPS-2 and again for the current survey round (KLPS-4). The second survey round tracked a representative subset of 7,500 children with an effective tracking rate of 82.5%. The I Module, the relevant part of the KLPS-4 round, collected information on a wide range of outcomes, including measures related to fertility, parenting, individual health and migration. While the main purpose of the I Module was to study the longer term impacts of the PSDP on now-adult beneficiaries, one section of it was dedicated to fertility, including a subsection around memory related to fertility.[4]

While most respondents have some access to contraceptives and family planning methods, for many in the sample access is imperfect. In survey round 4, 65% strongly agree and 21% agree that "there is a strong need for family planning programs providing access to contraceptives and advice for planning marriage and children in my district/ neighborhood".[5] Reported use of contraceptives paints a similar picture: among respondents who have had sex in the 12 months before survey round 4, 78% (74%) report ever having used some (modern) form of contraceptives (such as condoms, pills, or injectables), but 22% also report having relied on the safe day method at some point. The reported shares in survey round 2 for use of any contraceptive, modern contraceptives, and the safe day method are almost exactly

[4]For more details on the I Module and its primary purpose, read Baird et al. (2019).

[5]The additional options to "agree a little", "neither disagree nor agree", "disagree a little", "disagree", and "strongly disagree".

the same as the ones reported in round 4.

2.1 The Recall Module and its Experimental Design

For the purpose of this research project, the survey contains several questions around reproductive desires and their recall. Some of these questions are subject to experimental manipulations. These components are presented in figure 1. I will refer to this addition to the survey as "the recall module".

The key survey and experimental design of round 4 uses data on stated fertility desires in round 2 (denoted x_2) to a) assess the accuracy of recalled fertility desires and b) offer information about past desires to respondents. To assess the accuracy of respondents' memory, respondents were asked to recall how many children they desired in the year of their KLPS-2 interview (question "Recalled Fertility Desires"). The exact version of the question respondents were asked was experimentally randomized: 60% of respondents were not given monetary incentives to recall, 40% were given monetary incentives. Among those receiving monetary incentives, I varied whether respondents were promised 20 Kenyan Shilling (KES) or 40 KES for correctly remembering their past desires. These amounts are equivalent to \$.2 or \$.4 or to one third and two thirds of median hourly earnings in the sample (see table 1) and thus represent meaningful incentives to remember one's past desires. Among those not given monetary incentives, respondents are asked one of three versions of the question. One question on how many children they would have desired at the time (Control Version, 40% of observations), one version noting that their answer was recorded and thus stressing the memory task ("Reminder" Version, 10%) and one mentioning that it is normal to change one's mind ("Psychological Statement" Version, (10%)). The paper focuses on comparing recall for those given monetary incentives or not, detailed results for each experimental condition are shown in the Appendix.

The same subset of respondents were later offered to find out about their past reproductive desires in round 2 as part of the "Information Offer". Respondents were told about the offer at the end of the recall module and instructed that they would have the chance to privately look up their past answer on a tablet at the end of the survey. To do so, they simply had to remind the field officer at the end of the survey, on average 25 minutes after the information offer. The offer was either only about the information (for 60% of respondents) or bundled with monetary incentives of KES20 (\$.2). In the latter case, respondents are told they were drawn in a lottery and will receive an additional KES20 if they remind the field officer that they want to look up their past answer. Respondents in KLPS-4 who were not interviewed in KLPS-2 are only offered the monetary incentives for reminding the

field officer and are not promised any information.

Interviews as part of KLPS-4 were split into two representative waves.[6] The core questions above are asked in both waves, but some components between the recall module and the end of the survey were cut for wave 2. Consequently, the average time elapsed between the information offer and the end of the survey fell from 30 to 19 minutes from wave 1 to 2. This mattered for information take-up as I will point out in sections 5 and 6.

3 Individual Fertility Histories

How does women's and men's actual and desired fertility in their early- to mid-thirties compare to their desired number of children a decade ago? Using data from survey rounds 2 and 4 of the KLPS, I present three key patterns. First, changing one's reproductive desires is the norm and not the exception. Second, upward revisions in the desired number of children are much more common than downward revisions over this time horizon. Third, excess fertility is widespread already and will only become more prevalent as most respondents have more than 10 fecund years ahead.

For the majority of women and men in this setting, desired fertility is subject to considerable change over time. These changes reflect both a general upward trend as well as individual variation in desired and actual fertility. Most respondents, 57% of women and 52% of men, now want more children than they did 10 to 11 years ago and only 27% (28%) of women (men) desire the exact same number of children as before. This leaves 16% (20%) of women (men) who now want fewer children than before. The joint distribution of respondents' desires in survey rounds 2 and 4 in figure 2a furthermore illustrates that 33% of women and men have changed their reproductive desires by 2 or more children. The result is a strong increase in women's and men's desired fertility with a shift in modal desires from 3 to 4 children. Women have increased their desired fertility by 0.74 children from 3.19 to 3.93 children, and men by 0.64 children from 3.42 to 4.06 children on average.

These changes in desires reflect meaningful and often unanticipated changes to individuals' lives rather than noisy and inconsequential, temporary changes. Excess fertility is widespread already in respondents' early thirties. 34% of women have more children than they desired in survey round 2, with another 27% of women having exactly reached their desired number of children (see Appendix figure A1). On average, women are only .14 children away from their initially desired number of children. Excess fertility is not as pronounced for

[6] Wave 1 launched in September 2018 and ran through the end of 2019; Wave 2 was launched in 2020. Data collection had to be paused in March 2020 due to Covid-19, but continued with a few months delay and ran until fall 2021.

men yet as they marry and start having children later. Still, 25% of them already have more children than initially desired and another 20% have exactly reached their desired fertility.

Reproduction is thus an important domain of life that for many did not turn out as once anticipated or desired. Most deviations in desired and actual fertility were unanticipated in one of two ways: either in the form of unexpected and initially undesired additional children, or in the form of unanticipated increases in reproductive desires. Importantly, for most individuals, initial desires presented an upper bound of their desired number as Müller et al. (2022) show for earlier survey rounds of the KLPS. When asked whether they would prefer to have one child fewer or more than their desired number, 74% of women said "fewer". In addition, most women were able to imagine lowering their desires under certain scenarios, but found it unimaginable they might increase their desires under any scenario.

How aware are respondents of these unanticipated developments? Are they able to remember what they once wanted or is their memory tainted by what happened?

4 Memory of Past Reproductive Desires

In this section, I document that the memory of women and men is inaccurate, biased, and dependent on how life has personally turned out for them over the past decade. For this purpose, I evaluate respondents' memory in round 4 of how many children they desired at the time of survey round 2 against their actual past desires in round 2.[7] Using data on their actual number of children in survey round 4, I then examine how their memory depends on their personal experience. I characterize personal experiences by comparing respondents' actual fertility to their past desires in round 2.

Respondents' memory is inaccurate as only 33% (35%) of women (men) remember the exact number of children they desired in round 2. Overestimating one's past desires is twice as common as underestimating them; 45% (42%) of women (men) overestimate, 22% (23%) of them underestimate their past desires. Too many of them think they wanted 4 or more children already a decade ago when desiring 3 or fewer children was more common than they can remember (figure 2b). On average, women remember wanting 3.61 children, which is closer to their current desires of 3.92 children than to their actual past desires of 3.19. How closely are their remembered desires tied to their current desires? To answer this question, I estimate a simple model in which their recalled desires ($x^R_{i,2|4}$) follow a weighted average of their past desires ($x_{i,2}$) and current desires ($x_{i,4}$):

$$x^R_{i,2|4} = \alpha \; x_{i,4} + \beta \; x_{i,2} + \epsilon_i \tag{1}$$

[7] An overview of the design can be found in figure 1.

Women and men put much more weight (.58) on their current desires in round 4 than their actual past desires (.40) as stated in round 2, as can be seen in the estimates presented in table 2. Their current situation therefore does seem to present a strong influence on their perception of their past desires. This anchoring is sizable, especially compared to estimates of projection bias (Loewenstein et al., 2003) of around .3 to .4 by Conlin et al. (2007), and given that projection here does not involve prediction of future state-dependent utility, but rather retrospection into one's actual past.

Memory is not just inaccurate, it is also biased. Those with excess fertility are significantly worse at remembering their past desires and overestimate their past desires more than those with fewer children than desired underestimate their past desires. Individuals with excess fertility are 13 percentage points less likely to correctly remember their past desires than those without excess fertility, among whom 39% correctly recall their past desires. The same pattern holds for other measures of recall performance such as recall errors (see table B1).

This systematic upward bias in memory for individuals with excess fertility cannot be explained by a desire for consistency (Falk and Zimmermann, 2013) or by rational belief updating about one's past desires using one's number of living children as signal. Women and men consistently overestimate their past desires conditional on their current number of children (as displayed in figure 3). While those with more children on average did desire more children in round 2, they did not desire as many as respondents remember. This discrepancy appears to widen with the number of living children. For example, while those with 2 children overestimate their past desires on average by .28 children, those with 5 children do so by .74 children.

These average patterns are driven by too few respondents stating that they remember wanting fewer children than they have today and too many respondents stating they always wanted as many children as they have today or more. Conditional on individuals' current number of children, the distribution of remembered desires is systematically distorted compared to the distribution of actual past desires for those with 4 or more children (shown in figure B1). These shifts reveal the systematic bias towards overestimating past desires in more detail and are far from random, noisy inaccuracies.

More generally, the systematic bias in respondents' memory appears related to avoid declaring any child as undesired (or declaring any excess fertility) and not just mechanically to excess fertility itself. For example, those who have exactly reached their desired number of children are unlikely to underestimate their past desires at all, as can be seen in Appendix figure B2 plotting individuals' recall errors ($x^R_{2|4} - x_2$) by excess fertility. Compared to those still one child away from their past desires, those who have exactly as many children as once

desired are half as likely to underestimate their past desires. While they do not have more children than once desired yet, making the error of underestimating their past desires would mean declaring at least one child as undesired and admitting excess fertility. Consequently, those who have exactly reached their past desires rarely underestimate their past desires, while those still 1, 2 or more children away from their past desires frequently do so.

In addition, memory seems to be biased in the opposite direction for those far away from reaching their past desires, especially women. Among those 3 or 4 children away from their desired family size, almost no respondent overestimates their past desires. Rather, ca. 61% underestimate and 33% correctly remember their past desires. The pattern is the same for men albeit less pronounced. As a consequence, the distribution of remembered desires appears unbiased and symmetric only for those one or two children away from their desires (who are thus possibly on track to exactly reaching their desired family size).

The results document that respondents' memory of past reproductive desires is inaccurate, biased and closely related to personal fertility histories. This raises several follow-up questions: is biased memory the result of psychological motivations or due to insufficient effort or some mechanical explanation? In case memory is motivated, are memories forgotten or suppressed? And does biased memory have measurable consequences in this context?

5 Mechanisms of Memory

Why is memory asymmetric and biased? In this section, I examine whether biased memory is at least partly motivated and whether memories are forgotten or suppressed.

I focus on respondents with excess fertility as a group with potentially increased psychological costs of accurate memory. For example, individuals with excess fertility could worry about maintaining a self-image of being in some control of their lives and fertility, about life having turned out differently than once desired, and about avoiding negative feelings towards their children when admitting a child was unwanted. They could perceive admitting a child was unwanted as cruel to the child, as a sign of being a bad, potentially unloving parent, or as making it harder for themselves to motivate themselves to take proper care of all their children. This is not to say that others without excess fertility do not have similar concerns or potential concerns of their own.[8] It is to say that in this sample at this point in time, those with excess fertility are likely the ones with the strongest potential concerns on average, especially if most of those without excess fertility hope they might still (exactly)

[8]For example, they might share a concern about consistency between past and current desires, or have issues unique to them if for some (unfortunate) reason they could not have any children or not as many as they desired.

reach their past desires.[9]

The resulting patterns of recall in this section are consistent with motivated forgetting of past desires for those with excess fertility. I provide two key pieces of evidence on respondents' recall of past reproductive desires and their take-up of the information offer to shed light on the questions above.

5.1 Recalling Past Reproductive Desires

Do monetary incentives have the power to make respondents' memory more accurate and unbiased, by inducing effort and/or by crowding out certain psychological concerns? The evidence in figure 4 shows that recall improves with increased incentives, but only when more accurate recall does not come with potential psychological concerns.

First, recall of the past vice president significantly improves with monetary incentives for those with and without excess fertility: the share correctly recalling the past vice president increases by 16 to 17 percentage points for both groups. In contrast, recall of past fertility desires only improves for those without excess fertility, with the share among them accurately recalling increasing from 34% to 44% of respondents. It does not improve for those with excess fertility, among whom 24% recall their past desires without monetary incentives and 26% with monetary incentives. This difference in reaction to those without excess fertility is specific to the fertility recall as there is no such difference in reaction for the past vice president question. The p-value of this triple difference-in-difference is .1.[10] For the fertility recall, the difference between those with and without excess fertility can also be seen in the recall errors they make with and without monetary incentives, as shown in figure 5. Here again, monetary incentives do not markedly improve recall of those with excess fertility, while they clearly do for those without excess fertility.

This suggests that psychological concerns may keep those with excess fertility from accurately recalling their past reproductive desires. Psychological concerns could do so in two ways: one, respondents could be suppressing undesired memories, and the monetary incentives may not suffice to overcome the psychological concerns, even though past desires have

[9]This does not preclude potential heterogeneity in these concerns, as those with excess fertility might share the concerns above to differing degrees, and some not all.

[10]This is for the sample of respondents who did know the vice president at the time of their second-round survey such that answering the question is arguably about recalling a fact they once knew. As shown in figure C8, the patterns are the same (or even stronger) when using observation weights adjusting for the intensive tracking used in the tracking approach for the KLPS. All results replicate when using survey weights, and so I present evidence without observation weights throughout the paper. However, I show the results for the weighted version of figure 4 in figure C8 to demonstrate how similar the results are when using observation weights. More details on the tracking strategy for KLPS are available in Baird et al. (2016) and Baird et al. (2008).

not been fully forgotten. Second, respondents could have partly forgotten these memories and they may thus not be easy to access and retrieve.

Evidence on respondents' effort shows that these memories might not be easily accessible for those with excess fertility and thus might indeed have been partly forgotten. Effort as measured in seconds spent on a question increases equally with monetary incentives for both groups on each of the two questions (see Appendix figure C2). They spend 10 to 12 seconds more on the past fertility question, up from almost 20 seconds for both groups without monetary incentives, and 10 to 12 seconds more on the past vice president, up from ca. 28 seconds for both groups. Increased effort induced by monetary incentives thus improves recall, except when the memory comes with potential psychological concerns. The resulting difference in accurate recall is thus not due to differences in the elasticity of effort with respect to monetary incentives, but rather due to the elasticity of accurate recall with respect to effort. Since respondents with excess fertility do spend more time thinking about the question, it appears that they may indeed have forgotten the precise memories and are not necessarily just suppressing them. If respondents were simply suppressing memories, it would seem odd to spend more time thinking about the question. While I cannot rule out that higher monetary incentives may improve the accuracy of recalled fertility desires even for those with excess fertility, two additional reasons cast doubt that they would. First, recalled fertility desires are not more accurate when paying KES40 ($.40) rather than KES20 ($.20), see Appendix figures C3 and C4. Second, these are already meaningful incentives as KES40 is close to two thirds of the median hourly earnings in this sample.

Alternatively, could the pattern above be explained by differences in general recall ability? Those with excess fertility are also worse at recalling the past vice president, which means they could generally be worse at remembering. However, memory of past fertility desires stays asymmetric when controlling for respondents' income (decile), cognitive score (Raven Test), or level of education at survey round 2. This is true no matter whether controlling for these factors linearly, or splitting the controls into a group above and below median, see table C1. Moreover, the asymmetry in recall behavior associated with excess fertility is actually more pronounced for those with above-median earnings, for those with above-median cognitive scores, and for those with at least some secondary schooling, as compared to their respective counterparts. These patterns make it unlikely that the differential performance of those with excess fertility across the two types of questions can be explained by differences in general recall ability. The pattern also holds when using alternative measures of recall performance such as recalling relative fertility (as indicated by $sgn(f_4 - x^R_{2|4}) = sgn(f_4 - x_2)$) and recall errors, which means that it is not specific to the chosen measure of "correct recall"

(see Appendix figure B1).[11]

To tease out respondents' desire not to remember certain things irrespective of the ability to recall them, I offered respondents the opportunity to find out their past desires in the "Information Offer". I analyse the take-up of the information offer in the next subsection.

5.2 Information Offer about Past Reproductive Desires

At the end of the fertility module of round 4, those who had participated in survey round 2 were offered to find out how many children they had actually said they desired in their second round interview. Field officers instructed respondents that they would have the chance to find out their past answer if they reminded the field officer at the end of the survey. While everyone in this group was offered this information, 40% were also told that they were drawn in a lottery such that they would also receive KES20 ($.2) if they chose to remind the field officer at the end of the survey. Respondents who had not participated in survey round 2 were informed of the same lottery of KES20, but without any information about past desires.

The interview was designed to allow some time to elapse between the offer and the opportunity to remind the field officer, to give respondents who would like to avoid the information an opportunity to do so. This worked well in wave 1 of survey round 4, with an average of 30 minutes elapsing between the information offer and the end of the survey. It worked less well in wave 2 when only 19 minutes elapsed on average due to cuts to the survey. Since the elapsed time between the offer and the choice affected take-up, this difference influenced respondents' choices across the two waves. This is why I present results for both waves separately in figure 6.

Respondents' take-up of the information offer implies that those with excess fertility avoid the offer more often than those without excess fertility, suggesting that they fear some undesirable information. As shown in figure 6, while the two groups take up the offer at similar rates when only the information is offered, those without excess fertility react much more to the additional monetary incentives (+20 percentage points) than those with excess fertility (+8 percentage points). This implies that the share with overall costs of taking up the information above KES20 is estimated to be 12 percentage points higher among those with excess fertility than among those without. This asymmetry is not there in wave 2 (see panel b) of figure 6), most likely because the shorter time between the offer and the choice

[11] Why those with excess fertility are also worse at recalling the past vice president remains an open question. In theory, this could be a feature of associate memory when forgetting certain aspects about the past, as in Zimmermann (2020) and Enke et al. (2020). However, conditional on excess fertility, there is no correlation between recalling the past vice president and recalling past fertility desires. This makes it more likely that the subpar recall performance of the past vice president by those with excess fertility has a different explanation than their subpar performance on the fertility recall question.

did not leave respondents enough time to forget or ignore the offer. Table C3 presents the regression results of the information take-up for waves 1 and 2 jointly as well as separately.

5.3 Joint Behavior on the Recall Question and the Information Offer

Respondents' behavior on the recall question and their take-up of the information offer are correlated. Those who do not remember their past desires are significantly less likely to take up the information offer. This is particularly true for those with excess fertility. Respondents' selective forgetting and information avoidance may thus be driven by similar concerns about undesirable memories.

Figure C5 shows that take-up of information without any monetary incentives is 50% among those who correctly recalled their past desires (independent of excess fertility), but only 40% among those who did not recall their past desires. For respondents without excess fertility, monetary incentives close the gap in take-up of the information offer between those recalling (take-up +16 percentage points) and those not recalling their past desires (take-up +26 percentage points). For those with excess fertility, however, monetary incentives do not close the gap. Monetary incentives increase take-up for those recalling their past desires by 18 percentage points and by 16 percentage points for those not recalling their past desires.

As a result, under monetary incentives the asymmetry in take-up between those with and without excess fertility is only present for those who did not recall their past reproductive desires. Apparently, those who did not recall their past desires thus also had reasons to avoid the information about their true past desires. These concerns do not seem present for those with excess fertility who did remember their past desires as they access the information equally often as those without excess fertility who recall their past desires. These results imply that there is a subgroup among those with excess fertility who does not remember their past desires and does not want to be reminded of them, also suggesting heterogeneity in the presence and strength of these concerns among those with excess fertility.

Together, respondents' behavior on the recall question and the information offer represent an interesting state of memory: while some respondents may have willingly forgotten their past desires, they simultaneously appear to have a clue that the information offer might contain some information they do not want to know or be reminded of.

5.4 The (Un-)Desirability of the Information Content

Further evidence that some respondents specifically avoid the content of the information offer supports the interpretation that psychological motivations drive the observed asymmetries

in information take-up and recall behavior. First, comparing those who were offered KES20 only and without any information to those who were offered KES20 and information about their past desires, the additional information offer actually reduces take-up by 11 percentage points for respondents with 4 or more children, but not for respondents with fewer children (see figure C6). At 67.8%, respondents with 4 or more children are much more likely to have more children than desired than those with fewer children, suggesting that it is the potential information about excess fertility they are avoiding.[12]

Second, the more undesired children respondents have, the less likely they are to take up the information offer, suggesting that potential psychological costs are also tied to the intensive margin of excess fertility. This is particularly pronounced for women. While 70% of women who have reached their desired family size demand the information under monetary incentives, these shares fall to ca. 50%, 40% and 30% for those with one, two and three undesired children (see Appendix figure C7).

The results above are consistent with respondents displaying demand for (avoiding) certain memories. They appear averse to admit and be reminded of excess fertility and that any children might not have been desired initially. This could be driven by slightly different motivations as respondents could desire to maintain a self-image of being in some control of their fertility or lives, or to avoid negative feelings towards their (once undesired) children. The latter concern could be about not wanting to be cruel towards their children and wanting to perceive themselves as good parents, or about motivating themselves to love their children and treat them well. More generally, respondents may also seek to ex-post rationalize when life has turned out differently than once desired. For example, for those still 3 children away from their past desires, memory strongly depends on their currently desired number of children which could reflect how hopeful they are to still achieve their past desires or how painful it might be to remember for those that cannot achieve their past desires (see table C4). Those who lowered their desired number of children since survey round 2 on average underestimate their past desires by 1.06 children, but those who did not lower their desires (and may thus still hope to achieve their past desires) overestimate their past desires by .34 children. Memory is thus also asymmetric and biased in this sub-group, but exactly in the opposite direction. In addition to a potential desire to avoid negative feelings towards (at least initially) undesired children, for affective, self-image, or functional reasons,

[12]The assignment of respondents to the "Money (20 KES) + Info" condition was random, but the assignment to "Money (20 KES) Only" was not. It included everyone who did not participate in survey round 2. This is why I condition on the current number of children rather than on excess fertility itself, because for those who did not participate in round 2 I do not have data on their desires at the time of survey round 2. As long as conditional on the number of children the two groups do not differ in some way that affects their take-up in either condition, the difference in take-up between the two groups should be due to the additional information offer.

at least some part of their motivated memory thus appears to be about a desire to perceive themselves in some control of their lives or a desire to view their life outcomes as something they always desired.

These patterns illustrate the richness of potential concerns in the context of fertility. Focusing on excess fertility in this sample does not imply that all individuals with excess fertility necessarily have stronger concerns than everyone without excess fertility. In other samples or at a later age, those who remain childless against their desires might have a stronger need to ex-post rationalize for example. Given the set of potential concerns in this sample, how do those with excess fertility achieve selective memory?

6 The Dynamics of Memory

I next explore the dynamics of biased memories using both the recall question and information offer. Similar to findings by Zimmermann (2020), Huffman et al. (2019), and Chew et al. (2020) on selective memory over the span of months, I find evidence consistent with selective forgetting over both longer and shorter horizons of years and minutes. Time seems key to allow people to forget what they want to forget. This demonstrates both the potential power of time to help forget and its limiting nature as individuals cannot manipulate their memories at will in an instant.

I first focus on correlational evidence of how respondents' recall errors vary over years since the birth of a child (presented in table 3). I distinguish between children depending on their birth order position relative to the number of initially desired children. For example, the birth of a child could imply reaching one's desired number of children (i.e., the number of one's children being equal to $x_2 - 0$), surpassing it by one child (i.e., being equal to $x_2 + 1$) or still falling short by one child ($x_2 - 1$).

There are two interesting aspects to people's overestimation of past desires over time and additional children. First, the overestimation of past desires in the year after a child is born increases with each additional child: while respondents on average underestimate past desires by .2 children in the year of having their third-to-last desired child ($x_2 - 2$), they overestimate their past desires by .75, 1.18 and 1.61 children in the year of birth of their first, second or third undesired child. Second, for all children, the overestimation increases the older the child gets. For every desired child, the slope of recall errors with respect to "Years since Birth" is .05 or .06, for undesired children it is .09 and higher.

Memories thus appear to adjust upwards over time and one child at a time. At the same time, with each additional undesired child it also seems to become harder to hold memories that all children were desired. Following regressions in table 3, average memories would

reach the point of remembering every initially undesired child as always desired after 3 years for the first undesired child, after 9 years for the second, and after 13 years for the third undesired child.

Similar patterns of imperfect selective forgetting one child at a time can also be seen in the distribution of recall errors by excess fertility (figure B2). This sequential forgetting over time may also explain how respondents with two or three undesired children react to monetary incentives in Appendix figure C1: they may believe that they wanted one child less than they currently have, but seem to have forgotten that they actually wanted two or three children less.

Time also appears to help with information avoidance. When coupling the information offer with monetary incentives, this creates an immediate incentive to take up the offer, and a desire to ignore or forget this offer for those who do not want to be reminded of their past desires. Having more minutes elapse between the offer and the end of the survey appears crucial to forget the offer for those who want to. Respondents with excess fertility demonstrate a steeper decline in information take-up over time elapsing between the offer and the end of the survey than those without excess fertility (see panel b of Appendix figure 7). The difference is also significant when estimating linear slopes of forgetting (available in table D1). Under the bundled offer of information and money, every 10 minutes reduce take-up by 8 percentage points for those without excess fertility and by 13.4 percentage points for those with excess fertility. The p-value of this difference is .05, implying a greater desire to forget about the information offer among those with excess fertility.[13]

7 Other concerns and interpretations

The results in this paper show clear patterns of selective memory and information avoidance. Together, the evidence also points to an important role of private motivations behind both selective recall and information avoidance. However, some patterns of selective memory, in particular of selective recall, could be driven by alternative explanations than private motivations. In this section, I consider several alternative interpretations and explanations of the results above.

A. Social Image Concerns. One alternative explanation for asymmetric recall could be that respondents' with excess fertility desire to signal to the interviewer or researcher that they always desired all their children. In this case, their worry would be about what others think and not so much about what they think themselves. However, I set up the

[13]The pattern is not driven by a general tendency of those with excess fertility to more quickly forget the offer, as the behavior of the two groups for the "Information Only" condition in panel a) of figure 7 shows.

recall questions and information offer such that social image concerns should not drive the main results. First, for the recall questions, field officers explicitly told respondents in the reminder, 20KES, and 40KES conditions that we do know their past answer. This should limit their concern to signal with respect to admitting to excess fertility or not, and potentially increase their concerns to answer truthfully. Moreover, if social image concerns were a main driver of inaccurate and biased recall in the control condition, I would have expected recall to improve in the reminder condition compared to the control version, and especially so for those with excess fertility. As figure C3 shows, this is not the case. Furthermore, having told respondents that we do know their past answer, those with and without excess fertility should not differ in their social image concerns for the reminder and incentivized recall conditions. Having shut down social image concerns this way, the strong asymmetric recall performance in these conditions should thus not reflect social image concerns.

Second, when informed about the information offer, respondents were instructed that they would read off their past answer from a tablet with no one else watching. While the interviewer will observe whether a respondent takes up the information offer or not, they do not get to see the respondent's past answer and respondents are informed of this when being told about the offer. Respondents should thus not have social image concerns with respect to revealing the content of the information offer to the interviewer by taking up the offer or not. Rather, their only worry regarding the content of the information should be to be reminded of it themselves.

These patterns make it unlikely that the results of selective recall and selective information avoidance in this paper are driven by social image concerns.

B. Effort costs and recall. Theoretically, those with and without excess fertility could differ in their effort costs and thus show differing rates of recall. Since effort, as measured by the time spent on questions (shown in Appendix figure C2), is the same for the two groups and both groups adjust effort in the same way to incentives, it is unlikely that different costs of effort are driving the asymmetry in recall. The biased recall performance could still be due to different elasticities of accurate recall with respect to increased effort for those with and without excess fertility. However, this is consistent with motivated forgetting: those with excess fertility find it hard to retrieve memories of their past desires, potentially because they may have forgotten them and not because they are simply suppressing these memories or choosing not to share the true past desires when they actually do remember them. While this selective forgetting can be motivated, there are alternative explanations for selective memory that do not require any motivation behind it. For one, table C1 suggest that differences in income, education, or cognitive abilities are likely not explaining asymmetric recall. Similarly, respondents' effort and recall performance on the past vice

president shows that increased effort can result in improved recall also for those with excess fertility. Moreover, since recalling the past vice president and recalling past fertility desires are not correlated for those with and for those without excess fertility, it is unlikely that the same individual factors explain both recall of past fertility desires and recall of the past vice president.

And while other interpretations could explain selective memory without relying on motivations, they typically cannot explain asymmetric information avoidance or the correlation between recall and information avoidance that suggest that part of selective recall is driven by similar factors as asymmetric information avoidance. Nevertheless, I next consider some alternative explanations behind selective recall.

C. Noisy and biased past reproductive desires. Reproductive desires are elicited with some noise and potentially with bias, too. If initial desires in round 2 were measured with a systematic downward bias, this could explain some increases in desires and potentially also worse recall for those with excess fertility. However, several reasons speak against this concern. First, additional evidence suggests that past reproductive desires were not biased downwards. At age 19 for example, 74% of surveyed women said that they would rather have one child less than desired than one child more. When asked whether they would lower, increase or keep the same desires under 19 different scenarios around their health, finances, marriage, and children, many respondents could imagine to lower desires under several negative scenarios. Few respondents could imagine to increase their fertility desires under any scenario, however. These survey answers suggest that elicited reproductive desires represented upper rather than lower bounds (see Müller et al. (2022) for more detail). Second, the results are also unlikely to stem from noise or uncertainty in respondents' answers to the recall question today. After answering the primary recall question, respondents were asked what their most likely answer would have been about their past reproductive desires in round 2 in case their primary answer was not correct. While those without excess fertility on average clearly update their answer into the correct direction, for those with excess fertility this is only true for the few individuals who initially underestimated their past desires (see figure E2). Consequently, the asymmetry in recalling past fertility desires between those with and without excess fertility does not weaken when considering both primary and secondary recall, but becomes even more apparent (especially in comparison to recall of the past vice president, as shown in figure E1). Finally, systematic noise in elicited reproductive desires cannot explain asymmetric information uptake.

D. Interference. Asymmetric memory could be driven by interference through additional children that make it harder to remember for respondents that they ever wanted fewer children than they currently have. This interpretation is consistent with most of the

evidence on respondents' recall behavior. However, given that forgetting that a child was not always desired seems to become harder with each additional undesired child (see figures C1 and D1), a simple mechanism that once children are born they interfere with recalling lower past desires in the same way for all children is not consistent with all the dynamics of selective recall documented above. Since the shares of those recalling wanting fewer children than they currently have increases with the number of initially undesired children, interference would have to become weaker with each additional child. Three additional pieces of evidence support the interpretation that selective recall is not entirely due to such mechanical interference. Most importantly, interference cannot explain the asymmetric take-up of the information offer nor the lower take-up the more undesired children respondents have. The correlation between respondents' recall behavior and information take-up (see figure C5) further suggests that recall is driven by similar concerns as the asymmetric patterns of information avoidance and thus motivated in some way. Second, there is evidence that those far away from reaching their past desires and without hope to reach their past desires also show biased memory in the other direction. This pattern cannot be explained by interference caused by the birth of children, suggesting that selective recall is at least partly driven by some motivations other than mechanical interference caused by the birth of children. Third, the evidence on secondary recall in Appendix figures E2 and E1 also indicates that a simple mechanical interference explanation is likely not the complete story. While additional children likely interfere with remembering wanting fewer children than one currently has, this interference is unlikely to be purely mechanical and likely to be at least partly motivated.

Notwithstanding the exact degree to which selective recall is motivated, selective memory is likely relevant in many other contexts and with potentially important implications. If people generally mistake life outcomes as what they always wanted, even when their lives deviated from what they initially desired, similar patterns of selective memory could thus also matter in contexts such as marriage, careers, or politics, and have important individual and societal repercussions.

8 Implications of Selective Memory

Does memory have any consequences in this context? Biased memory of past fertility desires could be related to various aspects: one, it could be associated with respondents' mental health or well-being and also impact respondents' love for and treatment of their children. Two, it might be related to their beliefs of what is optimal and what they would recommend the younger generation to do when it comes to questions of marriage and fertility.

In this section, I provide evidence that individuals' recommendations of how many chil-

dren to have are strongly correlated to their remembered past desires.[14] Biased memory in form of overestimating one's past desires in turn is associated with women and men recommending 18-year-olds to have more children than is recommended by those not overestimating their past desires.

First, respondents' answers to how many children they would recommend an 18-year-old to have in their life are most closely related to how many children they recall having wanted themselves in their early-to-mid-twenties, and more strongly so than to their current or past desires or their perception of the prevailing local norms (results are available in table F1). Remembering to have wanted one child more is associated with recommending .18 children more. Whereas respondents' actual past desires are not significantly correlated to their recommendations, the coefficients for their current desires and their perception of local norms are .13 and .1, respectively. Women and men slightly differ in this regard: while women's recommendations are most strongly linked to their memory of past desires and not to their current desires, men's recommendations are most strongly related to their current desires and less with what they remember.

Next, I test in more detail how overestimating past desires may matter for recommendations to the next generation, controlling for fixed effects of all combinations of individuals' past desires and number of living children (as reported in table 4). Both, the extensive margin of overestimating at all and the intensive margin of recall errors are associated with individuals' recommendations. For example, compared to someone with accurate memory, an individual who overestimates past desires by 1 child would on average recommend to have .34 children more ($.15 + .19 \times 1$), or .53 children more if overestimating by 2 children ($.15 + .19 \times 2$).

For women, biased memory is also related to recommendations of when to get married. On average, women who overestimate their past desires would recommend to get married 9 months earlier than those not overestimating their past desires, see Appendix figure F2. This effect is mostly driven by the intensive margin: the more women overestimate their past desires, the earlier they recommend to get married.

The patterns in this section therefore imply that biased advice around questions of fertility (and marriage) may be one concrete consequence of selective memory of past fertility desires.

[14] In order to elicit respondents' recommendations independent of their preferences for grandchildren, women (men) were asked the following questions: "Imagine a typical 18-year old girl (boy) like a neighbors child, or a niece (nephew): How many children would you recommend this girl (boy) to have in her (his) life?"

9 Conclusion

How do people learn from personal experiences? This paper shows that in the context of fertility, people view their personal experiences, or number of children, as informative about their past desires, even when life outcomes deviate from past desires. Rather than seeing such deviations as the result of other, external influences on outcomes or on intermediate desires, many people misremember their past desires in the direction of their life outcomes. This selective memory is at least partly motivated. Respondents are less likely to recall undesirable memories and likely to forego money to avoid being reminded of these memories. However, selective forgetting is not without limits: the more "undesired" children people have, the harder it seems to remember all of them as always desired. Either because selective forgetting takes time or because deviating further from the truth becomes increasingly hard.

The tendency to misremember past desires in the direction of one's life outcomes can have important implications. For one, it may cause people to infer too much from their personal experiences about their preferences and beliefs. It may also lead people to underestimate the importance of external influences on their lives as well as how common it is to change one's desires. At the same time, if selective memory leads people to believe that they always wanted what they got although they did not necessarily get what they initially wanted, selective memory may actually make people better off.

Selective memory can also affect others than those who misremember. In this context, selective memory is associated with biased intergenerational advice of how many children to have and thus potentially biases the intergenerational transmission of fertility preferences. This raises the question when intergenerational transmission benefits and when it harms the next generation, and whether it also shapes societal phenomena such as cultural persistence.

Some areas for future research would be to document the potential implications of selective memory and the motivations behind it, as well as individual heterogeneity in the ability to forget or remember. The growing proliferation of survey panels offers a useful tool to address many of these questions. While in terms of survey design the results in this paper call for care when using retrospective survey questions because they may suffer from selective memory, retrospective survey questions also present a unique opportunity to better understand selective memory, its determinants and implications.

This is an important endeavour as the desire to hold certain memories appears to be a universal, deeply human desire across many different domains. This paper contributes to widening the scope of research on selective memory and shows that memory distortions over relatively short time periods and in lab experiments in high-income countries extend to long-term memory around big life decisions in the field and in low-income countries.

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Figures and Tables

Figures

Figure 1: Survey and Experimental Design: Survey Components, Treatment Groups and Question Texts

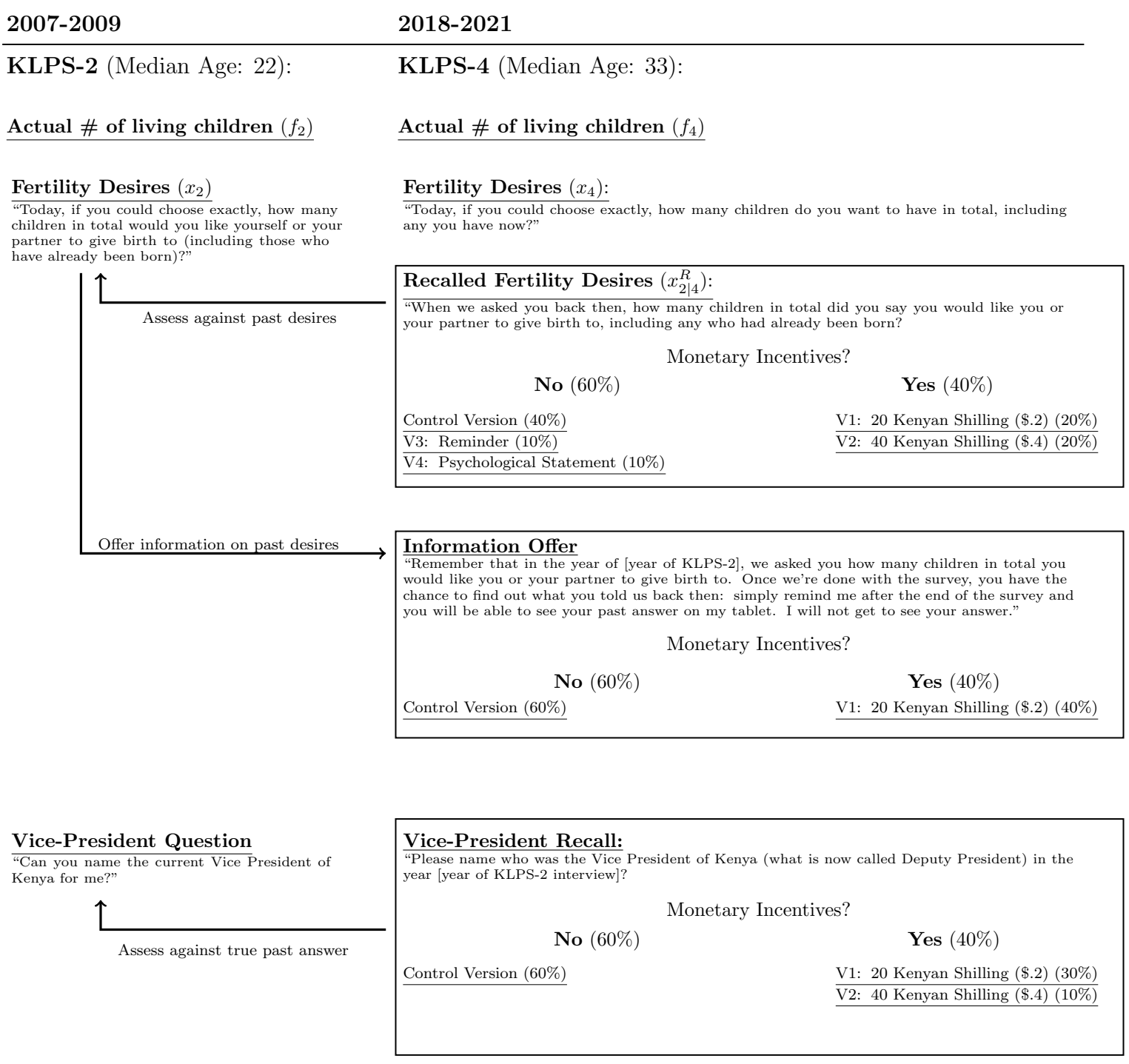
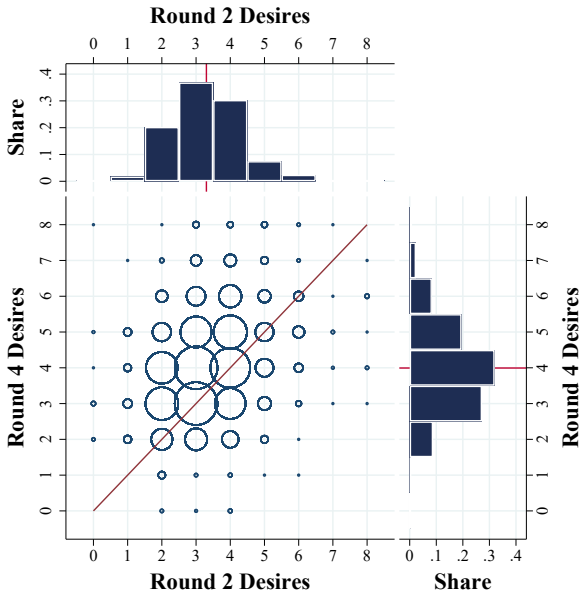


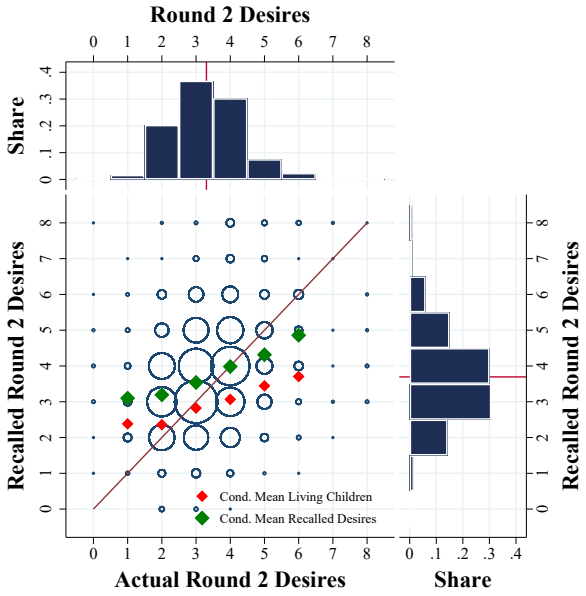
Figure 2: Reproductive Desires and Fertility Recall in Round 4 against Reproductive Desires in Round 2

(a) Reproductive Desires in Rounds 2 and 4



Notes: This figure is based on 3800 respondents with data on reproductive desires between 0 and 8 children in both rounds 2 and 4. The average desired number of children increased from 3.3 to 3.99 children. The bubbles indicate the number of observations for each combination of reproductive desires in rounds 2 and 4. The bar plots indicate the distribution of reproductive desires in round 2 (top left) and round 4 (bottom right).

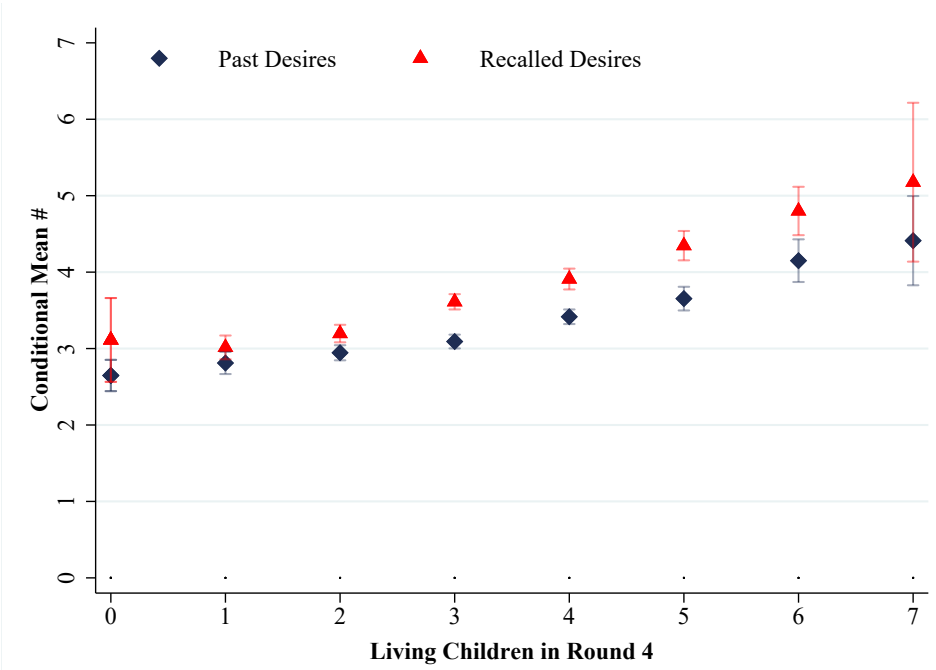
(b) Recall of Round 2 Reproductive Desires (in Round 4) against Round 2 Reproductive Desires



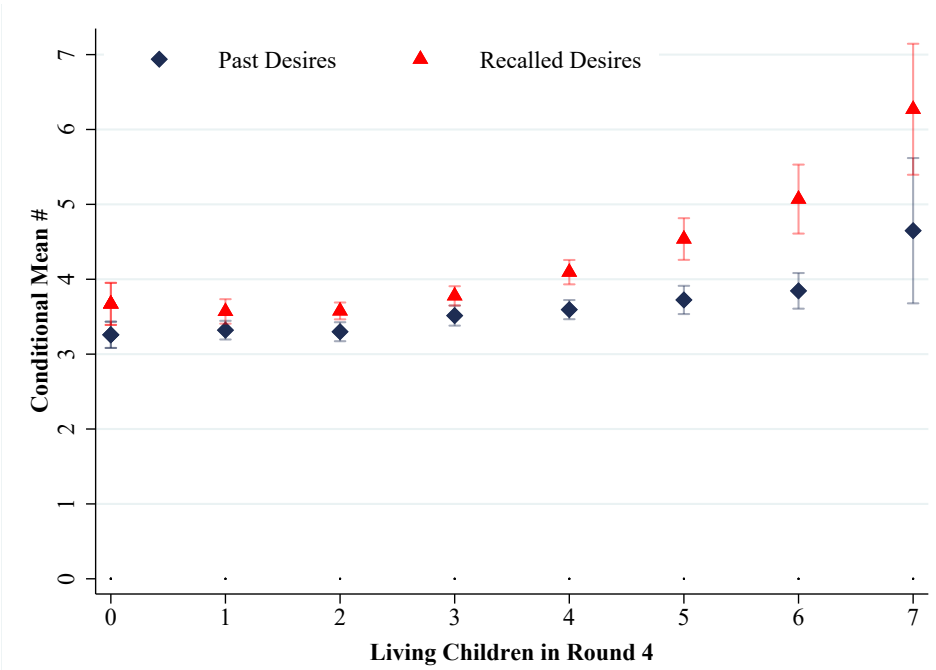
Notes: This figure is based on 3550 respondents with data on reproductive desires between 0 and 8 children in both rounds 2 and 4 and recalled desires between 0 and 8. The average desired number of children in round 2 in this sample was 3.3, the average recalled desires are 3.69 children. The bubbles indicate the number of observations for each combination of reproductive desires in rounds 2 and recalled desires for round 2 (as elicited in round 4). The bar plots indicate the distribution of reproductive desires in round 2 (top left) and of recalled desires for round 2 as elicited in round 4 (bottom right). For each number of desired children in round 2, the graph also shows the conditional mean of the number of living children (in red) and of the recalled number of desired children (in green)

Figure 3: Conditional Mean of Past Reproductive Desires and Recalled Reproductive Desires by Number of Living Children in Survey Round 4

(a) **Women**

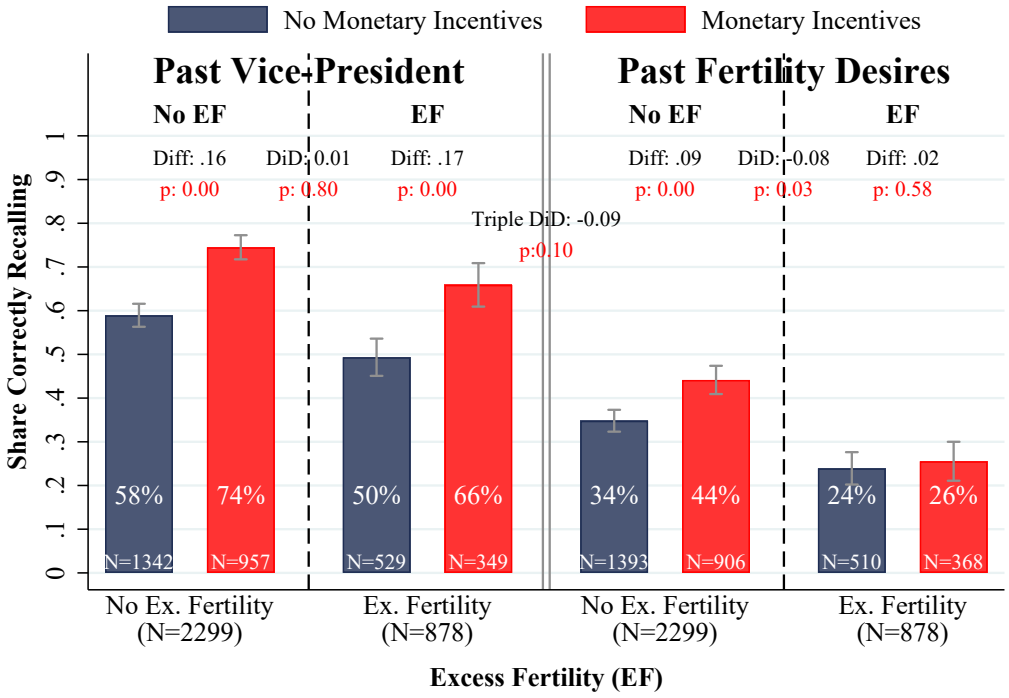


(b) **Men**



Notes: This figure shows the conditional mean and the 95%-confidence interval for past desires in round 2 and recalled desires in round 4 for the time of round 2, conditional on the number of living children at survey round 4.

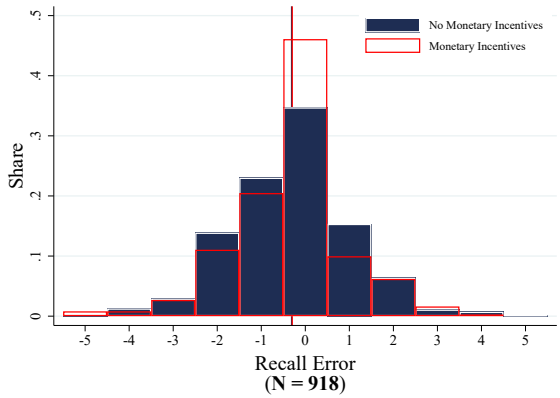
Figure 4: Recall Performance and Monetary Incentives: Past vice president and Past Fertility Desires



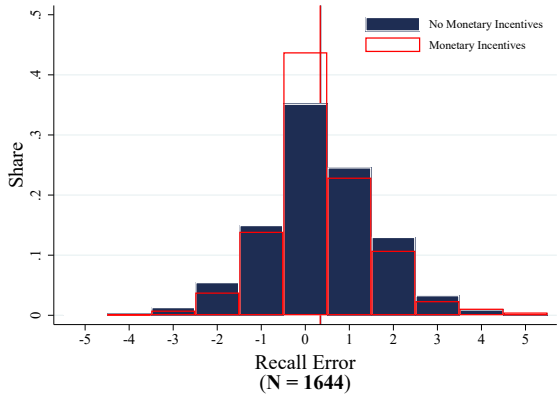
Notes: This graph shows the share (and 95%-CI) of respondents correctly recalling the past vice president and their past fertility desires conditional on being offered monetary incentives (in red) or not (in blue) and separately for those with and without excess fertility. The sample comprises all those who participated in round 2, knew the name of the vice president in round 2, stated a desire of having 8 children or fewer, and gave an answer to both questions (the vice president recall and desired fertility recall) in this survey round. At the time of survey round 2, 86.73% of these participants knew the vice president at the time. The difference between the two groups given or not given monetary incentives is reported after "Diff:", with p-values of these pairwise comparisons below in red. The difference-in-difference for each of the two memory questions is reported after "DiD:" and p-values are reported below in red. The unconditional triple difference-in-difference is $-.09$ and reported in table C2.

Figure 5: Monetary Incentives vs. No Monetary Incentives: Recall Errors by Excess Fertility ($EF = f_4 - x_2$)

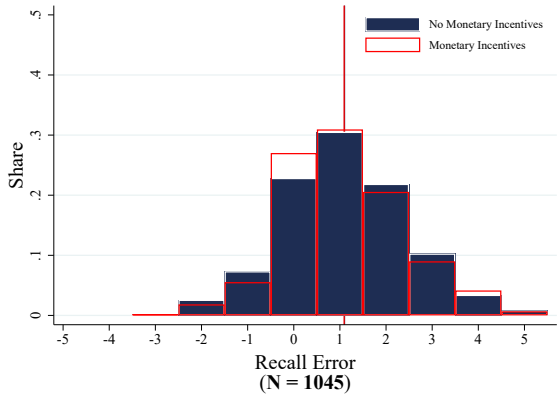
(a) **2 or more children fewer** than initially desired (EF ≤ -2)



(b) **As many as or one child less** than initially desired ($-1 \leq$ EF ≤ 0)



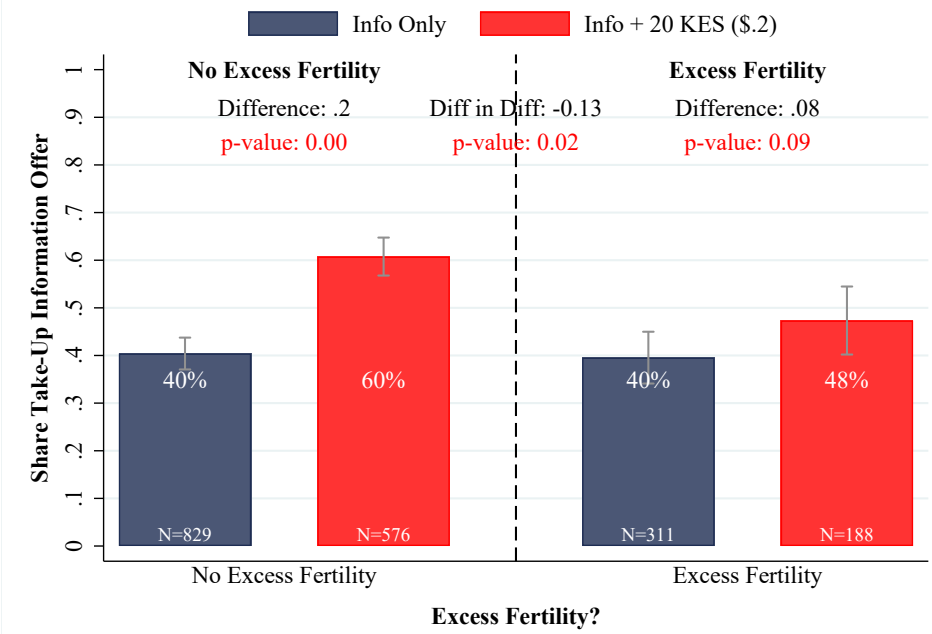
(c) **More children** than initially desired (EF > 0)



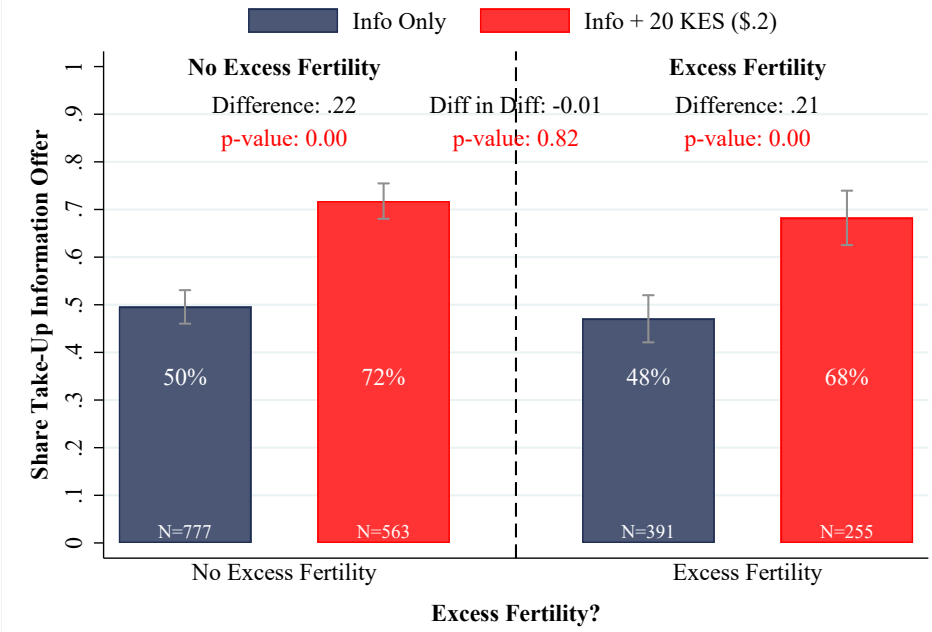
Notes: These graphs show the distribution of recall errors conditional on the extent of excess fertility, separately for those who did or did not receive monetary incentives to correctly recall their past desires. The lines indicate the average recall error for these two groups. The distribution of recall errors is shown for three groups of excess fertility, for those with a) 2 or more children fewer than initially desired ($EF \leq -2$), b) as many as or one child less than initially desired ($EF = -1$ or $EF = 0$) and c) more children than initially desired ($EF > 0$). More detailed distributions for each level of excess fertility can be found in figure C1.

Figure 6: Information Take-Up by Excess Fertility & Experimental Condition

(a) **Wave 1 (Long Gap between offer and take-up: ∅ 29 Minutes)**



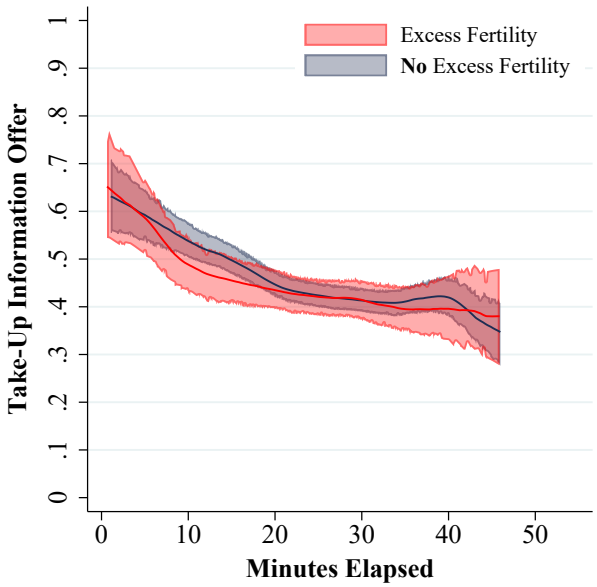
(b) **Wave 2 (Short Gap between offer and take-up: ∅ 18 Minutes)**



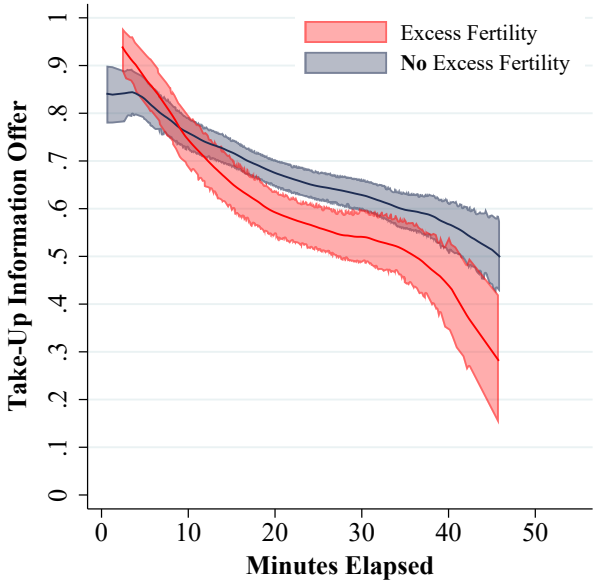
Notes: These graphs report the share (and 95%-CI) of respondents taking up the information offer depending on the experimental condition and whether they have more children than desired in the past or not. Data is presented separately for waves 1 and 2, because some unrelated survey components between the information offer and the end of the survey were cut. This resulted in less time between the offer and the potential take-up, which is why take-up rates differ so much across these two survey waves.

Figure 7: Information Take-Up depending on the Time Elapsed between the Information Offer and the Chance to Remind the Field Officer at the End of the Survey: Locally smoothed Mean by Excess Fertility

(a) **Information Only**



(b) **Information + Monetary Incentives (20 KES)**



Notes: These graphs show the locally smoothed mean share (95%-CI) of respondents taking up the information offer depending on the time elapsed between the information offer and the chance to ask for those with and without excess fertility, separately for those offered only the information (panel a) and those offered monetary incentives (KES 20, $.2) in addition (panel b). The chosen bandwidth is 5 minutes, included are all observations with time elapsed below 46 minutes (97^{th} percentile).

Tables

Table 1: Summary Statistics for Respondents with Data on Reproductive Desires in Survey Rounds 2 and 4

	All	Women	Men
Age	33.56	33.28	33.84
Number of Children (Alive) [Rd 4]	2.94	3.06	2.81
Number of Children (Alive) [Rd 2]	.86	1.15	.58
Desired Number of Children [Rd 4]	4.11	3.96	4.26
Desired Number of Children [Rd 2]	3.34	3.2	3.48
Years of Education [Rd 2]	8.9	8.53	9.28
Total Annual Household Earnings (2017 US-$)	1236.77	871.4	1621.29
" - Median (2017 US-$)	499.77	375.35	731.27
Total Hourly Earnings (2017 US-$)	1.2	.73	1.55
" - Median (2017 US-$)	.58	.33	0.83
Observations	3936	1968	1968

Notes: The table shows summary statistics (means) for all women and men with data on their reproductive desires in both rounds 2 and 4. For the number of desired children, only women and men wanting 20 or fewer children are included. Data on earnings are based on a sub-sample of 2,625 women and men who were surveyed about their earnings.

Table 2: Regressions of Recalled Desires on Current Desires (Rd 4) and Past Desires (Rd 2)

	Dependent Variable: Recalled Desires					
	All	Women	Men	All	Women	Men
	(1)	(2)	(3)	(4)	(5)	(6)
Desires Round 4 (α)	.58***	.6***	.57***	.57***	.58***	.56***
	(.01)	(.02)	(.02)	(.01)	(.02)	(.02)
Past Desires Round 2 (β)	.4***	.38***	.41***	.43***	.42***	.44***
	(.02)	(.02)	(.02)	(.01)	(.02)	(.02)
Test $\alpha + \beta = 1$	0	0	.04			
Constraint $\alpha + \beta = 1$?				✓	✓	✓
N	3612	1800	1812	3612	1800	1812

Notes: Each column reports the result of a separate regression of respondents' recalled desires on their current desires in round 4 and their past desires in round 2 (no constant): $x^R_{i,2|4} = \alpha\, x_{i,4} + \beta\, x_{i,2} + \epsilon_i$. Standard errors are reported below the coefficients in parentheses. Columns (4), (5) and (6) report the results of a constrained regression with the constraint of both coefficients α and β summing up to 1. The sample is restricted to those with past, current and recalled desires of 10 or below.

Table 3: Regressions for Dynamics of Recall: Recall Errors (and additional children born) by age of child depending on birth order relative to number of desired children in round 2

Dependent Variable	**Recall Error** $(x^R_{2\|4} - x_2)$						**Additional Children Born**					
Position Child to Past Desires (x_2):	x_2-2	x_2-1	x_2-0	x_2+1	x_2+2	x_2+3	x_2-2	x_2-1	x_2-0	x_2+1	x_2+2	x_2+3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Indicator for Year 0 of Birth	$-.2^{*}$	.1	$.51^{***}$	$.75^{***}$	1.18^{***}	1.61^{***}						
	(.1)	(.08)	(.07)	(.08)	(.11)	(.22)						
Years since Birth	$.05^{***}$	$.06^{***}$	$.06^{***}$	$.09^{***}$	$.09^{***}$	$.11^{*}$	$.17^{***}$	$.15^{***}$	$.13^{***}$	$.13^{***}$	$.13^{***}$	$.12^{***}$
	(.01)	(.01)	(.01)	(.02)	(.03)	(.06)	(0)	(0)	(0)	(.01)	(.01)	(.02)
N	1209	1729	1504	998	436	156	1209	1729	1504	998	436	156
R^2	.01	.02	.02	.03	.02	.02	.67	.62	.55	.5	.45	.33

Notes: Each column shows a separate regression of the outcome variable on the years since birth of the respective child, and on a dummy indicating the year 0 since its birth for columns (1) to (6). The outcome variable for columns (1) to (6) is the recall error $(x^R_{2|4} - x_2)$, for columns (7) to (12) the additional number of children born afterwards. The "Position Child to Past Desires (x_2) indicates how far respondents are from reaching their past desires (x_2) by the birth of the respective child. Observations in each column are restricted to respondents whose child of this "position" is 10 years or younger. Column (2) can be read in the following way, for example: how does recall error vary for respondents over the years since having a baby that left them only one child away from reaching their past desires of round 2 (as long as the child is younger than 10)? Respondents in this group whose baby was just born overestimate their past desires on average by .12. This overestimation increases by .05 children on average with each additional year. Robust standard errors are included in parentheses and significance levels are indicated by $^{***}: .01, ^{**}: .05, ^{*}: .1$

Table 4: Regressions for Respondents' Intergenerational Advice of **how many children to have** on Overestimating One's Past Desires, Recall Error and Interaction of these two

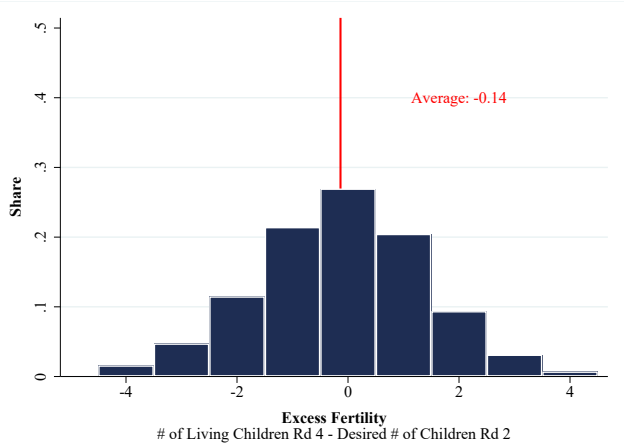
	DV: **Recommended # of Children to 18-year-old**								
	All			Women			Men		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Overestimate Past Desires	.56***		.15**	.55***		.23**	.55***		.08
	(.04)		(.06)	(.06)		(.1)	(.06)		(.09)
Recall Error		.24***	.21***		.23***	.22***		.23***	.21***
		(.02)	(.04)		(.03)	(.05)		(.02)	(.05)
Overestimate X Recall Error			−.02			−.07			0
			(.05)			(.07)			(.07)
FE "Fertility Histories" x_2 & f_4	✓	✓	✓	✓	✓	✓	✓	✓	✓
Unconditional Mean		3.14			3.06			3.22	
N	3630	3630	3630	1804	1804	1804	1826	1826	1826
R^2	.1	.12	.13	.09	.1	.1	.16	.18	.19

Notes: Each column presents coefficients and robust standard errors (in parentheses) for a separate regression of respondents' recommended number of children to 18-year-old girls (for women) and boys (for men). Each regression includes fixed effects for "fertility histories" which are described by all combinations of past desires (x_2) and number of living children (f_4) found in the data (such as having wanted 2 children in round 2 and now having 4 children for example). Significance levels are indicated by *** : .01,** : .05,* : .1. Observations are limited to those answering 10 or less to the dependent variable, their past desires and number of living children, as well as to those with recall errors between -10 and 10.

A Appendix A - Individual Fertility Histories

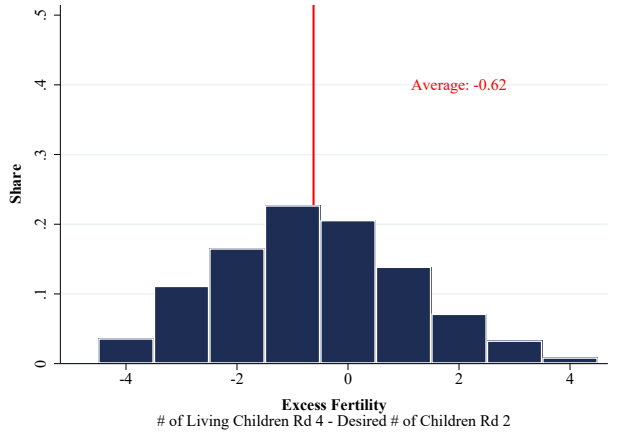
Figure A1: Excess Fertility (Number of living children at round 4 against the desired number of children at round 2) for Women and Men

(a) Women



Notes: This panel shows the distribution of excess fertility (number of living children at round 4 (f_4) against the desired number of children at round 2 (x_2)) for the 1939 women with excess fertility between -4 and +4.

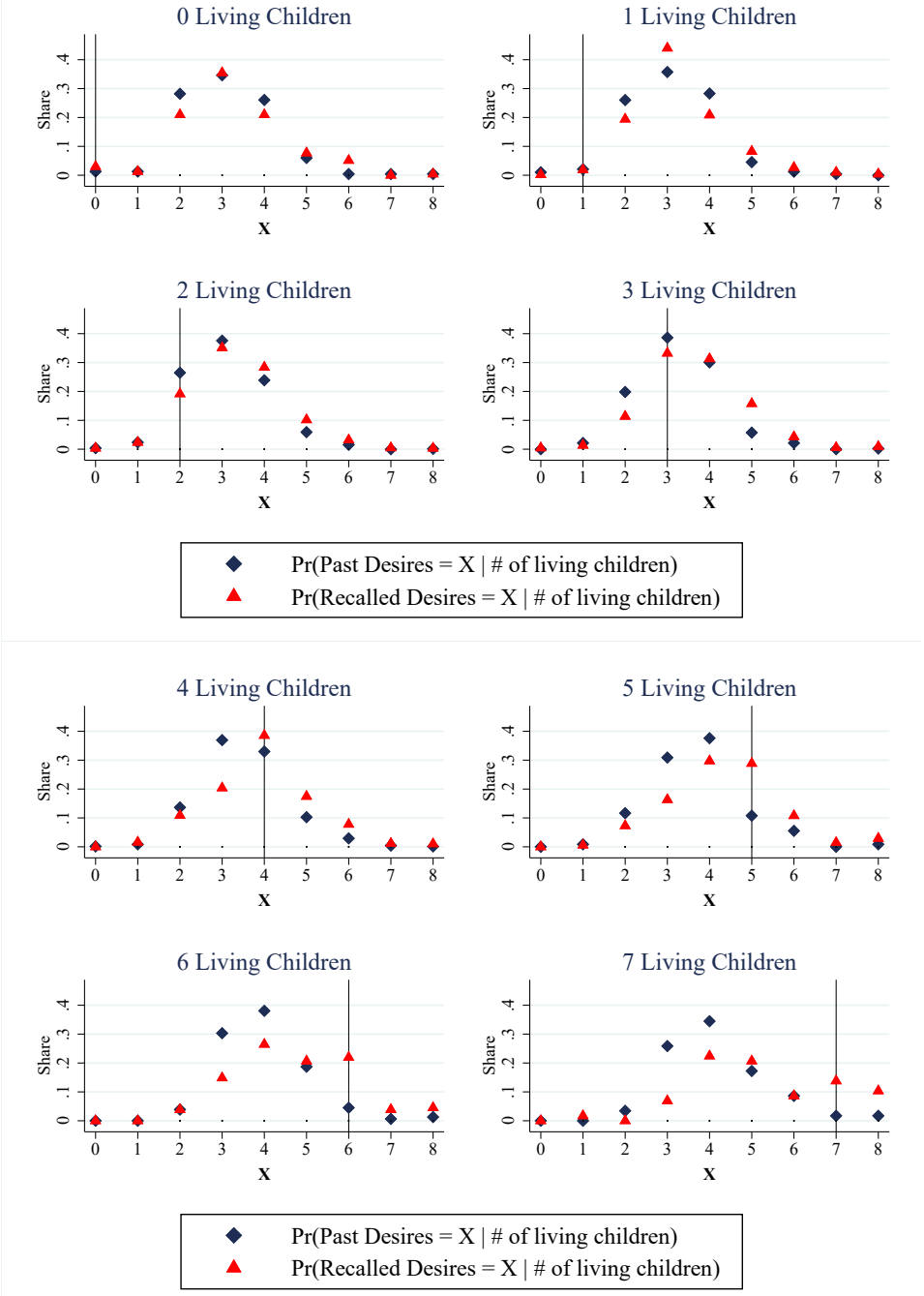
(b) Men



Notes: This panel shows the distribution of excess fertility (number of living children at round 4 (f_4) against the desired number of children at round 2 (x_2)) for the 1897 men with excess fertility between -4 and +4.

B Appendix B - Memory of Past Reproductive Desires

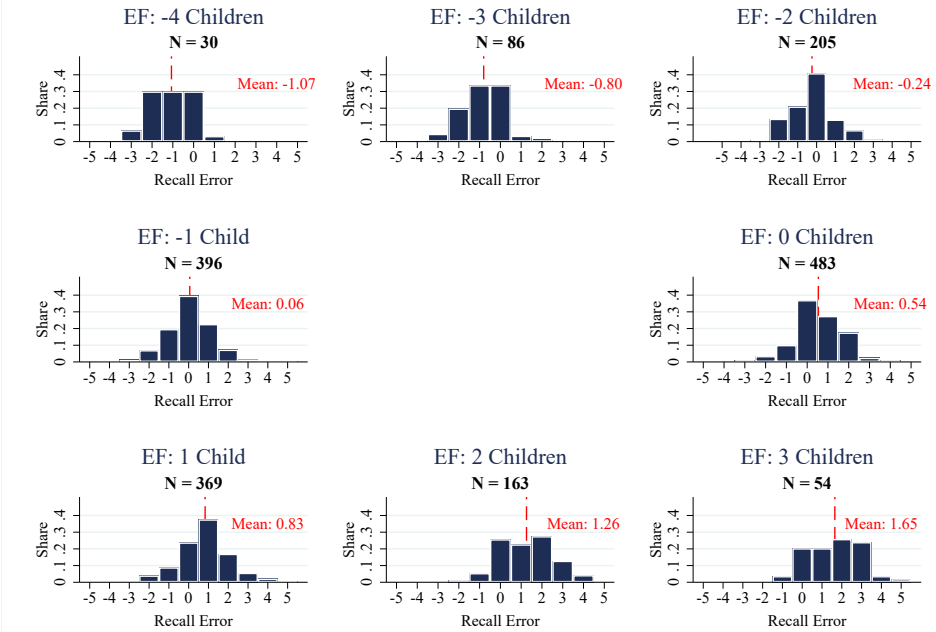
Figure B1: Distribution of Past Reproductive Desires and Recalled Reproductive Desires by Number of Living Children in Survey Round 4



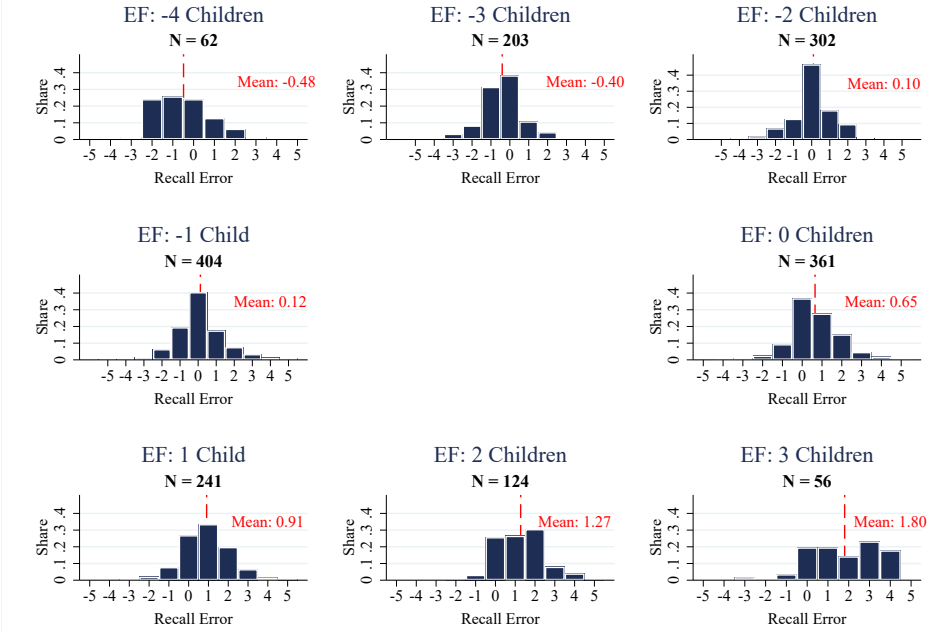
Notes: This figure shows the distributions of respondents' actual past desires in round 2 (in blue) and of respondents' recalled desires in round 4 for the time of round 2 (in red), conditional on the number of living children at the time of round 4.

Figure B2: Recall Error by Excess Fertility (EF) $[f_4 - x_2]$

(a) **Women**



(b) **Men**



Notes: This figure shows the distribution of recall errors conditional on excess fertility as measured by the difference between number of living children at round 4 (f_4) minus the desired number of children at round 2 (x_2). The number of observations for each graph is indicated above each graph. Results are reported separately for women (panel a) and men (panel b).

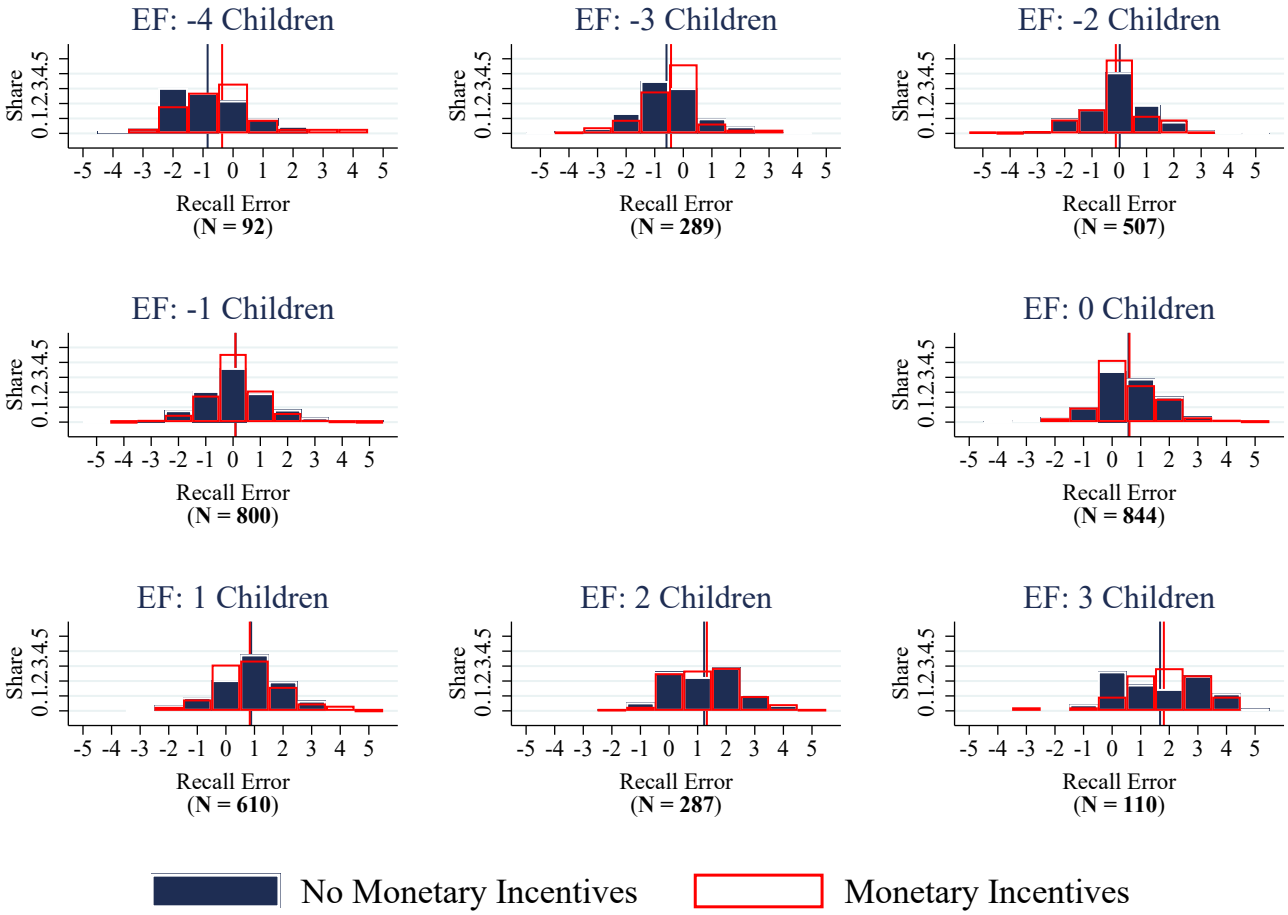
Table B1: Regressions: Recall Performance of Past Fertility Desires and Excess Fertility

	Dependent Variable								
	Correct Recall $(x^R_{2\|4} = x_2)$			**Recall Relative Fertility** $sgn(f_4 - x^R_{2\|4}) = sgn(f_4 - x_2)$			**Absolute Recall Mistake** $(\|x^R_{2\|4} - x_2\|)$		
	All	Women	Men	All	Women	Men	All	Women	Men
Excess Fertility (EF)	$-.13^{***}$	$-.12^{***}$	$-.14^{***}$	$-.17^{***}$	$-.13^{***}$	$-.21^{***}$	$.37^{***}$	$.34^{***}$	$.43^{***}$
	(.02)	(.02)	(.03)	(.02)	(.03)	(.03)	(.04)	(.05)	(.07)
Round 2 Desires FE					✓				
Mean (if $EF = 0$)	.39	.38	.39	.67	.62	.72	.97	.93	1.01
N	3635	1806	1829	3635	1806	1829	3635	1806	1829
R^2	.04	.04	.04	.06	.05	.07	.11	.12	.1

Notes: Each column presents the results for a separate regression of the indicated dependent variable on a dummy indicating excess fertility and fixed effects for each possible desire stated in round 2 for the relevant subgroup. Standard errors are indicated in brackets below the coefficients, significance levels indicated by $^{***}: .01, ^{**}: .05, ^{*}: .1$ The sample is restricted to those whose past desires and recalled desires are 10 children or lower.

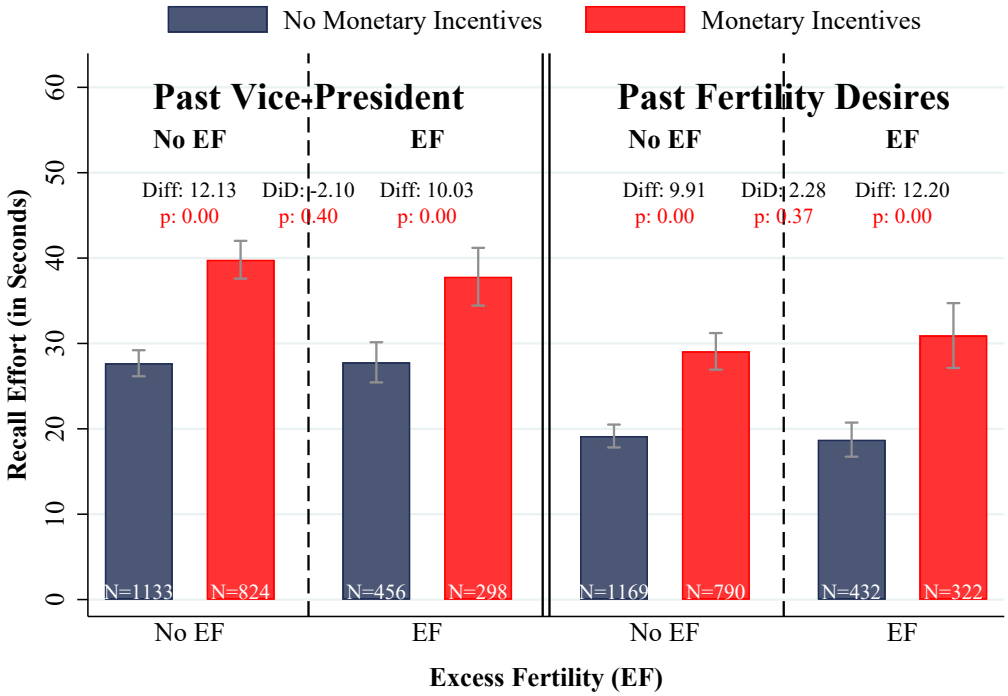
C Appendix C - Mechanisms of Memory

Figure C1: Monetary Incentives vs. No Monetary Incentives: Recall Errors by Excess Fertility (Number Children Round 4 - Desired Number of Children Round 2)



Notes: These graphs show the distribution of recall errors conditional on the extent of excess fertility, separately for those who did or did not receive monetary incentives to correctly recall their past desires. The lines indicate the average recall error for these two groups.

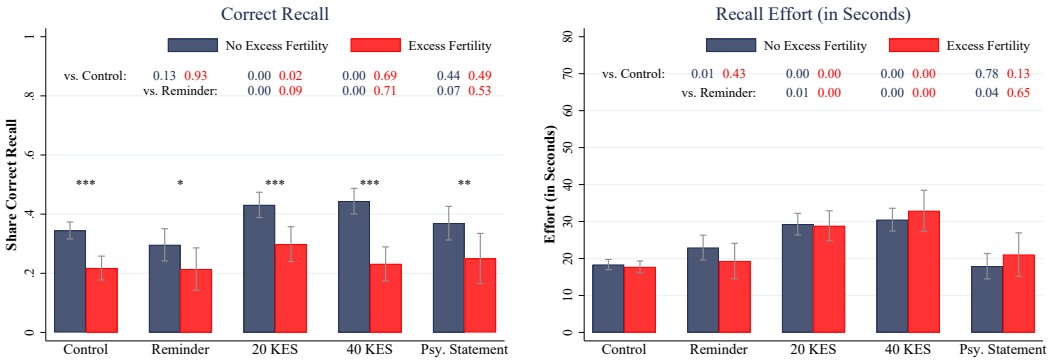
Figure C2: Recall Effort and Monetary Incentives: Past vice president and Past Fertility Desires



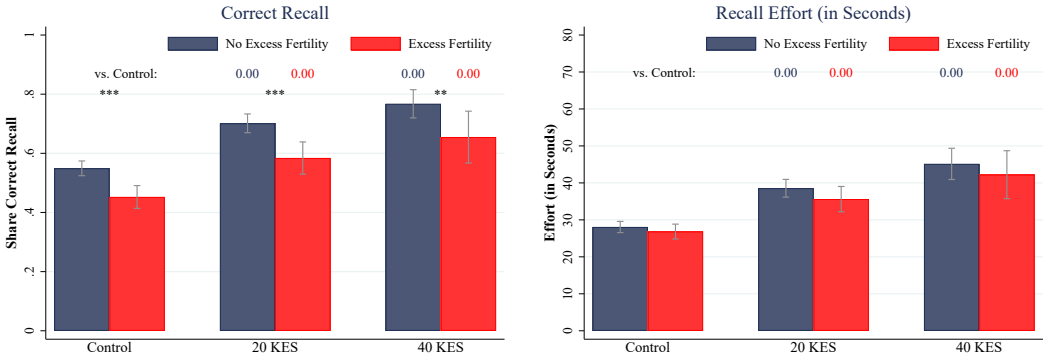
Notes: This graph shows the effort in seconds (and 95%-CI) of respondents trying to recall the past vice president and their past fertility desires conditional on being offered monetary incentives (in red) or not (in blue) and separately for those with and without excess fertility. The difference between these two groups is reported after "Diff:", with p-values of these pairwise comparisons below in red. The difference-in-difference for each of the two memory questions is reported after "DiD:" and p-values are reported below in red. The measured time in seconds includes the reading time (on average 14 seconds for the control versions), average additional reading times for experimental conditions other than the control condition are already subtracted. The sample comprises all those who participated in round 2, knew the name of the vice president in round 2 and gave an answer to both questions in this survey round. The sample is furthermore restricted to those taking less than 3 minutes to remember either question.

Figure C3: Recall Performance & Experimental Conditions: Past Reproductive Desires & Past vice president

(a) **Past Reproductive Desires**



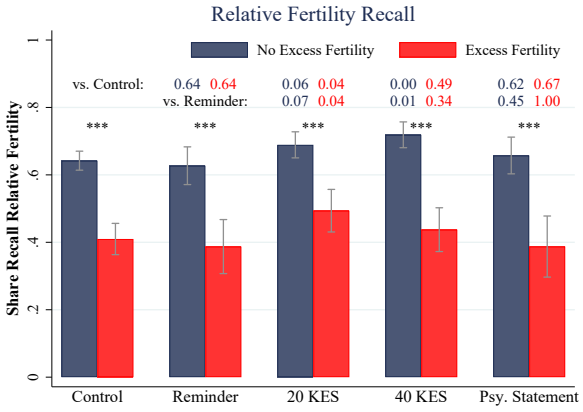
(b) **Past vice president**



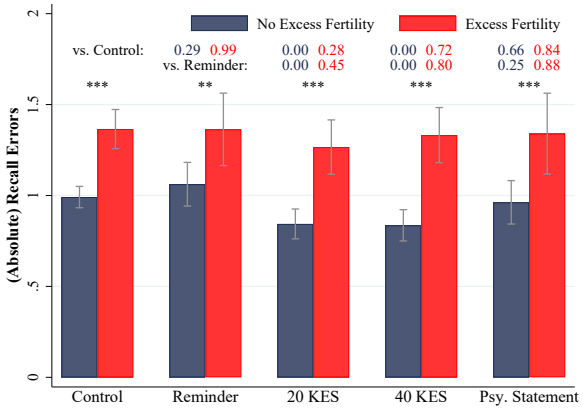
Notes: These graphs report the share (and 95%-CI) of respondents correctly recalling how many children they wanted in the year of survey round 2 (panel a), top) and correctly recalling the past vice president at the time (panel b), left side) as well as the time (and 95%-CI) spent on each question (bottom of panel a) and right side panel b)). The stars indicate the significance-level of pairwise comparisons between those with and without excess fertility conditional on the experimental condition, the remaining p-values indicate testing performance against the control or reminder version, respectively.

Figure C4: Fertility Recall Performance & Experimental Conditions: Relative Fertility Recall, Recall Errors & Absolute Recall Errors

(a) **Relative Fertility Recall**



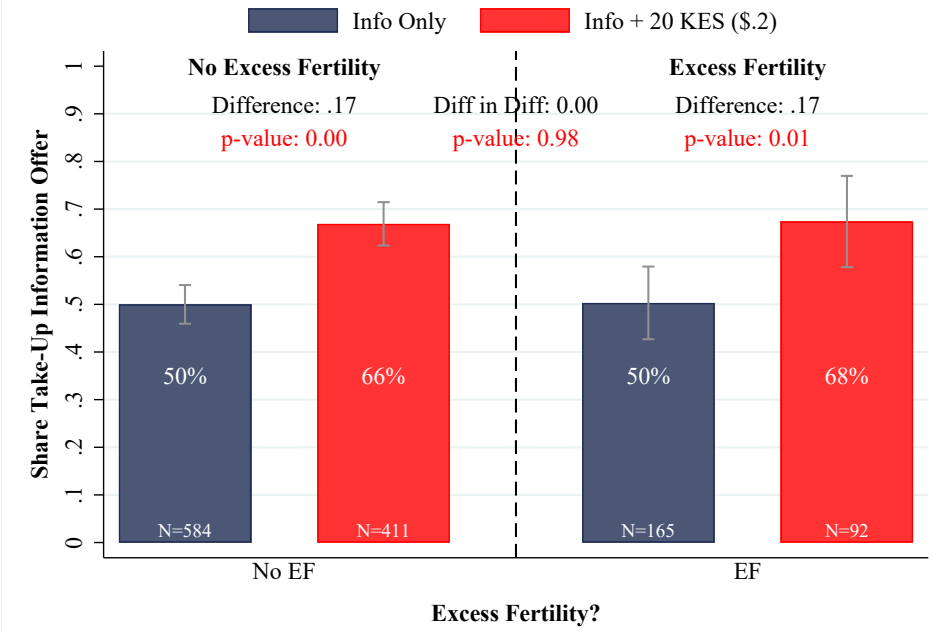
(b) **(Absolute) Recall Errors**



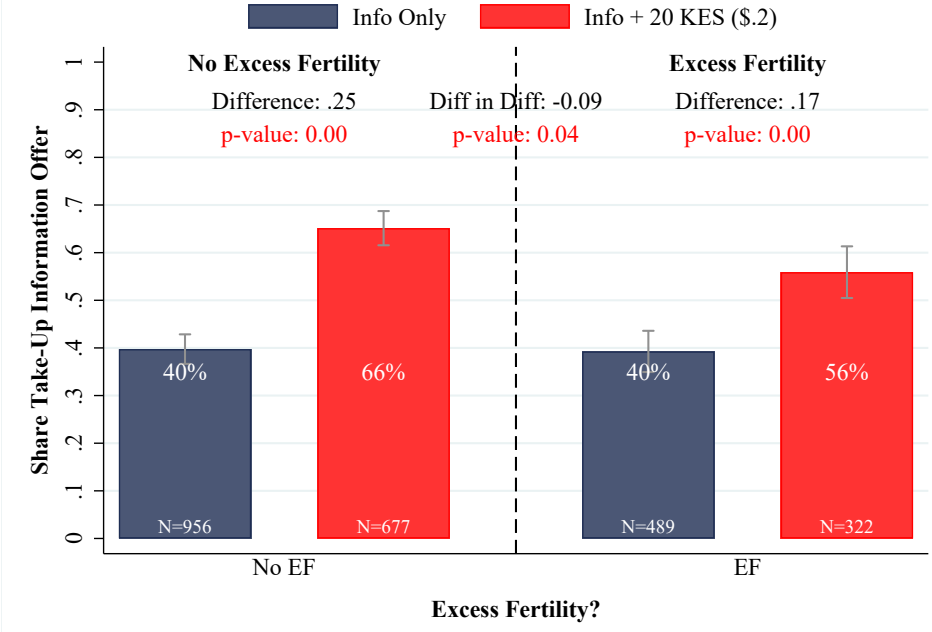
Notes: These graphs report the shares (and 95%-CI) of respondents correctly recalling whether they have more or fewer children than they desired in the past (panel a)) and the average absolute recall errors (and 95%-CI) (panel b). The measures are constructed in the following way: recalling relative fertility is indicated by $sgn(f_4 - x^R_{2|4}) = sgn(f_4 - x_2)$, absolute recall errors are constructed as follows: $|x^R_{2|4} - x_2|$. The stars indicate the significance-level of pairwise comparisons between those with and without excess fertility conditional on the experimental condition, the remaining p-values indicate testing performance against the control or reminder version, respectively.

Figure C5: Information Take-Up by Excess Fertility & Experimental Condition conditional on Correct and Incorrect Recall of Round 2 Fertility Desires

(a) **Correct Recall**

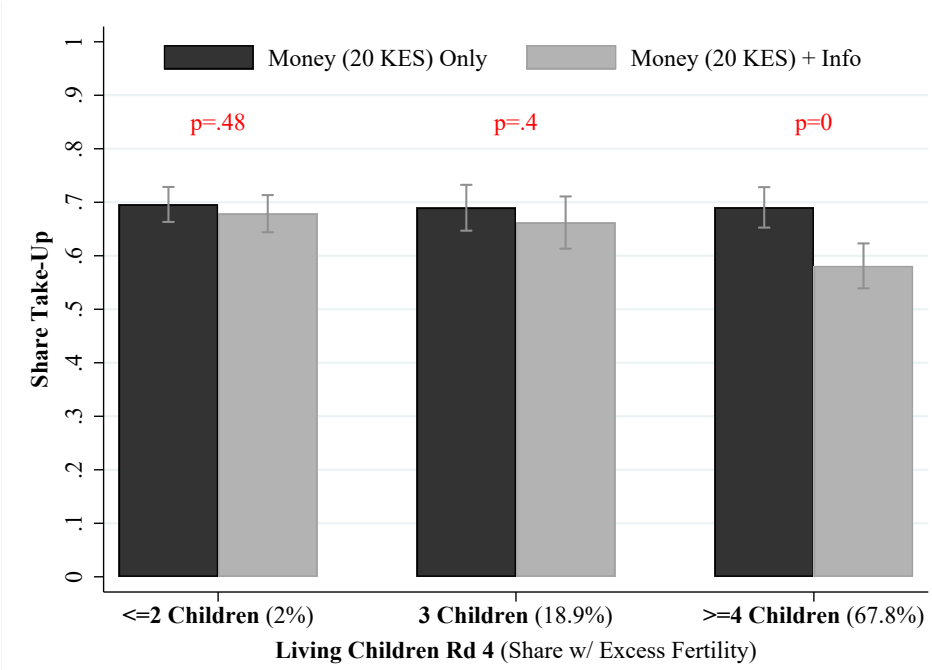


(b) **Incorrect Recall**



Notes: These graphs report the share (and 95%-CI) of respondents taking up the information offer depending on the experimental condition and excess fertility (i.e. whether they have more children than desired in the past or not). Results are reported separately for those who do correctly recall their past desired number of children (panel (a)) and those who do not correctly recall their past desired number of children (panel (b)).

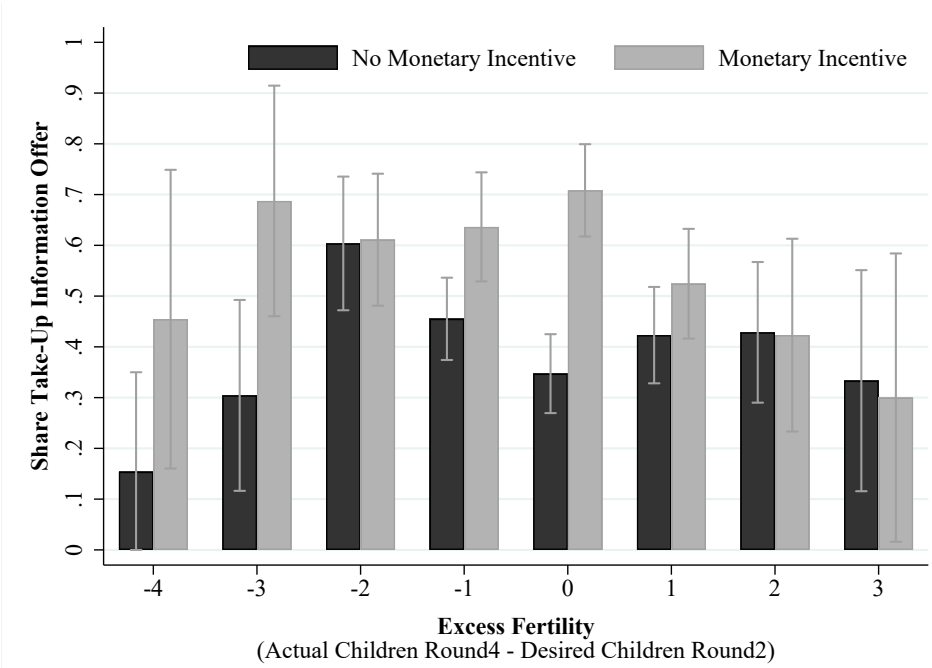
Figure C6: Information Take-Up for those offered 20 KES together with or without information



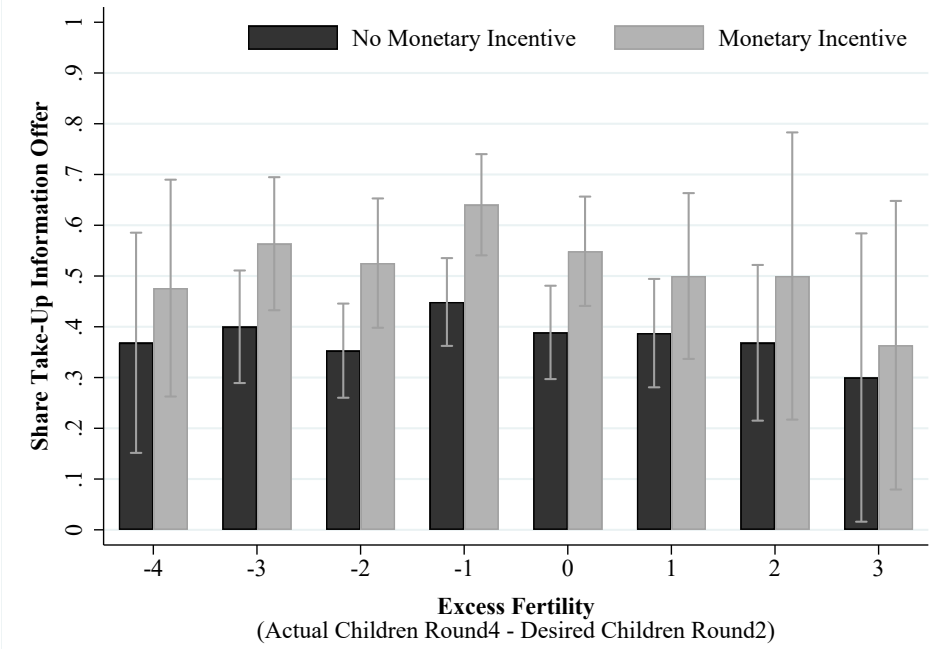
Notes: This graph shows the share (and 95%-CI) of respondents taking up the reminder offer to earn KES 20 ($.2) depending on being offered additional information about their past fertility desires or not and conditional on the number of children: 2 or fewer children, 3 children or 4 or more children. The share in the parentheses behind the number of children indicates the share of respondents for whom their number of children is higher than they desired 10 years ago. The p-value reported is for a simple pairwise comparison of shares. Respondents who were not surveyed in round 2 are offered the monetary incentive without any additional information offered as for them we do not know how many children they desired in round 2 (bars in black). Respondents who are being offered the monetary incentive together with information on their past desires are those who were interviewed in round 2 and were selected at random to be offered the information together with a monetary incentive.

Figure C7: Information Take-Up by Excess Fertility and Monetary Incentives (**Wave 1**)

(a) **Women**

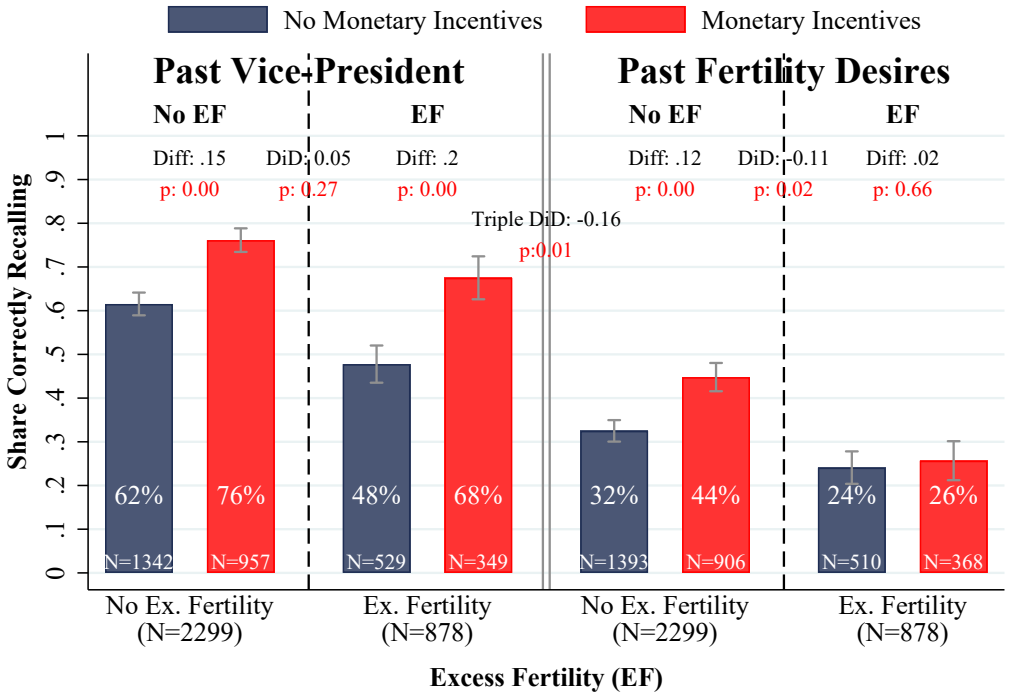


(b) **Men**



Notes: These graphs show the share (95%-CI) of women and men in wave 1 taking up the information offer depending on whether it is coupled with monetary incentives of KES20 or not, conditional on how many more children they have than they desired in the past.

Figure C8: (**Weighted**) Recall Performance and Monetary Incentives: Past vice president and Past Fertility Desires



Notes: This graph shows the weighted share (and 95%-CI) of respondents correctly recalling the past vice president and their past fertility desires conditional on being offered monetary incentives (in red) or not (in blue) and separately for those with and without excess fertility. This figure shows exactly the same as figure 4 except that all observations are now weighted. Observations are weighted using survey weights from Round 4, adjusted for the two-stage KLPS tracking design. As fewer respondents can be tracked and interviewed towards the later stages of each survey round, the survey team draws a random sub-sample of those respondents not yet found and interviewed. This random sub-sample is tracked "intensively" (both in terms of enumerator time and travel expenses) and the resulting additional observations later re-weighted to reflect their representation of the sub-sample not successfully tracked initially and to maintain the representativeness of the overall sample. The survey weights adjust for this two-stage nature of KLPS tracking. For more details on the tracking strategy, see Baird et al. (2016) and Baird et al. (2008).
As before, the sample comprises all those who participated in round 2, knew the name of the vice president in round 2, stated a desire of having 8 children or fewer, and gave an answer to both questions (the vice president recall and desired fertility recall) in this survey round. The difference between the two groups given or not given monetary incentives is reported after "Diff:", with p-values of these pairwise comparisons below in red. The difference-in-difference for each of the two memory questions is reported after "DiD:" and p-values are reported below in red. The unconditional triple difference-in-difference is -.16 (p-value of .01).

Table C1: Regressions: Recall Performance of Past Fertility Desires and Excess Fertility, controlling for Earnings, Cognitive Scores, and Years of Education (Secondary Schooling)

	Dependent Variable: Correct Recall ($x^R_{2\|4} = x_2$)								
				Earnings		**Raven-B**		**2ndary Schooling**	
	Benchmark	Linear Controls	Median Controls	Below Median	Above Median	Below Median	Above Median	No	Yes
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Excess Fertility (EF)	$-.15^{***}$	$-.14^{***}$	$-.14^{***}$	$-.09^{***}$	$-.2^{***}$	$-.12^{***}$	$-.19^{***}$	$-.13^{***}$	$-.18^{***}$
	(.02)	(.02)	(.02)	(.03)	(.03)	(.03)	(.03)	(.03)	(.04)
Controls									
Round 2 Desires FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Income Decile Ranking		✓							
Raven-B Scores		✓							
Years of Education		✓							
Indicator Above-Median Earnings			✓						
Indicator Above-Median Raven-B			✓						
Indicator Secondary Schooling			✓						
Sample Restrictions									
Observations for all controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Below Median Earnings				✓					
Above Median Earnings					✓				
Below Median Raven-B						✓			
Above Median Raven-B							✓		
No Secondary Schooling								✓	
Secondary Schooling									✓
N	2460	2460	2460	1225	1235	1282	1178	1370	1090
R^2	.04	.04	.04	.04	.06	.03	.07	.04	.05

Notes: Each column presents the results for a separate regression of correct recall on a dummy indicating excess fertility, controlling for fixed effects for each possible desire stated in round 2. The sample is limited to observations that have data on cognitive scores from Raven-B tests, years of education completed by survey round 2, and total annual earnings from survey round 4. Earnings data is only available for a subset, which is why the sample size is reduced compared to Table B1. Column (2) controls for the income decile, Raven-B score, and years of education, allowing them to enter linearly. Column (3) includes dummies for above-median earnings, above-median Raven-B-scores, and some secondary schooling (more than 8 years of schooling). Columns (4) to (9) show the gap in correct recall rates associated with excess fertility for those below and above median earnings, below and above median Raven-B scores, and for those with or without secondary schooling. Robust standard errors are indicated in parentheses, significance levels indicated by $^{***}: .01, ^{**}: .05, ^{*}: .1$ The sample is restricted to those whose past desires and recalled desires are 10 children or lower.

Table C2: Correct Recall of Past vice president (VP) and Past Fertility Desires: Excess Fertility (EF) & Monetary Incentives (conditional on knowing VP at Round 2)

	Dep. Var.: **Correct Recall**		
	(1)	(2)	(3)
Constant [α_0]	$.59^{***}$	$.4^{***}$	$.28^{***}$
	(.01)	(.08)	(.09)
Excess Fertility (EF) [β_1]	$-.1^{***}$	$-.1^{***}$	$-.1^{***}$
	(.03)	(.03)	(.03)
Monetary Incentives ($$) [β_2]	$.16^{***}$	$.16^{***}$	$.17^{***}$
	(.02)	(.02)	(.02)
Excess Fertility x $$ [β_3]	.01	.01	.01
	(.04)	(.04)	(.04)
Fertility Question [γ_0]	$-.24^{***}$	$-.24^{***}$	$-.13^{***}$
	(.02)	(.02)	(.02)
Fertility Q x EF [γ_1]	$-.01$	$-.01$	0
	(.03)	(.03)	(.04)
Fertility Question x $$ [γ_2]	$-.06^{**}$	$-.07^{**}$	$-.07^{***}$
	(.03)	(.03)	(.03)
Fertility Question x EF x $$ [γ_3]	$-.09^{*}$	$-.09^{*}$	$-.09^{*}$
	(.05)	(.05)	(.05)
Indicators for Past Desires		✓	✓
Indicator Male (+ Full Interactions w/ Fertility Q & EF)			✓
Observations	6354	6354	6354
R^2	.11	.11	.14

Notes: This table reports the results from pooled regressions of recall performance for both the past vice president and the past fertility desires questions. Key indicators include Excess Fertility and Monetary Incentives and their interaction terms. The sample is restricted to those who knew the name of the vice president during the time of their KLPS-2 interview, those with past desires of 8 or fewer children and those who answered both questions. Clustered standard errors (at the individual level) are reported in parentheses below the coefficients. Stars indicate significance levels: $^{*}: .1, ^{**}: .05, ^{***}: .01$. The estimated regression equation is the following: $\text{Correct Recall}_i = \alpha_0 + \beta_1 \text{EF}_i + \beta_2 \text{Money}_i + \beta_3(\text{EF} \times \text{Money})_i + \gamma_0 \text{Fertility Q}_i + \gamma_1(\text{Fertility Q} \times \text{EF})_i + \gamma_2(\text{Fertility Q} \times \text{Money})_i + \gamma_3(\text{Fertility Q} \times \text{EF} \times \text{Money})_i + \epsilon_i$.

Table C3: Information Take-Up by Monetary Incentives and Excess Fertility

	Waves 1 + 2			**Wave 1**			**Wave 2**		
	All	Women	Men	All	Women	Men	All	Women	Men
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Excess Fertility (EF)	−.02	−.01	−.03	−.02	−.02	−.02	−.03	−.01	−.06
	(.02)	(.03)	(.03	(.03)	(.05)	(.05)	(.03)	(.04)	(.04)
KES20 Incentive ($)	.22***	.25***	.19***	.21***	.24***	.17***	.23***	.25***	.2***
	(.02)	(.03)	(.03)	(.03)	(.04)	(.04)	(.03)	(.04)	(.04)
$ x EF	−.07*	−.09**	−.04	−.14***	−.19***	−.11	−.02	−.01	−.02
	(.04)	(.05)	(.05	(.05)	(.07)	(.08)	(.05)	(.06)	(.07)
Mean (EF=0 & $=0)	.45	.43	.46	.4	.41	.4	.5	.46	.53
Observations	3890	1941	1949	1904	939	965	1986	1002	984
R^2	.07	.08	.07	.07	.08	.09	.08	.11	.08
Controls									
FE # Desired Children (Rd 2)					✓				
Experimental Cond. Recall					✓				
Tests									
EF+EFx$ (p-value)	0	0	.1	0	0	.04	.18	.70	.15
$+$xEF (p-value)	0	0	0	.14	.4	.4	0	0	0

Notes: This table shows the results of regressing the information take-up on an indicator for excess fertility, an indicator for the information offer coupled with a monetary incentive of KES20 and an interaction term of these two. Controls include indicators for the number of desired children at round 2 as well as the indicators for the conditions of the recall questions. The last row displays the p-value of testing whether the monetary offer made a difference for those with excess fertility. The second to last row displays the p-value of testing whether those with excess fertility differ in terms of take-up from those without excess fertility conditional on everyone having been offered monetary incentives. Robust standard errors are shown in the parentheses and significance levels are indicated by $^{***}: .01, ^{**}: .05, ^{*}: .1$.

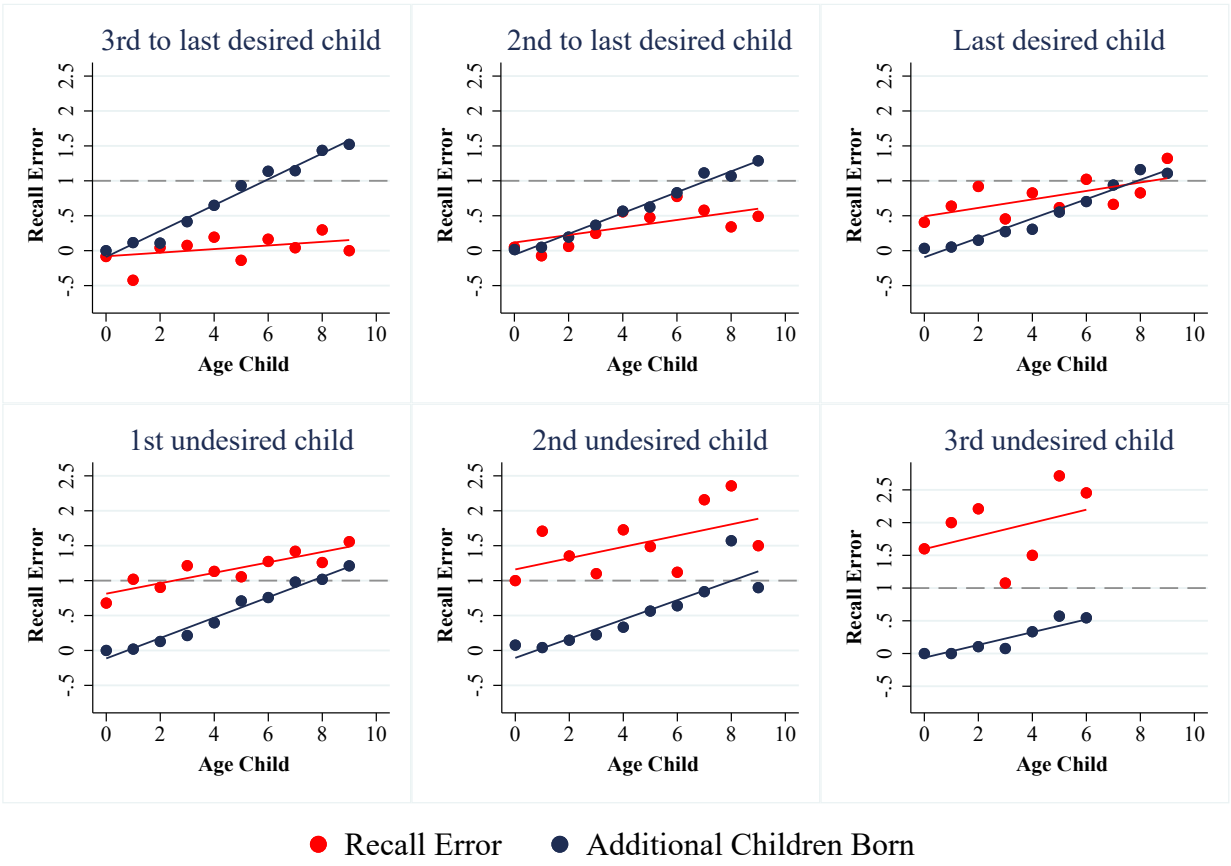
Table C4: Regressions: Recall Performance conditional on the number of additional children desired in round 4 for those still 3 or 4 children away from their initial desires

	Dependent Variable								
	Correct Recall $(x^R_{2\|4} = x_2)$			**Recall Relative Fertility** $sgn(f_4 - x^R_{2\|4}) = sgn(f_4 - x_2)$			**Abs. Recall Mistake** $(\|x^R_{2\|4} - x_2\|)$		
	All	Women	Men	All	Women	Men	All	Women	Men
Desires - # Children	$.05^{**}$	$.12^{***}$	.03	$.05^{***}$	$.07^{**}$	$.04^{***}$	$-.04$	$-.37^{***}$	.08
in Round 4	(.02)	(.04)	(.03)	(.01)	(.03)	(.02)	(.09)	(.08)	(.1)
Conditions Recall Q ✓									
Mean	.31	.31	.31	.95	.95	.95	1.16	1.16	1.16
N	306	88	218	306	88	218	306	88	218
R^2	.07	.2	.05	.11	.24	.09	.04	.3	.05

Notes: Each column presents the results for a separate regression of the indicated dependent variable on the number of additional children desired in round 4 ($= x_4 - f_4$) and fixed effects the experimental conditions of the recall conditions and being four children away from ones initial desires. Robust standard errors are indicated in brackets below the coefficients, significance levels indicated by $^{***}: .01, ^{**}: .05, ^{*}: .1$ The sample is restricted to those whose past desires and recalled desires are 10 children or lower, who are 3 or 4 children away from their past desires and who were asked about their current desires before they were asked to recall their past desires.

D Appendix D - The Dynamics of Memory

Figure D1: Dynamics of Recall: Recall Errors by age of x^{th} to last desired child and y^{th} undesired child (Bin-Scatter)



Notes: These six panels differentiate between whether a child was the last desired child according to a respondents' desires in survey round 2 or whether it was the first, second or third undesired child (in the bottom row) or the third or second to last desired child. For each panel, it shows respondents' recall errors and the number of additional children born conditional on the respective child's age (or years since birth of the respective child). These are bin-scatter-plots with the best linear fit presented. The sample is restricted to those whose recall errors are between -10 and +10 and there must be at least 25 observations for a given age in each panel for the data to be shown.

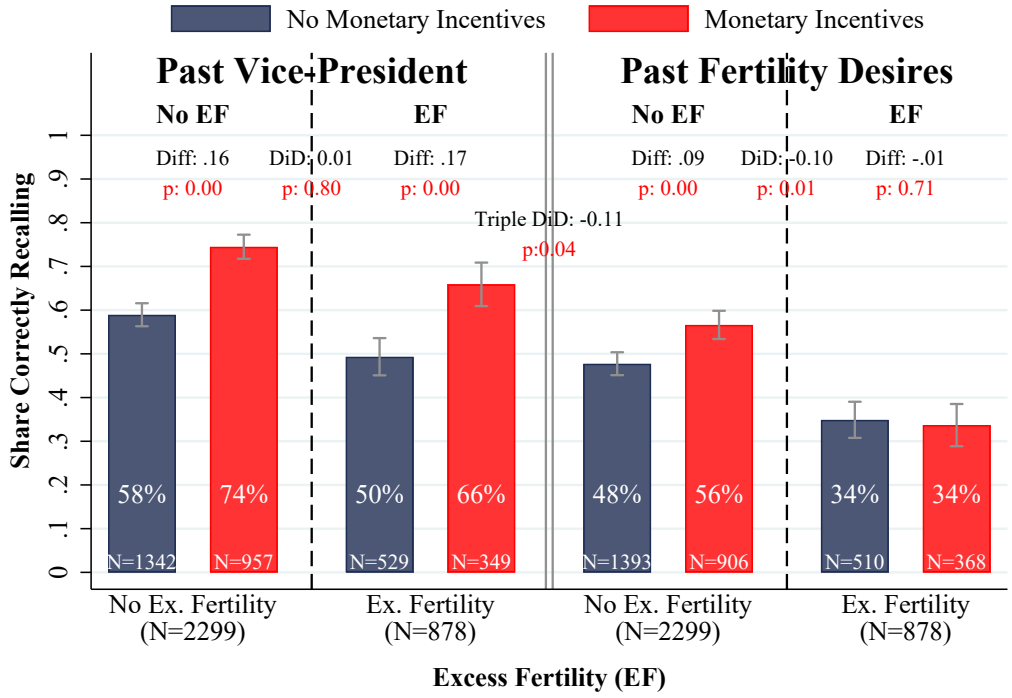
Table D1: The Dynamics of Information Take-Up: Excess Fertility & Minutes Elapsed between Information Offer and Potential Take-Up

	Information Only			**Information + Money**		
	All	Women	Men	All	Women	Men
	(1)	(2)	(3)	(4)	(5)	(6)
Excess Fertility (EF)	−.044	.0456	−.1167	.0434	.0177	.1027
	(.0619)	(.0907)	(.0859)	(.0695)	(.0961)	(.1045)
Minutes Elapsed	$-.0055^{***}$	$-.0041^{**}$	$-.0064^{***}$	$-.008^{***}$	$-.0063^{***}$	$-.0094^{***}$
	(.0013)	(.002)	(.0017)	(.0014)	(.0021)	(.002)
EF x Minutes Elapsed	.0007	−.0022	.0029	$-.0056^{**}$	−.0048	$-.0085^{*}$
	(.0024)	(.0034)	(.0035)	(.0028)	(.0038)	(.0044)
Unconditional Mean (No EF)	.45	.43	.47	.66	.68	.64
Observations	2185	1085	1100	1497	769	728
R^2	.08	.07	.1	.06	.06	.08
FE Desired # Children (Rd 2)		✓			✓	
Indicator Experim. Cond. Recall		✓			✓	

Notes: Each column reports the results of a separate regression of an indicator for taking up the information offer on an indicator for excess fertility, the minutes elapsed between the information offer and the possibility to remind the field offer of it and the interaction term of these two. Regressions control for indicators for the number of living children and the experimental conditions of the recall question. The sample is restricted to those whose time between the offer and the decision is below the 99^{th} percentile of minutes elapsed. Significance levels are indicated by $^{***}: .01, ^{**}: .05, ^{*}: .1$.

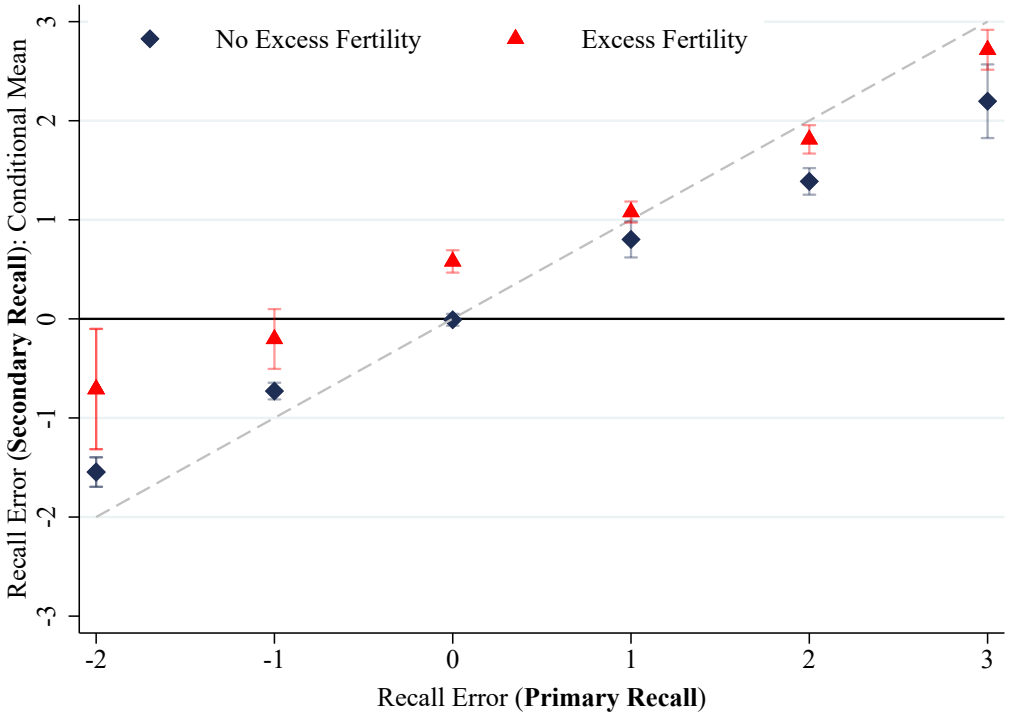
E Appendix E - Other concerns and interpretations

Figure E1: Recall Performance (**including a second chance for the fertility recall question**) and Monetary Incentives: Past vice president and Past Fertility Desires



Notes: This graph shows the share (and 95%-CI) of respondents correctly recalling the past vice president and their past fertility desires conditional on being offered monetary incentives (in red) or not (in blue) and separately for those with and without excess fertility. Compared to figure 4, the correct recall measure for past fertility desires here allows to get the answer right on a second try. After being asked the primary recall question, respondents were asked the following question: "You recall having wanted [*number answered in primary recall question*] children in [*the year of survey round 2*]. Lets suppose you did not say you wanted to have [*number answered in primary recall question*] children: Whats the most likely answer you provided us with back then instead of [*number answered in primary recall question*] children?" Secondary correct recall here takes the value of 1 if the respondent gets the answer right either in the primary or the secondary recall question. As before, the sample comprises all those who participated in round 2, knew the name of the vice president in round 2, stated a desire of having 8 children or fewer, and gave an answer to both questions (the vice president recall and desired fertility recall) in this survey round. At the time of survey round 2, 86.73% of these participants knew the vice president at the time. The difference between the two groups given or not given monetary incentives is reported after "Diff:", with p-values of these pairwise comparisons below in red. The difference-in-difference for each of the two memory questions is reported after "DiD:" and p-values are reported below in red. The unconditional triple difference-in-difference is -.11 (p-value of .04).

Figure E2: Conditional Mean of Recall Errors in the **Secondary** Fertility Recall Question against Recall Errors in the **Primary** Fertility Recall Question: Comparison of those with and without excess fertility



Notes: This figure shows the conditional mean and the 95%-confidence interval for recall errors in the secondary fertility recall question against recall errors in the primary fertility recall question, separately for those with and without excess fertility in red and blue. Recall errors are computed as the difference between respondents' recalled number of past fertility desires ($x^R_{2|4}$) and the actual desired number of children in round 2 (x_2). After being asked the primary recall question, respondents were asked the following question: "You recall having wanted [*number answered in primary recall question*] children in [*the year of survey round 2*]. Lets suppose you did not say you wanted to have [*number answered in primary recall question*] children: Whats the most likely answer you provided us with back then instead of [*number answered in primary recall question*] children?". The dashed 45-degree-line indicates the case of no updating on average from the primary to the secondary recall question. Average errors of zero or accurate recall in the secondary recall question are marked by the solid horizontal line at 0.

F Appendix F - Implications of Selective Memory

Table F1: Regressions for Respondents' Intergenerational Advice of how many children to have on Recalled Reproductive Desires, Past and Current Reproductive and Beliefs about Local Family Size Norms

	DV: **Recommended # of Children to 18-year-old**					
	Wave 1			Wave 1 & 2		
	All	Women	Men	All	Women	Men
	(1)	(2)	(3)	(4)	(5)	(6)
Recalled Desires	.18***	.24***	.13***	.17***	.19***	.15***
	(.02)	(.04)	(.03)	(.02)	(.03)	(.02)
Past Desires (Rd 2)	.02	−.05	.07**	.03	−.02	.08***
	(.03)	(.04)	(.03)	(.02)	(.03)	(.03)
Current Desires (Rd 4)	.13***	0	.22***	.15***	.07**	.2***
	(.03)	(.04)	(.05)	(.02)	(.03)	(.03)
Beliefs about Local Norm (Rd 4)	.1***	.08***	.12***			
	(.02)	(.02)	(.02)			
Constant	1.45***	1.99***	1.06***	1.81***	2.15***	1.55***
	(.12)	(.17)	(.17)	(.08)	(.11)	(.11)
Unconditional Mean Recommendations	3.13	3.04	3.22	3.13	3.06	3.21
N	1848	917	931	3607	1797	1810
R^2	.15	.08	.25	.12	.07	.18

Notes: Each column presents coefficients and robust standard errors (in parentheses) for a separate regression of respondents' recommended number of children to 18-year-old girls (for women) and boys (for men). Respondents' beliefs about local norm was only elicited in wave 1 of survey round 4: such that columns (1)-(3) report results for wave 1 including which number of children respondents believed to be the local norm and columns (4)-(6) report results for waves 1 and 2 without respondents' beliefs about local norms as independent variable. Significance levels are indicated by $^{***}: .01, ^{**}: .05, ^{*}: .1$. Observations are limited to those answering 10 or less to the dependent variable and the independent variables.

Table F2: Regressions for Respondents' Intergenerational Advice of **when to get married** on Overestimating One's Past Desires, Recall Error and Interaction of these two

	DV: **Recommended Age to Get Married**								
	All			Women			Men		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Overestimate Past Desires	−.15		−.03	−.78***		−.07	.3		.3
	(.19)		(.24)	(.24)		(.37)	(.27)		(.31)
Recall Error		−.06	−.02		−.41***	−.53***		.06	.31*
		(.06)	(.13)		(.1)	(.18)		(.07)	(.19)
Overestimate X Recall Error			−.04			.22			−.38*
			(.16)			(.26)			(.21)
FE "Fertility Histories"		✓			✓			✓	
Unconditional Mean		25.82			25.36			26.27	
N	1894	1894	1894	935	935	935	959	959	959
R^2	.03	.03	.03	.04	.05	.05	.05	.05	.05

Notes: Each column presents coefficients and robust standard errors (in parentheses) for a separate regression of respondents' recommended age to marry to 18-year-old girls (for women) and boys (for men). Since this question was posed to respondents only during wave 1, the number of observations here is smaller than for table 4. Each regression includes fixed effects for "fertility histories" which are described by all combinations of past desires (x_2) and number of living children (f_4) found in the data (such as having wanted 2 children in round 2 and now having 4 children for example). Significance levels are indicated by $^{***}: .01, ^{**}: .05, ^{*}: .1$. Observations are limited to those with recall errors between -10 and 10.

G Appendix G - Main Survey Questions Round 4 (Wave 2)

I

KENYAN LIFE PANEL SURVEY
ROUND 4, WAVE 2 (KLPS4)
I MODULE

CONTENTS SECTION

VERSION: ENGLISH

PUPIL ID
|_____|_____|_____|_____|_____|_____|_____|

 FO Comments:

SECTION 8. Community Groups, Social Capital and Political Attitudes

(…)

In this box: 1= Correct answer, 2= Incorrect Answer / No

18. Please name the current Deputy President of Kenya for me. |___|
DO NOT READ: Correct answer is WILLIAM RUTO. "RUTO" is ok.

19. Please name Kenya's current Cabinet Secretary of Education for me. |___|
DO NOT READ: Correct answer is GEORGE ALBERT OMORE MAGOHA . "George /Magoha" is ok.

20. Please name Kenya's current Cabinet Secretary of Health for me. |___|
DO NOT READ: Correct answer is Sicily Mbarire Kariuki. "Sicily/Mbarire" is ok.

21. Please name the current President of Uganda for me. |___|
DO NOT READ: Correct answer is YOWERI KAGUTA MUSEVENI. "MUSEVENI" is ok.

22. Please name the current President of Tanzania for me. |___|
DO NOT READ: Correct answer is JOHN MAGUFULI. "MAGUFULI" is ok.

23. Please name the current President of the United States of America for me. |___|
DO NOT READ: Correct answer is DONALD TRUMP. "TRUMP" is ok.

If conducting survey on paper, read version 23a. Otherwise, use version randomly selected by the tablet.

In this box: 1= Correct answer, 2= Incorrect Answer / No

23a) "Please name who was the Vice President of Kenya (what is now called Deputy President) in the year [year of KLPS-2 interview]? |___|

IF PAPER SURVEY, SKIP TO Question 24

23b) "Please name who was the Vice President of Kenya (what is now called Deputy President) in the year [year of KLPS-2 interview]? If you do correctly recall the name, we will later send you 20 KES via MPESA.
|____|

23c) "Please name who was the Vice President of Kenya (what is now called Deputy President) in the year [year of KLPS-2 interview]? If you do correctly recall the name, we will later send you 40 KES via MPESA
|____|

 FO Comments:

SECTION 19. Fertility

Please ensure the privacy of the FR for this section. If there are individuals within earshot who appear to be over age 5, please ask to speak with the FR privately.

Read: Now I would like to ask you some questions about your fertility and any children you might have. Please remember that this survey is confidential and that the information will be used for research purposes only. Also, I understand it may be difficult or upsetting to talk about, but please remember to include pregnancies that did not end in live birth.

(…)

 FO Comments:

52. Have you received any drugs for worm infections or schistosomiasis (for free) for your children in the last year? (1= Yes, 2= No, 99=DK) |___|

If respondent / partner HAS NEVER GIVEN (LIVE) BIRTH, ask question 53. OTHERWISE, skip to question 54.

53. Have you ever tried for 12 months to conceive a child with a partner but have been unable to?

(1=Yes, 2=No, 99=DK) |___|

Note: If survey is being conducted on paper, ask questions in the following order. If survey is being conducted on the tablet, 80% GET VERSION 1 (CURRENT PREFERENCES first, RECALL SUBSECTION second), while 20% GET VERSION 2 (RECALL SUBSECTION first, CURRENT PREFERENCES second).

Read: Now, I would like to ask you some questions about your hopes for the future, the children you would like to have, and the kind of family that you envision for yourself.

CURRENT PREFERENCES

54. Today, if you could choose exactly, how many children do you want to have in total, including any you have now? (44=As many as possible, 99=DK) |___|

If 44, skip to question 60. Otherwise continue.

55. If you were forced to choose between (Number given in Q54 + 1) and (Number given in Q54 - 1), which would you prefer? (99=DK) |____|

RECALL SUBSECTION

Read: Now, think back to the year of **[year of KLPS-2 interview]**:
If conducting survey on paper, read version 1. Otherwise, use version randomly selected by the tablet. One option between 61a. and 61e. chosen at random (40% control Version 1, 10% Reminder Version 2, 40% monetary incentives (20% Version 3 & 20% Version 4), 10% psychological concerns Version 5)

60a. ***[Version 1]*** If we had asked you back then, how many children in total would you have said you would like you or your partner to give birth to, including any who had already been born?
(44=As many as possible, 88= I don't recall, 99=DK) |___|

60b. ***[Version 2]*** When we asked you back then, how many children in total did you say you would like you or your partner to give birth to, including any who had already been born? Please note that we actually asked you this question back then and recorded its answer.
(44=As many as possible, 88= I don't recall, 99=DK) |___|

60c. ***[Version 3]*** When we asked you back then, how many children in total did you say you would like you or your partner to give birth to, including any who had already been born? Please note that we actually asked you this question back then and recorded its answer. If you remember your past answer correctly, we will transfer you 20KES via MPESA in the next 5 business days.
(44=As many as possible, 88= I don't recall, 99=DK). |___|

60d. ***[Version 4]*** When we asked you back then, how many children in total did you say you would like you or your partner to give birth to,including any who had already been born? Please note that we actually asked you this question back then and recorded its answer. If you

 FO Comments:

remember your past answer correctly, we will transfer you 40KES via MPESA in the next 5 business days.

(44=As many as possible, 88=I don't recall, 99=DK). |___|

60e. ***[Version 5]***: When we asked you back then, how many children in total did you say you would like you or your partner to give birth to, including any who had already been born)? Remember that we often have good reasons to change our mind and therefore, having a different number of children than you initially desired does not mean you are not in control of your own life. With that in mind, what answer did you provide us with back then?

(44=As many as possible, 88=I don't recall, 99=DK) |___|

61. You recall having wanted **[number given in Q60]** children in **[year of KLPS-2]**. Let's suppose you did not say you wanted to have **[numer given in Q60]** children: What's the most likely answer you provided us with back then instead of **[number given in Q60]** children? (99=DK) |___|

If participated in KLPS-1 Fertility module, continue. Otherwise, skip to question 65.

62. Think back to the year of **[year of KLPS-1 interview]**: If I had asked you back then, how many children in total would you have said you would want to have, including any who were already born? (44 = As many as possible, 99=DK)|___|

NORMS, EXPECTATIONS AND BELIEFS

65. Which number of children is most highly regarded where you currently live? Think about your village and surrounding villages (or neighborhood, if live in city). |__| 99=DK

66. How much do you agree with the following statement on a scale of 1 to 10: the number of children we end up having is something god-given and cannot be controlled by us. ***Show the respondent scale M, and demonstrate that they should select their answer using the scale.***

(1=not at all, 2, 3, 4, 5, 6, 7, 8, 9, 10=completely) |___|

67. How many children do you expect to have in total around age 45?

(44 = As many as possible, 99=DK) |___|

68. How confident are you in your answer to the previous question? ***Show the respondent scale N, and demonstrate that they should select their answer using the scale.***

(1=not confident at all, 2, 3, 4, 5, 6, 7, 8, 9, 10=absolutely certain) |___|

For question 70 and 71 ask women about girls, men about boys.

70. ***If male respondent:*** Imagine a typical 18-year old boy like a neighbor's child, or a nephew: How many children would you recommend this boy to have in her/his life? (99=DK) |___|

If female respondent: Imagine a typical 18-year old girl like a neighbor's child, or a niece: How many children would you recommend this girl to have in her/his life? (99=DK) |___|

73. How much do you agree with the following statement? There is a strong need for family planning programs providing access to contraceptives and advice for planning marriage and children in my district/ neighborhood. (1=strongly disagree, 2=disagree, 3=disagree a little, 4=Neither disagree nor agree, 5=agree a little, 6=agree, 7=strongly agree) |___|

 FO Comments:

INFORMATION TREATMENT

If conducting this survey on paper, skip to Section 20.1 .Otherwise continue.

Check the tracking sheet to see whether the respondent was surveyed in KLPS-2. If yes, enter the randomized group reported by the tablet. If no, enter C

Fertility Info Treatment Version: **|___|** (Valid responses: A, B or C)

[Randomization: 60% Version A, 40% Version B.]

IF INFO AT KLPS-2 available, ask Version A or Version B – IF NOT, ask Version C.

Reaction to be filled out at the end of the survey, depending on whether respondent chooses to obtain information.

If VERSION A: Read: Remember that in the year of **[year of KLPS-2]**, we asked you how many children in total you would like you or your partner to give birth to. Once we're done with the survey, you have the chance to find out what you told us back then: simply remind me after the end of the survey and you will be able to see your past answer on my tablet. I will not get to see your answer.

If VERSION B: Read: Remember that in the year of **[year of KLPS-2]**, we asked you how many children in total you would like you or your partner to give birth to. Once we're done with the survey, you have the chance to find out what you told us back then: simply remind me after the end of the survey and you will be able to see your past answer on my tablet. I will not get to see your answer. The tablet also tells me that you've been drawn in a lottery: if you do choose to remind me to see your past answer, you will be sent 20 KES via MPESA in the next 5 business days.

If **VERSION C: Read:** The tablet just told me that you've been drawn in a lottery: if you want to receive 20 KES via MPESA later today, simply remind me after the end of the survey and you can confirm on the tablet that you indeed want to receive those 20KES.

 FO Comments:

Section 25. Conclusion

Read: Thank you for your time. Please give me just a moment as I wrap up the survey.

If FERTILITY VERSION A or B:
7a. Has the respondent reminded you to see their KLPS-2 answers? (1=Yes, 2=No) |____|
If NO, skip to 7b. If at any time while concluding the survey, the respondent does remind you, come back and change this response to YES.
If YES, please hand the tablet to the respondent and instruct the respondent to swipe to see their response. Do not look at the respondent's answer.

(Do not read) 7b. If respondent in FERTILITY VERSION B ***AND*** question 7a equals 1, enter 20. Otherwise enter 0. |_____|

IF FERTILITY VERSION C, continue. Otherwise skip to question 8.
7c. Has the respondent reminded you about their lottery winnings from the fertility section? (1=Yes, 2=No). |____|
If YES, enter 20 for question 7ci. Otherwise, enter 0
7ci. Fertility Version C winnings: |___|

 FO Comments: