Women's status and children's height in India: Evidence from joint rural households

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Abstract

Children in India are puzzlingly short relative to their level of economic development. Stunting among Indian children is important because the same early life health insults that influence childhood height also influence adult human capital and health. One candidate explanation for why Indian children are so short is the very low social status of Indian women who, as mothers, feed and care for children in the early life. However, the literature lacks a well-identified test of this conjecture. Our paper applies a novel strategy to identify an effect of women's status on children's height. Anthropological and demographic literature suggest that within joint Indian households, women married to younger brothers have lower intrahousehold status than women married to older brothers. We study the children of these women: children of lower ranking daughters-in-law are shorter, on average, than children of higher ranking daughters-in-law in rural Indian joint households. We provide empirical evidence that lower ranking daughters-in-law indeed have lower status in joint households and rule out several competing explanations for our findings.

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1 Introduction

Height has emerged as an important variable among economists studying labor, development, and health (Steckel, 2009). Height is a persistent summary measure of early life health, which predicts adult height (Schmidt et al., 1995), as well as human capital and economic productivity (Case and Paxson, 2008; Vogl, 2011). However, despite the established use of height by economic historians as a measure of well-being, an open puzzle remains: international differences in height are not well explained by income across contemporary developing countries (Deaton, 2007). In particular, South Asian people are shorter than their incomes would predict. Indeed, the most recent nationally representative estimates suggest that almost half of Indian children under five years old are stunted, or 2 standard deviations or more shorter than the World Health Organization's international reference norms for healthy children.

Because of the implications of height for health and human capital, many economists have considered why Indians are so short.[1] At least since Ramalingaswami et al.'s (1996) exploration of the "Asian enigma" — the puzzle that, despite lower levels of mortality and higher incomes, children in South Asia are shorter than children in sub-Saharan Africa — researchers have hypothesized that exceptionally low social status of Indian women could partially explain this puzzle. Indian society discriminates against women even from a very young age. Literature on "missing women" has documented very low child sex ratios in India (Sen, 1992; Gupta, 2005); in the 2011 census, the under six sex ratio was only 914 girls per 1000 boys.[2] Because women are responsible for essentially all aspects of child care in India and provide nutrition to their children *in utero* and

[1]See Deaton (2007), Deaton and Drèze (2009), Tarozzi (2008), and Jayachandran and Pande (2012).

[2]There is ample evidence that the situation of women in India is extremely poor. Compared to other regions of the world, women's labor force participation in South Asia is low (Smith et al., 2003), reinforcing their lack of access to financial resources. The gap between men's and women's literacy is high: the 2011 census reported that 82% of males over seven years old were literate, but only 65% of females over seven years old were literature (Government of India, 2011). Women's disadvantage is also apparent in their anthropometric measures: Deaton and Drèze (2009) report that 36% of women in the NFHS 2005 have a body mass index score (BMI) below 18.5, the cutoff associated with chronic energy deficiency. Additionally, Deaton (2008) finds that the heights of adult men have been growing at about three times the rate of adult women over the past three decades.

during breastfeeding, it is plausible that mothers' access to resources, their time use, and their physical and mental well-being could have large effects on their children's early-life human capital accumulation.

Although it is clear that the situation of women and girls in South Asia is abysmal, it has been difficult to establish well-identified links from women's low status to child health. This is the case for two reasons. First, it is difficult to find an objective measure of women's status, and second, it is difficult to identify exogenous sources of variation in women's status that would not otherwise be correlated with child health. Our study exploits two properties of rural Indian society to identify an effect of women's status on child health. First, many families live in patrilocal joint households, that is, households in which adult sons live with their parents after marriage, and their wives join them in their parents' homes. Second, the wives of older brothers are assigned higher social rank in the household than the wives of younger brothers.

Comparing the children of higher and lower ranking daughters-in-law in the same household has two advantages. First, it eliminates the need for potentially subjective, survey reported status measures; and second, it allows us to hold constant many features of children's economic, demographic, and social environments while isolating an effect of women's status on children's height.

The primary contribution of this paper is to document that, among children living in the same joint household in rural India, the children of lower ranking mothers are shorter, on average, than the children of higher ranking mothers. In doing so, we present a novel way to identify an effect of women's status on child health. Our interpretation of this difference as an effect of women's status is consistent with several indicators and consequences of low status that we document. Lower ranking daughters-in-law report having less "say" in a range of household decisions; they spend less time outside the home on a normal day than higher ranking daughters-in-law; and, they have lower body mass index (BMI) scores than their higher ranking counterparts.

In contrast, the differences between higher and lower ranked daughters-in-law is not due to sorting into these roles: higher and lower ranking daughters-in-law are similar on observable human capital characteristics that are fixed before marriage. Our finding does not appear to be the result of other mechanisms of intrahousehold inequality, such as differences in economic opportunities between brothers who are fathers, nor does it seem to be a direct effect of larger households or more children, such as competition for resources among children, or disease spillovers in larger households.

These findings are important for several reasons. First, they provide the first causal identification of an effect of women's status on child height and human capital accumulation and underscore the depth of women's social exclusion in rural India. Second, they advance a growing literature documenting that human capital is malleable in early life, which is important since early life health insults have lasting consequences.[3] Third, these findings remind us that assuming that joint Indian households are unitary decision-makers may overlook important processes and inequalities.

The paper is organized as follows: section 2 reviews the literature on women's status and child health, on measuring women's status, and on Indian joint families. Section 3 presents our empirical strategy, and section 4 presents data and summary statistics about joint households and the children who live in joint households. In section 5, we show that the children of lower ranking daughters-in-law are shorter than their cousins who are born to a higher ranking daughter-in-law in the same household. Section 6 discusses our interpretation of these results, giving further evidence that lower ranking daughters-in-law indeed do have lower social status, and anticipating possible threats to validity. Finally, section 7 concludes.

[3]Indeed, there are likely many causes of child stunting in India, which require different kinds of policy responses. Spears (2012) documents a robust cross country and within-India relationship between sanitation coverage and child height. Menon (2012) discusses the extremely poor child feeding practiced in South Asia, and Sabharwal (2011) discusses the links between caste and poor anthropometric outcomes.

2 Background

In societies where women have most of the responsibility for child care, women's low social status and limited control of resources could contribute to poor child health. However, as Duflo (2011) has recently observed, this potentially important causal pathway can be difficult to document. Our analysis of rank differences within joint households addresses two key challenges in the existing literature. First, it avoids relying upon survey-reported status, where better educated or otherwise differing women might evaluate the same behaviors differently. Second, by comparing women and children within households, our approach holds constant heterogeneity across households that may be correlated with women's status. The remainder of this section reviews prior literature on women's status and joint Indian households.

2.1 The importance of women's status for child health

Prior econometric literature which tries to identify an effect of women's status on children's health[4] has relied on models which regress indicators of children's health on either place specific, or self-reported measures women's status, with controls for possibly confounding factors (see, for example, Smith et al. (2003)). However, even using detailed regression controls, it is difficult to account for the many correlates of women's status that may also influence children's health. At the aggregate level, we expect countries which afford women high status relative to men also to make better investments in children, and at the individual level, families which afford more status to women provide different environments to children than those in which women have lower status. Families in which women have higher status are likely to be wealthier, better educated, and more exposed to media, or, they may be families in which women earn income. All of these

[4]A related group of papers have found relationships between women's education and measures of children's health (Wolfe and Behrman, 1987; Behrman and Wolfe, 1987; Rosensweig and Wolpin, 1994; Glewwe, 1999). Thomas (1994) finds that in data from the United States, Brazil and Ghana to show that mother's education has a larger impact on her daughter's height than father's education, and that father's education has a larger impact on son's height than mother's education.

characteristics are likely to independently influence child health.

Several works from the qualitative social sciences establish a link between women's status and children's health. For instance, Castle (1993) compares two ethnic groups of Malian women living in close proximity to one another, but with different patterns of mothers' social standing and different support systems within their households. She finds that living in family structures that afford low autonomy to mothers and little support to women leads to child mortality and undernutrition.

Using data from the state of Punjab in India, Das Gupta (1990) finds that infants who are born in their mothers' natal, rather than marital, villages have higher rates of survival. She posits that this is due to the differences in women's autonomy in the two settings, saying that when in her marital village "a girl's behavior must undergo a dramatic transformation. She loses almost all voice and autonomy." But "once back in her parents' village, she is again free to be as mobile and vocal as before" (483). This paper, along with Das Gupta (1995), makes the important point that the trajectory of women's autonomy in South Asia over the life course does not favor healthy pregnancies and the healthy development of children: women's autonomy is at its lowest early in their marriages, at the start of their childbearing careers.

In an ethnography based on extensive fieldwork in Uttar Pradesh, Jeffrey et al. (1988) illustrate how "poor maternal and child health reflects, in microcosm, the problems facing the *bahu* [daughter-in-law]" (221). They discuss several mechanisms through which women's status in the joint household affect her children's health: "decisions about the seriousness of their own or their child's illnesses, about antenatal care, tetanus toxoid injections, strengthening food or rest, are rarely made by the woman alone. Nor do her views carry most weight with those in her *sasural* [in-laws' home] who might act on her behalf" (221).

While this work is thoughtful and convincing, we should, however, interpret the findings with care. Duflo (2011) discusses the links between women's empowerment and economic development, pointing out that although economists have found strong correlations between mothers' education and earnings and child health outcomes, it is difficult to establish causal links between these variables because the relationship may be confounded by socioeconomic status or by other characteristics of families with a more liberal attitudes toward women. The same problems arise in considering the relationship between women's status and children's health.

2.2 Measuring women's status

Part of the difficulty using women's status as an econometric variable is that women's status is hard to operationally define, and to hard to measure. It is difficult to find variables that capture variation in women's status as opposed to something else. For instance, Shen and Williamson (1998) explore the relationship between maternal mortality rates and women's status across countries. However, many of the variables that they use to identify women's status – differences between men and women's schooling, births attended by trained personnel, contraceptive prevalence, age at first marriage and total fertility – may have direct effects on the dependent variable, or capture aspects of the health environment beyond to women's status itself.

The recent economics literature has been more likely to study survey-reported women's status as a *dependent* variable. For instance, Anderson and Eswaran (2009) study the say women have in household purchases in Bangladesh, and find that it is influenced by their incomes and employment situations. Ashraf et al. (2010) report on a field experiment in the Philippines; they also look at decision making power over household purchases, and find that individually held commitment savings accounts help promote women's decision making power. Finally, Jensen and Oster (2007) look at data from India, and use reported say in household decisions, reported acceptability of beating and reported son preference as measures of women's status. They find that these variables are influenced by the introduction of cable television.

In this paper, we use a woman's intrahousehold rank as a measure of her status. Status is certainly multidimensional: the anthropological literature highlights many differences between higher and lower ranking daughters-in-law (discussed in section 2.3), and the empirical work in the latter part of this paper confirms that status differences are hard to define simply. However, the ways in which demographers Dyson and Moore (1983), Jejeebhoy and Satar (2001) and Rahman and Rao (2004), define women's autonomy seem to correspond with the kinds of differences between higher and lower ranking daughters-in-law which we use in our identification strategy. Dyson and Moore (1983) define autonomy as "the capacity to manipulate one's personal environment. Autonomy indicates the ability–technical, social, and psychological–to obtain information and to use it as the basis for making decisions about one's private concerns and those of one's intimates" (45). Jejeebhoy and Satar (2001) define autonomy as "the control women have over their own lives – the extent to which they have equal voice with their husbands in matters affecting themselves and their families, control over material and other resources, access to knowledge and information, the authority to make independent decisions, freedom from constraints on physical mobility, and the ability to form equitable power relationships within families" (688). Rahman and Rao (2004) echo certain elements of these definitions of women's status in South Asia: they argue that the differences in female autonomy are best described by thinking about differences in women's decision making power and mobility.

2.3 Joint households in rural India

The joint household, or joint family, is, in the words of Mandelbaum (1948), a "classic" Indian institution, which has been studied extensively by anthropologists. Joint households often consist of older parents, their sons, and the sons' wives and children. Figure 1 diagrams a simple case of a joint household.

Although the majority of households in rural India today consist of nuclear families, and this has been the case for several decades (Singh, 2005), joint households are nonetheless common, particularly among households with young children.[5] Table 1 shows the

[5] Joint households tend to break apart as the brothers get older and their parents pass away.

fractions of households that are joint households in each survey round of the NFHS, and the fraction of children under five living in joint households.

The fraction of children who live in joint households is greater than the fraction of households that are joint. This is primarily because joint households have more than one childbearing woman. It has also been suggested that joint families are conducive to higher fertility (Davis, 1955; Davis and Blake, 1956), although Burch and Gendell (1970) point out that this is a difficult claim to support because families shift in and out of joint household status due to death and dissolution. The NFHS surveys only record family structure at the time of the interview, and do not ask women whether they have ever lived, or plan to continue living in, a joint household.

Joint households are characterized by patriarchy and by age-hierarchy: women are subordinate to men and younger members are subordinate to older members. In particular, older brothers are afforded higher status than younger brothers; the oldest brother will assume the role of head of the family at the time of the father's death (Seymour, 1993). A woman's status is derived by her husband's status in the household, which is largely determined by his birth order (Singh, 2005).

New wives are expected to display subordinate behavior when they are in their husbands' homes. Mandelbaum (1988) describes how, when a new daughter-in-law joins the household, she is expected to "be most diffident, shy, and self-effacing...[keeping] her gaze lowered, her voice still, her features covered, and her whole presence unobtrusive" (5). The demands of propriety weigh even more heavily on a daughter-in-law who is married to a younger brother, because, even as time goes on, she "should never stop sending signals of deference and respect before her father-in-law and her husband's elder brothers." These signals include veiling her face in their presence, sitting on the floor, rather than a chair or a cot, and remaining quiet in their presence.

Mandelbaum (1988) discusses how all wives must show these signs of respect for their fathers-in-law; but the relationships of the oldest brother's wife with her husband's younger brothers are allowed to be "casual, joking relationship(s)." In front of them, she can "appear barefaced" (5). There are thus fewer people with whom the wife of the younger brother can be at ease in the joint household. These sorts of practices have led Dyson and Moore (1983) to remark that "senior wives tend to dominate young in-marrying wives" (44). Jeffrey et al. (1988) expand on this idea in their discussion of female hierarchy. They point out that when a new daughter-in-law enters the joint household, the daughters-in-law who are already established in the household "are concerned for the integrity of their husband's *chulha*[6] rather than to be supportive and welcoming: indeed, they wield authority over her [the new daughter-in-law]" (30). They go on to say that, "[i]n practice, then, much of the normal policing of young married women is delegated to older women, especially the *sas* [mother-in-law], *older sisters-in-law*, the husband's aunts and his older cousins' wives" (31, italics added).

The fact that status differences between higher and lower ranking daughters-in-law are fairly well accepted in the anthropological and demographic literatures, and the objectivity and relative ease of measuring husband's age order, supports our use of intrahousehold rank as a reliable way to identify variation in women's status.

3 Empirical strategy

Our strategy for identifying an effect of women's status on children's health involves comparing children living in the same joint household whose mothers are assigned different social status as a result of their marriage to older or younger brothers.[7] Thus, we are comparing children who share the same social environments, economic resources, and disease environments, all of which importantly influence child health and child height. Fixed effects regressions control for any aspect about the child's experience that is shared across cousins. Building upon the basic fixed effects regressions, we also introduce controls

[6]Literally, cooking stove, here, it captures ideas about reputation and proper home economy.

[7]We are not the first paper to use demographic circumstances of women's lives in South Asia to identify variation in their status. For instance, Kishore and Spears (2012) find that having a first son rather than a first daughter increases the probability that a woman in rural India will use clean cooking fuel and Zimmermann (2012) documents a temporary increase in the say that woman has in household affairs following the birth of a son.

specific to the child and her nuclear family. Finally, we verify empirically that lower ranking daughters-in-law indeed have lower social status than higher ranking ones, and rule out competing explanations.

3.1 Main regression specification

The children in our analysis are rural Indian children under five living in joint households with two daughters-in-law. Section 5 discusses our main results, presented in table 3. The main regression specification for table 3 is:

$$\begin{aligned} heightforage_{ih} &= \beta lowrankingmother_{ih} + \alpha_h + \\ &\quad A_{ih}\theta + D_{ih}\eta + M_{ih}\lambda + F_{ih}\delta + \varepsilon_{iv}, \end{aligned} \tag{1}$$

where h indexes joint households and i indexes children. Fixed effects α are included for joint households. Sample weights are used and standard errors are clustered at the primary sampling unit (PSU) level. Note that this coarser clustering is more conservative than clustering at the household level.[8]

The coefficient β is the parameter of interest. $lowrankingmother_{ih}$ indicates that the child's mother is the low ranking daughter-in-law, which is determined by the age of her husband relative to the age of his brother. It is necessary to include controls for the age of the child, because younger children, on average, have higher height-for-age z-scores than older children,[9] and lower ranking daughters-in-law are likely to have younger children than their higher ranking counterparts. A_{ih} is a vector of 118 indicator variables for age in months 1-59, separately for boys and girls. Because age in months$\times$sex is the level of disaggregation at which height-for-age z-scores are determined, in addition to controlling for any heterogeneity in age structure it accounts for any differences between the WHO reference population and the mean height of the children studied.

After the inclusion of age and sex controls, we find that the children of lower ranking

[8]The main results presented in table 3 are robust to doing the analysis without sample weights.
[9]The process of stunting unfolds over time. Figure 3 illustrates this pattern.

mothers have lower height for age z-scores than their cousins. Controls are added in stages to demonstrate that they have little effect on this conclusion. In particular, covariate controls are added in three sets: D_{if} is a vector of demographic controls about the child, M_{ih} is a vector of controls about the child's mother, and F_{ih} a vector of controls about the child's father.

3.2 Verifying status as a mechanism

Section 6 presents evidence that lower and higher ranking daughters-in-law are similar on pre-marriage characteristics: they have similar heights, levels of education and literacy, and ages at marriage. However, lower ranking daughters-in-law indeed have worse intrahousehold status than higher ranking daughters-in-law in three domains. We document that they have less say in household decisions, spend less time outside on a typical day, and have lower body mass index scores than higher ranking daughters-in-law. All three of these differences suggest ways in which intrahousehold status could affect children's health. We also use data from the NFHS 2005 men's survey, a subsample of men in households interviewed by the NFHS to compare brothers living in joint households. This comparison helps us rule out that our results are being driven by different socioeconomic circumstances in nuclear families.

4 Data and summary statistics

We use data from the National Family Health Survey, 2005 (NFHS 2005), the most recent Demographic and Health Survey of India.[10] We restrict our analysis to children younger than five years old[11] living in a rural joint household with two daughters-in-law.

[10]We do not have the opportunity to replicate our results using the earlier NFHS-2 because it only measures height of children under three years old There are very few households in which two daughters-in-law both had children under three years old. Nor can we replicate the results using the India Human Development Survey, 2005, because only one woman per household was interviewed for the woman's questionnaire.

[11]The heights of children five years and older were not measured, so we are not able to include older children in the analysis.

4.1 Joint households in the NFHS 2005

In the NFHS 2005, surveyors listed as household members "the persons who usually live in [the] household and guests of the household" who stayed at the house the night before the survey. In order to include only those families which are most likely to share resources that influence children's health, such as money and food, we include in our sample only households which listed a father-in-law, or a mother-in-law, as the head of household. That is to say, we excluded families in which both parents had died, or lived separately from their sons. Relatively few rural children under five in the NFHS 2005 live in such families: only 2.1% of rural children under five have a mother who is the sister-in-law of the head of the household.[12]

Table 1 shows the fraction of households in the NFHS 2005 which were joint families, and the fraction of children under five living in joint households. Between 1993 and 2005, the fraction of households that were nuclear households (with no daughters-in-law) increased from 77.1% to 81.2%. This may have been in part due to population aging, which would mean there are more households at a later point in their life cycle (that is, the grandparents have passed way, but the children have not yet married). However, it is also the case that the fraction of children under five living in nuclear family households increased from 66.4% to 67.8%.

The fraction of households in which there were two daughters-in-law, the households of interest in this paper, declined from 4.5% in 1993 to 3.1% in 2005. However, this is still an important family structure for children under five: the fraction of children under five living in households with two daughters-in-law declined by only about one percentage point between 1993 and 2005, from 9.1% to 8.2%.

In order to concentrate on identifying a casual effect of women's status, we sacrifice

[12]Because our identification strategy uses household fixed effects to control for socioeconomic characteristics of households, it is important to use only those households which are indeed economically integrated. Because joint households in which both parents have died no longer have the joint responsibility of caring for parents, they are likely to be less economically integrated. In these households, household fixed effects are not as useful in controlling for the economic environment in which the children are raised.

some external validity. Panel A of table 2 presents summary statistics which compare households with two daughters-in-law with other households in rural India. Households in which there are two daughters-in-law appear to be slightly better off than other rural households. In particular, they are more likely to belong to a general caste, rather than the historically disadvantaged scheduled castes and tribes, or to other backward castes. Caste is a characteristic that does not depend on the household's stage of its life cycle. It is slightly harder to interpret differences in other socioeconomic indicators, like asset count, sanitation and electricity. We would expect joint households to have more assets since they have more adult members, and they might be better off than other types of household on sanitation and electricity in part because they are older, more established, less mobile households in which the head couple has reached the peak of their earning potential.

Are children living in households with two daughters-in-law concentrated in certain states? Figure 2 plots, for each state, the fraction of rural children under five in the NFHS 2005 living in that state against the fraction of children under five in our sample from that state. Again, our sample consists of children living in joint households with two daughters-in-law. States which are above the 45-degree line are "over-represented" and states which are below the line are "under-represented." It is striking, however, that the states are so clustered around the line. As we would expect, the more socially conservative northern states such as Punjab, Rajasthan, and Uttar Pradesh lie above the line, and southern states such as Tamil Nadu and Andhra Pradesh lie below it. However, even the conservative, populous state of Uttar Pradesh, which lies farthest from the line, contributes 20% of the children in the NFHS 2005, and only 25% of our sample. We cannot reject the null hypotheses that the a regression of the fraction of our sample in each state on the fraction in the full rural dataset in each state has a slope of 1 and an intercept of 0.

4.2 Children's height for age

Panel B of table 2 compares children under five living in households with two daughters-in-law with children living in other types of rural households in India. The height for age z-scores of children in the 12 -23 month and the 24-59 month groups are slightly less negative (indicating taller children) in households with two daughters-in-law than other types of rural households. Although this in in part due to the fact that 24 - 59 month old children in households with two daughters-in-law are slightly younger than children in other types of rural households, this is not true for the 12 - 23 month old group. This pattern is consistent with the fact that households with two daughters-in-law appear to be slightly better off than other types of households.

Figure 3 uses local polynomial regression to compare the height for age z-scores of the children of higher and lower ranking daughters-in-law in joint rural households. Although our empirical strategy for identifying an effect of women's status on children's health uses household fixed effects to control for household level omitted variables, this figure presents the data in our regressions as a simple comparison of the cross-sectional, synthetic, growth trajectories of the children of higher and lower ranking daughters-in-law. Panel A includes the 1078 children living in households with two daughters-in-law, in which both daughters-in-law have children, and panel B includes the 1829 children living in households with two daughters-in-law. Even the youngest children of lower ranking daughters-in-law are shorter than the similarly aged children of their higher ranking counterparts; they have already been exposed to differences in social rank *in utero*.

5 Results

5.1 Main results: Children of lower ranking mothers are shorter

Table 3 reports the results of fixed effects regressions of children's height for age z-scores on their mother's rank in the household, and a number of controls. For robustness, we use two different panels. Panel A of table 3 restricts the sample only to children living in households in which both daughters-in-law have children under five at the time of the survey. Panel B of table 3 includes all children under five years old from households with two daughters-in-law.[13] Thus, some children in Panel B do not have cousins in the regression, but they contribute information to the estimation of the coefficients on the controls and to the standard errors. The results are similar in both panels: children of lower ranking daughters-in-law are about a fourth to a third of a standard deviation shorter, on average, than children of higher ranking daughters-in-law in rural joint households.

Comparing height for age z-scores of children of different ages can be misleading. In column 1, there is no apparent effect of mother's rank on children's height for age z-scores. This reflects an important property of stunting in developing countries: children's height-for-age z-scores fall as they age from birth to two years. In the NFHS 2005, mean height for age z-scores stabilize around -2 standard deviations at about two years of age, and perhaps improve slightly between the ages of two and five years old. Because lower ranking daughters-in-law have younger children, on average, it is necessary to control for the children's age in months. Column 2 introduces the necessary controls for the children's sexes, ages in months, and the interaction of sex and age in month dummies. After including these controls for age, there is a negative and significant effect of mother's rank on the children's height.

The regression results presented in table 3 use standard errors clustered at the PSU level, as well as sample weights given in the birth recode of the NFHS 2005. Results are similar if we do not weight the regressions. Since we might be concerned that households in which the father-in-law has died (but the mother-in-law is still alive) are less economically integrated, which could make the use of fixed effects less persuasive as identification strategy, we also run the regressions only for children in households in which the head of the household is reported to be a man. The results are similar.

[13] In some households, only one of the two daughters-in-law has children under five at the time of the survey.

5.2 Robustness to regression controls

5.2.1 Demographic controls

Could these results be due to some omitted property of the child, correlated with mother's rank? Since lower ranking daughters-in-law, almost by definition, have their children later, on average, than higher ranking daughters-in-law, it is possible that the effect that we see has to do with birth order among the cousins in the household rather than women's status. Suppose, for instance, mothers-in-law prefer older grandchildren to younger grandchildren, and so invest more in them. Since these children are more likely to be born to the higher ranking daughter-in-law, the higher height for age z-scores of children of higher ranking daughters-in-law could reflect this preference.

In column 3, we control for demographic characteristics of the child: whether the child is first born, whether she is a single birth, her mother's age at the time of birth, and her birth order in the joint household. The results are similar to those reported in column 2; if anything, they are stronger. The main result also holds if, instead of controlling for the child's birth order among the cousins in the joint household, we control for her birth order in the nuclear family, or if we drop all first born children from the regressions. Nor does splitting the sample into boys and girls, and running the regressions for each sex separately affect the results: the results are robust when we compare boy cousins to boy cousins and girl cousins to girl cousins.

The control for birth order in the joint household, that is, birth order among the cousins, likewise helps rule out a possible threat to validity having to do with the disease environment. If the total number of other children with whom a new infant shares the household environment has a negative impact on his disease environment, then we would expect higher birth order children to be shorter. Controlling for birth order in the joint household helps address this concern, because it is the same as controlling for the number of children already in the household when the child was born.

Finally, figure 4 shows nonparametrically that birth order in the nuclear family (the fact that we are more likely to be looking at lower birth order children of higher ranking daughters-in-law and higher birth order children of lower ranking daughters-in-law) is not driving our results. This figure plots the median and interquartile range of children's height for age by birth order in the nuclear family and mother's rank. It shows that a difference between the heights of higher and lower ranking daughters-in-law is present for children of all birth orders.

5.2.2 Parental controls

The household fixed effects control for omitted variables at the level of the household. However, it is possible that the children of lower ranking daughters-in-law are shorter not due to their mothers' status, but to some relative difference between their parents. If, for instance, their mothers were shorter,[14] or if either parent were less well educated, or if households are not really joint in their economic decision making, such that the younger brother's nuclear family has fewer resources, then we might expect their children to be shorter.

In table 3, we add controls in order to rule out that the result is being driven by parental differences correlated with rank. Column 4 of table 3 controls for mother's height, dummy variables for the years of education completed by the mother, and her age at marriage. These controls do nothing to change the coefficient on mother's rank. Column 5 adds two father-specific control variables taken from the women's survey:[15] father's age at the time of the survey (including a dummy variable that indicates whether the age is missing), as well as dummy variables for the father's level of education. We can also control for dummy variables indicating the fathers' occupational category (not shown); the coefficient is, if anything, greater in absolute value and still statistically significant.

[14] We do not expect the genetic component of fathers' height to vary across siblings, so fathers' genetic height differences would not, on average, constitute a threat to the validity of the main result.

[15] We take these controls from the women's survey because not all of the fathers of children in our sample answered the men's survey. Taking data from the women's survey allowed us to preserve a sample size similar to the ones in columns 1-3.

Figure 5 helps verify that differences in the heights of mothers, which strongly predict the heights of children, are not driving the difference we identify in the heights of children of higher and lower ranking daughters-in-law. Panel A of this figure shows that for all mothers' heights, the children of lower ranking daughters-in-law are shorter than the children of higher ranking daughters-in-law. Panel B plots children's height for age z-scores, net of age and sex, against the heights of their mothers. That is, these are residuals of regressions of height for age z-scores on age in month by sex dummies. The gap between the heights of children of higher and lower ranking daughters-in-law is unsurprisingly larger in panel B than in panel A because panel B accounts for the fact that the children of lower ranking daughters-in-law are younger on average, and therefore, have higher height for age z-scores.

6 Interpretation: Women's status

We interpret the effect of mothers' intrahousehold rank as a marker of her social status within the household. In support of this view, we first present evidence that higher and lower ranking daughters-in-law are not different, on average, before marriage. Next we show that, after marriage, women married to older brothers enjoy greater social status: they have more decision-making influence; they are able to leave the house more often; and, despite having similar heights, they have more body mass, suggesting more access to food or leisure. Finally, we show that there is no evidence that older brothers (who are the fathers of children in our sample) are taller or are able to bring more resources into their nuclear families within the joint households we study.

6.1 Do "less fit" mothers sort, before marriage, into lower rank?

People living in joint households almost universally practice arranged marriage; that is, the parents of the bride and the groom decide whether and when a marriage will take place, often with little input from their children. The parents of marriageable girls know before the marriage whether the proposed groom is an older or younger son. If parents with more desirable girls have more bargaining power, they may be better positioned to marry their daughters to a higher ranking son. More desirable wives may also be better mothers, allowing their children to grow taller.

Despite the seeming plausibility of this story, we find little evidence of it. Table 4 compares higher and lower ranking daughters-in-law on four observable dimensions that have been hypothesized to play important roles in determining children's health and heights: mother's height, her grade completed, whether she is literate, and her age at marriage. The only variable for which there is a difference is literacy: lower ranking daughters-in-law are *more* likely to be literate. In a simple fixed effects regression with no control variables, lower ranking daughters-in-law have about a half of a year more education, on average, than their higher ranking counterparts. This probably reflects secular increases in education levels over time, because after controlling for the mother's age at the time of the survey, the effect of rank on education goes away.

Thus, it does not seem that the results are being driven by lower ranking daughters-in-law being less fit for motherhood than their higher ranking counterparts. This makes sense in light of work done by Vogl (2012), who finds that, due to the parents' wish to marry their daughters-in-law in age order, older sisters marry less desirable husbands than younger sisters. Parents seem to be quite constrained in their choice of son-in-laws: marrying their daughter to a man of right caste, at the right time, in the right order (older sisters must marry before younger ones), may leave little remaining opportunity for parents to optimize on husband's birth order.

6.2 Lower ranking daughters-in-law have lower status

This section presents novel evidence that, after marriage, the daughters-in-law who are married to the younger brother are indeed lower ranking, in the ways described by Dyson and Moore (1983), Jejeebhoy and Satar (2001) and Rahman and Rao (2004) in section 2. We find that lower ranking daughters-in-law have less say in household decisions than higher ranking daughters-in-law, spend less time outside of the house, and have lower BMIs than their higher ranking counterparts.

6.2.1 Say in household decisions

Do lower ranking daughters-in-law have less autonomy and influence? The NFHS 2005 asks married women about who in their household has the "final say" in decisions about the woman's own health care, large household purchases, daily household purchases, the woman's visits to her own relatives and friends, and what to do with money her husband earns.[16] Women's responses about who has final say in each decision are reported with five options: the respondent alone, the respondent and her husband, the respondent and another person, her husband alone, or someone else.

Panel A of table 5 presents the results of the regression of a dummy variable indicating whether or not the woman has final say in the decision (coded as a binary variable that is equal to one when the women alone or the woman has say with another person) on her rank.[17] For decisions related to health, daily purchases and what to do with money, younger daughters-in-law are statistically significantly less likely than older daughters-in-law to report having final say, whether alone or with another person. Additionally, we create a variable that is the count of decisions in which the daughter-in-law has final say; lower ranking daughters-in-law have final say in fewer decisions.

In principle, it could be difficult to determine whether this difference is due to the lower status of lower ranking daughters-in-law within the household, or to the fact that they are younger than the higher ranking daughters-in-law. Therefore, in panel B of table 5, we control for the woman's age at the time of the survey, which controls for the age

[16]Some variables measuring women's status in the NFHS 2005, such as whether or not a woman is beaten by her husband, correlate in counterintuitive ways with other variables. For instance, beating correlates positively with wealth. This suggests that women's status is difficult to measure with survey questions because higher status women would be more likely to object to a given level of maltreatment. However, the number of decisions in which a woman has say correlates positively with wealth, as we would expect. Note that our fixed effects approach accounts for any household level measurement error of the "say" variables.

[17]The observations in these regressions are women who live in joint households with two daughters-in-law.

gap between the two women. We find that the results are generally robust to this control: lower ranking have say in a smaller number of household decisions and are less likely to have say over daily purchases.

Although not presented here, we also test for differences in "say" between higher and lower ranking daughters-in-law using the NFHS 1999. Using this alternative data set, we again find that lower ranking daughters-in-law have less say in household decisions than their husbands' older brothers' wives.

6.2.2 Time spent outside: Evidence from the India Time Use Survey

Do lower ranking daughters-in-law have less mobility? Rahman and Rao (2004), and Kabeer (1999), an important work in defining women's empowerment, discuss the role of women's mobility, particularly in the public sphere, as a sign of their social status. Using data from the India Time Use Survey, we compare the time spent outside in a typical day of higher and lower ranking daughters-in-law.

The India Time Use Survey, collected in 1998-9, interviewed the members of 12,750 rural households in six states in India: Harayana, Madhya Pradesh, Gujarat, Tamil Nadu, Orissa, and Meghalaya. One key purpose of the survey was to study gender discrimination in household tasks, and the contribution of women to the economy (MOSPI, 1999). Each member over the age of six was asked to report his or her activities on the day prior to the interview. Households were visited several times so that time use for "normal" days, "weekly variant" (such as a Sunday) days, and "abnormal" days (such as holidays) could be collected. Because we are interested in what is true for higher and lower ranking daughters-in-law on most days, we restrict our analysis to "normal" days.[18] In addition to reporting the activities in which he or she was engaged, respondents also reported how long he or she was doing the activity, and whether it took place inside or outside the home.

As in our analysis of the NFHS, we focus on a small subsample of households. 1.2%

[18] Other papers which have used the India Time Use Survey, such as Barcellos et al. (2012), have made this restriction as well.

of the rural households in the India Time Use Survey sample have two daughters-in-law. In contrast, data from the NFHS, 1999, showed that 2.8% of rural households had two daughters-in-law. This suggests an important underreporting of joint households, perhaps because the Time Use questionnaires were quite long and burdensome for both surveyors and respondents.[19] Because the India Time Use Survey collected little information other than time use from family members, it is difficult to know how the joint households that were reported as such compare to the joint households in the NFHS. Due to the small sample size, and the possible selection in the data, we see this analysis of time use of higher and lower ranking daughters-in-law as suggestive of differences in their rank in the household, but not as stand-alone evidence of the claim.

There are only 156 households for which the time use of two daughters-in-law on a normal day were recorded. We find that, on average, lower ranking daughters-in-law spend less time outside on normal days than higher ranking daughters-in-law.[20] Panel A of figure 6 plots the minutes spent outside by age at the time of the survey for lower and higher ranking daughters-in-law. A regression of time outside spent outside on a normal day on rank, using standard errors clustered at the household level, confirms that this difference is about 27 minutes, on average, and is statistically significant at the 8% level, using a two-sided test.[21] Panel B of figure 6 shows the cumulative distribution functions (CDF) of time spent outside for higher and lower ranking daughters-in-law. Almost everywhere, the CDF for lower ranking daughters-in-law is to the left that for higher ranking daughters-in-law, meaning that they spend less time outside of the household. A Kolmogorov-Smirnov test for equality of the distributions shows that there is a statistically significant difference between these CDFs at the 7% level.

[19] Both parties would have had an incentive to claim that a joint family was actually a nuclear one, in order to save time and effort.

[20] Since the survey did not record relationships between household members, but only listed members' relationship to the head of the household, we had to use the women's own ages to construct the rank variable in the time use analysis. For the other analyses in the paper, we are able to use our preferred variable – husband's age – to construct the rank variable for daughters-in-law.

[21] We follow Barcellos et al. (2012) and do not weight this analysis. If we include household fixed effects in this regression, the coefficient remains the same, but the p-value increases to 0.21, likely due to the very small sample size.

6.2.3 Body mass index

The low body mass index scores of women in India are an indicator of their malnourishment: 36% of women in the NFHS 2005 have a body mass index score (BMI) below 18.5, the cutoff associated with chronic energy deficiency. The BMIs of Indian women are among the lowest female BMIs in the world.

Another difference between higher and lower ranking daughters-in-law is that lower ranking daughters-in-law have lower BMIs than higher ranking daughters-in-law.[22] Table 6 presents the results of regressions of women's BMIs on their intrahousehold rank, and a number of controls. Panel A uses the 810 women who live in joint households in which both daughters-in-law have children under five as observations, and panel B uses the 1385 women living in households with two daughters-in-law as observations. All regressions use women's weights provided by the NFHS 2005; standard errors are clustered at the PSU level.

Column 1 reports the coefficient on rank from simple regression of woman's BMI on rank; it finds that lower ranking daughters-in-law are about one third of a BMI point smaller than higher ranking daughters-in-law. Column 2 introduces joint household fixed effects into the regression equation, and finds that the results change little. Lower ranking daughters-in-law are, on average, at a different stage in their child bearing careers than higher ranking daughters-in-law. Therefore, it is important to control for characteristics related to childbearing that could be confounding these results. Column 3 introduces controls for whether the woman is pregnant, whether she is breastfeeding, and the age of her youngest child in months, as well as dummy variables for her year of birth, and dummy variables for the number of children ever born to her. The estimate of the coefficient on rank changes little. Finally, in column 4, we replace the indicator for breastfeeding and the linear term for the age in months of the woman's youngest child

[22]Note that there is no contradiction here with the fact that higher and lower ranking women have similar heights. Height is determined in early life – before marriage – when we argue that higher and lower ranking mothers are similar, on average; weight-for-height reflects more recent net nutrition, in particular here after marriage has assigned different ranks.

with a 118 variable vector interacting the indicator for breastfeeding with 59 indicators for the age of months of the woman's youngest child. This more non-parametric control for any effect of breastfeeding on a woman's BMI makes it very unlikely that this result merely reflects a spurious relationship between intrahousehold rank and breastfeeding status.

This finding is important for two reasons. First, it provides further evidence that lower ranking daughters-in-law indeed have worse intrahousehold status than higher ranking daughters-in-law. Indeed, it is common in hierarchical Indian households for members to eat according to their rank, with household heads eating before men, who eat before women. Palriwala (1993) describes how this happens in rural north Indian households:

> "[t]he person who cooked and the youngest daughter in law, usually the same person, ate last. This acted against her, even if there was no conscious discrimination. Thus after feeding unexpected guests, the person who ate last, the cook, could prefer to do without rather than cook again. In middle peasant households, often there could be no vegetables or lentils left and she made do with a pepper paste and/or raabri. In a situation of deficit she went hungry when other household members did not have to (pg. 60)."

Second, the fact that lower ranking daughters-in-law have lower body mass index scores suggests a mechanism through which intrahousehold status could influence children's height. BMI is understood as a measure of nutrition, and as mentioned above, Indian women's BMIs are very low. That lower ranking daughters-in-law have lower BMIs may indicate worse pre-natal nutrition, which has been shown to influence children's height (Kusin et al., 1992; Adair, 2007).

6.3 Nuclear families' resources: Evidence from the men's survey

Is it possible that, rather than being driven by women's status, our results are driven by resource differences between the nuclear families of older and younger brothers? This would be the case if, for instance, older brothers received more investments in their early life human capital, or if they had more economic resources in adulthood, allowing them to provide more health inputs to their own children, even within a joint household setting. We find this unlikely since decisions relating to using resources to promote children's health tend to be made by household heads, although the possibility of differences between nuclear families should be seriously considered.

The NFHS 2005 interviewed men as well as women in the surveyed households. However, the men's survey was not attempted in all households. In most states, surveyors interviewed a subsample of the men aged 15-54 years in households selected for the main survey, but in seven states all men in selected households were interviewed.[23] Where a subsample of men was interviewed, households were randomly selected to participate in the men's interviews and all age eligible men were asked to respond to the survey. The response rate for rural men selected to answer the survey was about 90%, while the response rate for rural women was about 96% (International Institute for Population Sciences (IIPS) and Macro International, 2007).

The men's sample allows us to asses whether younger brothers have less human capital or fewer resources than their older brothers. Table 8 uses data from the men's survey to answer these questions. All of the regressions in this table use joint household fixed effects and dummy variables to control for the brothers' years of birth. The table presents the results for three subsamples of men: panel A includes all ever-married adult sons (over 20 years of age) of the head of the household living in households in which two such men

[23]The sampling strategy was designed to allow estimates of HIV prevalence in these states. They were Uttar Pradesh, Manipur, Nagaland, Tamil Nadu, Maharashtra, Andhra Pradesh and Karnataka. The sample weights provided by the NFHS allow us to compensate for the unequal sampling probability of men in different places.

reside; panel B looks at a subsample of the brothers in panel A who live in households with children under five; and panel C looks at a subsample of brothers in panel A who live in households in which both brothers have children under five years old. Column 1 of this table regresses brothers' heights on their age order, and finds that younger brothers are not statistically significantly shorter than older brothers, suggesting similar patterns of early life human capital accumulation for all three subsamples of men. In columns 2 and 3, the dependent variables are years of education and literacy, and again, we find no differences between older and younger brothers. Columns 4 and 5 capture aspects of brothers' individual economic status. Younger brothers are no less likely to report working, or to report working in white collar jobs, than older brothers.

Finally, table 9 replicates the results in table 3, which regresses children's height for age on mother's rank, controlling for father's height. Column 2 of table 9 restricts the analysis to those children whose fathers' heights were measured. Father's height is never a significant predictor of children's height; this is not unexpected considering that all of the specifications use household fixed effects. In the larger sample in panel B, the coefficient on mother's rank is robust to the inclusion of the control for father's height, although this is not the case in panel A, where the sample size shrinks to only 408 children living in households in which both daughters-in-law have children and in which the heights of men were measured. In columns 3 and 4, we include a dummy variable to indicate where father's height is missing in order to preserve the sample size. Here, the coefficients on mother's rank are statistically significant and of similar magnitude to the coefficients in table 3.

7 Conclusion

Could low social status of women be one cause of stunting among Indian children? This is plausible because women have nearly all of the responsibility for early-life child care. This paper has focused on a novel identification strategy, exploiting features of the family structure in rural joint households. Children born to mothers married to younger sons are shorter, on average, than their cousins born to mothers married to older sons, even though they live in the same household and are exposed to the same environment. We present additional evidence confirming that these lower ranking mothers indeed experience lower social status within the household after marriage: they have less decision-making say, less mobility outside the home, and lower weight-for-height. However, they do not appear to be less fit for childrearing before marriage: they are no shorter, or less well educated. Finally, the difference in children's height does not appear to be due to any difference between their fathers, who are brothers to one another, and sons of the household head.

In addition to documenting this effect of women's status, this paper contributes to a growing literature in economics that highlights the lasting importance of early-life health. Much of the stunting caused women's intrahousehold rank results from events that occurred in the first few years of a childs life, period which is extremely sensitive to human capital inputs (*e.g.* Currie, 2009). Indeed, Jeffrey et al. (1988) explain that low status of young daughters-in-law in rural India constrains investments in children even *in utero*. Economists have increasingly highlighted the importance of this period for human capital accumulation (*e.g.* Almond and Currie, 2011).

A principal contribution of this paper is its attention to internal validity: mothers' low status has a causal effect on the human capital of children, in this context. As is often the case, this clarity has come at a cost to external validity: we have only directly studied children living in a particular type of household. However, what we have learned about the importance of hierarchy and women's status almost certainly has broader implications for human capital formation elsewhere. The effect on children's height-for-age that we document is small relative to the 2 standard deviation gap between the average Indian child and the World Health Organization's international norms. However, the difference in status between higher and lower ranking daughters-in-law within the same household is also small relative to the difference between women and men in Indian society, and between high and low caste people. Although we cannot extrapolate directly from these results, we predict that these larger gaps in status would cause important gaps in Indian children's health and human capital as well.

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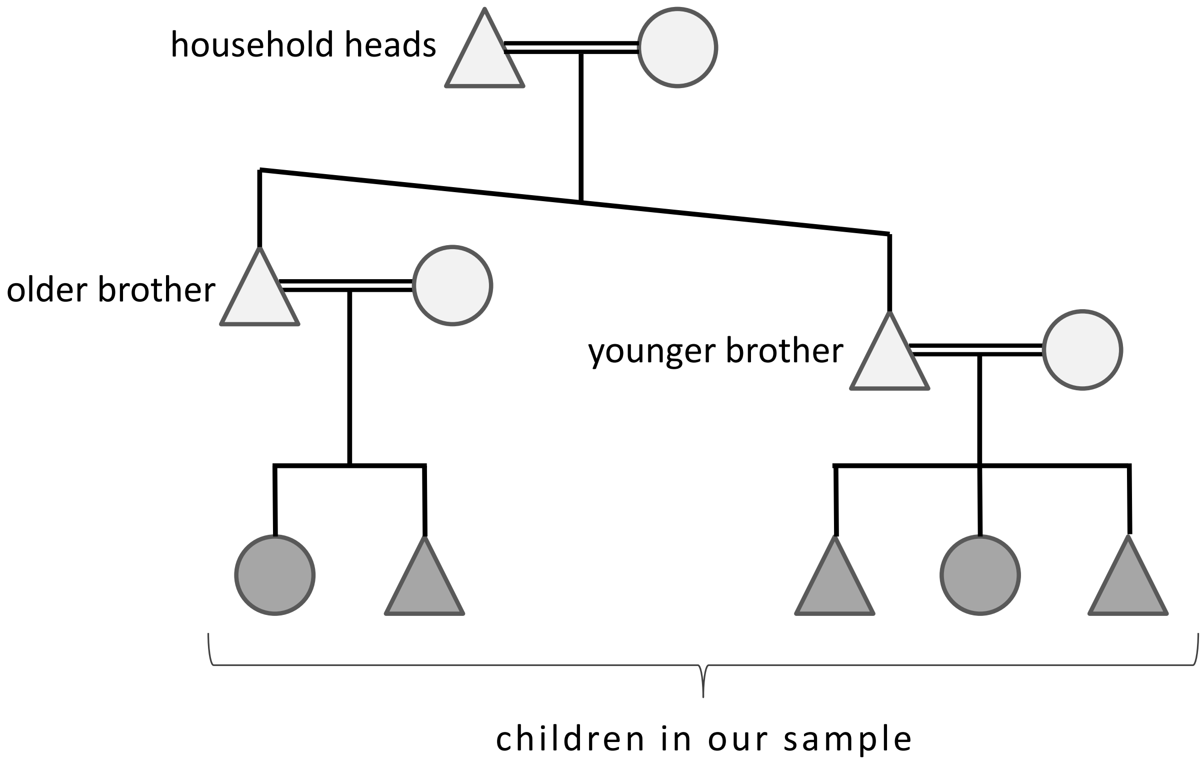

Figure 1: Children in a joint Indian household (males are triangles, females are circles)

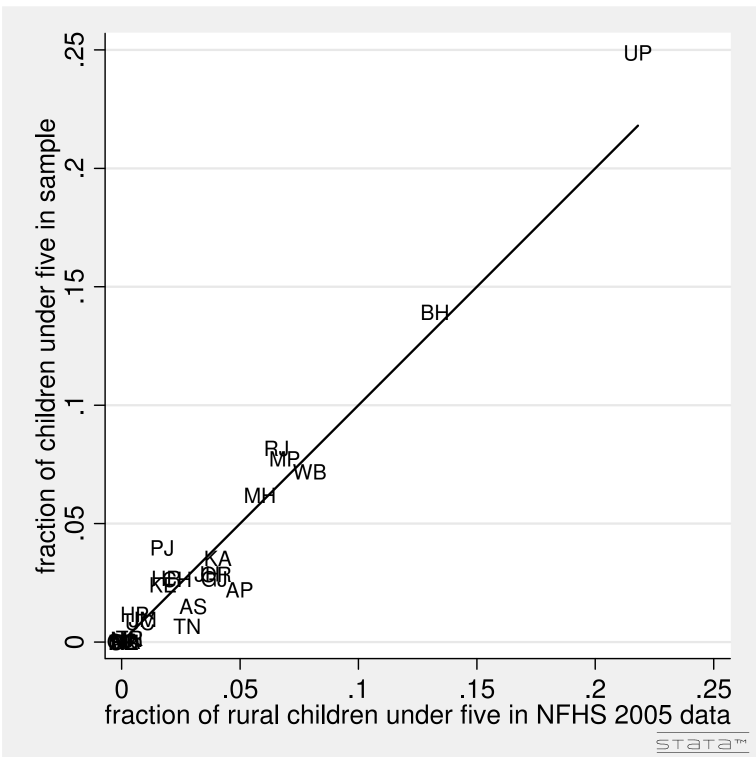

Figure 2: Fraction of rural children under 5 in each state in National Family Health Survey, 2005, and the fraction of those children in our sample

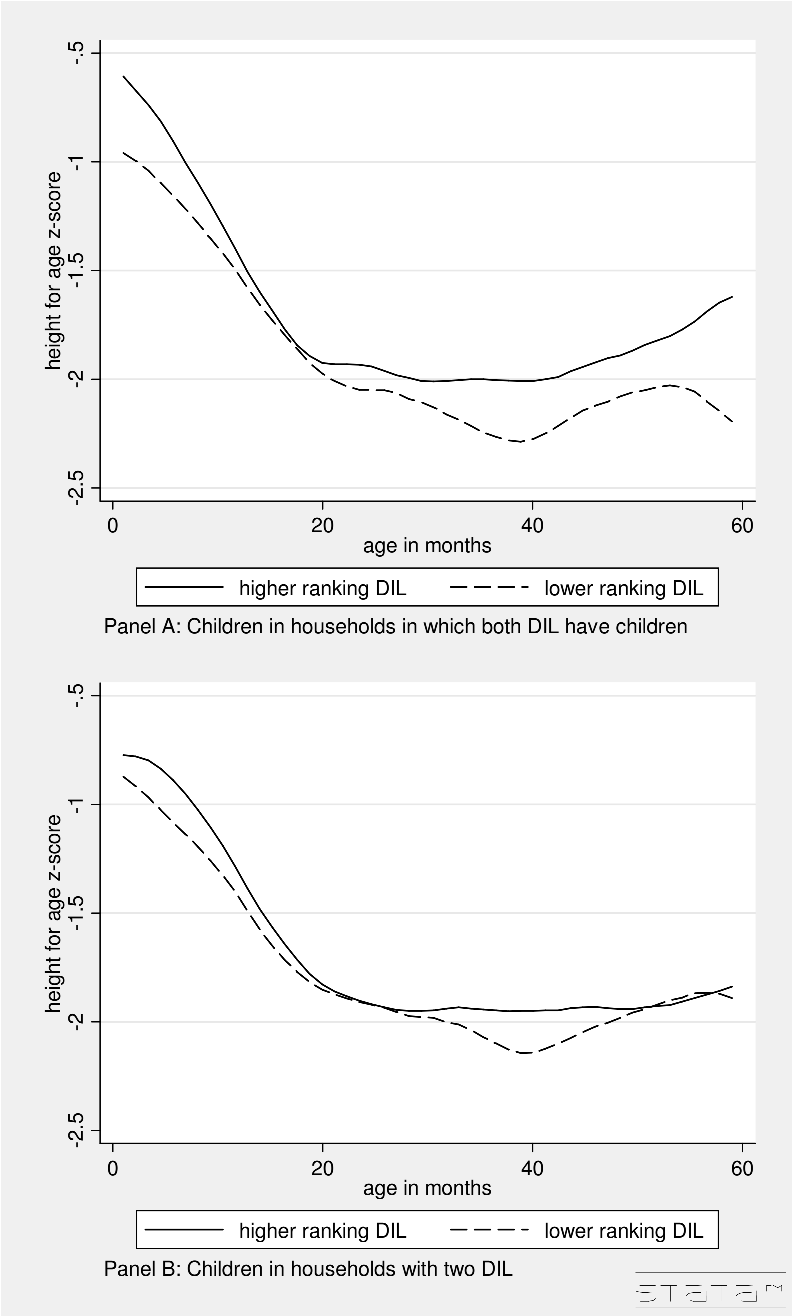

Figure 3: Height for age of children of higher and lower ranking daughters-in-law (DIL)

Local polynomial regression with an epanechnikov kernel and a bandwidth of 5. For panel A, n = 1078, for panel B, n = 1829. Data are taken from the National Family Health Survey, 2005.

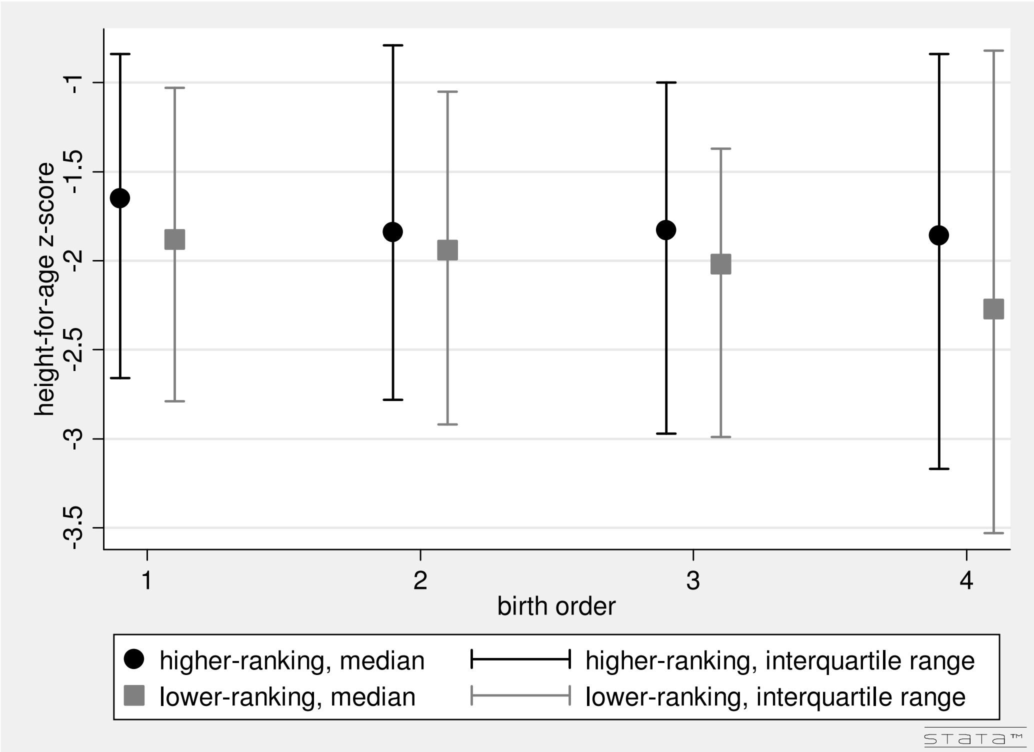

Figure 4: Quartile plot of height for age by birth order and mother's rank

n = 1829. Data are taken from the National Family Health Survey, 2005.

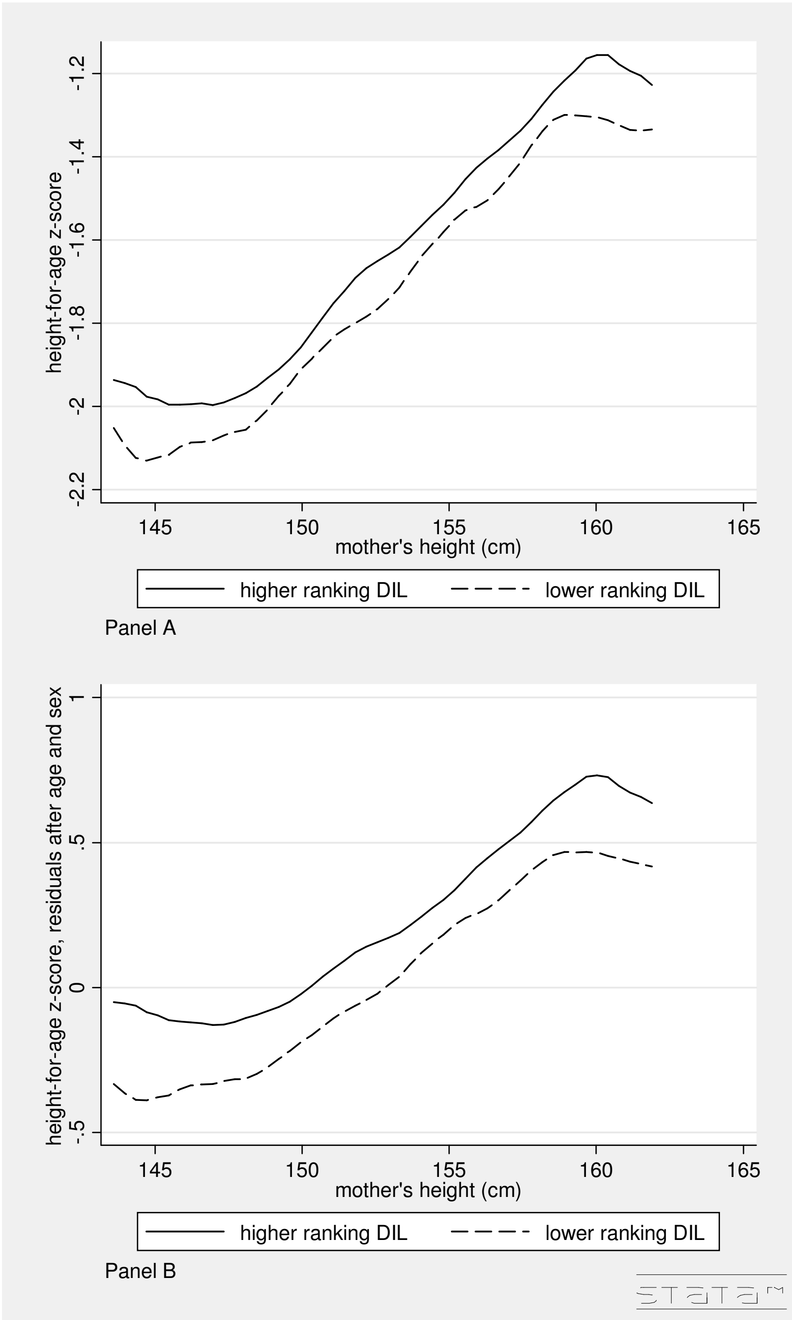

Figure 5: Lower ranking daughters-in-law (DIL) have shorter children at all heights of mothers

Local polynomial regression with an epanechnikov kernel and a bandwidth of 1.75. $n = 1829$. Data are taken from the National Family Health Survey, 2005.

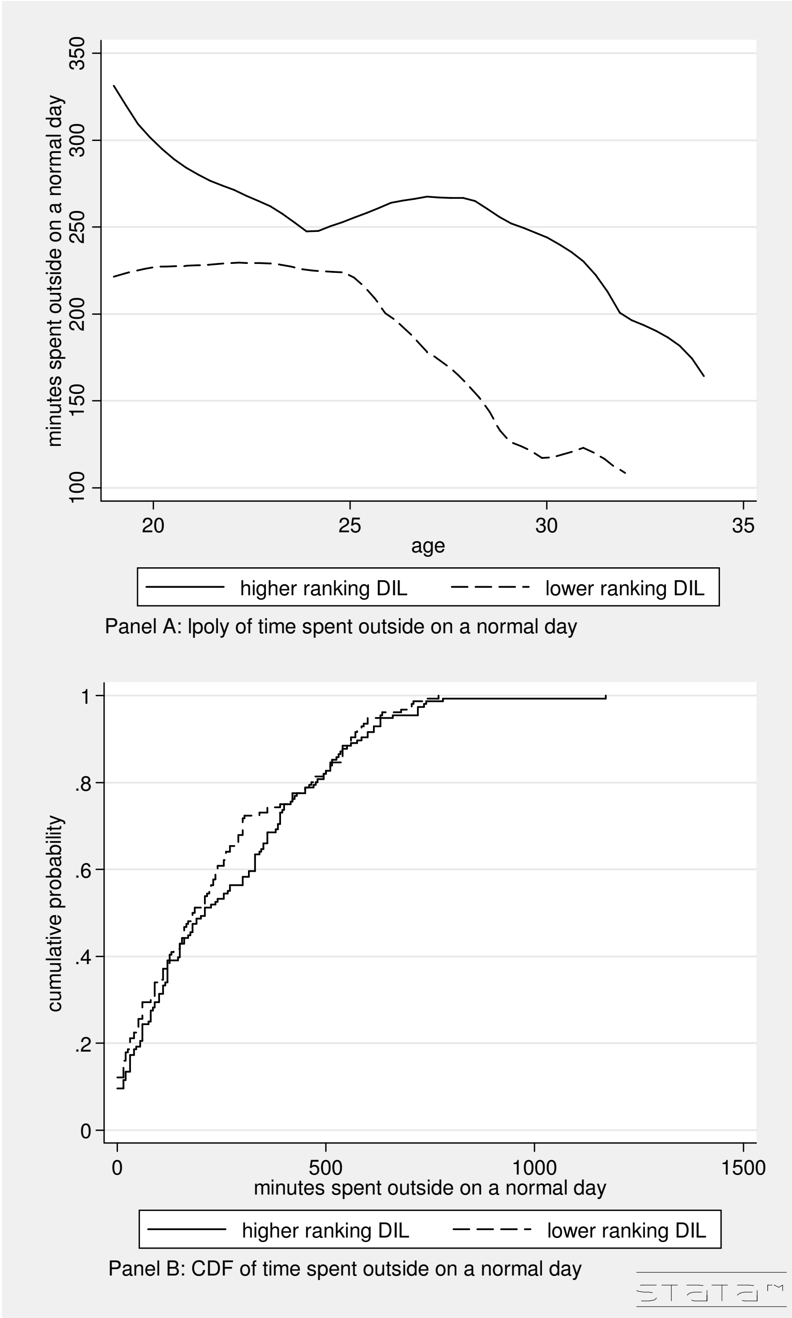

Figure 6: Time spent outside the house of a normal day

Panel A is local polynomial regression with an epanechnikov kernel and a bandwidth of 1.75. It plots minutes spent outside on a normal day by age at the time of the survey. Panel B is the cumulative distribution function of minutes spent outside on a normal day. n=312.

Data are taken from the India Time Use Survey, 1993, which is a representative sample of six states: Haryana, Madhya Pradesh, Gujarat, Orissa, Tamil Nadu and Meghalaya. We restrict the sample to daughters-in-law (DIL) living in households with two daughters-in-law. In this survey, individuals provided detailed data on time use for a normal day. For each activity, surveyors asked how long it lasted and whether it took place inside or outside the home.

Table 1: Fraction of rural households and children under five in three NFHS surveys living in joint families

	households			children under five		
	NFHS 1993	NFHS 1999	NFHS 2005	NFHS 1993	NFHS 1999	NFHS 2005
no daughters-in-law	0.771	0.788	0.812	0.664	0.645	0.678
one daughter-in-law	0.171	0.160	0.149	0.204	0.225	0.213
two daughters-in-law	0.045	0.040	0.031	0.091	0.092	0.082
more than two daughters-in-law	0.014	0.012	0.007	0.041	0.039	0.027

Statistics pertaining to households use household weights from each National Family Health Survey. Statistics pertaining to children under five use women's weights. The survey does not provide weights for the births data and suggests the use of women's weights.

Table 2: Comparison of joint rural households with two daughters-in-law and other households in rural India

	(1) rural households with two daughters-in-law	(2) other households in rural India	(3) p-value (2) - (1) = 0*
Panel A: Characteristics of households			
household asset count (out of 19 assets)	6.9	4.5	0.00
household practices open defecation	0.66	0.74	0.00
household has electricity	0.63	0.56	0.00
household head is general caste	0.28	0.25	0.04
household head is other backward caste	0.50	0.42	0.00
household head is scheduled caste	0.16	0.22	0.00
household head is scheduled tribe	0.06	0.12	0.00
household head is Hindu	0.84	0.83	0.58
household head is Muslim	0.11	0.11	0.60
Panel B: Characteristics of children under five			
average height** of 0-11 month old children in the household	-0.99	-0.98	0.92
average age in months of 0-11 month old children in the household	5.76	5.88	0.50
average height of 12-23 month old children in the household	-1.87	-2.15	0.00
average age in months of 12-23 month old children in the household	17.20	17.41	0.28
average height of 24-59 month old children in the household	-2.09	-2.24	0.01
average age in months of 24-59 month old children in the household	40.66	41.60	0.02

Data are taken from the National Family Health Survey, 2005. Statistics pertaining to children under five use women's weights. The survey does not provide weights for the births data and suggests the use of women's weights. Statistics pertaining to households use household weights.

*F-statistic from a Wald test of a difference in means which takes survey weights into account.

**All statistics about average height use WHO 2006 height for age z-scores.

Table 3: Fixed effects regressions of children's height for age z-scores on intrahousehold rank

	(1)	(2)	(3)	(4)	(5)
Panel A: Children in households in which both daughters-in-law have children					
lower ranking mother	0.0144	-0.245*	-0.377**	-0.382**	-0.422**
	(0.108)	(0.102)	(0.133)	(0.136)	(0.159)
mother's age at birth			-0.0241	-0.0177	-0.0102
			(0.0233)	(0.0289)	(0.0391)
mother's height				0.0190	0.0241†
				(0.0143)	(0.0142)
joint household fixed effects	✓	✓	✓	✓	✓
age in months×sex controls		✓	✓	✓	✓
demographic controls			✓	✓	✓
mother specific controls				✓	✓
father specific controls					✓
n (children in joint households)	1078	1078	1078	1075	1069
Panel B: Children in households with two daughters-in-law					
lower ranking mother	-0.0748	-0.380***	-0.472**	-0.350*	-0.665***
	(0.122)	(0.108)	(0.144)	(0.138)	(0.172)
mother's age at birth			-0.00929	0.0187	0.0879*
			(0.0237)	(0.0280)	(0.0382)
mother's height				0.0170	0.0257†
				(0.0154)	(0.0154)
joint household fixed effects	✓	✓	✓	✓	✓
age in months×sex controls		✓	✓	✓	✓
demographic controls			✓	✓	✓
mother specific controls				✓	✓
father specific controls					✓
n (children in joint households)	1829	1829	1829	1816	1808

Regressions are weighted using women's weights provided in the NFHS 2005 births recode. Standard errors clustered at the PSU level are shown in parentheses. † $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The following are the control variables added to the regressions each column: (2) age-in-months and sex dummies and their interactions; (3) a dummy for whether the child is first born to her mother, whether she is a single birth, her mother's age at the time of her birth, the child's birth order in the joint household; (4) mother's height, dummy variables for years of education completed by the mother, mother's age at marriage; (5) dummy variables for level of father's education, father's age at the time of the survey.

Table 4: Fixed effects regressions of mothers' pre-marriage indicators of human capital on intrahousehold rank

dependent variable:	(1) height	(2) grade completed	(3) literacy	(4) age at marriage
Panel A: Women in households in which both daughters-in-law have children				
lower ranking mother	0.268	-0.248	0.0399	0.108
	(0.594)	(0.335)	(0.0437)	(0.245)
woman's age	-0.0585	-0.203**	0.0187*	0.0541
	(0.113)	(0.0745)	(0.00805)	(0.0544)
joint household fixed effects	✓	✓	✓	✓
n (daughters-in-law)	811	814	813	814
Panel B: Women in households with two or more daughters-in-law				
lower ranking mother	0.343	-0.556	0.0831†	0.124
	(0.660)	(0.375)	(0.0483)	(0.281)
woman's age	-0.0432	-0.279***	0.0293***	0.0636
	(0.123)	(0.0782)	(0.00794)	(0.0628)
joint household fixed effects	✓	✓	✓	✓
n (daughters-in-law)	1386	1395	1390	1395

Regressions are weighted using women's weights provided in the NFHS 2005 births recode. Standard errors clustered at the PSU level are shown in parentheses. † $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The dependent variables are as follows: (1) woman's height in centimeters; (2) woman's grade completed in school; (3) a dummy variable for whether the woman is literate; (4) woman's age at marriage.

Table 5: Fixed effects regressions of "say" in households decisions on intrahousehold rank in households with two daughters-in-law

dependent variable:	(1) sum	(2) own health	(3) large purchases	(4) daily purchases	(5) visits	(6) money
Panel A						
lower ranking woman	-0.281*	-0.1000**	-0.0154	-0.0825*	-0.00906	-0.0737†
	(0.111)	(0.0363)	(0.0330)	(0.0344)	(0.0332)	(0.0382)
joint household fixed effects	✓	✓	✓	✓	✓	✓
n (daughters-in-law)	1395	1395	1395	1395	1395	1395
Panel B						
lower ranking woman	-0.298†	-0.0418	-0.0324	-0.140**	-0.0418	-0.0423
	(0.162)	(0.0542)	(0.0448)	(0.0487)	(0.0493)	(0.0544)
woman's age at the time of the survey	-0.00473	0.0157	-0.00461	-0.0155†	-0.00885	0.00846
	(0.0282)	(0.0107)	(0.00869)	(0.00907)	(0.0105)	(0.0116)
joint household fixed effects	✓	✓	✓	✓	✓	✓
n (daughters-in-law)	1395	1395	1395	1395	1395	1395

Regressions are weighted using women's weights provided in the National Family Health Survey, 2005. Standard errors clustered at the PSU level are shown in parentheses. † $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. For each of the dependent variables, a woman is said to have "final say" if she says she has final say on her own, or jointly with another family member, most commonly her husband. The dependent variables are: (1) the number of decisions (out of five) in which a woman has final say; (2) a dummy variable for whether the woman has final say in decisions about her own health; (3) a dummy variable for whether the woman has final say about large household purchases; (4) a dummy variable for whether the woman has final say about daily purchases; (5) a dummy variable for whether the woman has final say about visits to her family/friends; (5) a dummy variable for whether the woman has final say about how to spend money earned by her husband.

Table 6: Regressions of mothers' body mass index on intrahousehold rank

	(1)	(2)	(3)	(4)
Panel A: Women in households in which both daughters-in-law have children				
lower ranking mother	-0.362*	-0.345†	-0.439†	-0.401†
	(0.142)	(0.177)	(0.233)	(0.237)
pregnant			1.503**	1.119*
			(0.551)	(0.509)
breast feeding			0.277	
			(0.372)	
age of youngest child			-0.00819	
			(0.0112)	
age of youngest child×breastfeeding[i]				✓
mother's year of birth dummies			✓	✓
dummies for number of children ever born			✓	✓
household fixed effects		✓	✓	✓
n (daughters-in-law)	810	810	804	804
Panel B: Women in households with two or more daughters-in-law				
lower ranking mother	-0.0718	-0.345†	-0.390	-0.447†
	(0.175)	(0.192)	(0.264)	(0.257)
pregnant			1.275*	1.622**
			(0.542)	(0.542)
breast feeding			0.399	
			(0.409)	
age of youngest child			-0.00601	
			(0.0106)	
age of youngest child×breastfeeding[i]				✓
mother's year of birth dummies			✓	✓
dummies for number of children ever born			✓	✓
household fixed effects		✓	✓	✓
n (daughters-in-law)	1385	1385	1377	1377

Regressions are weighted using women's weights provided in the National Family Health Survey, 2005. Standard errors clustered at the PSU level are shown in parentheses. † $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

[i]age of youngest child×breastfeeding is a vector of indicator variables for the age of the woman's youngest child in months interacted with whether or not she is breastfeeding that child.

Table 7: Regressions of early life mortality on intrahousehold rank

	(1) IMR	(2) PNM	(3) NNM
lower ranking mother	28.72†	4.791	26.43*
	(15.44)	(10.51)	(11.03)
girl	-12.08	-5.561	-10.04
	(12.72)	(8.981)	(9.804)
year of birth fixed effects	✓	✓	✓
constant	61.05	12.19	52.03
	(39.35)	(20.47)	(33.76)
n (live births in the last 10 years)	3227	3095	3703

Regressions are weighted using women's weights provided in the National Family Health Survey, 2005. Standard errors clustered at the PSU level are shown in parentheses. † $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 8: Fixed effects regressions brothers' human capital indicators on birth order in joint rural households

	(1)	(2)	(3)	(4)	(5)
dependent variable:	height (cm)	years of educ	literate	working	white collar job
joint household fixed effects	✓	✓	✓	✓	✓
year of birth dummies	✓	✓	✓	✓	✓
Panel A: All ever-married adult sons of head over 20 years old in households with two such men					
younger brother	0.115	-0.139	-0.0217	-0.00526	0.0191
	(0.689)	(0.412)	(0.0360)	(0.0356)	(0.0466)
n (adult brothers)	986	1049	1047	1050	1050
Panel B: Brothers from Panel A restricted to households with children under 5					
younger brother	-0.404	-0.421	-0.0199	-0.0163	0.0410
	(0.735)	(0.446)	(0.0402)	(0.0372)	(0.0523)
n (adult brothers)	868	925	923	926	926
Panel C: Brothers from Panel A restricted to households in which both brothers have children under 5					
younger brother	-0.754	-0.372	-0.00333	-0.0116	0.0444
	(0.922)	(0.557)	(0.0470)	(0.0426)	(0.0604)
n (adult brothers)	512	553	552	554	554

These fixed effect regressions are weighted using men's weights provided in the National Family Health Survey, 2005 male recode. Standard errors clustered at the household level are shown in parentheses. † $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The dependent variables are: (1) height of the man in centimeters; (2) years of education; (3) whether the man is literate; (4) whether the man is working at the time of the survey; (5) whether the man is working a white collar job at the time of the survey.

Table 9: Fixed effects regressions of children's height for age z-scores on mother's intra-household rank controlling for fathers' heights

	(1)	(2)	(3)	(4)
Panel A: Children in households in which both daughters-in-law have children				
lower ranking mother	-0.245*	-0.0748	-0.249*	-0.385**
	(0.102)	(0.182)	(0.103)	(0.135)
father's height		0.0289	0.00386	-0.00846
		(0.0280)	(0.0201)	(0.0210)
father's height missing			-0.167	-0.265
			(0.293)	(0.288)
mother's height				0.0200
				(0.0145)
joint household fixed effects	✓	✓	✓	✓
age in months $\times$ sex controls	✓	✓	✓	✓
demographic & mother controls				✓
n (children in joint households)	1078	408	1078	1075
Panel B: Children in households with two daughters-in-law				
lower ranking mother	-0.380**	-0.451**	-0.380**	-0.353*
	(0.108)	(0.167)	(0.108)	(0.138)
father's height		0.00813	-0.00699	-0.0168
		(0.0321)	(0.0220)	(0.0215)
father's height missing			-0.0513	-0.218
			(0.261)	(0.256)
mother's height				0.0178
				(0.0155)
joint household fixed effects	✓	✓	✓	✓
age in months$\times$sex controls	✓	✓	✓	✓
demographic & mother controls				✓
n (children in joint households)	1829	745	1829	1816

Regressions are weighted using women's weights provided in the National Family Health Survey, 2005. Standard errors clustered at the PSU level are shown in parentheses. † $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Demographic controls include a dummy for whether the child is first born to her mother, whether she is a single birth, her mother's age at the time of her birth, and the child's birth order in the joint household. Mother controls include mother's height, dummy variables for years of education, and mother's age at marriage.