Early Life Experiences and Adult Fertility Behavior: Evidence from Indonesia

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Abstract

An emerging literature finds that early life experiences influence adult preference. We apply this intuition to understand the influence of witnessing adverse pregnancy outcomes and sibling deaths as a child on subsequent adult fertility outcomes in Indonesia. Using panel data and a sibling fixed effect model, we identify solely based on the exogenous variation in the age of pre-existing children with the same family. Our findings strongly confirm the importance and persistence of early life experiences. This suggests that early life interventions may be important and that the efficacy of health interventions may not be visible until decades afterwards.

Keywords: Indonesia; Childhood Shocks; Fertility, Fertility Preferences

JEL Codes: I10, J13, J16

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1. Introduction

The demographic transition and the accompanying changes in fertility patterns have been widely studied in economics (Teitelbaum, 1975; Eckstein, Schultz and Wolpin, 1984; Bloom and Williamson, 1998; Galor and Weil, 2000; Mason, 2001; Casterline, 2001; Mason, 2005; Galor, 2012). This extensive literature highlights the role of improvements in medicine and access to health services (Teitelbaum, 1975) as well as other factors such as human capital (Galor, 2012). In contrast, the processes by which fertility preferences are formed and evolve over time have been relatively understudied. Existing studies have primarily focused on channels such as the evolution of cultural norms (Fernandez and Fogli, 2014), economic empowerment (Bongaarts and Watkins, 1996) and growth (Bloom and Williamson, 1998). In this paper, we explore a novel channel: early life exposure to fertility and child mortality outcomes.

The psychology literature and, more recently, an emerging economics literature highlight the role of early life experiences in shaping adult preferences and behavioral parameters (Barker, 1992; Cunha and Heckman, 2007; Almond and Currie, 2011). Although preferences do evolve over time, it is believed that "different types of preferences tend to become 'frozen' at different periods in one's life … [leading individuals to] become increasingly inoculated against external influences" (Loewenstein and Angner, 2003: 363). For instance, early life experiences have been linked to adult risk preferences (Olbrich et al., 2012), trust levels (Yishay, 2013) , time preferences (Chen, 2013), and political preferences (Madestam and Yanagizawa-drott, 2011).

In the same vein, children who witness adverse events may also have different fertility preferences and outcomes. We focus on three common outcomes in developing countries: miscarriages, stillbirths, and the death of children (siblings). Following the literature, we allow for the effects of the events to vary based on the age of exposure. Consequently, we are able to identify variation across age groups and to allow for the preferences to become “frozen”.

We use representative panel data from Indonesia, the Indonesian Family Life Survey (IFLS). These data offer three particular advantages. First, the length of the panel (14 years) allows us to match girls (the 2nd generation) with their mother’s birth histories (1st generation) and then to observe the girl’s fertility outcomes as adults. In contrast, cross-sectional data typically contain only few multi-generational households and it is therefore impossible to obtain representative data of the 1st and 2nd generation’s fertility histories. Second, the IFLS follows many of the girls and their sisters as they grow up and form new households. We are therefore able to use sibling fixed effects to control for unobserved (fixed) family characteristics. In particular, by identifying only off of the variation in the age of exposure to events, we are able to control for family histories of adverse fertility events (which are known to respondents but unobserved to the econometrician). Lastly, since the panel covers a period during which Indonesia was undergoing its fertility transition (Kim, 1993), there is substantial variation in the birth rates during this period (-33% in the fertility rate).

Our results confirm the importance of early life experiences. For instance, all of the early life experiences measured (exposure to child (sibling) deaths, miscarriages and stillbirths) affect the number of adult pregnancies. Additionally, we find that the effects differ based on the age during which the adverse events are experienced. In general, exposure to adverse fertility and child outcomes leads to higher numbers of subsequent pregnancies, induce women to marry sooner and shorten the spacing between marriage and the 1st pregnancy. Losing male siblings tend to have a greater impact on women’s subsequent pregnancies even though the effect tends to dissipate when interacted with income status.

We explore potential channels for such behavior and establish a link through fertility preferences. As a result of child (sibling) deaths, women tend to increase the desired number of children by one-to-one proportion especially when lost siblings are male. We also note that there is a higher impact if the perished sibling was between ages 1 to 5 years at the time of the death. In particular, the size of the coefficient (typically greater than 1.0) suggests that for each negative event witnessed, women "overcompensate" in terms of additional pregnancies. This is akin to the so-called child hoarding or stockpiling (see for example, (Sah, 1991; Ozcan, 2003)) where parents have more children than desired to insure against children dying young. Our results confirm hoarding for child deaths and extend it to adverse fertility outcomes. More broadly, we highlight an important inter-generational aspect to the formation of fertility preferences and fertility outcomes. Consequently, it also suggests that the efficacy of fertility interventions cannot fully be evaluated using short run (1st generation) effects.

The remainder of this paper is organized as follows; Section 2 discusses the literature in Indonesia followed by a section on methodology. Section 4 details the data while Section 5 summarizes the regression results. Section 6 concludes.

2. Fertility in Indonesia

Even though Western countries required well over a century for the demographic transition to take full course, in Indonesia and some other East and South East Asian countries[1] the transitions occurred in less than two decades (Kim, 1993). The reported natural increase (the difference between crude birth rate and crude death rate) has decreased from 21.4 in 1960-65 to 18.1 in 1990-95. IFLS round 1 was implemented in 1993 and the demographic transition was expected

[1] The other countries include Japan, Hong Kong, the Republic of Korea, Singapore, Taiwan, China, and Thailand.

be completed by the 1990s (Kim, 1993). The decline in birth and death rates is highlighted in Figure (1) based on which the number of births (crude births per 1,000 people) has dropped by 25.8 during 1960-2013 while the reduction in death rate is 14.1. Consequently, the natural increase has reduced further to 12.5 by 2013.

The current fertility transition literature focusing on Indonesia concentrates on female education (Angeles, Guilkey and Mroz, 2005), family size (Maralani, 2008), household bargaining power (Beegle, Frankenberg and Thomas, 2001), East Asian economic crisis (Waters, Saadah and Pradhan, 2003), access to health care (Frankenberg, Suriastini and Thomas, 2005), and preferences for sons (Carranza, 2012). Our paper includes most factors that are addressed in the literature and take a step beyond in analyzing the childhood experience. The following section elaborates our methodology in pinning the early life events to adult outcomes.

3. Methodology

We estimate the following model for the i th daughter (the 2nd generation) at time t:

$$(1)\quad FO_{it} = \alpha + \beta M_{it} + \delta D_{it} + \gamma S_{it} + \theta C_{it} + \rho A_{it} + \vartheta A_i + \varepsilon_{it.}$$

where the fertility outcomes, FO_{it}, are determined by a host of observables, predominantly, mother's fertility outcomes, $M_{it,}$ after controlling for daughter's characteristics, D_{it}, spouse's characteristics, $S_{ti,}$ and community characteristics, C_{it}. The vectors A_{it} and A_i are comprised of covariates that are time-variant and invariant respectively. Our primary coefficients of interest are the β coefficients which indicate the effects of the mother's fertility outcomes (live births, miscarriages, stillbirths, and child deaths), denoted by vector M.

We focus on two primary outcomes: the total number of pregnancies of the daughter (Model 1) and her desired number of children (Model 2). We calculate the total number of pregnancies that the daughter has realized by the fourth wave of IFLS. The total number of pregnancies includes the number of live births, miscarriages, and stillbirths[2]. The IFLS has marked the fertility outcomes for each of its respondent's pregnancies and we use this information to compute each of the categories. There is a caveat to be noted here. Since, voluntary termination of pregnancy (abortion) is illegal in Indonesia, the survey cannot ask for such matters directly. Therefore we cannot completely rule out the possibility that some of the outcomes that are recorded as stillbirths or miscarriages could have been abortions. To overcome such shortcoming we look at other fertility outcomes by exploiting two temporal proxies. First is the age of the first marriage (Model 2) which is computed using the birth year and year of first marriage. Since having children out of wedlock is extremely rare (and culturally disapproved) in Indonesia,[3] it is reasonable to assume that women who want to start having families as soon as possible would marry sooner after controlling for age, education, employment status and other covariates. Second, we examine the time elapsed (in years) between marriage and the first pregnancy (Model 3). In the face of potential adverse fertility outcomes and infant deaths, we assume that respondents who want more births might start their pregnancies sooner.

While mothers in the sample experience many adverse outcomes, there are (thankfully) not a sufficient number to identify a separate effect for each year of age. Consequently, we follow Yishay (2013) and group adverse events by 5 year intervals. For instance, we have a variable for the total number of miscarriages experienced by the mother when the daughter is aged 0-4 and another for 5-9. We then group the remaining years into a 10 and older age bracket.

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[2] IFLS questionnaire recognizes the stillbirths as "being born without showing any signs of life. E.g. breathing, crying, [and] moving".

[3] In our sample we observe only 23 incidents (1.46%) where the pregnancy occurring prior to marriage.

One concern is that certain mothers (i.e. families) are more prone to adverse fertility outcomes. If this is true, then we would mistakenly interpret β (our coefficients of interest) as the effect of experiencing, for example, a miscarriage when it would be capturing both the experience of witnessing a miscarriage and being in a family where miscarriage are more common. This later component is constant within families (i.e. mothers) and unobserved (to the econometrician). We overcome this problem using a sibling fixed effect (φ_i). Since the family history is constant, we are therefore identifying the effect of witnessing adverse fertility events at different age intervals (within the same family). Consequently, we are able to interpret the β as a causal effect. At the same time, it controls for any other fixed characteristic of the mother or the family. We can then rewrite Eq. (1) as:

$$(2)\ FO_{it} = \alpha + \beta M_{it} + \delta D_{it} + \gamma S_{it} + \theta C_{it} + \rho A_{it} + \varphi_i + \omega_{it.}$$

The inclusion of fixed effect requires that the daughter have at least one sibling present in our sample, which further limits the sample to 1390 daughters with siblings. Since the IFLS protocol for interviewing children aged 0 to 14 in round 1 was to randomly select two children, the daughters who are without siblings cannot necessarily be interpreted as the only children. It could be the case that the other selected child is her brother (since sons are not part of our sample for reasons mentioned in the next section).

We control for daughter's characteristics that may predict fertility, denoted by D in Eq. (2) including age (Bumpass, Rindfuss and Jamosik, 1978), education (Behrman, 2014), employment status, birth order (Murphy and Knudsen, 2002), and an indicator for whether she is the oldest daughter. For married daughters we also have data on whether she is able to conceive and her own fertility outcomes (miscarriages and stillbirths). S is a vector of the characteristics of daughter's spouse: his age, work status, years of education, and whether he resides at the household.[4] We unfortunately do not have information on the spouse's experience growing up since that requires the daughter getting married to a person who is also part of the IFLS which is rare. Indonesia underwent a number of birth control campaigns between the 1970s and 80s to which individuals in our dataset are exposed. As such campaigns could have an impact on fertility decisions, we include the community characteristics, C, which encompass the availability of contraception and family planning counseling (Goldin and Katz 2002; Angeles et al. 2005) in the locality. The time-variant factors include parents' education status and the invariant factors are religion (Carranza, 2012), household income in round 1 (Bevis and Barrett, 2013), the locality and municipality of residence as is the standard in the literature.

For the fertility outcomes of number of pregnancies and gap between marriage and first pregnancy we employ a Tobit model which is left censored at zero. For the age at first marriage regressions we implement the left censoring at age 18 since in our sample the unmarried daughters are maximum 17 years of age in the first round (for reasons mentioned in the next section) and 18 is culturally a popular age to get married.

4. Data

Our data for Indonesia comes from the Indonesia Family Life Survey (IFLS), a nationally representative survey with rounds in 1993, 1997, 2000, and 2007. The fourteen year panel survey tracks the original sample and the splitoffs from the original households. IFLS 1 interviewed 22, 377 people corresponding to 7,224 households. The household questionnaire provide detailed information on the household composition, consumption, income, assets, educational attainment, demographic characteristics, economic activities, marriage, migration, health status, and fertility

[4] It is common for men to be employed in the city and live away from the wife.

and contraception of the household members. The community facility survey provides the information on infrastructure quality and availability of services. Our analysis draws on both household and community level information.

We restrict our sample to all girls who are aged between 9 and 17 in IFLS 1 (and who are therefore aged between 23 and 31 in IFLS 4) and who have married by IFLS 4. We focus on women since women marry at a younger age than men. During the time elapsed between IFLS 1 and 4 (14 years), most sons are unmarried. Since fertility preferences and outcomes are only asked for individual who are or have ever been married, the small subset of men who are married might not be representative. In contrast, most women are married within this age bracket (mean age of first marriage is 21 in the sample).[5] We limit the sample to the particular age bracket so that women are sufficiently old to be married and have children in the last round (the lower limit of 9 years old) and young enough that they are not married in IFLS (upper limit of 14 years old). While some girls do marry at younger ages, these are outliers.

Thus we retain 2901 daughters who are matched from IFLS 1 to IFLS 4 which is a matching rate of 87 percent. Since the fertility module is only recorded for ever married women our effective sample size is 2231. With the sibling fixed effect, the effective sample size is 1390.

Although the IFLS attempts to track individuals across rounds, they focus only on individuals who remain in the enumeration areas. Consequently, our sample is only representative of those who do not change enumeration areas. Approximately 7 percent of the daughters move from the enumeration areas.

[5] In our effective sample 78 percent of the daughters of the age group 23 to 31 have married at least once.

Table 1 shows the summary statistics of the key variables used in this paper. We perform two test of means as listed in Table 2 and 3. In Table 2 we check for the systematic differences between mothers who lost children compared to those who did not. We find that the mothers who lose children (child deaths) tend to be 1.86 years younger, have 1.84 more pregnancies, 1.73 more live births, and 2.07 years less educated on average. We also conduct a test of means to check if the married and unmarried daughters are statistically different and report the results in Table 3. We find that the married daughters are statistically older by 1.33 years, 15 percent more likely to come from rural households, have 1.93 years less education, 7 percent more likely to be Muslim, 24 percent less likely to be employed and 9 percent more likely to be the oldest daughter compared to the unmarried counterpart.

5. Results

We estimate the effects of exposure to early life fertility and child death experiences on the number of pregnancies in Table 4. We cluster at the municipality level. Columns (1) and (2) present the results for our two samples. In particular, we present first the results for the entire sample (Column (1)) and then restrict the sample to siblings and introduce sibling fixed effects (Column (2)). In Table 4, for the full sample, generally only events experienced at age 10 or older are significant. Experiences earlier in life are not significant with the exception of miscarriages between ages 5 and 9. In contrast, when we restrict the sample and introduce the sibling fixed effects in Column (2), almost all of the experience coefficients become significant. This indicates that the substantial effect of (fixed) family-level unobservables.[6] The results are

[6] Another possibility is that the sub-sample of siblings differs from the broader sample. When we restrict the sample to just siblings and rerun Eq. (1) without the sibling fixed effect, we obtain results which are qualitatively similar to Column (1). These results are available upon request.

broadly consistent across sibling deaths, mother's miscarriages and stillbirths. Any experience which reduces the number of (prospective) siblings increases the number adult pregnancies[7]. The coefficients on the adverse fertility outcomes (with the exception of youngest miscarriage age group) are all larger (and significantly different than (1) suggesting that individual overcompensate to the adverse effect. Moreover all daughters sample results (Column (1)) are lower than the sibling fixed effect results (Column (2)) indicating a downward bias due to omitted variables which is rectified by the sibling fixed effect model.

One potential explanation for these results is that we are simply identifying households which have histories of fertility and early childhood problems. We can address it directly, using the sibling fixed effects since the family histories and other unobserved medical problems are constant across siblings. Rather, we are identifying the effects based on the variation in the timing of events relative to the age of the respondent (the observer). Consequently, if the change in fertility outcome is purely driven by witnessing the event, as opposed to the common family history, the estimated coefficients should differ across age groups. We are able to establish the differential effect in each case: sibling deaths, mother's miscarriages, and stillbirths. The findings are consistent with our hypothesis that the age in which a daughter witnesses adverse fertility outcomes of her mother has an impact on her own choices.

Based on the results for the daughter's number of pregnancies, we would expect the early life events to have some impact on other fertility behavior such as the age in which she first gets married and the time elapsed between marriage and first pregnancy. Thus we estimate Eq. (2) with these outcome variables. We summarize the results for age at first marriage regressions in Table (5). In both estimations, the results are broadly consistent: early life experiences induce the

[7] The only exception is miscarriages witnessed earlier, at the age of 0 to 4 years.

daughter to get married sooner[8]. In the estimation process we take measures to account for the daughter's religion, her education and employment status and a host of covariates explained in the data section. The estimation with all the daughters in our sample (Column (1)) generally yield no significant results, yet with the sibling fixed effect (Column (2)) the significance changes dramatically. The magnitudes vary across different events and age groups in which they are observed. Roughly speaking, we observe about 1 year to 4 year decrease in the age of first marriage as a result of the early childhood adverse shocks.

In Table (6), we examine the elapsed time (in years) between marriage and first pregnancy. Similar to the previous two cases, the inclusion of sibling fixed results the estimated coefficients for adverse outcomes becoming significant (Column (2)). Both child deaths (except the oldest age category) and stillbirths witnessed result in daughters getting pregnant sooner after their marriage. Witnessing miscarriages and sibling deaths when once is relatively older (10 years or more) seem to increase the time elapsed between the two major fertility behavior patterns.

In order to ensure the differential impact of age, i.e. the age cutoffs are in fact statistically different from each other; we conduct a series of t-tests and report them in Table (7). For all of the three fertility outcomes mentioned above we are able to establish, at 99 percent significance level, the differential effects based on the age in which they are witnessed. We then conduct an attrition analysis to confirm that our results are not driven by attrition. As per the results summarized in Table (8) we can conclude that attrition is not a factor causing the observed estimates. We see an impact of daughters whose parents are middle school educated. Yet in our analysis, the sibling fixed effect would correct this issue since extreme changes in parent's education over the course of the panel is quite rare in our sample and is mostly accounted by the

[8] The exceptions are the miscarriages observed at ages 0 to 4 and stillbirths observed at ages 5 to 9. In both the instances the coefficient reports positive values which is contrary to our hypothesis.

sibling fixed effect. We also plot the relationship between the explanatory variables of interest and number of pregnancies in Figure 2. We conduct further robustness checks based on the age cutoffs and the age of the perished sibling to ensure the consistency of our results as detailed in the following section.

Robustness Check

Our decision to group the events into five year intervals is completely arbitrary. To check for the robustness of our estimates, we regroup the age categories to have four year intervals instead of five. Due to the number of underlying adverse events, we prefer the five year age brackets. Table (9) summarizes the regression results for the three outcome variables under four year age intervals. We observe that the results are qualitatively consistent with the five year age cutoffs. For instance, adverse shocks in the family observed during the daughter's childhood years generally increase her number of pregnancies (Column (1)), induces her to marry earlier (Column (2)) and start a family sooner (Column (3)). Since the frequency with which the adverse shocks occur is low, our analysis would benefit from grouping off of four or five year intervals. We estimate the impact at even smaller age intervals (ex. three-year, two-year, and one-year intervals) and find that there is not enough variation to conduct the analysis[9].

As another robustness measure, instead of treating all the sibling deaths equally, we regroup them into how long the perished sibling lived. We create three groups based on the age at the time of death: infant (lived 0 to less than 1 year), young (lived 1 to 5 years), old (lived 6 or more years) for the convenience of the analysis. We then count how many of these different types of

[9] Results not shown but available upon request.

deaths the daughter observed after she was born. The rationale is that the older the sibling was prior to death the more emotionally connected the daughter might have been to him or her. Therefore witnessing an older sibling dying could potentially have a differential impact than an infant sibling death. We conduct the regressions for the three main outcome variables using this measure of sibling death and summarize the results in Table (10). Much like before, inclusion of the sibling fixed effect renders our coefficients of interest statistically significant. We find that if the perished sibling was older than 5 years at the time of the death, the daughter's number of pregnancies increase by 1.3 on average (Column (2)). This hints at a one to one replacement for the older sibling deaths. If the perished sibling was less than 5 years at the time of death we observe a reduction in the number of daughter's own pregnancies. However, the magnitude of the coefficients is low (0.3 and 0.5 pregnancies) despite the significance. As per the other fertility behavioral outcomes, witnessing younger sibling deaths (aged less than 5 years) induces the daughter to get married earlier (Column (4)) and start a family sooner (Column (6)). The results also reveal that at the death of siblings aged over 6 years, the daughters on average get married later and allow more time to elapse between marriage and pregnancy. The results are consistent with the signs of the coefficients we found for daughters who were 10 years or older when they witnessed sibling deaths reported in Table (6) Column (2) such that if the perished siblings were older than 5 years, then the daughters who observed such deaths must have been even older. Therefore we notice that the older the perished sibling was and older the survived daughter was, we would expect a delay in the marriage and first pregnancy.

Heterogeneity

We then check for the possible heterogeneous effects of the sibling deaths by categorizing them into the number of male sibling deaths and female sibling deaths that a daughter witnessed after she was born. We observe differential impact based on the gender of the perished sibling. Based on results in Table (11) Column (2) having seen brothers dying increases the number of pregnancies at a larger proportion than a daughter has more compared to losing sisters (magnitude is 0.9 pregnancies and 0.09 respectively). Losing brothers also result in her getting married earlier (Column (4)) and getting pregnant sooner (Column (6)). With respect to losing sisters, the daughter postpones marriage, however once married she starts a family rather quickly than otherwise.

We then interact the income status (proxied by household expenditure), i.e. whether above or below the median income, with the number of sisters and brothers lost and summarize the results in Table (12). The daughters whose household income is above the median income tend not to have a dramatic difference based on the gender of the perished sibling since in both cases her own number of pregnancies increase by roughly the same amount (0.6 and 0.4) (Column (2)). The age at first marriage is slightly lower if the daughter is from above median income household and has more lost brothers (Column (4)). In both events, we notice that the daughter spends about the same time between marriage and pregnancy (Column (6)). In the following section we explore the potential mechanisms of the results observed.

Mechanisms

The following section discusses some potential channels that could be the driving force of the results. Witnessing adverse shocks in childhood could potentially influence the daughter's behavioral parameters, i.e. fertility preferences altogether. IFLS measures the prospective fertility and preferences directly and we use the most recent desired fertility preference (IFLS 4) for the daughter. In the absence of the most recent information we fill the missing values with stated preferences in previous waves. [10] We estimate Eq. (2) with the daughter's desired number of children. Since IFLS asks the respondents how many more children they would like to have in addition to the children they already have, we control for the daughters current number of children in addition to afore mentioned covariates.

In Table (13), we report the fertility preference regression results. Under the sibling fixed effect (Column (2)) results indicate that witnessing sibling deaths increases the desired family at a one to one proportion. The miscarriages and stillbirths do not seem to be affecting fertility preference as much as sibling deaths do. Further analysis explains that siblings who were aged 1 to 5 years at the time of the death seem to have the highest impact on the survived daughters (Table (14) Column (2). Breaking down the sibling deaths by gender of the perished sibling reveals that the higher the number of brothers lost (compared to number of sisters lost) the daughters tend to increase the ideal number of children by 1.59 (Table (15) Column (2). Another explanation for the magnitudes of the coefficients, and the fact that they are not significantly different from 1, suggest that daughters stockpile (or hoard) one extra child for sibling death they observe. The child hoarding behavior is suggested in the literature (Olsen, 1983; Zhang, 1990; Gupta, 1995; Ozcan, 2003; Doepke, 2005) especially with respect to fertility decisions of the same mother. In

[10] There are 95 cases where IFLS 4 reported missing values for ever married women and they were replaced using IFLS 2 and IFLS 3 information.

our study what we observe is that child (sibling) deaths have an impact on the prospective mothers and that the effect is carried intergenerationally. This is a case of intergenerational dividends for health policy which may not be directly observable at the time of the implementation.

Having observed adverse shocks during childhood could potentially influence a person's preferences for time, i.e. whether it makes one more impatient? We obtain the time preferences for the observational unit, daughter, from IFLS 4 in the form of ubiquitous method of lottery choice. The first two questions screen individuals who are irrational and may be fundamentally different from those who are willing to take risk. Our study is thus devoid of such individuals who are "gamble averse" (Hamoudi, 2006). After the initial screening, a series of questions are asked from the respondents and in each question the respondent has the choice between a certain payoff (X) today and other payoffs in five years (Y and Z) (Ng, 2013). Using expected utility theory we can assume that an individual will chose to wait for the later payoffs only if the expected utility of that option is higher than the expected utility of the certain payoff which can be written as:

$$(3)\ U(X) < 0.5\, U(Y) + 0.5\, U(Z).$$

We illustrate the hypothetical game in Figure 2. We categorize the individuals, after the first screening, into four groups: group 1 (least impatient) to group 4 (most impatient). Even though one could argue that hypothetical games as such may not provide the incentive for the respondents to be truthful since no real stakes are involved, there is empirical evidence of high correlation between survey data and an actual experiment carried out by Hamoudi and Thomas (2006) using the Mexican Family Life Survey (MxFLS) respondents. The module in IFLS was patterned after MxFLS (Strauss et al., 2009). We estimate the model using ordered probit technique and report the coefficients and marginal effects for the whole sample as well as siblings sample in Table (16). According to the marginal effects results in Column (4) early life shocks as designed in this study do not seem to be affecting the time preferences. We do further analysis by regrouping the sibling deaths by age at the death and the gender of the perished sibling, yet marginal effects are not statistically different from zero (results not shown)[11].

Another channel we are able to rule out in our analysis is risk preferences. Similar to the time preferences case we construct four risk categories based on the IFLS lottery questions where category 1 indicate least risk averse group and category 4 represent the most risk averse respondents. Based on the results shown in Table (17) we do not find statistically significant results for the marginal effects (Column (4))[12].

Another potential channel could be mental health since witnessing adverse events in childhood could have lasting impact on one's mental status. The IFLS 4 implemented a mental health questionnaire that included ten questions (a shorter version) of the Center for Epidemiologic Studies Depression Scale (CES-D). While CES-D is widely used as a depression measure, studies have attested its reliability and validity as a measure for depression symptoms in both less developed and developed societies (Mackinnon et al., 1998). Similar approaches have been used in prior studies analyzing the Indonesian context with respect to, for example, urban-rural migration (Lu, 2010). The measure of mental health is thus a continuous scale constructing by adding the four-point Likert scale (from 0 to 3) for the ten questions asked. The measure ranges

[11] We also conduct a binary classification of time preferences in multiple ways (first by clubbing time preference categories 1 and 2 to take value 0 (patient) and 3 and 4 to take the value of 1 (impatient), next putting the categories 1, 2, 3 together as 0 (patient) and category 4 as 1 (impatient)). In both instances the probit estimation fails to converge under the maximum likelihood estimation.

[12] We compute a binary classification of risk preferences in multiple ways (first by clubbing risk preference categories 1 and 2 to take value 0 (less risk averse) and 3 and 4 to take the value of 1 (more risk averse), next putting the categories 1, 2, 3 together as 0 (less risk averse) and category 4 as 1 (more risk averse)). In both instances the probit estimation fails to converge under the maximum likelihood estimation.

from 0 to 30 while a higher score reflecting higher depression level (Radloff, 1977). According to results shown in Table (18) we are unable to establish a causal channel from adverse fertility outcomes of the mother to the daughter's mental health (Column (4)).

6. Conclusion

In this paper, we built on an emerging literature on the lasting effects of early life experiences to examine adult fertility behavior. In particular, we focus on the lasting effects of witnessing adverse fertility outcomes (miscarriages and stillbirths) and sibling deaths. We find strong results which persist across time and which vary in intensity based on the respondent's age at the time of the event, the age as well as the gender of the perished sibling. We find evidence that the observers of these adverse outcomes change the fertility preferences in order to ensure a particular family size. Our results are thus strongly consistent with hoarding behavior. Whereas the previous literature discussed the hoarding of children (to insure against deaths), we find that women "hoard" pregnancies to compensate for potential adverse fertility and child outcomes.

The results point to a strong inter-generational persistence to fertility suggesting that the effect of health interventions may not be limited to only one generation. They may extend across multiple generations through changed fertility behavior (independent of any effects on human capital formation). In particular, our results imply that reducing adverse fertility and child outcomes observed during childhood leads children to have smaller families when they become adults. Consequently, there is an additional payoff in the second generation.

More broadly, these results fit into a broader literature on the inter-generational transfers. Whereas earlier research has focused on physical and human capital as well as occupation choices, we suggest that experiences are part of this inheritance and shape subsequent adult behavior.

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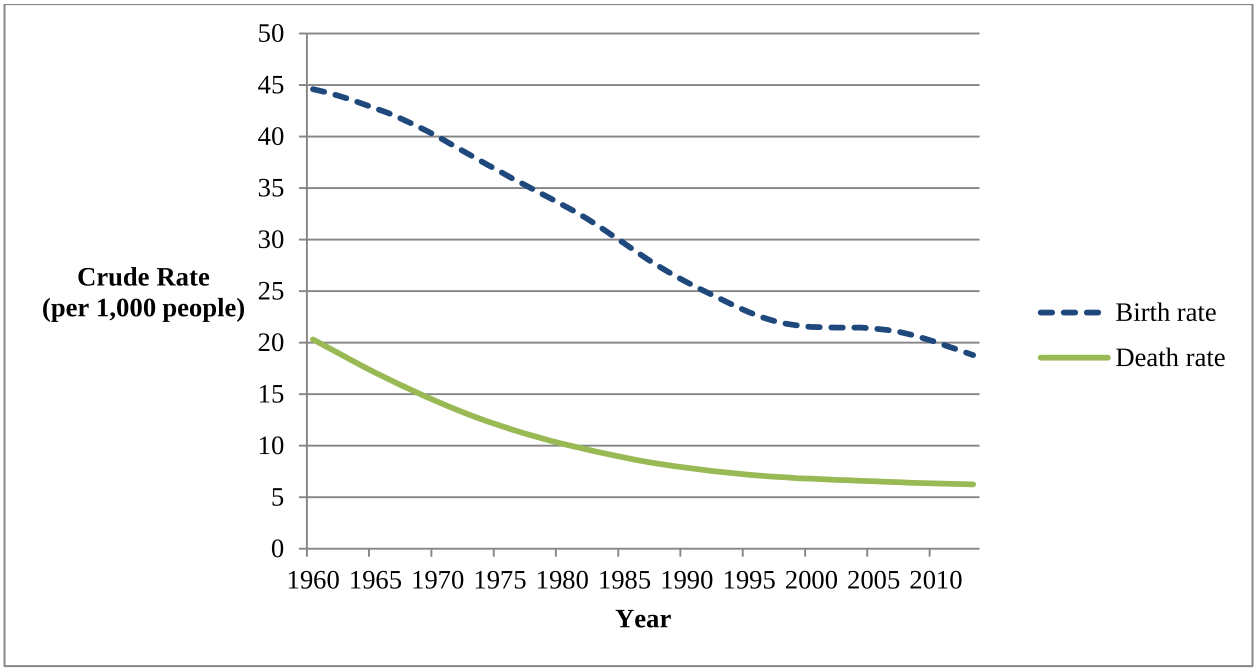
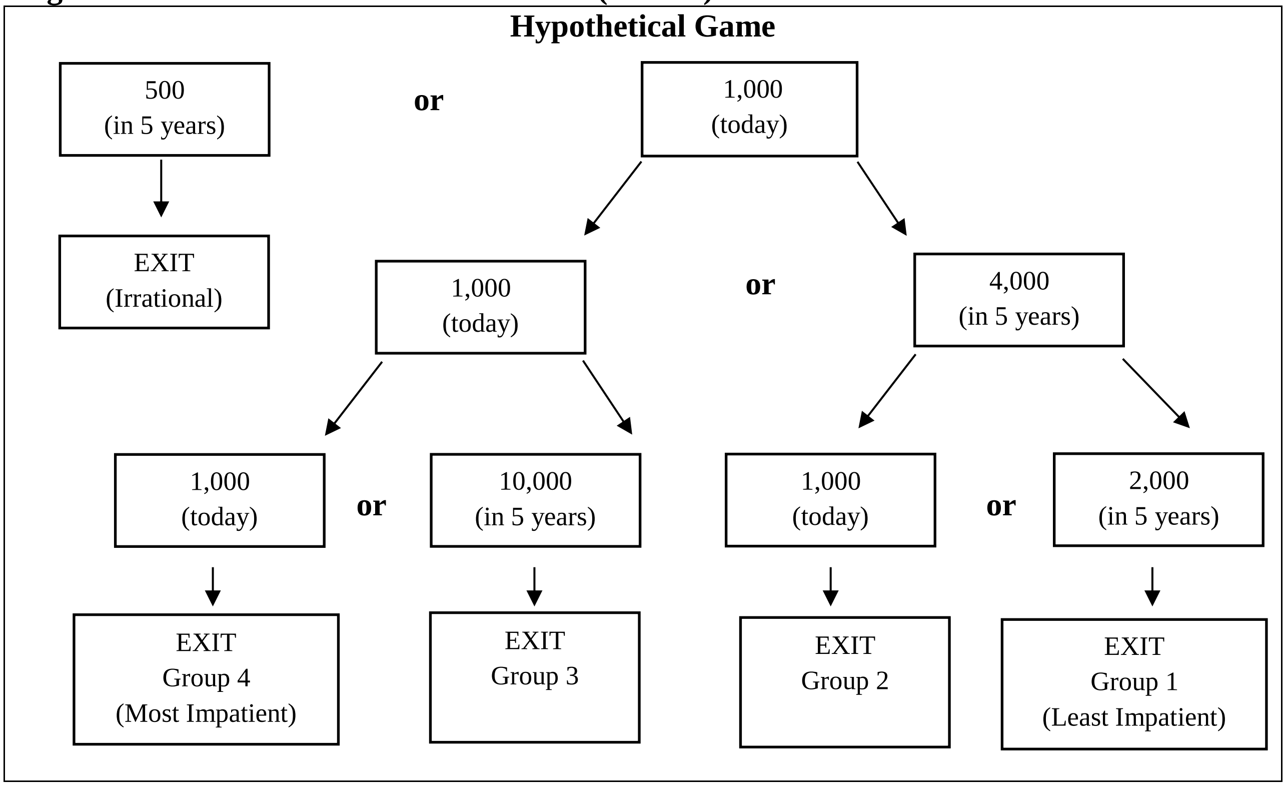
Appendix

Figure 1 – The Trend in Crude Birth Rate and Crude Death Rate in Indonesia from 1960 - 2013



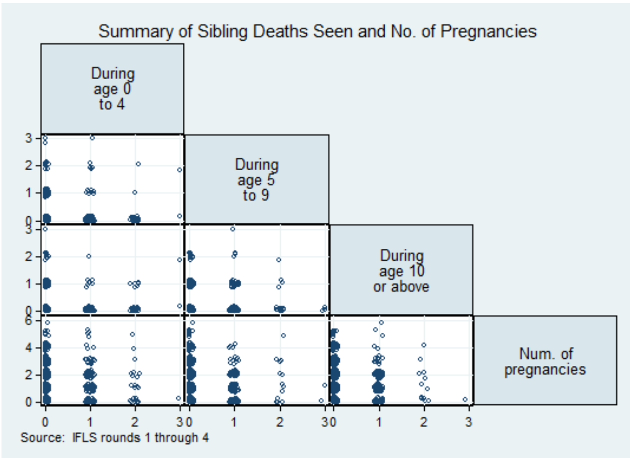
Notes:
[1] Data obtained from the World Development Indicators of the World Bank.

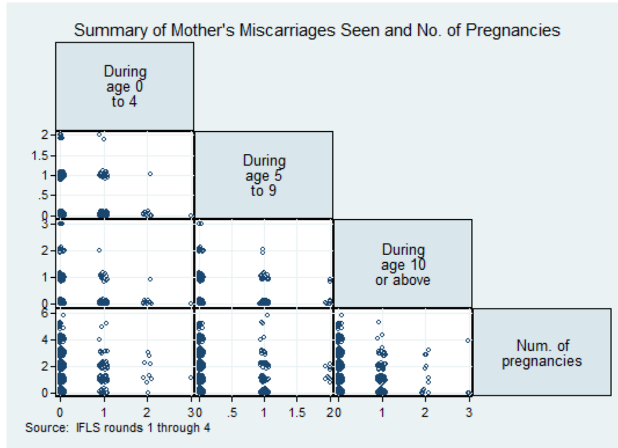
Figure 2 - Flowchart on Time Preferences (IFLS 4)



Notes:
[1] All payoffs reported are in thousand Indonesian Rupiah.
[2] The wait times are shown in parenthesis.

Figure 3 – The Scatterplot Matrix of Childhood events and Number of Pregnancies





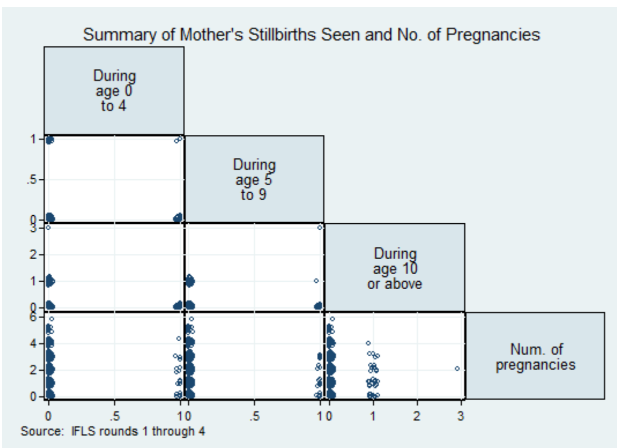


Table 1 – Descriptive Statistics for Daughters who are 9 to 17 Years Old in 1993

Variable	N	Mean	SD	Min	Max
Daughter's Fertility Outcomes					
No. of pregnancies	2,278	1.143	1.048	0	6
Ideal no. of kids	1,676	2.514	1.047	0	13
Current no. of kids	1,758	1.334	0.832	0	6
Age at first marriage	1,772	20.93	3.333	12	32
Married before 21 (*dummy*)	2,395	0.344	0.475	0	1
Gap (yrs) between marriage and 1st pregnancy	1,574	1.184	1.395	-9	12
Mother's Fertility Outcomes					
No. of pregnancies	2,901	5.649	2.806	0	18
No. of livebirths	2,901	5.197	2.547	0	17
No. of stillbirths	2,901	0.0814	0.353	0	5
No. of miscarriages	2,901	0.371	0.731	0	6
No. of child deaths	2,901	0.428	0.884	0	9
Whether a child die (*dummy*)	2,901	0.267	0.443	0	1
Daughter's Behavioral Outcomes					
Risk preferences	1,976	3.763	0.689	1	4
Time preferences	2,135	3.729	0.615	1	4
Mental health score	2,149	3.816	3.586	0	26
Daughter's Characteristics					
Age in 2007	2,901	26.65	2.544	23	31
Ever Married *(dummy)*	2,854	0.782	0.413	0	1
Ability to conceive *(dummy)*	1,773	0.967	0.179	0	1
Muslim (*dummy*)	2,854	0.872	0.334	0	1
Rural (*dummy*)	2,901	0.442	0.497	0	1
Employed (*dummy*)	2,851	0.567	0.496	0	1
Birth order	2,725	2.202	1.235	1	9
Oldest daughter (*dummy*)	2,725	0.353	0.478	0	1
Education					
Primary school education or less (*dummy*)	2,901	0.253	0.435	0	1
Middle school education (*dummy*)	2,901	0.213	0.409	0	1
High school education (*dummy*)	2,901	0.335	0.472	0	1
College education (*dummy*)	2,901	0.182	0.386	0	1
Spouse's Characteristics					
Employed (*dummy*)	2,231	0.653	0.476	0	1
Lives at household (*dummy*)	2,231	0.658	0.474	0	1
Education					

Primary school education or less (*dummy*)	2,278	0.190	0.392	0	1
Middle school education (*dummy*)	2,278	0.122	0.327	0	1
High school education (*dummy*)	2,278	0.243	0.429	0	1
College education (*dummy*)	2,278	0.0887	0.284	0	1
Age					
29 years or less (*dummy*)	2,278	0.222	0.415	0	1
30 to 39 years (*dummy*)	2,278	0.388	0.487	0	1
40 + years (*dummy*)	2,278	0.0338	0.181	0	1
Community Characteristics					
Fam. planning counselling availability (*dummy*)	2,899	0.988	0.111	0	1
Contraception availability (*dummy*)	2,899	0.978	0.146	0	1

Table 2: Characteristics of mothers who had child deaths vs. those who did not

Variable	N	No child deaths Mean (SD)	N	Had child deaths Mean (SD)	P-value
Age in 1993	1574	39.62	570	37.76	<0.001
		(8.54)		(5.97)	
Rural (*dummy*)	1574	0.51	570	0.57	0.009
		(0.49)		(0.49)	
Number of pregnancies	1574	4.97	570	6.81	<0.001
		(2.68)		(2.70)	
Number of live births	1574	4.56	570	6.29	<0.001
		(2.43)		(2.41)	
Number of stillbirths	1574	0.06	570	0.11	0.012
		(0.34)		(0.38)	
Number of miscarriages	1574	0.34	570	0.40	0.099
		(0.71)		(0.75)	
Education	1477	7.64	542	5.57	<0.001
		(7.17)		(5.02)	
Household expenditure in 1993	1565	1.23E+07	569	1.27E+07	0.844
		-4.21E+07		-4.39E+07	

Notes:

[1] P-values based on a t-test.

[2] Education includes both mother's and father's education

Table 3: Characteristics of unmarried vs. married daughters

Variable	N	Unmarried Mean (SD)	N	Married Mean (SD)	P-value
Age in 2007	623	25.59	2231	26.92	<0.001
		(2.36)		(2.51)	
Rural (*dummy*)	623	0.32	2231	0.47	<0.001
		(0.46)		(0.49)	
Education	623	11.61	2230	9.68	<0.001
		(3.99)		(3.68)	
Cognitive Score	552	0.01	1820	0.001	0.853
		(1.10)		(0.96)	
Muslim (*dummy*)	623	0.81	2231	0.88	<0.001
		(0.38)		(0.31)	
Number of siblings	623	0.86	2231	0.77	0.034
		(0.95)		(0.94)	
Employed (*dummy*)	622	0.75	2229	0.51	<0.001
		(0.42)		(0.49)	
Birth order	582	2.45	2101	2.13	<0.001
		(1.34)		(1.19)	
Oldest daughter (*dummy*)	582	0.28	2101	0.37	<0.001
		(0.45)		(0.48)	

Notes:
[1] P-values based on a t-test.

Table 4 - Number of Pregnancies Regressions

VARIABLES	Model 1	
	All daughters	Sibling only
	(1)	(2)
Deaths seen during age 0 to 4	0.073	0.855***
	(0.089)	(0.002)
Deaths seen during age 5 to 9	-0.019	0.756***
	(0.102)	(0.003)
Deaths seen during age 10 or more	0.208**	1.308***
	(0.092)	(0.005)
Miscarriages seen during age 0 to 4	0.065	-0.088***
	(0.052)	(0.004)
Miscarriages seen by during 5 to 9	0.220**	1.360***
	(0.086)	(0.010)
Miscarriages seen during age 10 or more	0.234***	1.869***
	(0.072)	(0.008)
Stillbirths seen during age 0 to 4	0.237	3.637***
	(0.259)	(0.017)
Stillbirths seen by during 5 to 9	-0.020	1.635***
	(0.185)	(0.021)
Stillbirths seen during age 10 or more	0.107	2.825***
	(0.163)	(0.006)
Observations	1,675	791
Municipality FE	YES	YES
Religion FE	YES	YES
Sibling FE	NO	YES

Notes:

[1] Robust standard errors clustered by municipality in parentheses.

[2] *** p<0.01, ** p<0.05, * p<0.1.

[3] All regressions estimated using a Tobit model left censored at 0.

[4] All regressions controlled for mother's live births seen, daughter's, spouse's, and community characteristics.

Table 5 - Age at First Marriage Regressions

	Model 2	
VARIABLES	All daughters	Siblings only
	(1)	(2)
Deaths seen during age 0 to 4	-0.212	-0.993***
	(0.248)	(0.010)
Deaths seen during age 5 to 9	-0.364	-1.949***
	(0.232)	(0.014)
Deaths seen during age 10 or more	-0.170	-3.090***
	(0.262)	(0.016)
Miscarriages seen during age 0 to 4	-0.061	0.365***
	(0.229)	(0.020)
Miscarriages seen by during 5 to 9	-0.507**	-1.207***
	(0.216)	(0.011)
Miscarriages seen during age 10 or more	-0.220	-1.084***
	(0.238)	(0.017)
Stillbirths seen during age 0 to 4	-0.817	-4.023***
	(0.822)	(0.019)
Stillbirths seen by during 5 to 9	-0.714	3.200***
	(0.876)	(0.023)
Stillbirths seen during age 10 or more	-0.317	-0.375***
	(0.443)	(0.011)
Observations	1,674	791
Municipality FE	YES	YES
Religion FE	YES	YES
Sibling FE	NO	YES

Notes:

[1] Robust standard errors clustered by municipality in parentheses.

[2] *** p<0.01, ** p<0.05, * p<0.1.

[3] All regressions estimated using a Tobit model left censored at age 18.

[4] All regressions controlled for mother's live births seen, daughter's, spouse's, and community characteristics.

Table 6 - Gap between Marriage and First Pregnancy Regressions

	Model 3	
VARIABLES	All daughters	Siblings only
	(1)	(2)
Deaths seen during age 0 to 4	-0.098	-1.018***
	(0.122)	(0.005)
Deaths seen during age 5 to 9	-0.014	-0.457***
	(0.153)	(0.007)
Deaths seen during age 10 or more	0.116	0.214***
	(0.162)	(0.010)
Miscarriages seen during age 0 to 4	0.131	0.229***
	(0.124)	(0.013)
Miscarriages seen by during 5 to 9	-0.077	1.053***
	(0.114)	(0.012)
Miscarriages seen during age 10 or more	-0.057	0.924***
	(0.148)	(0.029)
Stillbirths seen during age 0 to 4	-0.263	-4.547***
	(0.248)	(0.006)
Stillbirths seen by during 5 to 9	0.091	-11.305***
	(0.576)	(0.011)
Stillbirths seen during age 10 or more	0.499	-9.075***
	(0.332)	(0.008)
Observations	1,492	704
Municipality FE	YES	YES
Religion FE	YES	YES
Sibling FE	NO	YES

Notes:

[1] Robust standard errors clustered by municipality in parentheses.

[2] *** p<0.01, ** p<0.05, * p<0.1.

[3] All regressions estimated using a Tobit model left censored at 0.

[4] All regressions controlled for mother's live births seen, daughter's, spouse's, and community characteristics.

Table 7- Test of Coefficients

Event	P - Value		
	Pregnancies	Age at first marriage	Gap (yrs)
	Model 1	Model 2	Model 3
Pr (Age 0 to 4 = Age 5 to 9 = Age 10 or more)			
Sibling deaths seen	0.000	0.000	0.000
Miscarriages seen	0.000	0.000	0.000
Stillbirths seen	0.000	0.000	0.000

Notes:

[1] All regressions estimated using a Tobit model and the siblings sample.

[2] All regressions controlled for mother's live births seen, daughter's, spouse's, and community characteristics.

Table 8 - Attrition Analysis

VARIABLES	Likelihood of appearing in IFLS 4
Age in 1993	-0.017
	(0.025)
Rural	-0.222
	(0.161)
Birth order	0.017
	(0.060)
Oldest daughter	-0.015
	(0.135)
Level of education:	
Middle school	-0.171
	(0.157)
High school	0.335
	(0.215)
Family expenditure	0.000
	(0.000)
Parent's education:	
Middle school	-0.301***
	(0.113)
High school	-0.297
	(0.197)
College	-0.222
	(0.273)
Observations	2,461
Municipality FE	YES
Religion FE	YES
Sibling FE	NO

Notes:

[1] Robust standard errors clustered by municipality in parentheses.

[2] *** p<0.01, ** p<0.05, * p<0.1.

[3] Regression estimated using a probit model.

Table 9 - Robustness Check: 4 Year Interval Regressions

	Pregnancies	Age at first marriage	Gap (yrs)
VARIABLES	(1)	(2)	(3)
Deaths seen during age 0 to 3	0.870***	-0.478***	-0.642***
	(0.003)	(0.014)	(0.008)
Deaths seen during age 4 to 7	0.915***	-2.472***	-0.474***
	(0.004)	(0.019)	(0.011)
Deaths seen during age 8 to 11	0.627***	-0.981***	0.561***
	(0.005)	(0.020)	(0.011)
Deaths seen during age 12 or more	1.462***	2.085***	0.205***
	(0.003)	(0.018)	(0.027)
Miscarriages seen during age 0 to 3	-0.084***	0.735***	0.040***
	(0.005)	(0.021)	(0.013)
Miscarriages seen during age 4 to 7	0.472***	-0.310***	0.826***
	(0.004)	(0.017)	(0.015)
Miscarriages seen during age 8 to 11	0.893***	-2.969***	1.338***
	(0.005)	(0.030)	(0.016)
Miscarriages seen during age 12 or more	1.153***	-0.569***	0.307***
	(0.008)	(0.035)	(0.016)
Stillbirths seen during age 0 to 3	6.218***	-11.069***	-3.800***
	(0.008)	(0.028)	(0.076)
Stillbirths seen during age 4 to 7	3.238***	-5.641***	-3.298***
	(0.015)	(0.033)	(0.020)
Stillbirths seen during age 8 to 11	5.213***	-8.732***	-4.704***
	(0.007)	(0.020)	(0.048)
Stillbirths seen during age 12 or more	6.101***	-7.222***	-3.341***
	(0.006)	(0.022)	(0.012)
Observations	791	791	704
Municipality FE	YES	YES	YES
Religion FE	YES	YES	YES
Sibling FE	YES	YES	YES

Notes:

[1] Robust standard errors clustered by municipality in parentheses.

[2] *** p<0.01, ** p<0.05, * p<0.1.

[3] All regressions estimated using a Tobit model and the siblings sample.

[4] All regressions controlled for mother's live births seen, daughter's, spouse's, and community characteristics.

Table 10 - Robustness Check: The Age at Death of the Perished Sibling

	Pregnancies		**Age at first marriage**		**Gap (yrs)**	
	All daughters	Sibling only	All daughters	Sibling only	All daughters	Sibling only
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Number of sibling deaths who were :						
aged (<1yr) at death	0.005	-0.313***	-0.401	-4.794***	0.035	-6.890***
	(0.111)	(0.003)	(0.391)	(0.010)	(0.194)	(0.005)
aged (1 to 5 yrs) at death	0.109	-0.569***	-0.222	-1.159***	-0.011	-4.785***
	(0.096)	(0.003)	(0.260)	(0.018)	(0.155)	(0.012)
aged (>5 yrs) at death	0.009	1.340***	0.094	2.645***	-0.050	5.634***
	(0.134)	(0.003)	(0.437)	(0.012)	(0.157)	(0.008)
Observations	1,675	791	1,674	791	1,492	704
Municipality FE	YES	YES	YES	YES	YES	YES
Religion FE	YES	YES	YES	YES	YES	YES
Sibling FE	NO	YES	NO	YES	NO	YES

Notes:

[1] Robust standard errors clustered by municipality in parentheses.

[2] *** p<0.01, ** p<0.05, * p<0.1.

[3] All regressions estimated using a Tobit model.

[4] All regressions controlled for early life shocks (livebirths, stillbirths, and miscarriages), daughter's, spouse's, and community characteristics.

Table 11 - Heterogeneity: The Gender of the Perished Sibling

	Pregnancies		**Age at first marriage**		**Gap (yrs)**	
	All daughters	Sibling only	All daughters	Sibling only	All daughters	Sibling only
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Number of perished siblings who were :						
sisters	0.062*	0.095***	0.092	3.231***	-0.045	-8.310***
	(0.037)	(0.003)	(0.201)	(0.016)	(0.111)	(0.007)
brothers	0.036	0.943***	-0.363**	-1.656***	0.057	-0.700***
	(0.048)	(0.004)	(0.144)	(0.009)	(0.078)	(0.005)
Observations	1,675	791	1,674	791	1,492	704
Municipality FE	YES	YES	YES	YES	YES	YES
Religion FE	YES	YES	YES	YES	YES	YES
Sibling FE	NO	YES	NO	YES	NO	YES

Notes:

[1] Robust standard errors clustered by municipality in parentheses.
[2] *** p<0.01, ** p<0.05, * p<0.1.

[3] All regressions estimated using a Tobit model.

[4] All regressions controlled for early life shocks (livebirths, stillbirths, and miscarriages), daughter's, spouse's, and community characteristics.

Table 12 - Heterogeneity: The Gender of the Perished Sibling and Income above Median

	Pregnancies		**Age at first marriage**		**Gap (yrs)**	
	All daughters	Sibling only	All daughters	Sibling only	All daughters	Sibling only
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Sisters lost * Income above median	0.133**	0.640***	-0.154	-1.241***	-0.041	-1.260***
	(0.067)	(0.001)	(0.313)	(0.007)	(0.205)	(0.011)
Brothers lost * Income above median	0.052	0.413***	-0.322	-3.372***	0.230**	-1.126***
	(0.072)	(0.005)	(0.223)	(0.014)	(0.107)	(0.011)
Observations	1,672	791	1,671	791	1,489	704
Municipality FE	YES	YES	YES	YES	YES	YES
Religion FE	YES	YES	YES	YES	YES	YES
Sibling FE	NO	YES	NO	YES	NO	YES

Notes:

[1] Robust standard errors clustered by municipality in parentheses.

[2] *** p<0.01, ** p<0.05, * p<0.1.

[3] All regressions estimated using a Tobit model.

[4] All regressions controlled for early life shocks (livebirths, stillbirths, and miscarriages), daughter's, spouse's, and community characteristics.

Table 13 - Mechanisms: Fertility Preference Regressions

	Ideal Number of Children	
VARIABLES	All daughters	Siblings only
	(1)	(2)
Deaths seen during age 0 to 4	0.216***	1.492***
	(0.082)	(0.337)
Deaths seen during age 5 to 9	0.168	1.190***
	(0.140)	(0.384)
Deaths seen during age 10 or more	-0.032	1.203**
	(0.075)	(0.499)
Miscarriages seen during age 0 to 4	-0.045	0.112
	(0.087)	(0.315)
Miscarriages seen by during 5 to 9	-0.020	0.254
	(0.098)	(0.457)
Miscarriages seen during age 10 or more	-0.205***	0.192
	(0.076)	(0.649)
Still births seen during age 0 to 4	-0.361**	-0.927
	(0.162)	(0.935)
Still births seen by during 5 to 9	-0.172	-0.040
	(0.244)	(0.955)
Still births seen during age 10 or more	0.182	-0.365
	(0.122)	(0.972)
Observations	1,573	748
Municipality FE	YES	YES
Religion FE	YES	YES
Sibling FE	NO	YES

Notes:

[1] Robust standard errors clustered by municipality in parentheses.

[2] *** p<0.01, ** p<0.05, * p<0.1.

[3] All regressions estimated using a Tobit model left censored at 0.

[4] All regressions controlled for mother's live births seen, daughter's, spouse's, and community characteristics.

Table 14 - Mechanisms: Fertility Preference and the age at Death of the Perished Sibling

	Ideal Number of Kids	
	All daughters	Sibling only
VARIABLES	(1)	(2)
Number of sibling deaths who were :		
aged (<1yr) at death	-0.030	0.427
	(0.087)	(0.424)
aged (1 to 5 yrs) at death	-0.060	1.732***
	(0.063)	(0.625)
aged (>5 yrs) at death	0.177*	0.301
	(0.095)	(0.713)
Observations	1,573	748
Municipality FE	YES	YES
Religion FE	YES	YES
Sibling FE	NO	YES

Notes:

[1] Robust standard errors clustered by municipality in parentheses.

[2] *** p<0.01, ** p<0.05, * p<0.1.

[3] All regressions estimated using a Tobit model left censored at 1.

[4] All regressions controlled for early life shocks (livebirths, stillbirths, and miscarriages), daughter's, spouse's, and community characteristics.

Table 15 - Mechanisms: Fertility Preference and the Gender of the Perished Sibling

	Ideal Number of Kids	
	All daughters	Sibling only
VARIABLES	(1)	(2)
Number of perished siblings who were :		
sisters	0.125**	0.999
	(0.051)	(0.686)
brothers	0.040	1.591***
	(0.042)	(0.381)
Observations	1,573	748
Municipality FE	YES	YES
Religion FE	YES	YES
Sibling FE	NO	YES

Notes:

[1] Robust standard errors clustered by municipality in parentheses.

[2] *** p<0.01, ** p<0.05, * p<0.1.

[3] All regressions estimated using a Tobit model left censored at 0.

[4] All regressions controlled for early life shocks (livebirths, stillbirths, and miscarriages), daughter's, spouse's, and community characteristics.

Table 16 - Mechanisms: Time Preference Regressions

VARIABLES	Time Preference			
	All daughters		Sibling only	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
	(1)	(2)	(3)	(4)
Deaths seen during age 0 to 4	-0.275**	0.010*	3.007**	-0.016
	(0.132)	(0.005)	(1.175)	(0.110)
Deaths seen during age 5 to 9	0.231	-0.008	2.037	-0.010
	(0.174)	(0.007)	(1.858)	(0.070)
Deaths seen during age 10 or more	-0.015	0.001	-1.161	0.007
	(0.165)	(0.006)	(1.968)	(0.046)
Miscarriages seen during age 0 to 4	-0.169	0.006	-0.145	0.001
	(0.120)	(0.005)	(0.885)	(0.007)
Miscarriages seen by during 5 to 9	-0.135	0.005	-0.232	0.001
	(0.115)	(0.004)	(2.190)	(.)
Miscarriages seen during age 10 or more	0.049	-0.002	8.449**	-0.048
	(0.134)	(0.005)	(3.589)	(0.311)
Stillbirths seen during age 0 to 4	0.325	-0.012	1.459	-0.007
	(0.506)	(0.018)	(1.008)	(0.047)
Stillbirths seen by during 5 to 9	-0.503	0.018	-16.441***	0.094
	(0.310)	(0.013)	(4.627)	(0.648)
Stillbirths seen during age 10 or more	0.263*	-0.009	-3.348	0.020
	(0.154)	(0.006)	(3.196)	(0.133)
Observations	1,602	1,602	766	766
Province FE	YES	YES	YES	YES
Religion FE	YES	YES	YES	YES
Sibling FE	NO	NO	YES	YES

Notes:

[1] Robust standard errors clustered by municipality in parentheses.

[2] *** p<0.01, ** p<0.05, * p<0.1.

[3] Categorical dependent variable. Category 1 least impatient and category 4 most impatient.

[4] All regressions estimated using an ordered probit model.

[5] All regressions controlled for mother's live births seen, daughter's, spouse's, and community characteristics.

Table 17 - Mechanisms: Risk Preference Regressions

VARIABLES	Risk Preference			
	All daughters		Sibling only	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
	(1)	(2)	(3)	(4)
Deaths seen during age 0 to 4	-0.134	0.033	19.469***	-0.522
	(0.163)	(0.040)	(4.127)	(0.000)
Deaths seen during age 5 to 9	0.007	-0.002	10.994	-0.295
	(0.168)	(0.041)	(8.470)	(0.000)
Deaths seen during age 10 or more	0.228*	-0.056*	0.651	-0.018
	(0.138)	(0.033)	(.)	(0.000)
Miscarriages seen during age 0 to 4	-0.210	0.051	-13.158	0.353
	(0.198)	(0.048)	(9.310)	(0.000)
Miscarriages seen by during 5 to 9	-0.194	0.047	-6.492	0.174
	(0.164)	(0.039)	(12.546)	(0.000)
Miscarriages seen during age 10 or more	-0.045	0.011	-59.758**	1.601
	(0.142)	(0.034)	(30.471)	(0.000)
Stillbirths seen during age 0 to 4	0.109	-0.027	33.908**	-0.909
	(0.491)	(0.120)	(15.839)	(0.000)
Stillbirths seen by during 5 to 9	-0.301	0.073		
	(0.493)	(0.121)		
Stillbirths seen during age 10 or more	-0.191	0.046		
	(0.376)	(0.092)		
Observations	875	875	419	419
Province FE	YES	YES	YES	YES
Religion FE	YES	YES	YES	YES
Sibling FE	NO	NO	YES	YES

Notes:

[1] Robust standard errors clustered by municipality in parentheses.

[2] *** p<0.01, ** p<0.05, * p<0.1.

[3] Categorical dependent variable. Category 1 least risk averse and category 4 most risk averse.

[4] All regressions estimated using an ordered probit model.

[5] All regressions controlled for mother's live births seen, daughter's, spouse's, and community characteristics.

Table 18 - Mechanisms: Mental Health Regressions

	Mental Health Score			
	All daughters		Sibling only	
VARIABLES	Coefficient	Marginal Effect	Coefficient	Marginal Effect
	(1)	(2)	(3)	(4)
Deaths seen during age 0 to 4	0.141	-0.032	0.737	-0.074
	(0.102)	(0.023)	(0.500)	(0.000)
Deaths seen during age 5 to 9	-0.008	0.002	0.551	-0.055
	(0.087)	(0.020)	(1.226)	(0.000)
Deaths seen during age 10 or more	0.051	-0.012	-0.118	0.012
	(0.141)	(0.032)	(1.658)	(0.000)
Miscarriages seen during age 0 to 4	0.124	0.053	-0.806	0.779
	(0.133)	(0.064)	(0.552)	(0.000)
Miscarriages seen by during 5 to 9	-0.124	0.056	-3.280***	0.646
	(0.107)	(0.050)	(1.175)	(0.000)
Miscarriages seen during age 10 or more	-0.189*	0.044	-2.921	0.456
	(0.103)	(0.047)	(2.026)	(0.000)
Stillbirths seen during age 0 to 4	-0.229		-7.807***	
	(0.278)		(1.744)	
Stillbirths seen by during 5 to 9	-0.244		-6.471***	
	(0.216)		(2.390)	
Stillbirths seen during age 10 or more	-0.190		-4.566*	
	(0.208)		(2.576)	
Observations	1,613	1,613	769	769
Province FE	YES	YES	YES	YES
Religion FE	YES	YES	YES	YES
Sibling FE	NO	NO	YES	YES

Notes:

[1] Robust standard errors clustered by municipality in parentheses.

[2] *** p<0.01, ** p<0.05, * p<0.1.

[3] Categorical dependent variable. Value range 0 - 30. The higher the score the higher the depression.

[4] All regressions estimated using an ordered probit model.

[5] All regressions controlled for mother's live births seen, daughter's, spouse's, and community characteristics.