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Mothers' Social Status and Children's Health: Evidence From Joint Households in Rural India

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ABSTRACT The premise that a woman's social status has intergenerational effects on her children's health has featured prominently in population science research and in development policy. This study focuses on an important case in which social hierarchy has such an effect. In joint patrilocal households in rural India, women married to the younger brother are assigned lower social rank than women married to the older brother in the same household. Almost 8% of rural Indian children under 5 years old—more than 6 million children—live in such households. We show that children of lower-ranking mothers are less likely to survive and have worse health outcomes, reflected in higher neonatal mortality and shorter height, compared with children of higher-ranking mothers in the same household. That the variation in mothers' social status that we study is not subject to reporting bias is an advantage relative to studies using self-reported measures. We present evidence that one mechanism for this effect is maternal nutrition: although they are not shorter, lower-ranking mothers weigh less than higher-ranking mothers. These results suggest that programs that merely make transfers to *households* without attention to intrahousehold distribution may not improve child outcomes.

KEYWORDS Early-life mortality • Child height • Women's social status • Intrahousehold inequality • India

Introduction

Demographers have investigated the effects of social inequality and social hierarchy on health in a variety of contexts. In one branch of this research, demographers and other social scientists have asked whether and how women's social status and empowerment shape their children's health and early-life human capital formation (Thomas 1990). This question is especially relevant for low- and middle-income countries, where gender inequalities tend to be high, where women are often responsible for essentially all aspects of childcare, and where poor health is often a constraint on human development more broadly. Many development programs and policies are built on the premise that socially empowering women will improve their children's outcomes (World Bank 2001). Although the effects of a woman's status and empowerment on her children's health outcomes are plausible in many contexts

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and although understanding the mechanisms behind such a relationship is of clear importance, several challenges combine to make the relationship between mother's status and child health a challenging one to study.

First, women of different social statuses often differ along other relevant dimensions of human capital, personal resources, or household wealth (Strauss and Thomas 1995).[1] Second, women's status and empowerment are often context-dependent and difficult to measure. Finally, programs or events that influence women's status may also have other effects on child outcomes.[2] Despite these challenges, the importance of studying the effects of women's status on child health and understanding the context in which they occur is clear from its recurrence in the demographic literature and from policymakers' emphasis on women's empowerment to improve child outcomes.

In this article, we address these challenges by studying joint patrilocal households in rural India. Joint patrilocal households are those in which adult sons live with their parents, their wives, and their children. Almost 8% of rural Indian children under 5 years old—more than 6 million children—live in this type of household.[3] A robust prior anthropological and sociological literature (discussed later) has documented that women married to the older son are assigned higher social status upon marriage relative to women married to the younger son. This study's contribution is to use within-household variation in mothers' status to estimate consequences for their children's health and survival. The simple clarity of this empirical strategy allows us to shed new light on the old question of the effects for children of women's status (Das Gupta 1990).

The fact that this difference in mothers' status occurs within rural households allows us to identify effects of an objectively measurable source of variation in mothers' status on children while holding constant much about the environment to which children are exposed.[4] We use household fixed-effects regression models to compare children born to lower-ranking mothers with their cousins born to higher-ranking mothers. We find that within the same joint household, children of the lower-ranking mother are more likely to die in the first month of life and are about a quarter of a height-for-age standard deviation shorter than their cousins born to the higher-ranking mother.

[1] In a classic example, Das Gupta (1990) found that children in Punjabi villages were more likely to die if their father rather than their mother decided what to cook. They were also more likely to die if they were born in the father's natal home rather than the mother's. These foundational regression results point to an important mechanism, but the study design did not narrowly exploit a specific source of variation in women's status.

[2] For example, Thomas (1990) could not separate a special effect of a mother's money from any social consequences it may entail. Miller (2008) showed an aggregate effect of women's suffrage on child health but did not study effects of a mother's own status.

[3] The UN World Population Prospects (United Nations 2015) reported that 118,983,000 children under 5 were living in India in 2015, the year of the most recent DHS survey. The 2015 DHS survey found that 71.5% of children under 5 lived in rural settings. For comparison, 6.6 million, the population size of the children in our sample, is 33% of the total number of U.S. children under 5 in 2015 (just under 20 million).

[4] The variation in social status that we study is not subject to reporting bias, which is an advantage relative to relying on self-reported measures alone. That is not to say that self-reported measures of social status are necessarily unreliable. We provide recent quantitative evidence on self-reported decision-making power to complement the qualitative literature and to support the idea that women married to older sons have higher status than those married to younger sons.

We then investigate the mechanisms behind these differences among cousins. We show that premarriage differences between the mothers and fathers we study are not driving the differences in early-life mortality and child height that we observe. We do this by verifying that the mothers' rank (and fathers' birth order) is balanced with respect to observable characteristics that are fixed before marriage. If anything, lower-ranking mothers and their husbands are slightly taller and better educated than higher-ranking parents within the same household. Further, children of higher-ranking mothers are not more likely to be born in a hospital setting than children of lower-ranking mothers.

However, we find that lower-ranking mothers have worse nutritional status than higher-ranking mothers. A woman's body mass, which depends on her food consumption and energy expenditure, determines her ability to nourish her child *in utero* and while breastfeeding. Although lower-ranking mothers are no shorter than higher-ranking mothers, they have less body mass. This finding is important because it clarifies the causal chain linking mothers' status to child outcomes in this context. Mothers who are less well-nourished in pregnancy are more likely to have low-birth-weight babies (Rasmussen and Yaktine 2009). Low-birth-weight babies are more likely to die in the first month; if they survive, they are shorter in adulthood, on average, than the children of better-nourished mothers (Adair 2007).

This study contributes to several areas of demographic inquiry. First, we address a significant open empirical question about the effect of women's social status on their children's health. Second, by linking the observed difference in height outcomes with maternal nutrition and birth weight, we contribute to the literature on very early-life origins of disadvantage, particularly to studies on physical height as a measure of human capital (Case and Paxson 2008). We build on literature that documents that average height and early-life mortality rates are correlated at the population level (Bozzoli et al. 2009; Hathi et al. 2017). Finally, we add to a growing literature that documents the relevance of social and household institutions to health, especially in low- and middle-income countries (Vogl 2013).

This article is organized as follows. We first review the literature on joint households and on marriage in rural India. Then, we present our data and empirical strategy; we show that higher-ranked mothers have more decision-making power. We then present the main results, showing that children born to higher-ranking mothers are more likely to survive and are taller than children born to lower-ranking mothers. We show that this is not because of differences in mothers' or fathers' premarriage characteristics, nor because children born to higher-ranking mothers are more likely to be born in a health facility. We find evidence that maternal nutrition is an important mechanism through which women's status affects child height and survival in this context. We conclude by discussing implications for research and policy.

Background and Conceptual Framework

Women in Joint Households in Rural India

In rural India, marriages are typically patrilocal, meaning that women move to their husbands' homes after marriage. The joint households that we study are ones in

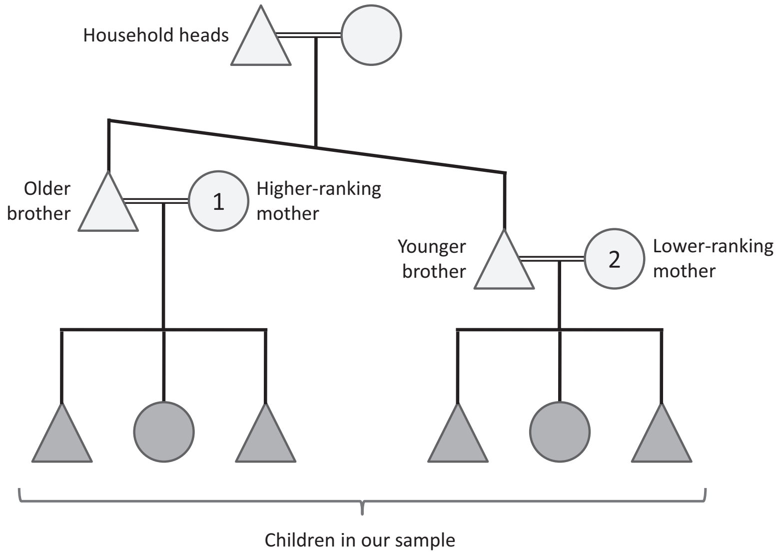

Fig. 1 Illustration of empirical strategy: Difference in status of daughters-in-law in three-generation joint households

which the husband's parents and his brothers live with him.[5] Figure 1 diagrams a joint household of the type we study: two brothers live with their parents, wives, and children. Although most young children in India live in nuclear families, joint households are nonetheless an important family structure—especially in rural India, where they are associated with agricultural landholding and conservative social attitudes.[6]

How does joint family life generate within-household variation in women's status? A large anthropological and sociological literature notes that joint households are characterized by patriarchy and by age hierarchy: women are subordinate to men, and younger members are subordinate to older members. In her husband's home, a young woman typically behaves in ways that both reflect and reinforce her low social position. As Mandelbaum (1998:5) described, a newly married woman 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."

The status of a woman who marries into the household is derived in part from her husband's birth order (Singh 2005). This status is reflected in expectations for her behavior. The demands of propriety are typically even more oppressive for a daughter-in-law who is married to a younger brother than for one who is married to the older brother. Jeffery et al. (1988:30–31) noted that when a new daughter-in-law

5 In another type of joint household, brothers live together without their parents. We exclude these households from our analysis because our identification strategy depends on households being economically integrated. Brothers living in households in which both parents have died or live elsewhere do not share the responsibility of caring for their parents. These households are less likely to be economically integrated than joint households where parents are present. In households without parents, household fixed effects are not as useful in controlling for children's economic environment.

6 In part because they are more likely to own land, higher-caste households are more likely to be joint than Scheduled Caste and Scheduled Tribe households.

enters the joint household, the daughters-in-law who are already established in the household often "wield authority" over the new wife, "policing" her actions. Although relationships between the oldest brother's wife with her husband's younger brothers are often casual and friendly, a younger brother's wife is expected to signal respect and deference to all adult members of the household (Mandelbaum 1988). These differences between the lives of higher- and lower-ranked women in joint households led Dyson and Moore (1983:44) to remark that "senior wives tend to dominate young in-marrying wives."

Women's property rights in India have traditionally been weak, and legislation to establish and strengthen them has been only partially successful (Bhalotra et al. 2020; Deere et al. 2013; Deininger et al. 2019). Lack of property rights and low female labor force participation rates mean that a woman's status is closely tied to that of her husband. Further, the younger daughter-in-law in a joint family is at a disadvantage because inheritance rules (such as primogeniture) accord higher social status to the eldest son (Jassal 1997; Ray 1991).[7]

A woman's rank within the joint household affects not only the amount of stress she experiences but likely also her food intake. In joint households, it is also common for people to eat in the order of their social rank, with the household heads eating before their sons, who eat before their children, who eat before their mothers. Palriwala (1993:60) studied joint households and noted the following:

> The person who cooked and the youngest daughter-in-law, usually the same person, ate last. This acted against her . . . 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.

No Evidence That Marriage Matches on Groom's Birth Order

Our empirical strategy would be threatened if arranged marriage decisions systematically matched women with lower human capital (or who otherwise would be expected to have less healthy children) into the lower-ranking daughter-in-law position. We must therefore ask whether marriages in this context match on the groom's birth order.

[7] Ray (1991:3015) noted that

> The eldest male, or "karta," is the head of the family with decision-making powers over all significant family affairs . . . . The "karta's" wife or "ginni" is the head of domestic side of the family, and has command over the females of the household. The other in-married females stand according to the rank of their respective husbands, on whose death they lose status and power.

Regarding the status of the younger daughter-in-law, Ray (1991:3017) stated the following:

> It is actually the "ja" or husband's brother's wife with whom a new bride has to contend with. Since all in-married women are initially strangers with no common understanding or blood-tie (unlike the men in the family) with one another, there is no strong woman-bonding among them. On the contrary, their relationship is fraught with strong overtones of envy. There is often mutual resentment due to differential family connections, dowry, etc., but most importantly because of competition for greater popularity among the members of the new family and greater powers in the kitchen and the store, the acknowledged centres of the domestic world.

Anthropological and demographic research on joint family life suggests that status differences between higher- and lower-ranking daughters-in-law are salient in everyday life. Perhaps surprisingly, however, the literature offers little evidence that the birth order of the husband-to-be is an important factor in a family's decision about which groom to choose for their daughter. The 2005 India Human Development Survey found that 95% of marriages in rural India are arranged (Banerji et al. 2013), with the parents or extended family members of the bride and groom deciding whether a couple will marry.[8]

A large social scientific literature has sought to understand how marriages are arranged, finding that in general, arranged marriages are highly constrained decisions that weigh many factors. The reasons for a particular match often have more to do with its economic and social implications for the extended families—that is, the people who make the decisions—than with externality effects on the daily life of the bride-to-be. For instance, Rosenzweig and Stark (1989) found that marriages to villages farther away help families smooth consumption. Munshi and Rosenzweig (2006) found that marriage reinforces caste-based social networks that influence employment opportunities for men. In their research on dowry in South Asia, Anderson (2003) and Rao (1993) identified characteristics that influence brides' families' perceptions of groom quality, including his caste, education, income, occupation, landholding, and city or village.

None of these papers, nor any other literature that we are aware of, has discussed the groom's birth order as a factor in Indian arranged marriage decisions. In particular, groom's birth order is absent from related literature in economics documenting the trade-offs that families are willing to make to marry their daughters within caste (Banerjee et al. 2009) and according to the daughters' age order (Vogl 2013). For example, Banerjee et al. (2009) analyzed data from bride and groom advertisements in Calcutta newspapers. Their summary statistics table lists 38 characteristics that they found in these advertisements; the groom's birth order is not among them.

Our qualitative research in rural Uttar Pradesh, a state with pronounced gender hierarchies, suggests that the irrelevance of the groom's birth order to arranged marriage decisions may be because people see joint family life as temporary: joint families typically dissolve into nuclear families after the household heads pass away. Of course, we cannot rule out that parents have preferences over grooms' birth order when they arrange marriages, but we find no evidence that any such sorting has a quantitatively important effect on the variables we study.

Conceptual Framework: Mothers' Social Status, Mothers' Nutrition, and Child Health

How does the joint household structure shape child health in rural India? We hypothesize that low-ranking mothers experience stress resulting from their social positions in the household. Also, women, and low-ranking wives especially, are expected to be

[8] Today, the bride and groom are sometimes consulted when a suitable match has been found, but they often play little role in marriage negotiations.

self-sacrificing with their food intake. These circumstances generate differences in maternal nutrition that have profound consequences for children. Our hypothesized causal pathway can be visualized as follows:

intrahousehold social status → maternal nutrition → child health outcomes.

Because the data used in this study are cross-sectional rather than longitudinal, we cannot directly observe the link between maternal nutrition and child outcomes. Instead, we observe the link between intrahousehold social status and child outcomes by comparing children born to higher- and lower-ranking daughters-in-law; we also link the rank of the daughter-in-law to her nutrition at the time of the survey. Although it would improve the research design to be able to observe the mothers' nutrition during pregnancy, no such longitudinal data are available. However, the differences in body mass between higher- and lower-ranking daughters-in-law that we document likely existed prior to their children's birth as well.

In this article, we do not observe links between maternal nutrition and child health outcomes. However, prior research has documented these links. It is well-established that low prepregnancy body mass and poor weight gain in pregnancy increase the chances that a baby will be born at a low birth weight (Rasmussen and Yaktine 2009). Low-birth-weight babies are more likely to die in the neonatal period and grow up shorter, on average, than babies born at higher birth weights (Adair 2007; Ludwig and Currie 2010; Nohr et al. 2008).

Data and Empirical Strategy

India's Demographic and Health Surveys

We use data from India's 2005 and 2015 rounds of the Demographic and Health Survey (DHS), the most recent DHS from India for which individual-level data have been released.[9] In India, the DHS is called the National Family Health Survey (NFHS); the 2005 and 2015 waves are known as the NFHS-3 and NFHS-4, respectively. The NFHS is a clustered, two-stage, random-sample survey. In each surveyed household, all women aged 15–49 were interviewed.

Although the NFHS is a nationally representative survey, in support of our research strategy, we focus on a subsample of children. Our sample includes children in rural households that list their mothers' father-in-law or mother-in-law as the head of the household. For the main results, we study only children living in rural joint households with exactly two daughters-in-law, each of whom have children under 5 years old (Spears et al. 2022). The restriction of the data to children under 5 is necessary because the DHS only measures the heights of children under 5 years old. We do not study nuclear families; prior research has compared child health in joint and nuclear families in India (Allendorf 2013). The restriction to households with exactly two daughters-in-law eases the interpretation of the results. In the NFHS-3, 78% of joint households with more than one daughter-in-law had two daughters-in-law.

[9] These data are publicly available from www.dhsprogram.com.

Variables and Summary Statistics

Independent Variable: Mothers' Intrahousehold Status

Table 1 presents summary statistics for the variables of interest. Means are presented separately for children in the NFHS-3 and the NFHS-4. For each survey round, we first present the means for all rural children for comparison ("All Rural"). However, the subsample of children that we use is much smaller than this because only a minority of children live in the type of household that we study. So we next show the mean of the full fixed-effects sample, that is, all children younger than 5 living in households with two daughters-in-law who have children of this age ("FE Sample"). The next two columns break up the fixed-effects sample by the intrahousehold rank of the mother ("FE Higher" and "FE Lower"). A higher-ranking mother is married to the older brother in the household; a lower-ranking mother is married to the younger brother. The mother's intrahousehold rank is our independent variable of interest.

Dependent Variables: Health Outcomes

The top row of Table 1 shows the average height-for-age in each subgroup in each survey round. Height-for-age is given in terms of *z* scores, or standard deviations from the World Health Organization (WHO) mean height for healthy children. They are constructed at the sex–month level from the measured height of children. *z* scores that are more negative indicate worse health; they deviate more from the mean for healthy children.

In both 2005 and 2015, the children we study were taller, on average, than the average rural child. Nevertheless, these height-for-age *z* scores represent profound undernutrition. The average child under 5 in the joint rural households we study was 1.72 standard deviations below the mean height for healthy children in 2005; this improved to 1.44 standard deviations below the mean in 2015. For comparison, average height-for-age among children under 5 in Ethiopia in 2016 was −1.4; it was −1.2 among children in Liberia in 2013 (USAID and ICF-International 2021). The average household in both Ethiopia and Liberia is far poorer than that in rural India.

Average height of children across the two subgroups of interest ("FE Higher" and "FE Lower") are similar. However, because children born to lower-ranking mothers are younger on average, and because stunting is a process that unfolds during the early childhood period, our regression results, which control for children's ages (in months), will reveal the health deficits associated with being born to a lower-ranking mother.

Whereas height-for-age is measured for children younger than 60 months at the time of the survey, neonatal (and postneonatal and infant) mortality is measured for all births to women aged 15–49 for whom a month or more (a year or more) has passed since their birth. Therefore, the sample size is substantially larger for the mortality outcome than for the height outcome. The neonatal mortality rate (NNMR) is the number of deaths per 1,000 live births that take place in the first month of life; the

Table 1 Summary statistics by fixed-effects subgroup

	NFHS-3 (2005–2006)				NFHS-4 (2015–2016)			
	All Rural	FE Sample	FE Higher	FE Lower	All Rural	FE Sample	FE Higher	FE Lower
Height-for-Age *z* Score	−1.85	−1.72	−1.72	−1.72	−1.56	−1.44	−1.47	−1.41
n	26,065	1,011	530	481	171,519	1,308	655	653
IMR	67.75	66.64	63.02	71.92	47.49	37.49	38.30	36.43
NNMR	45.03	46.76	45.94	47.95	33.54	28.25	29.20	27.01
PNMR	23.14	20.86	17.90	25.18	14.49	9.51	9.37	9.68
n	101,336	2,866	1,698	1,168	609,691	3,681	2,089	1,592
Age (in months)	29.87	26.48	29.78	22.85	29.90	28.30	31.92	24.66
Girl	.48	.46	.46	.45	.48	.48	.44	.52
Mother's Height (in cm)	151.71	152.76	152.52	153.02	151.53	152.50	152.48	152.52
Mother's BMI	19.72	19.85	19.99	19.70	20.78	21.00	21.21	20.79
Mother's Age at Birth	24.70	22.78	24.13	21.29	25.06	23.81	25.10	22.51
Mother's Age at Marriage	17.92	18.06	18.12	18.00	19.10	19.37	19.44	19.30
Mother Has Any Education	.51	.66	.65	.68	.65	.76	.74	.78
Birth Order	2.82	2.04	2.45	1.60	2.34	1.85	2.18	1.53
Sibsize (siblings ever born)	3.14	2.34	2.78	1.85	2.64	2.13	2.45	1.81
Household Birth Order	3.69	4.75	4.52	5.01	3.12	4.28	4.02	4.53
Firstborn to Mother	.28	.41	.25	.58	.35	.46	.32	.60
Mother Has Some Say	2.34	1.59	1.63	1.53	2.78	2.58	2.60	2.56
Father's Height (in cm)	163.79	165.82	165.67	165.96	163.28	164.45	164.28	164.61
Father's Education	6.08	8.20	8.16	8.24	7.21	8.71	8.89	8.52
Home Birth	.68	.58	.63	.53	.27	.19	.20	.17
C-section	.06	.09	.07	.10	.11	.12	.11	.13

Notes: The "all rural" sample is not used in our analysis but is included for comparison. FE stands for household fixed effects. For all control variables, the sample is the height-for-age sample. The height-for-age *z* scores use the 2006 WHO reference standard. IMR (infant mortality rate) and NNMR (neonatal mortality rate) are indicators for number of deaths in the first year and month, respectively, per 1,000 live births. PNMR (postneonatal mortality rate) is an indicator for number of deaths in Months 1 to 11 per 1,000 live births. "Mother has some say" is a count of four decision situations included in the DHS questionnaire in which she reported having some decision-making power.

infant mortality rate (IMR) is the number of deaths per 1,000 live births in the first year of life. Table 1 shows that early-life mortality in rural India is very high. The NNMR in rural India was 45 in 2005 and improved to 34 in 2015. By comparison, Ethiopia's NNMR was 39 in 2005 and 29 in 2016. In Liberia, the NNMR was 32 in 2007 and 26 in 2013 (USAID and ICF-International 2021).

We also study the health outcomes of the mothers of the children in our sample. Table 1 shows very little difference in the height of higher- and lower-ranking mothers. Because adult height is largely determined by a person's early-life health environment, the fact that higher- and lower-ranking mothers have similar heights supports the idea that marriage to the younger brother does not select for a mother who experienced a less healthy childhood.

Control Variables and Other Variables of Interest

Table 1 also presents summary statistics for the control variables that we use in our analyses. Because our empirical strategy (described later) uses household fixed effects, all the control variables we use are at the nuclear family or child level. Most of the variables are self-explanatory; here, we mention a few definitions that may not be. Table 1 shows the proportion of mothers with any education. In the regression analyses, mother's education is included, categorized as no education, primary education, secondary education, and higher education, with no education being the omitted category. Sibsize refers to the number of siblings ever born alive to a child's mother, and household birth order refers to a child's birth order among their siblings and cousins in the joint household.

We use variables referring to a mother's "say" to assess the extent to which the social status of lower-ranking mothers as described in the sociological and anthropological literature is also reflected in their survey self-reports of decision-making power. The NFHS asks women to report who, in their households, has the final say on four types of decisions: the woman's own health care, making large purchases, visits to family or relatives, and deciding what to do with money that her husband earns. Both survey rounds posed these questions identically. We classify a woman as having *some say* about that decision if she reports that either she alone or along with her husband has decision-making power. Children in joint rural households have mothers with less decision-making power than the average rural child. This is likely a reflection of the fact that these households tend to be more socially conservative than the average rural household.

Fixed-Effects Regression Specifications

We estimate

$$y_{ihv} = \beta\ lower_{ihv} + \alpha_{hv} + \mathbf{X}_{ihv}\theta + \delta_{ihv} + \epsilon_{ihv'}, \quad (1)$$

where y is a dependent variable (which will depend on the application), *lower* is an indicator for being a child of the lower-ranking mother, α are household (h) effects, and **X** are other controls as specified in particular applications. We cluster standard errors by village (v) to reflect the two-stage sampling of the survey. The two main dependent variables of interest are early-life mortality rates (child-level indicators, but scaled as 1,000 or 0 so that coefficients are comparable to published demographic rates) and height-for-age z scores (scaled to WHO 2006 standard deviations). When mortality rates are the dependent variable, regressions include fixed effects (δ) for the century-month-code cohort of birth, as well as a control for child sex. When height is the dependent variable, regressions include fixed effects (δ for 119 age-in-months $\times$ sex categories).[10]

In comparing within households by including household fixed effects, we hold constant many aspects of children's social, economic, and neighborhood environments that are known to correlate with early-life health and that might otherwise confound estimates of the effect of women's status. Such factors include household wealth (Finaret and Masters 2019), household caste and neighborhood casteism (Coffey et al. 2019), local sanitation (Coffey and Spears 2017; Coffey et al. 2017; Headey and Palloni 2019), local air pollution (Gupta and Spears 2017; Spears et al. 2019), and neighborhood classification (Nolan 2015).

Our two dependent variables have complementary strengths and weaknesses. Height is measured only for children under 5 in the DHS, but mortality is observed for children born more than five years before the survey in the DHS retrospective birth history (Spears et al. 2022). Miller et al. (2019) noted a selection-into-identification problem for high-dimensional fixed effects. For transparency related to this challenge, the summary statistics in Table 1 compare our fixed-effects sample of interest with all measured rural children in the DHS. For readers concerned about selection into identification for the height sample, the mortality results offer a robustness check that does not have the same sample restrictions. Further, although mortality regressions have a larger sample, they are less powered than the height regressions because mortality is a binary dependent variable (for a rare outcome), whereas height-for-age is a continuous, normal dependent variable.

Results

Mothers' Decision-making Say

To complement sociological and anthropological findings that daughters-in-law married to younger brothers have lower social rank within joint households than those married to older brothers, we analyze data on mothers' reported decision-making power. If children of daughters-in-law married to the younger brother have worse

[10] Agarwal et al. (2017) and Larsen et al. (2019) demonstrated bias implications of misreporting and other patterns of child month of birth and age reporting in the DHS. Unlike the empirical strategies that they emphasized, we do not identify off of child age. Readers concerned about these issues can see our early-life mortality results (where, e.g., NNM is always assessed in the age of first month of life) as a confirmatory robustness check.

Table 2 Mother's decision-making say is lower for lower-ranking mothers

	OLS (1)	OLS (2)	Ordered Logit (3)	OLS (4)
Lower	–0.097*	–0.087†	–0.107*	–0.136†
	(0.047)	(0.047)	(0.052)	(0.079)
Education (ref. = no education)				
Primary education		–0.115		
		(0.135)		
Secondary education		–0.165		
		(0.115)		
Higher education		–0.001		
		(0.209)		
Mother's Age at Marriage		0.015		
		(0.013)		
Mother's Age at Survey				–2.340
				(6.650)
Household Fixed Effects	Yes	Yes	No	Yes
Mother's Cohort Fixed Effects	No	No	No	Yes
n (mothers in NFHS-3 or NFHS-4)	1,758	1,758	1,758	1,666

Notes: Each observation is a mother of one of the children in the height regressions of either the NFHS-3 (2005–2006) or NFHS-4 (2015–2016), combined here into one sample. The dependent variable is the count of situations in which the mother reported having a decision-making say; the two surveys asked about four situations in both rounds. Each confidence interval and coefficient estimate corresponds to $\hat{\beta}$ in a separate regression estimate of $s_{ihv} = \beta\ lower_{ihv} + \alpha_{hv} + \mathbf{X}_{ihv}\ \theta$, where s is a mother's self-reported decision-making say, *lower* is an indicator for being the lower-ranking mother, α represents household (h) fixed effects, and **X** are other controls as specified. Column 4 has a smaller sample because observations in which mothers do not differ on cohort of birth (measured as century-month codes) are omitted; we include column 4 to account for the correlation between age and cohort in cross-sectional surveys. Standard errors, clustered by village (v), are shown in parentheses.

†$p < .10$; *$p < .05$

early-life outcomes because their mothers have lower social status, we would expect their mothers to report less decision-making power.

The dependent variable is the count (0–4) of four types of decisions in which a woman reported having say. The variable is from pooled data from the NFHS-3 and NFHS-4. Columns 1 and 2 of Table 2 model this linear dependent variable using ordinary least squares (OLS) regression with household fixed effects to make within-household comparisons. Daughters-in-law married to the younger brother report having a say in one tenth fewer decisions than those married to the older brother. This is a meaningful difference considering that the average mother reported having a say in only one or two decisions. As column 2 shows, controlling for the mother's observable characteristics does not change the regression coefficient much. Column 3 displays the results of an ordered logit specification in a robustness check to verify that the linear use of the count variable (needed for high-dimensional household fixed effects) is not necessary for this result. In short, these results are consistent with lower intrahousehold social status for the lower-ranking daughters-in-law.

Main Results From Fixed-Effects Regressions

Figure 2 presents coefficients on having a lower-ranking mother (and their 95% and 90% confidence intervals) from regressions of mortality measures on the mother's rank and control variables. The *column at the left of the figure* lists the control variables included in each regression specification. (Table A3 in the online appendix presents all regression details, including coefficients for control variables.) Figure 2 shows that in 2005, there were statistically significant differences in neonatal mortality between children born to higher- and lower-ranking daughters-in-law, which was also reflected in infant mortality. By 2015, the differences were somewhat muted. This may be in part because rural infant mortality declined by approximately 20 deaths per 1,000 births over the decade between these survey rounds. Nevertheless, the fact that we find statistically significant within-family differences in mortality after controlling for child's birth cohort and sex in a small sample is noteworthy. In particular, the fact that we find an effect on *neonatal* mortality, rather than death at a later age, is our first indication that maternal nutrition may be an important mechanism for this effect.

Figure 3 is similar to Figure 2, except that the dependent variable in the regression specifications is child height-for-age. The sample sizes for the height regressions are smaller, given the sample restriction to children younger than 5 living in a joint rural household with two daughters-in-law at the time of the survey. By contrast, the mortality regressions include any child born to a woman in the household structure that we study, including those who were born more than five years before the survey. The coefficients on being born to a lower-ranking daughter-in-law are large: in 2005, a child born to a lower-ranking mother was about 0.3 of a standard deviation shorter, on average, than a child born to a higher-ranking mother. Although slightly reduced, the difference for 2015 is large and statistically significant in all but one specification. Tables A1 and A2 in the online appendix present all regression details, including coefficients for control variables.

In the online appendix, we use kernel-weighted local regressions to verify that our results are not driven by a few key potential threats to identification. These are presented in Figure A1 for mortality and Figure A2 for child height. One of these robustness checks presents results stratified by father's height to address potential concerns that if younger brothers were shorter than older brothers (despite summary statistics showing that they are not), this could have been reflected in the heights of their children. In fact, we find differences in children's height in both surveys across nearly the entire distribution of father's height. Combined with our earlier regression results, these local regressions provide strong support for the claim that in joint households in rural India, children born to lower-ranking daughters-in-law are less healthy than children born to higher-ranking daughters-in-law.

Finally, in Table A4 (online appendix), we present a result that begins to point toward a mechanism. For some children, the DHS reports a quantitative birth weight. The fraction of the height observations with a survey-reported quantitative birth weight increased from 36% in the NFHS-3 to 79% in the NFHS-4, ten years later. Birth weight data are not missing at random: the 60% of the height observations that have a quantitatively reported birth weight are more than half a standard deviation taller as measured in height-for-age than the other 40% of children; they are 0.4 standard deviations taller

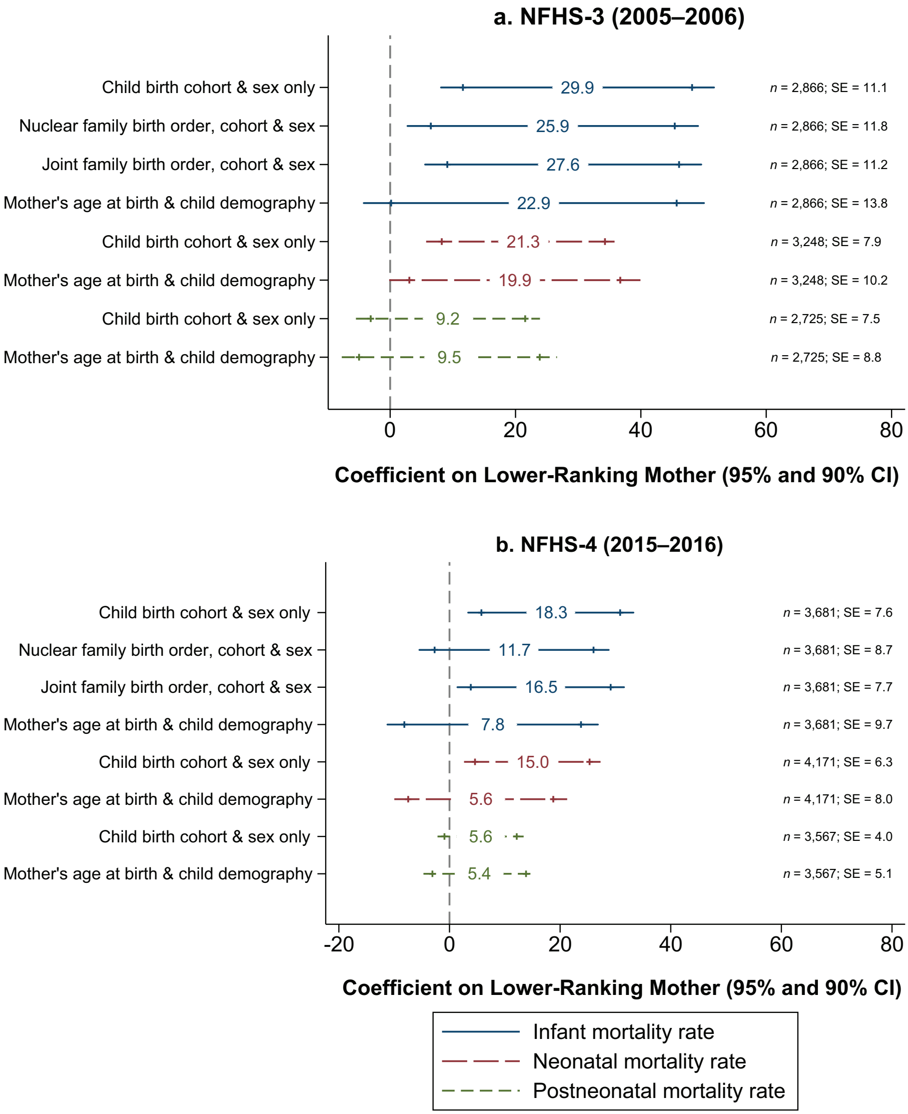

Fig. 2 Main regression result 1: Coefficients for mother's intrahousehold rank predicting early-life mortality. Each confidence interval (CI) and coefficient estimate corresponds to $\hat{\beta}$ in a separate regression estimate of $y_{ihv} = \beta\ lower_{ihv} + \alpha_{hv} + \mathbf{X}_{ihv}\,\theta + \delta_{ihv} + \epsilon_{ihv}$, where y is the specified early-life mortality indicator (scaled as deaths per 1,000), *lower* is an indicator of being a child of the lower-ranking mother, α represents household (h) fixed effects, and $\mathbf{X}$ are other controls as specified (although in each regression, these include child sex and century-month-code cohort of birth fixed effects). Standard errors are clustered by village (v). Full regression tables are shown in Table A3 in the online appendix.

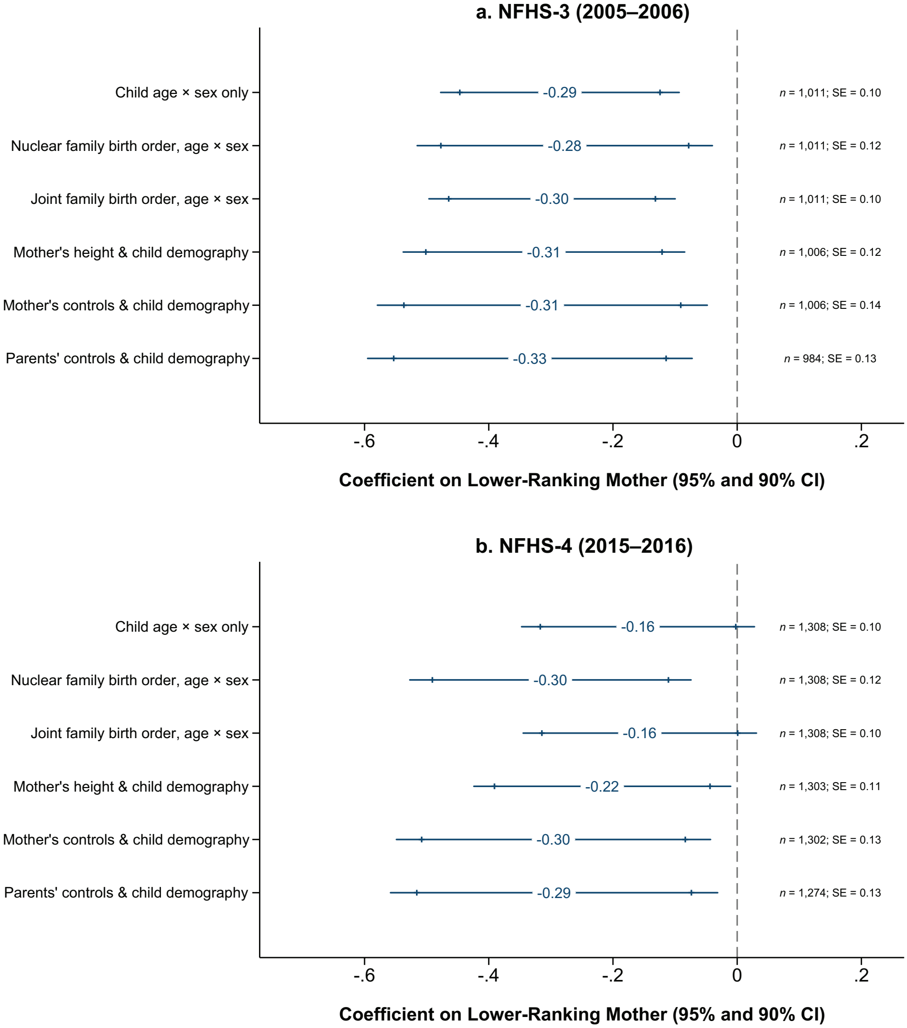

Fig. 3 Main regression result 2: Coefficients for mother's intrahousehold rank predicting height-for-age. Each confidence interval (CI) and coefficient estimate corresponds to $\hat{\beta}$ in a separate regression estimate of $y_{ihv} = \beta\ lower_{ihv} + \alpha_{hv} + \mathbf{X}_{ihv}\theta + \delta_{ihv} + \epsilon_{ihv}$, where *h* is the child's height-for-age *z* score, *lower* is an indicator for being a child of the lower-ranking mother, α represents household (*h*) fixed effects, **X** are other controls as specified, and δ are 119 age (in months) × sex fixed effects. Standard errors are clustered by village (*v*). Full regression tables are shown in Tables A1 and A2 in the online appendix.

within the NFHS-4 only. That said, if we estimate our fixed-effects regression shown in Eq. (1) among the children with birth weight data, we find that birth weight was approximately 100 grams lower for children of the lower-ranking mother than for children of the higher-ranking mother in the same household. This difference holds for both survey rounds, with or without a set of plausible controls. Because this difference at the start of life indicates that causes begin *in utero*, it suggests that maternal nutrition mediates the effect of social status on child outcomes.

Mechanism: Women's Status and Maternal Nutrition

Demographers studying health disparities have increasingly made efforts not only to document health differences between people from different groups but also to understand why those differences arise (Burgard and Hawkins 2014; Guillot and Allendorf 2010; Sasson and Hayward 2019). Why are children born to lower-ranked daughters-in-law less healthy than those born to higher-ranked daughters-in-law in the same household?

Considering the links between maternal nutrition and child health in the rural Indian context (Coffey 2015a, 2015b) and complementary literature linking nutrition and social rank more broadly (Coffey et al. 2019; Coffey et al. 2018), we expect to observe differences in maternal nutrition among daughters-in-law of different ranks. Before we present the evidence available in the NFHS data for differences in maternal nutrition, we first rule out other possible mechanisms for the observed child health differences.

What Intrahousehold Status Does Not Predict

Table 3 shows that many important predictors of child well-being are *not* predicted by mothers' intrahousehold status. The results are presented separately for NFHS-3 and NFHS-4. Each row shows the coefficient on *lower-ranking mother* from a regression of the dependent variable listed in that row for the lower-ranking mother and household fixed effects. Observations are children in joint rural households whose heights were measured; that is, the same sample of children as in Figure 3. The only statistically significant differences between children of higher- and lower-ranking mothers show *advantages* to being born to a lower-ranking mother. For example, children born to lower-ranking mothers have mothers with more years of education, on average, and are less likely to have been born at home.

Maternal Nutrition: Body Mass Index and Underweight

In low-income country settings, and especially in rural India, a mother's poor nutrition in pregnancy is linked to a baby's increased chance of early-life death, especially in the neonatal period due to low birth weight, and to poor infant and child growth among those who survive (Adair 2007; Fadel et al. 2017). Indeed, we found effects of a mother's intrahousehold rank on her children's neonatal mortality and birth weight. It would be consistent with our results to find that lower-ranking mothers had worse nutrition during pregnancy than higher-ranking mothers. Unfortunately, as discussed earlier, the NFHS is a cross-sectional study and therefore did not measure mothers' nutrition during pregnancy for the children we study.

To approximate nutrition during pregnancy, we look at a woman's body mass index (BMI) and whether she was underweight (BMI <18.5) at the time of the survey, controlling for correlates of body mass that might differ across higher- and lower-ranking mothers. In particular, we control for a mother's age at the time of

Table 3 Balance on correlates of child health: Coefficients on *lower* predicting observable characteristics, with household fixed effects

Dependent Variable	NFHS-3 (2005–2006)	NFHS-4 (2015–2016)
Mother's Height (in cm)	0.382	–0.076
	(0.396)	(0.299)
Mother's Age at Marriage	–0.109	–0.095
	(0.167)	(0.172)
Rural Home Before Marriage	–0.013	—[a]
	(0.021)	
Mother's Education	0.118*	0.150**
	(0.050)	(0.041)
Father's Education	0.201	–0.248
	(0.219)	(0.169)
Father's Height (in cm)	0.170	0.199
	(0.639)	(0.360)
Home Birth	–0.092**	–0.060**
	(0.025)	(0.019)
C-section	0.026	0.028
	(0.018)	(0.019)

Notes: Each coefficient estimate and standard error corresponds to $\hat{\beta}$ in a separate regression estimate of $y_{ihv} = \beta\ lower_{ihv} + \alpha_{hv} + \epsilon_{ihv}$, where y is the dependent variable listed in the table, *lower* is an indicator for being a child of the lower-ranking mother, and α represents household (h) fixed effects. Standard errors, clustered by village (v), are shown in parentheses. Being a lower-ranking daughter-in-law is the identifying variation of the main results. The samples correspond to the main height results shown in Figure 3, except when some variables are missing for some observations.

[a] This question was not asked in the NFHS-4.

*$p<.05$; **$p<.01$

measurement because age is independently correlated with a woman's BMI in India. We also control for whether she is currently pregnant or breastfeeding.

Table 4 combines data from the NFHS-3 and NFHS-4 to show that lower-ranking mothers had statistically significantly lower BMIs and were more likely to be underweight at the time of the survey, even after we control for their ages, breastfeeding status, and pregnancy status. These results suggest that if we could observe nutrition in pregnancy, lower-ranking mothers would have less body mass at that critical time.

Discussion

This article addresses the question of whether women's social status affects their children's health. Although many social scientists and development practitioners assume that such a relationship exists, and although such a relationship is intuitive and plausible, omitted variables and measurement problems make it difficult to find data that allow us to be confident that mother's social status impacts child health. This study investigates the unique social institution of joint households in rural India, in which

Table 4 Mechanism: Maternal nutrition is worse for lower-ranking mothers

	BMI			Underweight		
	(1)	(2)	(3)	(4)	(5)	(6)
Lower	–0.489**	–0.437*	–0.317†	0.0505*	0.076**	0.052†
	(0.134)	(0.180)	(0.188)	(0.021)	(0.028)	(0.029)
Height (in cm)		–0.048*	–0.044*		0.006*	0.006†
		(0.019)	(0.019)		(0.003)	(0.003)
Age at Measurement		0.012	–0.022		0.007	0.012*
		(0.034)	(0.040)		(0.005)	(0.006)
Currently Breastfeeding			–0.023			0.010
			(0.305)			(0.044)
Currently Pregnant			1.375**			–0.127*
			(0.339)			(0.051)
Months Since Last Birth			0.001			–0.004
			(0.009)			(0.001)
n (mothers in NFHS-3 or NFHS-4)	1,744	1,744	1,742	1,744	1,744	1,742

Notes: Each observation is a mother of one of the children in the height regressions of the NFHS-3 or NFHS-4 (combined here into one sample). The dependent variable is body mass index (BMI) or an indicator for being underweight (BMI <18.5); these were measured at the time of the survey, *not when the child was in utero*. Each confidence interval and coefficient estimate corresponds to $\hat{\beta}$ in a separate regression estimate of $y_{ihv} = \beta\ lower_{ihv} + \alpha_{hv} + \mathbf{X}_{ihv}\theta + \delta_{ihv} + \epsilon_{ihv}$, where y is a measure of maternal nutrition, *lower* is an indicator for being the lower-ranking mother, α represents household (h) fixed effects, and $\mathbf{X}$ are other controls as specified. Standard errors, clustered by village (v), are shown in parentheses.

†$p < .10$; *$p < .05$; **$p < .01$

women married to the younger brother have lower social rank than women married to the older brother but in which women are not sorted into these social roles based on premarriage characteristics.

The children of lower-ranking mothers are more likely to die in early life. Further, those who survive are shorter, on average, than their cousins in the same household. We present evidence that one mechanism for this effect in this context is maternal nutrition: although they are not shorter, lower-ranking mothers weigh less than higher-ranking mothers. The finding that maternal nutrition is worse among lower-ranking daughters-in-law does not rule out other possible mechanisms. For instance, the stress of being lower ranking has additional effects on mothers and their pregnancies that may not be reflected in weight. Unfortunately, the sorts of stress biomarker data that are becoming increasingly available for high-income country populations are not yet available for India (Goosby et al. 2018). When such data are available, it would be useful to document any differences in stress biomarkers between higher- and lower-ranking women in the same household in rural India.

One important policy implication arising from our results concerns targeting efforts to improve maternal nutrition and early-life health. The sort of household structures that we study—and more broadly, the hierarchical social forces that they reflect and that influence maternal health—is not equally common throughout India. In Figure A3 (online appendix), we show that these joint households are more common in northern states and less common in southern states. Readers familiar with India's human geography will know that this geographic gradient is correlated with many human development outcomes (Dyson and Moore 1983): mothers are less healthy, children are shorter, and early-life mortality is more common in the north. Our result is identified off a particular household structure, but we believe it is informative about patriarchy, women's status, and social hierarchy in India more broadly. Just as the government made strong efforts in recent years to encourage colostrum feeding and increase rates of hospital birth to improve infant health, with special programs targeted at the northern states, future policy efforts can focus on the time before birth and encourage families to invest in pregnant women's nutrition and prenatal care.

However, the fact that the effect we document persists even in the later survey round—even into 2015 and 2016—cautions policymakers not to underestimate the strength and endurance of hierarchical social forces. When we restrict the sample to households in which both mothers have some education, we still find a height-for-age shortfall of 0.29 standard deviations among children of the lower-ranked daughter-in-law (not shown). Thus, education alone is not a solution.

Our results suggest that policies to expand rural mothers' choice sets in ways that weaken traditional household hierarchies may improve child health. Although well beyond the scope of this article, such policies may include old-age pensions (Case and Deaton 1998) or other forms of social support that allow older parents to support themselves without relying on the economic support that comes from the joint household structure. Further, cash transfers to women during pregnancy may give them greater bargaining power to improve maternal nutrition (Drèze et al. 2021; Kalra and Priya 2020). However, programs and policies that merely make transfers to *households* without attention to intrahousehold distribution (especially to socially low-ranking young mothers) may be less successful in improving child outcomes (Brown et al. 2019). ■

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