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Gender-Discriminatory Premarital Investments, Fertility Preferences, and Breastfeeding in Egypt

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Gender-Discriminatory Premarital Investments, Fertility Preferences, and Breastfeeding in Egypt*

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Abstract

We investigate whether Egyptian mothers display son preference in their breastfeeding behaviour, given the trade off between the protective effects of breastfeeding and its contraceptive properties. We also examine how intensity of exposure to gender-biased parental investments before childbirth affects maternal nursing behaviour, exploiting exogenous variation in mothers' age at premarital genital mutilation. We find mothers breastfeed boys for longer than girls, but breastfeed both boys and girls longer and more equally if they already have sons. Excess children are breastfed longer, reflecting reduced maternal desire to conceive beyond ideal family size. However these "unwanted" children are also breastfed less exclusively during infancy, receiving less protection from illness. Mothers circumcised before adolescence wean infants faster if they already have sons, in direct contrast to mothers circumcised when older. The bias in favour of older sons shown by mothers circumcised early is unaltered by educational attainment.

JEL classification: I14, J16, O15, O55

Keywords: Breastfeeding, fertility, gender bias, Egypt

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1 Introduction

Son preference is a persistent phenomenon in Egypt, influencing parental decisions on contraception as well as human capital investments in children (E.g. see Obermeyer, 1995; El-Gilany and Shady, 2007; Klasen, 2002; Yount, 2005). In this paper we examine the interplay between these two household choices. We investigate how women in Egypt optimally choose to breastfeed their children based on their previous and desired fertility outcomes, and their exposure to gender-discriminatory premarital health investments via genital mutilation. The maternal choice of breastfeeding duration involves a trade-off between protecting the health of her child, and the contraceptive effects and caloric costs of nursing (Blackburn, 2007; Weis, 1993; Thapa, 1987, Huffman et. al., 1987). Seminal findings for India presented in Jayachandran and Kuziemko (2011) show that son preference in combination with these properties of nursing leads to changing breastfeeding duration with as mothers' desire for more children evolves over the fertility cycle. A "passive" form of discrimination between children of differing gender and birth order may then inadvertently arise in breastfeeding protection, with adverse consequences for their future educational and labour market outcomes due to poorer early life health (E.g. see Miguel and Kremer, 2003; Smith, 2009; Case and Paxon, 2008). The robustness of the theoretical framework presented in this work is yet to be empirically examined for developing countries other than India where son preference is a social norm. Such examination is important for the external validity of the study, as India is dissimilar to other such countries with the marital dowry institution explaining much of the gender bias against girl children (E.g. see Rose, 2000; Murthi et. al., 1995). Our first contribution to the literature is to empirically test the framework in Egypt, which also has high prevailing son preference despite there being a bride price tradition at marriage rather than dowry (Anderson, 2007; Mashhour, 2005). The root causes of son preference in Egypt lie elsewhere, making the populous developing country a good alternative setting to validate the relevance and importance of the theory in the above study outside of India.

We further contribute to the literature by investigating the importance of maternal exposure to gender-discriminatory premarital investments as a causal channel for fertility preference impacts on breastfeeding behaviour. We measure the intensity of such exposure using the age at which the mother was circumcised before marriage. Our data show that premarital circumcision, or female genital mutilation, among Egyptian girls is still the norm despite being illegal and having potentially serious health consequences (Toubia, 1994; Dirie and Lindmark, 1992; Lightfoot-Klein and Shaw, 2006). The procedure is carried out by parents as a premarital investment to increase daughters' value on the marriage market. Higher parental lifetime utility from reduced agency costs of ensuring daughters' virginity and marital fidelity than from daughters' human capital leads to female child circumcision at lower ages (Posner, 1994; Chesnokova and Vaithianathan, 2010). Girls circumcised when relatively younger may show greater gender bias towards their own children due to lower human capital stock at marriage (E.g. see Thomas, 1994), as well as stronger son preference inherited from the parental household. On the other hand circumcision at a young age may lead girls to provide greater protection to their daughters. This is the first paper that attempts to identify causal effects of exposure to gender-discriminatory premarital investments on breastfeeding behaviour exploiting exogenous variation in age of maternal circumcision before marriage. By doing so we bring new findings as well as a novel identification strategy to the literature on intergenerational transmission of health and preferences (E.g. see Adriani and Sonderegger, 2009; Tabellini, 2008; Bisin and Verdier, 2001; Ahlburg, 1998; Göhlmann et. al., 2009; Bhalotra and Rawlings, 2009, 2011; Almond and Chey, 2006; Barker, 1992; Farré and Vella, 2007).

Finally, we augment existing findings by investigating fertility preference impacts on exclusive breastfeeding rates among infants. This is arguably a more important outcome than breastfeeding duration, as exclusive breastfeeding in the first six months of infancy is crucial for immune system development and protection from disease in early childhood, particularly in developing countries where the risk of exposure to unsanitary environments and drinking water is high (Ogra and Dayton, 1979; Goldman et. al., 1990; Clemens et. al., 1999). WHO country statistics show that diarrhea alone accounted for 7% of total under-5 mortality in Egypt in 2010, despite a successful ORS treatment campaign that greatly reduced incidence during 1980-91.[1] There is additional evidence that exclusive breastfeeding up to age six months improves child cognitive development and schooling outcomes (Kramer et. al., 2007). Examining exclusive breastfeeding therefore allows us to separately identify effects of maternal incentives to protect children from changing desire to conceive, as breastfeeding duration may change due to the latter but may also be more or less exclusive due to the former. We measure exclusive breastfeeding rates among infants aged up to six months using information on age at weaning and consumption of solid foods and liquids besides breast milk. Since longer breastfeeding duration beyond age six months also protects children from diarrheal and disease morbidity, we also examine how weaning varies with fertility outcomes

[1] The under-5 child mortality rate was 22 per 1000 live births in 2010.

for infants aged up to twelve months (Lamberti et. al., 2011).[2] This is the first paper that examines fertility preference impacts on breastfeeding explicitly in the infancy period as opposed to at all child ages.

To separate the effect of fertility preferences on breastfeeding from alternative causal channels such as "learning-by-doing" with successive births, we present a specific empirical pattern of results motivated by the theoretical framework in Jayachandran and Kuziemko (2011) that may not rule out alternative hypotheses, but are such that other hypotheses would also have to explain. Our results are qualitatively the same as those found for India, and point to a link between desired fertility and duration of breastfeeding. We find that there is gender discrimination in breastfeeding duration, with boys in Egypt having nearly twice the advantage over girls than in India. Breastfeeding duration increases with birth order and increases further sharply when women have conceived their ideal number of children, indicating declining desire for more children while approaching ideal family size and a further steep decline once it is achieved. Having older male siblings increases breastfeeding duration and reduces the breastfeeding gender gap, reflecting a reduced desire for more children once sons are born.

Children born in excess of ideal fertility are much more likely to be given food and liquids besides breast milk during ages 0-6 months. Conversely, these excess children are significantly less likely to be weaned. This shows that mothers breastfeed undesired offspring for longer so as to not conceive again, but actually give them less effective health protection by reducing breastfeeding exclusivity. We find the same pattern in child vaccinations, supporting this hypothesis. Mothers circumcised before age ten greatly increase weaning of infants aged 0-6 months once they already have sons, placing greater importance on allocating nutrients towards older male children. They also increase weaning of children in this age group as family size increases, prioritising child protection much less compared to mothers circumcised at older ages who reduce weaning with more sons and increasing family size. We find the same pattern of weaning among infants aged 0-12 months in response to larger family size and a higher male fraction of older offspring by age of maternal circumcision.

[2]This also makes the existing results on total breastfeeding duration beyond infancy more relevant in the developing country context.

The rest of the paper is organised as follows. Section 2 discusses son preference and female circumcision in Egypt, and the links from breastfeeding to child health and maternal fecundity. Section 3 describes the data, theoretical motivation, and methodology used in the analysis. Section 4 presents the results from our estimations and accompanying robustness checks. Section 5 concludes.

2 Background

In this section we motivate the relevance of our work and set it in the Egyptian context. The results from our analysis apply generally to developing countries where contraception use is not universal, and sanitation and hygiene standards are low enough to pose a health risk to young children. Egypt is an example of a country that grapples with these issues, and also has high prevailing son preference due to its religious and cultural institutions. This combination of circumstances yields testable predictions regarding the impact of fertility outcomes on breastfeeding as theoretically outlined in Jayachandran and Kuziemko (2011).

2.1 Egypt: Gender Institutions and Female Circumcision

There is a wealth of evidence in the medical and social science literatures documenting the presence of son preference in human capital investments and fertility choice in Egypt (E.g. see Obermeyer, 1995; El-Gilany and Shady, 2007; Klasen, 2002; Yount, 2005). This is largely because women have less autonomy than men in household decision-making, fewer rights over owning and inheriting property, and have low participation rates in the labour force (World Bank, 2004). The roots of this gender bias are to a large extent attributable to conservative interpretations of Islam that lead to gender inequality in marital and divorce rights, inheritance laws, and formal labour market participation (Inhorn, 1996; Doumato and Posusney, 2003; Mir-Hosseini, 2000).[3] The combined effect of these institutions is to make sons more valuable than daughters, as sons are likelier to contribute earned income to the household and keep inherited property within the family. We can therefore expect that desired fertility outcomes will reflect this son preference, and in combination with existing sex-composition of offspring will affect birth spacing and indirectly breastfeeding duration as well.

[3]Women were given the right to unilateral divorce in 2000 via the passage of the 'khula' law, but the democratic government has attempted reversing the legislation.

The institutional setting described has also contributed to the prevalence of female circumcision in Egypt. Female circumcision via excision of some or all of the external sexual organs is a widespread premarital investment carried out on daughters by parents. Existing research maintains that the practice is meant to protect daughters' virginity before marriage and remove the risk of marital infidelity on their part, ostensibly increasing their value on the marriage market (E.g. see Assaad, 1980; El-Gibaly et. al., 2002; Sayed et. al., 1996). Besides the risk of haemorrhage and death during the procedure, there are other documented health complications from circumcision such as cysts, infection, and septicemia (Toubia, 1994; Dirie and Lindmark, 1992; Lightfoot-Klein and Shaw, 2006). Crucially for our analysis, there is no evidence that these health risks vary systematically with age at circumcision or have implications for fertility and nursing. [4] The parental choice to expose daughters to these health risks at relatively earlier ages reflects a more intensely gender-discriminatory preference structure, as we argue when outlining the theoretical framework for our analysis.

2.2 Breastfeeding, Child Health, and Maternal Fertility

According to the medical literature, breastfeeding reduces fertility by interrupting the release of the Gonadotropin-releasing hormone that is necessary to begin ovulation. Breastfeeding also may increase the level of the hormone prolactin that is an ovulation inhibitor (Blackburn, 2007). This leads to a period of lactational amenorrhea in nursing mothers, during which they do not menstruate. Calories are diverted away from the mother while breastfeeding, and in developing countries this may very well lead to malnutrition that prevents ovulation. The caloric requirements of breastfeeding may conversely lead to children being weaned earlier in developing countries if their mothers become pregnant (Weis, 1993; Thapa, 1987, Huffman et. al., 1987). Mothers on average need to consume anywhere in the range of 300-670 calories extra over was needed to maintain pre-pregnancy weight to breastfeed exclusively without further weight loss (Riordan, 2004; Dewey, 1997; Institute of Medicine, 1991). There is no universally accepted figure, as the nutritional costs of breastfeeding depend on various factors such as maternal fat stores built up over pregnancy, how often the child is breastfed daily, and the efficiency with which mothers convert fat and food to milk (Reifsneider and Gill, 2000). Women in developing countries such as Egypt are unlikely to

[4] A particularly aggressive form of female circumcision termed infibulation has potential menstrual and obstetric complications, which potentially biases our results if the procedure and its fertility-related health effects are occur non-randomly at different ages. The cited literature on the topic however states that infibulation is not the prevailing form of circumcision in Egypt, and is in fact referred to as "Sudanese circumcision" as it is more widely practiced in neighbouring Sudan.

have built up significant fat stores in pregnancy, and are therefore likelier to produce less milk than women in developed countries, and require additional calories close to the upper end of this range to exclusively breastfeed for an extended period (Institute of Medicine, 1991). These nutritional costs of breastfeeding exclusively are likely to lead to changes in maternal nursing behaviour in Egypt in response to child gender and number of offspring.

The health benefits to children from being breastfed are numerous according to existing observational and clinical studies. Breast milk is attributed with stimulating immunological development in newborns alongside providing nutrition (Ogra and Dayton, 1979; Goldman et. al., 1990). An extensive review of existing evidence by the WHO found breastfed children to have significantly lower cholesterol and blood pressure in adulthood, and also to be less likely to be overweight or have type-2 diabetes than children who were not breastfed. It also found that breastfed children scored higher on intelligence tests (Horta et. al, 2007). Since 2001 the WHO recommends exclusive breastfeeding of infants up to age six months based on findings that it reduces gastrointestinal infection (Fewtrell et. al., 2007). This is particularly pertinent in developing countries including Egypt where there is a high risk of children consuming contaminated food and water if they are not exclusively breastfed, increasing diarrheal morbidity and infant mortality (E.g. see Arifeen et. al., 2001; Clemens et. al. 1999). This often leads to recommendations of some breastfeeding up to age 23 months to prevent diarrheal morbidity and mortality among children in developing countries (see review of developing country studies in Lamberti et. al., 2011). Importantly, there is a growing body of causal evidence from randomised controlled trials showing that exclusive breastfeeding up to age six months reduces gastrointestinal infections and increases cognitive test scores and motor development among children (Kramer et. al., 2007; Dewey et. al., 2001). Hence we will examine not only breastfeeding duration, but also exclusive breastfeeding among children aged 0-6 months and 0-12 months in our analysis.

3 Theoretical Motivation, Data, and Methodology

3.1 Framework for Analysis

The theoretical framework presented in Jayachandran and Kuziemko (2011) yields several empirically testable predictions for the impact of son-biased fertility preferences on breastfeeding duration. Breastfeeding duration should increase with birth order as mothers space their births more with each additional child. The male advantage in breastfeeding is expected to be greatest in the middling birth orders, where girls are weaned faster to facilitate the quicker birth of a following son before the mother's fertility ends. The gender gap should then close at higher birth orders, as mothers' desire for additional children declines irrespective of offspring sex composition. Breastfeeding duration should increase with the presence of older male siblings, as a satiated desire for sons would lead to reduced desire for future births and greater birth spacing. Finally, breastfeeding duration should increase as mothers approach their ideal total fertility, and then increase further among children born beyond the ideal as children are no longer weaned to facilitate future pregnancies. This final prediction is important to isolate the fertility preference effect from other mechanisms that may lead to longer breastfeeding duration with increasing birth order, such as "learning-by-doing" or reduced maternal attachment to the labour market as the number of children increases.

The rational choice approach to explaining the mechanisms behind female circumcision was initially outlined in Mackie (1996), which cites paternal certainty of offspring and assurance of women's virginity at marriage in a patriarchal culture and marriage market as the driving factors behind the practice.[5] An economic rationale is provided in Posner (1994), which attributes the practice to the associated reduction in the parental agency costs of protecting female children's virginity before marriage in the presence of imperfect information. Chesnokova and Vaithianathan (2010) also provides an economic motivation for female circumcision, showing theoretically that the practice is a necessary pre-marital investment in societies where it is common and also that marriage market competition leads to circumcision at younger ages to allow girls to find wealthy partners and marry them earlier.

Drawing from this literature, we can surmise that female circumcision at earlier ages takes place when parental lifetime utility from daughters' successful marriage market outcomes is greater than that from daughters' educational attainment, labour market participation, and potential health complications from the procedure. This is the outcome of an inherently son-biased preference structure over child human capital investments, as an equivalent trade-off between human capital and agency costs is not present for sons. An earlier age of female circumcision may therefore be interpreted as more intense exposure to gender-discriminatory premarital investment, as it entails a longer period of risk to health

[5]Identity economics is presented as an alternative explanation for female circumcision in Coyne and Mathers (2009).

and human capital accumulation before adolescence and marriage for the child.[6] We exploit variation in age of maternal circumcision as an exogenous measure of intensity of exposure to gender-discriminatory premarital investments, which is justifiable given Egyptian women traditionally only begin childbearing after marriage whereas circumcision is carried out before marriage.

We may expect that women circumcised at a relatively earlier age will show greater son preference towards their own children due to various causal channels. On possible channel is lower human capital stock at marriage for women circumcised earlier, which may arise because the health effects of circumcision prevent educational achievement, or because lower parental utility from their daughter's education relative to her successful marriage leads to lower premarital educational investment. This would reduce potential labour market earnings for these women, increasing their dependence on sons for household income and support at older ages. Sons also keep accumulated wealth in the family upon marriage, which may motivate greater son preference among women without significant labour market earnings. Lower educational attainment at marriage may additionally mean lower awareness of the health benefits of breastfeeding. Another important causal channel is inherited son preference from the parental household, which would lead women circumcised earlier to place greater value on sons' health due to prevailing labour and marriage market practices. However women circumcised relatively earlier may instead show more preference towards daughters in response to facing greater discrimination themselves. They may also marry wealthier partners, thereby having less dependence on sons for support. Exante the net effect of these different causal channels on breastfeeding behaviour is ambiguous.

3.2 Data and Descriptive Statistics

To carry out our analysis we use data from 5 waves of DHS surveys from Egypt.[7] The survey is carried out via interviews with women aged 15-49 years, and collects detailed information on each woman's fertility history, education, marital history, as well as child health and mortality outcomes, household wealth indicators, and information on family members.

[6]The higher degree of parental son preference reflected in their choice of earlier age of daughters' circumcision is more greatly underscored when daughters are circumcised before sexual maturity, when there is significantly less risk to girls virginity compared to during adolescence and thereafter. Circumcising girls when they are young also reduces the chances of them resisting the procedure, a motive that is backed by anecdotal evidence and further establishes higher parental son preference.

[7]The years of data collection are 1995, 2000, 2003, 2005, and 2008.

Specifically for our purposes, the survey records the number of months a child is breastfed for all children born in the past five years to each woman interviewed.

We make sampling restrictions to facilitate the empirical analysis. We only include children born to women who have had eight births or less, which retains 95% of the original sample of children and prevents our results from being skewed by unusually large family size. We also only carry out our estimations for children who are living, as breastfeeding duration for deceased children is truncated in a fashion unrelated to maternal preferences. Additionally, we exclude children of multiple births as they could bias our estimates with respect to birth order. Finally we only include children born to women who are in their first marriage to maintain consistency of parental fertility preferences over all births. Our final sample consists of 48,304 children born to 34,346 women during 1990-2008.

Figure 1 shows the frequency distribution of children by the number of months breastfeeding they receive. The mean breastfeeding duration is 14.05 months. There is a statistically significant gender difference in breastfeeding, with boys receiving 14.32 months and girls 13.77 months. The figure reveals a continuous distribution of child numbers by breastfeeding duration, but with peaks at 12, 18, and 24 months. This is likely due to maternal recall bias. Our analysis of exclusive breastfeeding remedies this issue, as we only examine weaning and consumption of nutrients besides breast milk for children born up to twelve months before the survey. Recall bias should be substantially reduced with this approach. Exclusive breastfeeding is also an important outcome in itself given its health impacts, and the long average duration of breastfeeding children receive in Egypt. Exclusive breastfeeding rates appear to be very low in the critical 0-6 month age window in Egypt, with 75.94% of the 3,233 children in this age-group at the time of the survey having been given liquids besides breast milk. 45.07% of these children were also given solid foods during this time. The role of fertility preferences in motivating these feeding practices is therefore worth examining.

Female circumcision is nearly universal among mothers in our sample at 95.84%. Furthermore, 99.72% of circumcised mothers are exposed to the procedure before marriage. These prevalence rates validate our assumption that female circumcision is an exogenous pre-marital investment that precedes childbearing.[8] Figure 2 shows the cumulative distribution of circumcised mothers by the age at which they underwent the procedure. There is

[8]all children in our sample are born after their mothers are married.

a gradually accelerating increase in proportion of women circumcised as age increases from infancy to age nine, and then a large discontinuous increase from 47.65% to 71.69% of women between age nine and age ten. This is most likely capturing a parental desire to circumcise daughters before they enter adolescence. The increase in proportion of women circumcised then diminishes rapidly with increasing age beyond ten years, with 99.78% of women being circumcised by age sixteen. We use the discontinuity in circumcision probability at age ten to define a binary measure of maternal exposure to discriminatory premarital investments for our analysis, classifying mothers circumcised at or before age ten as highly exposed and those circumcised after age ten as less exposed.

Comparing women by this binary measure informs the theoretical basis for our analysis. Table 1 presents descriptive statistics of women who circumcised after age ten years, and Table 2 presents the same statistics for women circumcised before age ten. Nearly all the differences in characteristics between the two groups of women are statistically significant, but the absolute differences are mostly very small except for one key trait.[9] Women circumcised relatively earlier are less educated, being 6.1 percentage points less likely to complete primary school and 7.0 percentage points less likely to complete secondary school. Educational attainment among all mothers is generally low in our sample with only 55.4% of mothers completing primary school. This difference in educational attainment likely reflects relatively low parental preference for the human capital stock of women circumcised earlier compared to their success in the marriage market. In our analysis we control for educational differences, as well as potential alternative mechanisms such as age at marriage and the wealth of the marital household.

3.3 Empirical Strategy: Breastfeeding Duration

We start by investigating the presence of gender bias in months of breastfeeding, as well as the variation in breastfeeding duration by birth order. To do this we use the following specification,

$$Breastfeed_i = \alpha + \gamma \, Male_i + \sum_{k=2}^{8} \beta_k \cdot \mathbb{1}(Birth\,Order_i = k) + \delta \, X_i + \theta_i + \epsilon_i \qquad (1)$$

[9]The characteristics of women who do not report their age of circumcision are nearly identical to those who do, reducing concerns of sample selection. This is important as while nearly all mothers report whether or not they are circumcised, 42.96% of them are not able to accurately report the age at which it took place.

where the dependent variable $Breastfeed_i$ is the number of months child i is breastfed. $Male_i$ is a dummy variable taking the value one when child i is a boy, and zero otherwise. The coefficient γ captures any gender difference in breastfeeding that may be present. The beta coefficients capture the birth order effects, which are entered as dummy variables with the oldest child acting as the reference category. X_i is the standard vector of controls, which includes linear and quadratic terms of mother's age, dummy variables for mother's educational attainment, linear and quadratic controls for child birth year, and a dummy variable for whether the mother resides in a rural area. These regressors control for potential confounders of the effect of child birth order, such as mother's decreased attachment to labour force with age and increasing trends in breastfeeding over time. θ_i is a vector of age-in-months fixed effects that corrects for the fact that recently-born children will appear to have fewer months of breastfeeding due to right-censoring. ϵ_i is an idiosyncratic error term. We also interact child birth order with the male child indicator to identify whether the gender difference in breastfeeding duration changes along different stages of the fertility cycle.

We then explore how breastfeeding changes as women near or exceed their ideal number of children. The specification implemented for this is as follows,

$$\begin{aligned} Breastfeed_i \;=\; & \alpha + \gamma\, Male_i + \tau_1\, \Delta Ideal_i + \tau_2\, \mathbb{1}(\Delta Ideal_i \geq 0) \\ & + \tau_3\, \mathbb{1}(\Delta Ideal_i \geq 0)^*\, \Delta Ideal_i + \delta\, X_i + \theta_i + \epsilon_i \end{aligned} \tag{2}$$

where $\Delta Ideal_i$ measures the distance from the mother's reported ideal number of children, which is defined as $(Birth\,Order_i - Ideal)$, where Ideal is the mother's reported ideal number of children. τ_1 captures the effect on breastfeeding duration as the woman approaches her ideal fertility level, and τ_2 will identify any discrete change in breastfeeding once a woman reaches or exceeds this fertility level. τ_3 captures the effect of distance from the ideal number of children once a woman has exceeded her ideal fertility level, which allows us to capture any discontinuous change in breastfeeding at the ideal fertility ceiling while allowing for trend effects beyond the ceiling itself. The remaining regressors are the same as in (1).

There are some potential issues with the $\Delta Ideal_i$ variable, which are also discussed in Jayachandran and Kuziemko (2011). First, a woman's report of her ideal number of children potentially depends on the number of sons she conceives, or expects to conceive, under son-biased fertility preferences. However we are able to rule this out by showing robust impacts of the ideal fertility variables on breastfeeding duration conditional on child gender and the gender composition of older siblings. Secondly, women may progressively update their ideal number of offspring to equal their actual number of children if they exceed their initial total desired fertility. This does not seem to be a problem in our data, as 49.71% of the 42,572 children for whom this information is gathered are reported as excess to their mothers' desired fertility total. More strikingly, 52.17% of these "excess" children are male, showing that the ideal number of children is not driven by female births only.

Finally, we examine whether breastfeeding duration changes as the sex composition of older siblings changes. The specification we use for this is the following,

$$\begin{aligned} Breastfeed_i \;=\; & \alpha \,+\, \gamma\, Male_i \,+\, \chi_1\, Male\, Fraction_i \\ & +\, \chi_2\, Birth\, Order_i + \delta\, X_i \,+\, \theta_i \,+\, \epsilon_i \end{aligned} \tag{3}$$

where $Male\, Fraction_i$ is the fraction of older siblings of child i that are male, conditional on birth order. χ_1 will capture any impact of son preference on breastfeeding separately from that of total fertility identified in χ_2, as a higher fraction of males among total offspring is likely to increase subsequent birth intervals and therefore also potentially increase breastfeeding duration under son-biased fertility preferences. We also investigate whether the presence of just one son among the older siblings is enough to alter breastfeeding duration by replacing the regressor $Male\, Fraction_i$ with $\mathbb{1}(Male\, Fraction_i \,>\, 0)$. The remaining regressors are the same as in (1) and (2).

We estimate all the specifications using ordinary least squares, and cluster the standard errors by mother. Given that breastfeeding duration is right-censored due to younger children still being nursed, we also estimate some of the specifications using a Cox proportional hazard duration model and present these results alongside the OLS estimates for the purpose of comparison. The failure event in the Cox model is defined as a child being weaned. We do not estimate any of the specifications with mother fixed effects, as breastfeeding information is only collected for children born in the past five years. Hence exploiting within-mother variation in the explanatory variables would build in a mechanical negative relationship between these variables and breastfeeding, as multiple births in the past five years would mean shorter spacing and breastfeeding duration between the births.

3.4 Exclusive Breastfeeding Rates and Maternal Circumcision

We take our analysis further by examining whether fertility outcomes and preferences affect exclusive breastfeeding rates among children aged 0-6 months at the time of the survey. We explicitly measure violation of exclusive breastfeeding using information on solid food and liquids given to the child in the week preceding the survey.[10] We define binary outcome variables that take the value 1 if the child has been given any solid food or liquids besides breast milk, and 0 if no food or drink besides breast milk were consumed. We use the same specifications as above with the binary indicators for consumption of solid foods and other liquids as the outcome variables, and estimate them using probit models.[11] The one week window before the survey is short enough to reduce concerns of recall bias regarding nutrients given to the child. To control for regional and seasonal variation in availability of water and other foods, we include region[12] and interview month fixed effects in these regressions. We also use child birth year fixed effects rather than linear and quadratic birth year controls to better control for time trends and annual variation in food and water availability.

Besides consumption of food and liquids, we also measure exclusive breastfeeding using a binary indicator for whether children aged 0-6 months at the time of the survey have been weaned.[13] Weaning implies the child consumes *only* food and liquids besides breast milk, and is therefore a much stronger outcome measure of exclusive breastfeeding. As predominant breastfeeding beyond age six months is also recommended to reduce consumption of contaminated food and liquids, we also estimate fertility choice impacts on weaning for children aged 0-12 months at the time of the survey. Again, the short time interval between the child's birth and the survey date reduces maternal recall bias of child breastfeeding duration and age at weaning.

Finally, we examine differences in weaning by whether a mother is circumcised by age ten years. Clearly there is a strong desire among the majority of parents to ensure daughters'

[10] The liquids besides breast milk on which data is collected include plain water, sugar water, herbal tea, commercial baby formula, tinned or powdered milk, fresh milk, and fruit juice. This data is only available for the 1995, 2000, and 2003 surveys.

[11] We also use linear probability models, and the results are identical and highly robust. These are available from the author on request.

[12] Egypt is divided into 27 governorates, the first-level administrative areas in the country. In our data, these governorates are divided into six broad regions.

[13] We define children as having been weaned if they have received fewer months of breastfeeding than their age in months at the time of the survey.

suitability for marriage by this age which has not declined very significantly with time. We interact the binary indicator of circumcision by age ten, $Circ.Age\,10$, with the fertility preference measures, and re-estimate the specifications for weaning including the interaction terms as regressors to investigate whether premarital exposure to discriminatory investments changes the impact of fertility preferences on nursing.

4 Results

4.1 Fertility Outcomes and Breastfeeding Duration

The gender-specific effects of birth order on breastfeeding duration estimated from (1) without additional covariates are presented in Figure 3. Breastfeeding duration increases at a diminishing rate with birth order, and is greater for sons than for girls at all birth orders. The male advantage in breastfeeding has an inverted u-shape, and is greatest at birth order four. The curve for girl children shows slower growth in breastfeeding duration at birth orders 3-5, reflecting faster weaning of girls at middling birth orders. These breastfeeding patterns are consistent with the theoretical predictions, and are qualitatively the same as those for India in Jayachandran and Kuziemko (2011).

Analogous estimates of birth order effects with additional regressors included are shown in Table 3. In column (1) we find that the male advantage in breastfeeding is 0.652 months on average and highly significant. This is nearly twice the male advantage of 0.391 found in the corresponding estimates for India.[14] The linear and quadratic controls for birth order in column (1) also capture the increase in breastfeeding duration with each birth that diminishes at higher birth order values, as in Figure 3. In column (2) we introduce the standard set of covariates, which change the estimates only marginally. In column (3) we interact birth order with the male child indicator, and find that the male advantage in breastfeeding peaks in the middling birth orders and then declines as the theory predicts. The Cox proportional hazard results in column (4) reflect the same pattern as the OLS estimates in column (1), showing that girls are 2.5 percentage points more likely to be weaned than boys, and that the proba-

[14]This male advantage in breastfeeding in Egypt amounts to about 20 days of additional nursing, which in itself is unlikely to have a significant effect on child health. Our results on exclusive breastfeeding and weaning in infancy therefore carry greater implications for breastfeeding health effects arising from fertility preferences.

bility of being weaned declines by at a diminishing rate with each unit increase in birth order.

We now turn to the estimates from (2) on the impact of ideal fertility. Child frequencies and initial impact estimates are depicted in Figure 4. The frequencies show large numbers of children being born in excess of mothers' desired fertility. The estimates also show a discontinuous increase in breastfeeding duration for children of birth order equalling their mother's ideal fertility total as the theory predicts. The full regression results are in Table 4. In column (1) we find that breastfeeding duration increases by 0.196 months with each additional child that brings the mother closer to her ideal reported number of offspring. Once she has reached this fertility level there is a sharp additional increase in breastfeeding of 0.600 months. These results are qualitatively the same and larger in magnitude compared to the results for India, where breastfeeding duration increases by 0.320 months with each child that brings the mother closer to her ideal total fertility, and then increasing discretely by 0.399 months once she has reached that number of offspring. The same pattern of results is found in column (2) where we allow the effect of distance to ideal fertility to vary beyond the ideal total by including the interaction of the two regressors. In column (3) we include our standard regressors and results persist, with breastfeeding increasing by 0.168 months per birth order increase approaching ideal fertility and discontinuously increasing by 0.420 months once the ideal total is achieved.

We do not find any gender differences in breastfeeding effects of distance to ideal fertility. This is in contrast to the findings for India, where girls are breastfed 0.590 months less if they are the mother's marginal child. This is potentially explained by the dowry institution in India, whereby a large dowry is paid by the bride's family to that of the groom at the time of marriage. Hence every girl child represents a significant potential financial burden to parents, driving the increased sensitivity of breastfeeding to child gender near the end of the mother's fertility cycle. In Egypt there is no such dowry custom, which could explain why there is no discernible faster weaning of girls near the desired fertility ceiling.

We now discuss the results from specification (3) on the impact of sibling sex composition on breastfeeding. The estimates are in Table 5. In column (1), we find breastfeeding increases by 0.424 months when the child has an older male sibling. The estimates in column (2) reveal that girls receive 0.327 more months of breastfeeding than boys due to having an older brother, eliminating 50.93% of the 0.642 month male breastfeeding advantage estimated in column (1). While this is indicative of son preference, it could also simply reflect a maternal desire for gender diversity among her offspring. Hence in column (3) we replace the older male sibling indicator with the male fraction of older siblings to examine whether breastfeeding increases continuously with rising share of brothers among older siblings. We indeed find that an incremental increase in the fraction of brothers among older offspring increases breastfeeding, with a maximum increase of 0.510 months when all older siblings are male. Interacting the male fraction of older siblings with the male child dummy in column (4) shows that girls are breastfed increasingly longer than boys as the male fraction of older siblings increases, with a maximum relative female gain of 0.519 months when all older siblings are male. This is 80.84% of the male breastfeeding advantage in column (1). This evidence is suggestive of a maternal willingness to breastfeed for longer and more equitably between sons and daughters when she has already conceived sons. The estimates in columns (1) and (3) reflect the same qualitative impacts of sibling sex composition as those found for India, and are also approximately twice as large. The Cox regressions results in columns (5) and (6) show the same qualitative results as those in columns (1) and (3).

4.2 Robustness Checks: Ruling Out Alternative Mechanisms

So far the results indicate that son preference in fertility plays a part in determining gender discrimination levels in breastfeeding duration. However we cannot rule out with certainty that our results are not driven by standard bias in favour of sons in health investments that manifests in a pattern highly correlated with our birth order, ideal fertility, and sibling sex composition variables. We therefore implement the same estimations with vaccinations as the dependent variable to provide additional evidence supporting the role of fertility preferences. As vaccinations are not a fertility-related health investment, we should not find the same pattern of results with respect to our regressors of interest as we do for BCG and measles vaccines, and three rounds each of the polio and DPT vaccines. The results of these estimations are in Table 6. In column (1) we find that there is a statistically significant male advantage of 0.029 vaccinations. However vaccinations received do not vary significantly with birth order unlike breastfeeding duration. In column (2) we find that vaccinations increase as birth order approaches ideal fertility, as with breastfeeding duration. However vaccinations received decline discontinuously once mothers achieve ideal fertility, and decline further still with each birth beyond the ideal total. This is the opposite of what we find for breastfeeding duration, and suggests a reduced maternal desire to protect children beyond the ideal fertility total even if breastfeeding increases. We explore this further in our estimates on weaning and exclusive breastfeeding. Finally in column (3) we find no impact of having an older male sibling on vaccinations. These results collectively point to son-biased fertility preferences driving our results on breastfeeding.

As we are claiming that our results for breastfeeding are capturing impacts of desired future fertility, we further examine whether we find a supportive pattern of coefficients from our regressors of interest where the outcome of interest is the existence of a younger sibling. The results are in Table 7. In column (1) we find that children are significantly less likely to have younger siblings if they are male, providing support for the argument that boys receive more breastfeeding due to reduced maternal desire to conceive again after having sons. This effect remains in columns (2) and (3). The coefficients on the linear and quadratic birth order terms also support the desired fertility argument, with probability of having a younger sibling declining at a diminishing rate with birth order. These estimates mirror those found for breastfeeding duration, which increases with birth order at a diminishing rate. In column (2) we find more supportive evidence, with the probability of having a younger sibling declining as child birth order approaches ideal fertility, and discontinuously declining at birth orders thereafter. In column (3) we find having a younger sibling is less likely if the child has an older brother, but this effect is smaller if the child is male. Again this mirrors what we find for breastfeeding duration, which also increases in the presence of an older male sibling, but less so if the child is male. In all, the estimates all point to desired fertility being the mechanism behind our results on breastfeeding duration.

4.3 Exclusive Breastfeeding and Weaning

The probit marginal effects of fertility outcomes on weaning rates for children aged 0-6 months at the time of the survey are shown in Table 8. In column (1) we find that the probability of being weaned during these ages declines by 1.6 percentage points with each unit increase in child birth order, and the effect diminishes negligibly at higher birth orders. These results match those found for mean breastfeeding duration among children of all ages, showing that birth order affects breastfeeding behaviour at early life as well as beyond infancy. Column (2) shows that the effect of birth order on weaning is gender-neutral, implying that the male advantage in breastfeeding duration occurs beyond ages 0-6 months. In column (3) we see that there is a one-time decline in the probability of being weaned of 1.4 percentage points for children born at or beyond their mother's ideal total fertility. This effect is sizeable, constituting 36.75% of the baseline probability of being weaned in the sample (which is 3.81%). It is also in line with the previous results showing longer breastfeeding duration among children of all ages who are born in excess of their mother's ideal. There is no significant effect of having at least one older brother on weaning in column (4), but in column (5) we find a decline in weaning as the fraction of males among older siblings increases. This decline peaks at 1.4 percentage points when all older siblings are male. Again, this fits the pattern of results seen previously with breastfeeding duration increasing with more older brothers present. However unlike the previous results, the effect of the male fraction of older siblings on weaning is gender neutral.

Turning to results on consumption of solid food and liquids besides breast milk during ages 0-6 months in Table 9, column (2) shows that the probability of having been given liquids in the past week declines by 3.6 percentage points with each unit increase in birth order with a weak diminishment at higher birth orders. This could be due to both increased maternal demand for contraception and reduced allocation of alternative nutrients to younger children as family size grows. There is however no such decline with birth order in the probability of consuming solid foods in column (1). The link between fertility preferences and exclusive breastfeeding is more conclusively evident in columns (3) and (4). The probability of consuming solid food declines by 3.3 percentage points with each birth approaching mother's ideal fertility with weak statistical significance in column (3). There is a strongly significant effect however of being born after the ideal, with probability of consuming solid food increasing by 6.4 percentage points with each such successive birth. The same pattern of consumption emerges for liquids in column (4), with a strongly significant decline in consumption probability of 2.5 percentage points with each birth approaching ideal fertility and a weakly significant increase in consumption probability of 2.3 percentage points with each birth thereafter. The noteworthy implication of these results is that even though weaning in early life declines for children born in excess of mother's ideal fertility, mothers clearly have a reduced desire to expend the caloric and time costs necessary to protect excess children against disease via exclusive breastfeeding.[15] In column (5) we find no effect of having at least one older male sibling on the probability of consuming food and liquids besides breast milk. In column (6) however we find a significant decline in the probability of consuming

[15] It is worth noting that boys are actually more likely to be given liquids besides breast milk by a marginally significant factor of 2.0-2.2 percentage points. This is likely due to a maternal desire to provide sons with additional nutrients in early life, combined with an unawareness about the benefits of exclusive breastfeeding. Such unawareness is potentially commonplace among mothers based on the descriptive statistics seen earlier.

other liquids with an increasing male fraction of older siblings, in line with our results on weaning and breastfeeding duration. The effect achieves a maximum of 4.6 percentage points when all older siblings are male. This is most likely due to both increased desire for contraception and a higher maternal incentive to protect children once they already have sons, given that weaning also declines with a higher fraction of older male siblings..

Weaning rates among children aged 0-12 months support the theoretical predictions even more emphatically than those for children aged 0-6 months according to Table 10. Again we find that the probability of being weaned declines by 2.4 percentage points per unit increase in birth order in column (1), with a mild diminishment at higher birth orders. We additionally find a male advantage in breastfeeding among infants in column (2), with sons being 0.6 percentage points less likely to be weaned than daughters per unit increase in birth order before reaching age 12 months. Weaning declines once and for all by 2.3 percentage points for children born at or after mother's ideal fertility in column (3). Finally in columns (4) and (5) we find infants are less likely to be weaned by 1.6 percentage points if they have at least one older brother, and by a maximum of 1.9 percentage points if all older siblings are male respectively.

4.4 Age of Maternal Circumcision and Weaning

We now examine whether weaning rates differ between mothers circumcised at or before age ten years, and mother circumcised after. We first analyse weaning among children born within six months of the survey in response to the gender of older siblings. The probit marginal effects are reported in Table 11. In column (1) we find that women circumcised before age ten are 6.5 percentage points more likely to wean a child aged 0-6 months if they already have a son than if they do not. The effect is strongly significant at the 1% level. This is in direct contrast to mothers circumcised at later ages, who actually reduce weaning by 4.4 percentage points if they have an older son. Including the standard covariates, mother's age at marriage, and indicators for household wealth quintile as regressors in column (2), we find no significant change in the results. This indicates the importance of early maternal exposure to discriminatory premarital investments as a causal channel for future breastfeeding behaviour, as educational attainment, age of marriage, and household wealth do not independently mitigate its effects.[16] To specifically investigate whether mothers cir-

[16]The sharp differences in breastfeeding in response to the presence of an older son by age of maternal circumcision are at first glance surprising given that previous results show higher maternal willingness to

cumcised younger reduce protection to children born after a son because they have lower education, we include an interaction term of the indicator for having an older brother with a dummy variable $Primary\,School$ for whether the child's mother has completed primary schooling. Column (3) shows that while completed primary education explains nearly half of the increased protection mothers circumcised when older give children born after a son via reduced weaning, it hardly affects the estimated reduction in protection for such children born to mothers circumcised when younger. A lower stock of human capital at marriage therefore does not seem to be the primary explanation for the bias mothers circumcised earlier show against children born after older sons, suggesting inherited son preference may be the driving mechanism. The results are strengthened upon examining the effect of the male fraction of older siblings. Again we find increased weaning of children in column (4) by mothers circumcised before age ten as this fraction increases, with the increase in probability peaking at 7.9 percentage points when all older siblings are male. Mothers circumcised when older conversely reduce weaning by a maximum of 8.2 percentage points when they have a higher proportion of older sons. The addition of the other covariates does not significantly change the estimates in column (5). Including the interaction of the fraction of male older siblings with the maternal primary schooling indicator again does not change the estimated increase in weaning of children aged 0-6 months by mothers circumcised before age ten if they are born after older brothers.

We find no similar effects by age of maternal circumcision and sibling gender on total breastfeeding duration, indicating that we are capturing reduced desire among women circumcised early to protect subsequent children via breastfeeding once a son is born rather than changing demand for contraception. This reduced protection is ostensibly due to higher allocation of calories towards feeding older male children, which mothers circumcised before age ten seemingly prioritise over the nutritional costs of breastfeeding younger children. Mothers circumcised when older on the other hand appear more benevolent towards younger children once they have sons. We also check for more heterogeneous impacts of age at circumcision by examining whether there are any additional impacts of maternal circumcision before age five years on weaning, and find no evidence of such heterogeneity. This points more conclusively to a binary divergence in maternal health investment behaviour varying

protect children with older brothers on average in the whole sample. However this is explained by the fact the composition of women who report their age at circumcision is more biased towards those circumcised early, and these women also have more children that therefore make up most of the final sample of infants.

by adolescent versus pre-adolescent exposure to the procedure.[17]

Weaning among infants aged 0-12 months at the time of the survey follows the same pattern as among children aged 0-6 months as shown in Table 12. Mothers circumcised before age ten increase weaning of infants by a weakly significant estimate of 2.7 percentage points when they have an older son compared to when they do not. Mothers circumcised when older conversely reduce weaning by a strongly significant 4.1 percentage points. The inclusion of the other regressors increases the positive effect of early maternal circumcision on weaning to 3.1 percentage points in column (2), which is significant at the 5% level. Adding the interaction term of the indicator for having an older brother with the dummy for completed maternal primary education does little to change this estimate in column (3). Column (4) shows that mothers circumcised before age ten increase weaning of infants by a weakly significant maximum difference of 3.2 percentage points with an increased fraction of older sons. In comparison, mothers circumcised when older reduce weaning by 5.2 percentage points. Again, including the regressors only changes the results marginally in column (5). Maternal primary education does not change the size of this estimate upon interaction with the fraction of older male siblings in column (6). This set of results verifies our findings for children in the 0-6 month age group, and also mitigates concerns that those estimates were being driven by small sample sizes.

The indication that our results are capturing changing maternal incentives to protect by age of circumcision rather than changing contraceptive demands are bolstered by further examining the impacts of birth order and ideal fertility. In column (1) of Table 13 we find that women circumcised before age ten *increase* weaning of children aged 0-6 months by 1.6 percentage points per unit increase in child birth order. This contrasts sharply with our results on exclusive breastfeeding shown in Tables 8, 9, and 10 which reveal more protective breastfeeding in the entire sample on average with increasing birth order. Indeed, women circumcised when older reduce weaning by 2.0 percentage points per unit increase in birth order in column (1), in line with these previous results. There is a clear divergence in the priorities of the two groups of mothers when nursing, with women circumcised earlier appearing to be much less willing to protectively breastfeed offspring as family size increases and women circumcised later preferring to do the exact opposite. Including the additional

[17]The results on breastfeeding duration and heterogeneous impacts by age at circumcision are available from the author on request.

regressors in column (2) increases the probability of weaning to 2.2 percentage points per unit increase in birth order by mother circumcised earlier. The effect does not diminish at higher birth orders as indicated in column (3) after including the interaction of the age of circumcision indicator with the quadratic birth order term. We find the same divergent weaning patterns by child birth order between the two groups of mothers for infants aged 0-12 months in columns (4)-(6). Estimating the analogous specifications from columns (1)-(3), we find that women circumcised before age ten increase weaning by 1.1-3.0 percentage points while women circumcised when older reduce weaning by 2.1-3.2 percentage points as birth order increases. In Table 14 we find no differential effects on weaning by age of maternal circumcision as distance to ideal fertility changes among children aged 0-6 months, but there are significant increases in weaning by mothers circumcised earlier of infants aged 0-12 months of 1.4-1.5 percentage points as distance to ideal fertility increases. Importantly, there are no discontinuities in weaning probability as ideal fertility is reached and exceeded, emphasising that we are capturing the effect of family size on maternal incentives to protect children and not changing contraceptive demand.

5 Discussion and Conclusions

Our results show that there is significant gender bias against girls in breastfeeding duration in Egypt. On average girls are breastfed for 0.642-0.652 months less than boys, which is nearly twice the male breastfeeding advantage of 0.391 months estimated for India in Jayachandran and Kuziemko (2011). The rest of our results for Egypt strongly support the argument made in their seminal work that mothers' desired fertility outcomes influence their breastfeeding behaviour, particularly when fertility preferences are son-biased. We find that breastfeeding increases with birth order, suggesting a reduced desire to conceive additional children as mothers have more offspring. We additionally find that women breastfeed their children more as they approach their ideal total fertility, and breastfeeding duration increases sharply once they reach this ideal. The presence of an older male sibling increases the duration and gender-equality of breastfeeding. This pattern of results is nearly identical to those found by the above authors for India, and is unlikely to be driven by alternative mechanisms.

We find the same pattern of results for exclusive breastfeeding of children aged 0-6 months. Weaning becomes significantly less likely during these ages with increased birth order, with a higher fraction of brothers among older siblings, and if born in excess of mother's ideal total fertility. Consumption of solid food and liquids besides breast milk during these ages also declines as birth order approaches mother's ideal fertility, but increases sharply for children born in excess of the ideal. This is a weighty finding, as it shows that while breastfeeding may increase for "excess" children in line with the theory, mothers actually reduce their protection of the health of these unwanted children. The same is true for immunisations, which decline significantly for children born beyond their mother's ideal fertility total. The policy implications of these results for contraceptive uptake therefore encompass not only family planning, but also child morbidity and mortality from diarrhea and diseases preventable by inoculation.[18]

Mothers exposed to discriminatory premarital investments via genital mutilation relatively earlier significantly increase weaning of infants born after older sons compared to those who are not, both while these children are aged 0-6 months and when they are older. This is likely due to a reduced incentive to protect younger children once a son is born, and also potentially because of increased allocation of nutrients away from the demands of breastfeeding younger children towards feeding older sons. This bias against children born after older brothers is also gender-neutral, making it a very particular form of son preference. While in India each daughter brings a large anticipated dowry cost to her parents, making each additional son that much more valuable as a source of compensating household earnings and future dowry. In Egypt there is no such dowry cost. However having at least one son is crucial for Egyptian parents to rely on in old age and keep inherited wealth in the family, making the survival of older male children more important than that of their younger siblings. This most likely explains the higher gender sensitivity of breastfeeding of the marginal child in India, as well as the reduced protection of infants born after older sons in Egypt. Mothers circumcised earlier additionally increase weaning of infants as they have more children, in direct contrast to mothers circumcised when older. Hence mothers circumcised when younger appear to prioritise allocation of nutrients away from themselves and the caloric costs of breastfeeding towards older children over the contraceptive effects of nursing. This seems especially true if the older children are sons. This preference structure over nutrient allocation has potentially adverse health implications not only for children, but also pregnant and nursing women if they are malnourished as a result.

[18] 11.40% of 14,778 women with at least one child interviewed in the last DHS survey in 2008 had never used any form of contraception. An additional 3.16% were using traditional or folkloric methods rather than modern contraception.

Importantly, we find that maternal education does not mitigate the effects of being circumcised earlier on reduced protection of children born after older sons. This points to inherited son-preference structures from the parental household dominating this important causal channel. It also casts doubt on the potential effectiveness of policies solely focused on increasing women's education in reducing gender bias in child health investment. While increasing women's education may play an important role via raising awareness of the benefits from exclusively breastfeeding infants aged 0-6 months, there is a clear need for accompanying policy that addresses traditionally accepted gender roles in Egypt, and confers greater value to women via increased labour market earnings and more inheritance rights over parental wealth. Whether the recent transition to democracy in the country slows or hastens the pace of such policy reform remains to be seen.

References

Adriani, F. and S. Sonderegger (2009). Why Do Parents Socialize Their Children to Behave Pro-Socially? An Information-Based Theory. *Journal of Public Economics 93*(11).

Ahlburg, D. (1998). Intergenerational Transmission of Health. *The American Economic Review 88*(2), 265–270.

Almond, D. and K. Chay (2006). The Long-Run and Intergenerational Impact of Poor Infant Health: Evidence from Cohorts Born During the Civil Rights Era. *University of California-Berkeley, Mimeograph*.

Anderson, S. (2007). The Economics of Dowry and Brideprice. *The Journal of Economic Perspectives*, 151–174.

Arifeen, S., R. Black, G. Antelman, A. Baqui, L. Caulfield, and S. Becker (2001). Exclusive Breastfeeding Reduces Acute Respiratory Infection and Diarrhea Deaths Among Infants in Dhaka Slums. *Pediatrics 108*(4), e67–e67.

Assaad, M. (1980). Female Circumcision in Egypt: Social Implications, Current Research, and Prospects for Change. *Studies in Family Planning*, 3–16.

Barker, D. (2008). The Fetal and Infant Origins of Disease. *European journal of clinical investigation 25*(7), 457–463.

Bhalotra, S. and S. Rawlings (2009). Gradients of the Intergenerational Transmission of Health in Developing Countries. *The Review of Economics and Statistics*.

Bhalotra, S. and S. Rawlings (2011). Intergenerational Persistence in Health in Developing Countries: The Penalty of Gender Inequality? *Journal of Public Economics 95*(3), 286–299.

Bisin, A. and T. Verdier (2001). The Economics of Cultural Transmission and the Dynamics of Preferences. *Journal of Economic Theory 97*(2).

Blackburn, S. (2007). *Maternal, Fetal, & Neonatal Physiology: A Clinical Perspective*. WB Saunders Co.

Case, A. and C. Paxson (2008). Stature and Status: Height, Ability, and Labor Market Outcomes. *Journal of Political Economy 116*(3).

Chesnokova, T. and R. Vaithianathan (2010). The Economics of Female Genital Cutting. *The BE Journal of Economic Analysis & Policy 10*(1).

Clemens, J., R. Elyazeed, M. Rao, M. MEngg, S. Savarino, B. Morsy, Y. Kim, T. Wierzba, A. Naficy, and Y. Lee (1999). Early Initiation of Breastfeeding and the Risk of Infant Diarrhea in Rural Egypt. *Pediatrics 104*(1), e3–e3.

Coyne, C. and R. Mathers (2009). The Identity Economics of Female Genital Mutilation. *Available at SSRN 1369969*.

Dewey, K. (1997). Energy and Protein Requirements During Lactation. *Annual Review of Nutrition 17*(1), 19–36.

Dewey, K., R. Cohen, K. Brown, and L. Rivera (2001). Effects of Exclusive Breastfeeding for Four Versus Six Months on Maternal Nutritional Status and Infant Motor Development: Results of Two Randomized Trials in Honduras. *The Journal of Nutrition 131*(2), 262–267.

Dirie, M. and G. Lindmark (1992). The Risk of Medical Complications After Female Circumcision. *East African Medical Journal 69*(9), 479–482.

Doumato, E. and M. Posusney (2003). *Women and Globalization in the Arab Middle East: Gender, Economy, and Society*. Lynne Rienner Pub.

El-Gibaly, O., B. Ibrahim, B. Mensch, and W. Clark (2002). The Decline of Female Circumcision in Egypt: Evidence and Interpretation. *Social Science & Medicine 54*(2), 205–220.

El-Gilany, A. and E. Shady (2007). Determinants and Causes of Son Preference Among Women Delivering in Mansoura, Egypt. *Eastern Mediterranean Health Journal 13*(1), 119.

Farré, L. and F. Vella (2007). The Intergenerational Transmission of Gender Role Attitudes and its Implications for Female Labor Force Participation. *IZA Working Paper No. 2802*.

Fewtrell, M., J. Morgan, C. Duggan, G. Gunnlaugsson, P. Hibberd, A. Lucas, and R. Kleinman (2007). Optimal Duration of Exclusive Breastfeeding: What is the Evidence to Support Current Recommendations? *The American Journal of Clinical Nutrition 85*(2), 635S–638S.

Göhlmann, S., C. Schmidt, and H. Tauchmann (2009). Smoking Initiation in Germany: The Role of Intergenerational Transmission. *Health Economics 19*(2), 227–242.

Goldman, A., R. Goldblum, and L. Hanson (1990). Anti-Inflammatory Systems in Human Milk. *Advances in Experimental Medicine and Biology 262*, 69.

Horta, B., R. Bahl, J. Martines, and C. Victora (2007). Evidence on the Long-Term Effects of Breastfeeding. Technical report, WHO.

Huffman, S., K. Ford, H. Allen Jr, and P. Streble (1987). Nutrition and Fertility in Bangladesh: Breastfeeding and Post Partum Amenorrhoea. *Population Studies 41*(3), 447–462.

Inhorn, M. (1996). *Infertility and patriarchy: The Cultural Politics of Gender and Family Life in Egypt.* Univ of Pennsylvania Pr.

Institute of Medicine (1991). *Nutrition During Lactation.* The National Academies Press.

Jayachandran, S. and I. Kuziemko (2011). Why Do Mothers Breastfeed Girls Less Than Boys? Evidence and Implications for Child Health in India. *The Quarterly Journal of Economics 126*(3), 1485–1538.

Kramer, M., F. Aboud, E. Mironova, I. Vanilovich, R. Platt, L. Matush, S. Igumnov, E. Fombonne, N. Bogdanovich, T. Ducruet, et al. (2008). Breastfeeding and Child Cognitive

Development: New Evidence from a Large Randomized Trial. *Archives of General Psychiatry 65*(5), 578.

Lamberti, L., C. Walker, A. Noiman, C. Victora, and R. Black (2011). Breastfeeding and the Risk for Diarrhea Morbidity and Mortality. *BMC Public Health 11*(Suppl 3), S15.

Lightfoot-Klein, H. and E. Shaw (2006). Special Needs of Ritually Circumcised Women Patients. *Journal of Obstetric, Gynecologic, & Neonatal Nursing 20*(2), 102–112.

Mackie, G. (1996). Ending Footbinding and Infibulation: A Convention Account. *American Sociological Review*, 999–1017.

Mashhour, A. (2005). Islamic Law and Gender Equality: Could There Be a Common Ground?: A Study of Divorce and Polygamy in Sharia Law and Contemporary Legislation in Tunisia and Egypt. *Human Rights Quarterly 27*(2), 562–596.

Miguel, E. and M. Kremer (2003). Worms: Identifying Impacts on Education and Health in the Presence of Treatment Externalities. *Econometrica 72*(1), 159–217.

Mir-Hosseini, Z. (2000). *Marriage on Trial: Islamic Family Law in Iran and Morocco*. IB Tauris.

Murthi, M., A. Guio, and J. Dreze (1995). Mortality, Fertility, and Gender Bias in India: A District-Level Analysis. *Population and development review*, 745–782.

Obermeyer, C. E. (Ed.) (1995). *Family, Gender, and Population in the Middle East: Policies in Context*. American University in Cairo Press Cairo.

Ogra, P. and D. Dayton (1979). *Immunology of Breast Milk*. Raven Press.

Posner, R. (1994). *Sex and Reason*. Harvard University Press.

Reifsnider, E. and S. Gill (2000). Nutrition for the Childbearing Years. *Journal of Obstetric, Gynecologic, & Neonatal Nursing 29*(1), 43–55.

Riordan, J. and K. Wambach (2010). *Breastfeeding and Human Lactation*. Jones & Bartlett Learning.

Rose, E. (2000). Gender Bias, Credit Constraints and Time Allocation in Rural India. *The Economic Journal 110*(465), 738–758.

Sayed, G., M. El-Aty, and K. Fadel (1996). The Practice of Female Genital Mutilation in Upper Egypt. *International Journal of Gynecology & Obstetrics 55*(3), 285–291.

Smith, J. (2009). The Impact of Childhood Health on Adult Labor Market Outcomes. *The Review of Economics and Statistics 91*(3), 478–489.

Tabellini, G. (2008). The Scope of Cooperation: Values and Incentives. *The Quarterly Journal of Economics 123*(3), 905–950.

Thapa, S. (1987). Determinants of Fertility in Nepal: Applications of an Aggregate Model. *Journal of Biosocial Science 19*(03), 351–365.

Thomas, D. (1994). Like Father, Like Son; Like Mother, Like Daughter: Parental Resources and Child Height. *Journal of Human Resources*.

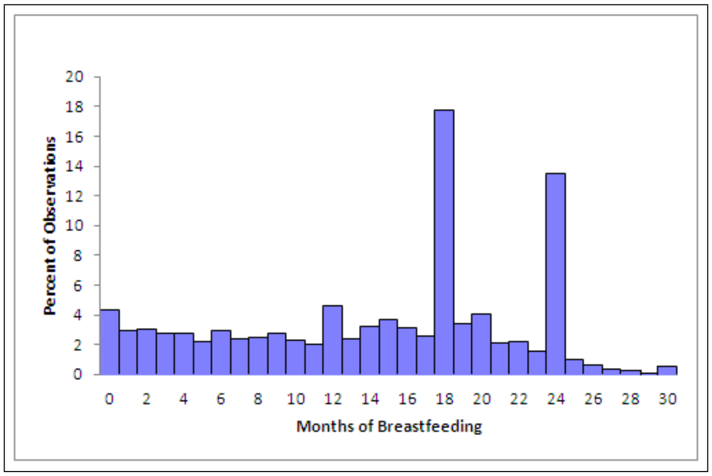
Toubia, N. (1994). Female Circumcision as a Public Health Issue. *New England Journal of Medicine 331*(11), 712–716.

Weiss, P. (1993). The Contraceptive Potential of Breastfeeding in Bangladesh. *Studies in Family Planning 24*, 100–108.

World Bank (2004). Gender and Development in the Middle East and North Africa: Women in the Public Sphere. Technical report, World Bank.

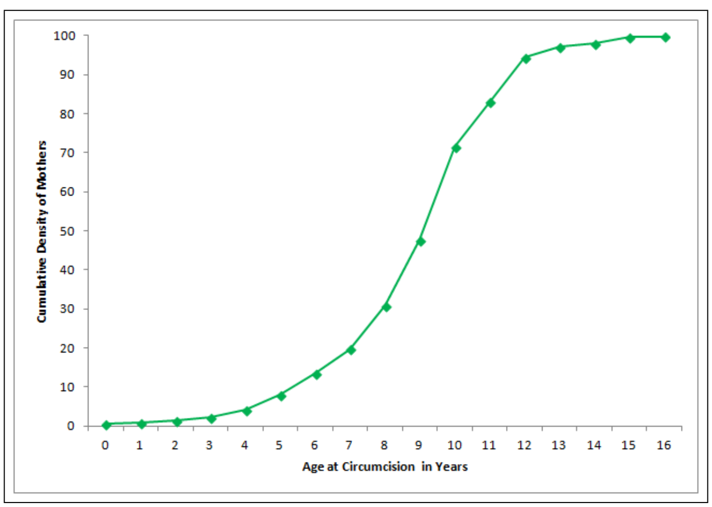
Yount, K. (2005). Women's Family Power and Gender Preference in Minya, Egypt. *Journal of Marriage and Family 67*(2), 410–428.

Figure 1: Months of Breastfeeding - Frequency Distribution



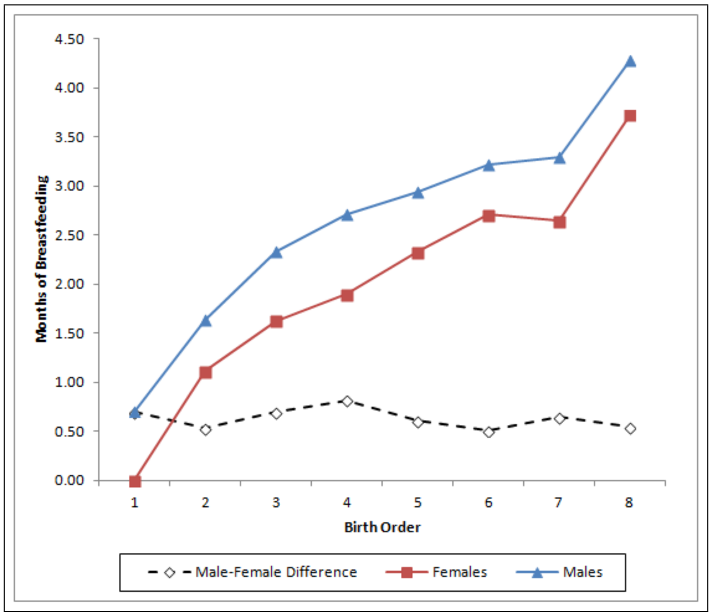
Notes: The figure shows the percent distribution of child frequency by the total number of months they were breastfed. Breastfeeding duration data is obtained from mothers' reports.

Figure 2: Age of Maternal Circumcision - Cumulative Density



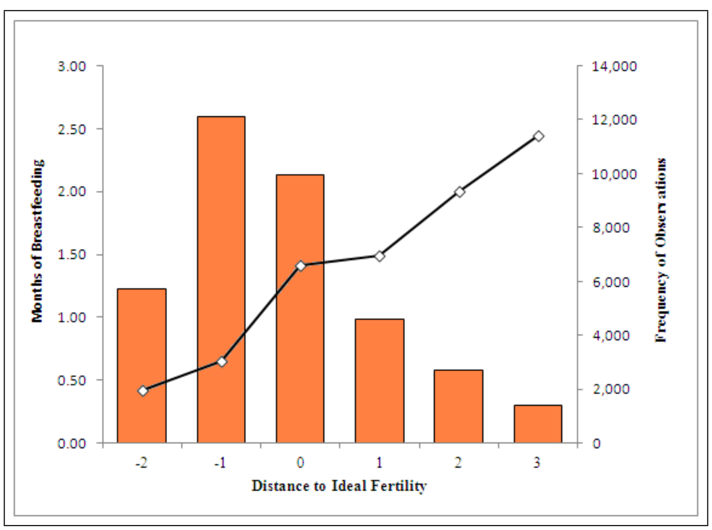
Notes: The figure shows the cumulative density of mothers by the age at which they were circumcised.

Figure 3: Months of Breastfeeding by Gender and Birth Order



Notes: The solid lines show gender-specific coefficients from a regression of months of breastfeeding on birth order dummies. The regression also contains age-in-months fixed effects as controls. The dashed line shows the difference between the male and female-specific coefficients.

Figure 4: Ideal Fertility and Breastfeeding Duration



Notes: The solid line shows coefficients from a regression of months of breastfeeding on distance to ideal fertility dummies with age-in-months fixed effects included. The columns indicate frequency of children.

Table 1: Summary Statistics of Mothers Circumcised After Age Ten

Mother Characteristics	Mean	S.D.	Min	Max	Freq
Completed primary school	0.618	-	0	1	5,492
Completed secondary school	0.473	-	0	1	5,492
Has electricity	0.986	-	0	1	5,208
Has television	0.898	-	0	1	5,208
Rural residence	0.638	-	0	1	5,492
Poorest two quintiles	0.378	-	0	1	5,493
Height (cm)	158.673	5.875	73.400	181	5,425
Age at Marriage	19.537	3.64	11	37	5,492
Age at First Birth	21.027	3.675	12	40	5,492
Age when circumcised	11.967	1.193	11	23	5,493
Current age	27.827	5.915	16	48	5,492
Total children born	2.686	1.637	1	8	5,492
Ideal number of children	2.805	1.159	0	14	5,150

Notes: Statistics are for mothers with surviving children at the time of the survey who were circumcised after age ten.

Table 2: Summary Statistics of Mothers Circumcised Before Age Ten

Mother Characteristics	Mean	S.D.	Min	Max	Freq
Completed primary school	0.557	-	0	1	14,045
Completed secondary school	0.403	-	0	1	14,045
Has electricity	0.979	-	0	1	13,531
Has television	0.893	-	0	1	13,526
Rural residence	0.62	-	0	1	14,045
Poorest two quintiles	0.368	-	0	1	14,045
Height (cm)	158.503	6.182	56.7	198.5	13,837
Age at Marriage	19.297	3.92	9	42	14,045
Age at First Birth	20.895	3.906	11	44	14,045
Age when circumcised	8.195	2.04	0	10	14,045
Current age	28.576	6.071	15	49	14,045
Total children born	3.002	1.785	1	8	14,045
Ideal number of children	2.949	1.323	0	30	12,878

Notes: Statistics are for mothers with surviving children at the time of the survey who were circumcised before age ten.

Table 3: Breastfeeding by Birth Order and Gender

	Months of Breastfeeding			
	OLS			Cox
	(1)	(2)	(3)	(4)
$Male$	0.652*** (0.054)	0.642*** (0.054)	-	-0.025** (0.011)
$Birth\,Order$	0.982*** (0.060)	1.007*** (0.068)	0.804*** (0.072)	-0.186*** (0.038)
$Birth\,Order^2$	-0.065*** (0.008)	-0.076*** (0.008)	-0.052*** (0.010)	0.009* (0.005)
$Male^*\,Birth\,Order$	-	-	0.392*** (0.045)	-
$Male^*\,Birth\,Order^2$	-	-	-0.046*** (0.009)	-
Observations	45,358	45,358	45,358	44,827
Covariates	No	Yes	Yes	No
R-Squared	0.470	0.477	0.477	-

Notes: Robust standard errors clustered by mother in parentheses. Covariates include linear and quadratic terms of mother's current age, dummy variables for mother's educational attainment, linear and quadratic terms of the child's birth year, a dummy variable for whether the mother lives in a rural area, and child age-in-months fixed effects. *** Significant at 1% ; ** Significant at 5% ; * Significant at 10%.

Table 4: Breastfeeding by Ideal Fertility

	Months of Breastfeeding		
	(1)	(2)	(3)
$Male$	0.655***	0.659***	0.647***
	(0.058)	(0.058)	(0.057)
$\Delta Ideal$	0.196***	0.100**	0.168***
	(0.027)	(0.040)	(0.041)
$\mathbb{1}(\Delta Ideal \geq 0)$	0.600***	0.680***	0.420***
	(0.085)	(0.089)	(0.093)
$\mathbb{1}(\Delta Ideal \geq 0) * \Delta Ideal$	-	0.174***	-0.102*
		(0.054)	(0.057)
Observations	40,120	40,120	40,120
Covariates	No	No	Yes
R-Squared	0.462	0.463	0.473

Notes: Robust standard errors clustered by mother in parentheses. All specifications are estimated with OLS. Covariates include linear and quadratic terms of mother's current age, dummy variables for mother's educational attainment, linear and quadratic terms of the child's birth year, a dummy variable for whether the mother lives in a rural area, and child age-in-months fixed effects. *** Significant at 1% ; ** Significant at 5% ; * Significant at 10%.

Table 5: Breastfeeding by Sibling Sex Composition

	Months of Breastfeeding					
	OLS				Cox	
	(1)	(2)	(3)	(4)	(5)	(6)
$Male$	0.642*** (0.054)	0.801*** (0.076)	0.642*** (0.054)	0.820*** (0.072)	-0.172*** (0.035)	-0.173*** (0.035)
$\mathbb{1}(Male\,Fraction > 0)$	0.424*** (0.069)	0.592*** (0.090)	-	-	-0.278*** (0.035)	-
$Male * \mathbb{1}(Male\,Fraction > 0)$	-	-0.327*** (0.107)	-	-	-	-
$Male\,Fraction$	-	-	0.510*** (0.072)	0.776*** (0.099)	-	-0.262*** (0.044)
$Male * Male\,Fraction$	-	-	-	-0.519*** (0.132)	-	-
Observations	45,358	45,358	45,358	45,358	44,827	44,827
Covariates	Yes	Yes	Yes	Yes	No	No
R-Squared	0.477	0.477	0.477	0.477	-	-

Notes: Robust standard errors clustered by mothers in parentheses. Additional regressors include birth order, the standard covariates, and child age-in-months fixed effects. *** Significant at 1% ; ** Significant at 5% ; * Significant at 10%.

Table 6: Vaccinations by Gender, Birth Order, and Ideal Fertility

	Number of Vaccinations		
	(1)	(2)	(3)
$Male$	0.029*** (0.010)	0.015 (0.010)	0.015 (0.013)
$Birth\,Order$	-0.018 (0.015)	-	-
$Birth\,Order^2$	-0.004* (0.002)	-	-
$\Delta Ideal$	-	0.054*** (0.012)	-
$\mathbb{1}(\Delta Ideal \geq 0)$	-	-0.085*** (0.021)	-
$\mathbb{1}(\Delta Ideal \geq 0) * \Delta Ideal$	-	-0.079*** (0.015)	-
$\mathbb{1}(Male\,Fraction > 0)$	-	-	-0.032 (0.020)
$Male * \mathbb{1}(Male\,Fraction > 0)$	-	-	0.029 (0.021)
Observations	45,329	40,095	45,329
Covariates	Yes	Yes	Yes
R-Squared	0.702	0.729	0.702

Notes: Robust standard errors clustered by mother in parentheses. Additional regressors include linear and quadratic terms of mother's current age, dummy variables for mother's educational attainment, linear and quadratic terms of the child's birth year, a dummy variable for whether the mother lives in a rural area, and child age-in-months fixed effects. Columns (3) also includes a linear birth order term. *** Significant at 1% ; ** Significant at 5% ; * Significant at 10%.

Table 7: Younger Sibling by Gender, Birth Order, and Ideal Fertility

	Younger Sibling		
	(1)	(2)	(3)
$Male$	-0.040***	-0.036***	-0.057***
	(0.003)	(0.004)	(0.005)
$Birth\,Order$	-0.137***	-	-
	(0.004)		
$Birth\,Order^2$	0.013***	-	-
	(0.000)		
$\Delta Ideal$	-	-0.026***	-
		(0.003)	
$\mathbb{1}(\Delta Ideal\ \geq\ 0)$	-	-0.131***	-
		(0.006)	
$\mathbb{1}(\Delta Ideal\ \geq\ 0) * \Delta Ideal$	-	0.030***	-
		(0.004)	
$\mathbb{1}(Male\,Fraction\ >\ 0)$	-	-	-0.126***
			(0.005)
$Male * \mathbb{1}(Male\,Fraction\ >\ 0)$	-	-	0.034***
			(0.007)
Observations	45,329	40,095	45,329
Covariates	Yes	Yes	Yes
R-Squared	0.360	0.368	0.359

Notes: Robust standard errors clustered by mother in parentheses. Additional regressors include linear and quadratic terms of mother's current age, dummy variables for mother's educational attainment, linear and quadratic terms of the child's birth year, a dummy variable for whether the mother lives in a rural area, and child age-in-months fixed effects. Column (3) also includes a birth order term. *** Significant at 1% ; ** Significant at 5% ; * Significant at 10%.

Table 8: Weaning During Ages 0-6 Months

	Weaned Aged 0-6 Months				
	(1)	(2)	(3)	(4)	(5)
$Male$	-0.001 (0.005)	-0.003 (0.014)	-0.002 (0.005)	-0.001 (0.004)	-0.001 (0.004)
$Birth\,Order$	-0.013** (0.006)	-0.015** (0.007)	-	-	-
$Birth\,Order^2$	0.002*** (0.001)	0.002*** (0.001)	-	-	-
$Male^*\,Birth\,Order$	-	0.005 (0.009)	-	-	-
$Male^*\,Birth\,Order^2$	-	-0.001 (0.001)	-	-	-
$\Delta Ideal$	-	-	0.001 (0.003)	-	-
$\mathbb{1}(\Delta Ideal\ \geq\ 0)$	-	-	-0.014** (0.007)	-	-
$\mathbb{1}(\Delta Ideal\ \geq\ 0)^*\,\Delta Ideal$	-	-	0.002 (0.004)	-	-
$\mathbb{1}(Male\,Fraction\ >\ 0)$	-	-	-	-0.006 (0.005)	-
$Male\,Fraction$	-	-	-	-	-0.014** (0.006)
Observations	5,224	5,222	4,664	5,222	5,222
Weaned %	3.81%	3.81%	3.81%	3.81%	3.81%
Covariates	Yes	Yes	Yes	Yes	Yes

Notes: The regression sample consists of children born within six months of the survey. Coefficients are marginal effects from Probit estimations. Robust standard errors clustered by mother in parentheses. Additional regressors include the standard covariates, dummy variables for Governorate and month of interview, and child age-in-months fixed effects. Columns (4) and (5) also include linear birth order controls. *** Significant at 1% ; ** Significant at 5% ; * Significant at 10%.

Table 9: Food and Liquid Besides Breast Milk Aged 0-6 Months

	Given Solid Food or Other Liquids							
	Solid	Liquid	Solid	Liquid	Solid	Liquid	Solid	Liquid
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Male$	-0.002 (0.020)	0.022* (0.012)	0.004 (0.022)	0.020* (0.012)	-0.003 (0.028)	0.035** (0.016)	-0.008 (0.026)	0.018 (0.015)
$Birth\,Order$	-0.038 (0.024)	-0.036** (0.014)	-	-	-	-	-	-
$Birth\,Order^2$	0.005* (0.003)	0.004** (0.002)	-	-	-	-	-	-
$\Delta Ideal$	-	-	-0.033* (0.017)	-0.025** (0.010)	-	-	-	-
$\mathbb{1}(\Delta Ideal \geq 0)$	-	-	-0.006 (0.037)	-0.013 (0.019)	-	-	-	-
$\mathbb{1}(\Delta Ideal \geq 0) * \Delta Ideal$	-	-	0.064*** (0.022)	0.023* (0.013)	-	-	-	-
$\mathbb{1}(Male\,Fraction > 0)$	-	-	-	-	-0.010 (0.032)	-0.023 (0.018)	-	-
$Male\,Fraction$	-	-	-	-	-	-	-0.012 (0.036)	-0.046** (0.020)
Observations	3,232	3,232	2,738	2,738	3,232	3,232	3,232	3,232
Other Food/Liquid %	45.1%	75.9%	45.4%	76.5%	45.1%	75.9%	45.1%	75.9%
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The regression sample consists of children born within six months of the survey. Coefficients are marginal effects from Probit estimations. Robust standard errors clustered by mother in parentheses. Additional regressors include the standard covariates, dummy variables for Governorate and month of interview, and child age-in-months fixed effects. Columns (5)-(8) also include linear birth order controls, and child gender-sibling sex interactions which are insignificant. *** Significant at 1% ; ** Significant at 5% ; * Significant at 10%.

Table 10: Weaning During Ages 0-12 Months

	Weaned Aged 0-12 Months				
	(1)	(2)	(3)	(4)	(5)
$Male$	-0.007 (0.004)	0.009 (0.008)	-0.005 (0.005)	-0.006 (0.004)	-0.006 (0.004)
$Birth\,Order$	-0.024*** (0.005)	-0.020*** (0.005)	-	-	-
$Birth\,Order^{\,2}$	0.002*** (0.001)	0.002*** (0.001)	-	-	-
$Male\,{}^{*}\,Birth\,Order$	-	-0.006** (0.003)	-	-	-
$\Delta Ideal$	-	-	0.002 (0.003)	-	-
$\mathbb{1}(\Delta Ideal\ \geq\ 0)$	-	-	-0.023*** (0.007)	-	-
$\mathbb{1}(\Delta Ideal\ \geq\ 0)\,{}^{*}\,\Delta Ideal$	-	-	-0.001 (0.004)	-	-
$\mathbb{1}(Male\,Fraction\ >\ 0)$	-	-	-	-0.016*** (0.005)	-
$Male\,Fraction$	-	-	-	-	-0.019*** (0.006)
Observations	10,070	10,064	8,994	10,064	10,064
Weaned %	6.64%	6.64%	6.67%	6.64%	6.64%
Covariates	Yes	Yes	Yes	Yes	Yes

Notes: The regression sample consists of children born within twelve months of the survey. Coefficients are marginal effects from Probit estimations. Robust standard errors clustered by mother in parentheses. Additional regressors include the standard covariates, dummy variables for Governorate and month of interview, and child age-in-months fixed effects. Columns (4) and (5) also include linear birth order controls. *** Significant at 1% ; ** Significant at 5% ; * Significant at 10%.

Table 11: Weaning Aged 0-6 Months, Circumcision, and Older Siblings

	Weaned During Ages 0-6 Months					
	(1)	(2)	(3)	(4)	(5)	(6)
Male	0.005 (0.006)	0.004 (0.006)	0.005 (0.006)	0.005 (0.005)	0.005 (0.006)	0.005 (0.006)
$Circ.\,Age\,10$	-0.018* (0.010)	-0.017* (0.010)	-0.015 (0.010)	-0.015* (0.009)	-0.013 (0.009)	-0.012 (0.008)
$\mathbb{1}(Male\,Fraction\ >\ 0)$	-0.044*** (0.015)	-0.047*** (0.017)	-0.027 (0.017)	-	-	-
$\mathbb{1}(Male\,Fraction\ >\ 0) * Circ.\,Age\,10$	0.065*** (0.025)	0.072*** (0.028)	0.069** (0.027)	-	-	-
$\mathbb{1}(Male\,Fraction\ >\ 0) * Primary\,School$	-	-	-0.020** (0.008)	-	-	-
$Male\,Fraction$	-	-	-	-0.082*** (0.020)	-0.082*** (0.022)	-0.074*** (0.023)
$Male\,Fraction * Circ.\,Age\,10$	-	-	-	0.079*** (0.021)	0.080*** (0.023)	0.080*** (0.022)
$Male\,Fraction * Primary\,School$	-	-	-	-	-	-0.012 (0.013)
Observations	2,924	2,594	2,594	2,924	2,594	2,594
Weaned %	3.59%	3.59%	3.59%	3.59%	3.59%	3.59%
Covariates	No	Yes	Yes	No	Yes	Yes

Notes: The regression sample consists of children born within six months of the survey. Coefficients are marginal effects from Probit estimations. Robust standard errors clustered by mothers in parentheses. Additional regressors include the standard covariates, mother's age at marriage, household wealth quintile indicators, and Governorate and child age-in-months fixed effects. *** Significant at 1% ; ** Significant at 5% ; * Significant at 10%.

Table 12: Weaning Aged 0-12 Months, Circumcision, and Older Siblings

	Weaned During Ages 0-12 Months					
	(1)	(2)	(3)	(4)	(5)	(6)
$Male$	-0.000	-0.003	-0.003	-0.000	-0.003	-0.003
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
$Circ.\,Age\,10$	-0.014	-0.014	-0.014	-0.012	-0.011	-0.011
	(0.008)	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)
$\mathbb{1}(Male\,Fraction\,>\,0)$	-0.041***	-0.039***	-0.022	-	-	-
	(0.012)	(0.012)	(0.015)			
$\mathbb{1}(Male\,Fraction\,>\,0)*Circ.\,Age\,10$	0.027*	0.031**	0.030*	-	-	-
	(0.015)	(0.015)	(0.015)			
$\mathbb{1}(Male\,Fraction\,>\,0)*Primary\,School$	-	-	-0.022**	-	-	-
			(0.010)			
$Male\,Fraction$	-	-	-	-0.052***	-0.048***	-0.033*
				(0.016)	(0.017)	(0.019)
$Male\,Fraction*Circ.\,Age\,10$	-	-	-	0.032*	0.032*	0.032*
				(0.018)	(0.018)	(0.018)
$Male\,Fraction*Primary\,School$	-	-	-	-	-	-0.024
						(0.016)
Observations	5,798	5,144	5,144	5,798	5,144	5,144
Weaned %	6.07%	5.93%	5.93%	6.07%	5.93%	5.93%
Covariates	No	Yes	Yes	No	Yes	Yes

Notes: The regression sample consists of children born within six months of the survey. Coefficients are marginal effects from Probit estimations. Robust standard errors clustered by mothers in parentheses. Additional regressors include the standard covariates, mother's age at marriage, household wealth quintile indicators, and Governorate and child age-in-months fixed effects. *** Significant at 1% ; ** Significant at 5% ; * Significant at 10%.

Table 13: Weaning in Infancy, Circumcision, and Birth Order

	Weaned in Infancy					
	Aged 0-6 Months			Aged 0-12 Months		
	(1)	(2)	(3)	(4)	(5)	(6)
Male	0.004	0.004	0.004	-0.000	-0.003	-0.003
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Circ. Age 10	-0.044**	-0.062**	-0.077*	-0.032**	-0.032**	-0.056**
	(0.022)	(0.026)	(0.045)	(0.014)	(0.014)	(0.026)
Birth Order * *Circ. Age* 10	0.016***	0.022***	0.030*	0.011**	0.011**	0.026**
	(0.006)	(0.006)	(0.015)	(0.004)	(0.004)	(0.013)
Birth Order ^{2} * *Circ. Age* 10	-	-	-0.002	-	-	-0.002
			(0.002)			(0.002)
Birth Order	-0.020***	-0.019*	-0.026	-0.021***	-0.021**	-0.032**
	(0.007)	(0.010)	(0.016)	(0.006)	(0.009)	(0.013)
Birth Order ^{2}	0.001	0.001	0.002	0.001*	0.002**	0.004**
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
Observations	2,924	2,594	2,594	5,798	5,144	5,144
Weaned %	3.59%	3.59%	3.59%	6.07%	5.93%	5.93%
Covariates	No	Yes	Yes	No	Yes	Yes

Notes: The regression sample consists of children born within six months of the survey in columns (1)-(3), and within twelve months of the survey in columns (4)-(6). Coefficients are marginal effects from Probit estimations. Robust standard errors clustered by mothers in parentheses. Additional regressors include the standard covariates, mother's age at marriage, household wealth quintile indicators, and Governorate and child age-in-months fixed effects. *** Significant at 1% ; ** Significant at 5% ; * Significant at 10%.

Table 14: Weaning in Infancy, Circumcision, and Ideal Fertility

	Weaned in Infancy			
	Aged 0-6 Months		Aged 0-12 Months	
	(1)	(2)	(3)	(4)
$Male$	0.006	0.006	0.002	-0.001
	(0.006)	(0.006)	(0.006)	(0.006)
$Circ. Age\,10$	-0.009	-0.008	0.006	0.006
	(0.015)	(0.018)	(0.014)	(0.015)
$\Delta Ideal_i * Circ. Age\,10$	0.005	0.005	0.015**	0.014*
	(0.007)	(0.009)	(0.007)	(0.008)
$\mathbb{1}(\Delta Ideal_i \geq 0) * Circ. Age\,10$	0.026	0.027	0.000	0.002
	(0.025)	(0.028)	(0.019)	(0.020)
$\mathbb{1}(\Delta Ideal_i \geq 0) * \Delta Ideal_i * Circ. Age\,10$	0.001	0.010	-0.011	-0.008
	(0.012)	(0.016)	(0.011)	(0.011)
$\Delta Ideal_i$	-0.003	-0.001	-0.010*	-0.009
	(0.005)	(0.005)	(0.006)	(0.006)
$\mathbb{1}(\Delta Ideal_i \geq 0)$	-0.036*	-0.039*	-0.018	-0.016
	(0.018)	(0.021)	(0.016)	(0.018)
$\mathbb{1}(\Delta Ideal_i \geq 0) * \Delta Ideal_i$	0.005	-0.004	0.011	0.014
	(0.010)	(0.014)	(0.009)	(0.010)
Observations	2,708	2,413	5,369	4,783
Weaned %	3.66%	3.61%	6.13%	5.96%
Covariates	No	Yes	No	Yes

Notes: The regression sample consists of children born within six months of the survey in columns (1)-(2), and within twelve months of the survey in columns (3)-(4). Coefficients are marginal effects from Probit estimations. Robust standard errors clustered by mothers in parentheses. Additional regressors include the standard covariates, mother's age at marriage, household wealth quintile indicators, and Governorate and child age-in-months fixed effects. *** Significant at 1% ; ** Significant at 5% ; * Significant at 10%.