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Social Affiliation and the Demand for Health Services: Caste and Child Health in South India *

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Abstract

This paper assesses the role of social affiliation, measured by caste, in shaping investments in child health. The special setting that we have chosen for the analysis – tea estates in the South Indian High Range – allows us to control nonparametrically for differences in income, access to health services, and patterns of morbidity across low caste and high caste households. In this controlled setting, low caste households spend more on their children's health than high caste households, reversing the pattern we would expect to find elsewhere in India. Moreover, health expenditures do not vary by gender within either caste group, in contrast once again with the male preference documented throughout the country. A simple explanation, based on differences in the returns to human capital across castes in the tea estates is proposed to explain these striking results.

Keywords

Health; Human Capital; Networks; Caste; Gender; Household decisions

1 Introduction

There is a growing awareness among economists that health is not only an important determinant of individual wellbeing but of macroeconomic growth as well. Consequently, much progress has been made in understanding how access to health services can be improved and, more generally, how the supply of health care can be increased. In contrast, economists have placed less emphasis on researching the demand side of the health market, and in particular, how utilization of health services differs across social groups. This paper aims to fill this gap by exploring health seeking behavior for children in India, and how this behavior differs by caste, one of the most important and enduring social affiliations in the country.

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There is a large literature in anthropology, sociology, and public health that seeks to understand how individual and group characteristics affect health seeking behavior. With respect to community effects, numerous studies have uncovered significant differences in health and health care utilization across race, ethnicity, religion, and region (Burgard 2002, Stephenson and Tsui 2002, Basu 1990). Along the same lines a number of studies have also found significant differences in health investment by caste in India (Bonu, Rani and Baker 2003, Kabir et al. 2003, Kapoor, Kshatriya and Kapoor 2003).

Treatment choices could differ across castes due to differences in health beliefs and practices, discrimination by health care providers, and differential returns to health investments. The low castes in Hindu society were historically relegated to menial occupations and faced severe social discrimination. Although the government of India has taken steps to remedy these inequities by subsidizing education and reserving positions in institutions of higher learning and the public sector for the low castes, a large caste-gap in education and income continues to be observed in both rural and urban India today, 50 years after independence. Thus, low caste households might also invest less in health simply because they tend to be poor and cannot afford to pay for treatment or because they live far away from health facilities. These constraints on health seeking behavior are a consequence of household level characteristics that tend to be correlated across members of a caste due to historical circumstances rather than a consequence of social affiliation *per se*.

This paper compares health investments across castes in a unique empirical setting where income and access to treatment facilities do not vary across these social groups. Our study is situated in 23 tea plantations or “estates” belonging to one company in the South Indian High Range, a mountainous region on the border of the modern Indian states of Tamil Nadu and Kerala. The High Range was virgin forest until it was cleared for tea cultivation by British planters around 1860. Since the local area was uninhabited, labor was imported from the neighboring state of Tamil Nadu. The 23 tea estates are part of the modern state of Kerala today and the workers are the third generation descendants of the original migrants, supplemented by the fresh influx of new arrivals in each generation through marriage. Low caste and high caste workers have the same jobs – and the same incomes we will see – on the tea estates, in contrast with what we would expect to find elsewhere in the country.

The tea company offers heavily subsidized health services to its employees in hospitals located in each estate. More serious health conditions are referred to the company's General Hospital. There is a shared perception among the workers that the company's facilities, which we refer to as the “inside” treatment option, although relatively cheap are also of poor quality. Apart from the company's health facilities, the workers can seek treatment “outside” the estates in private clinics or a government hospital located in the main town. Low caste and high caste families live side by side in the tea estates in company provided housing units – once again in contrast with the pattern of residential segregation elsewhere in India. Workers and their families across castes thus have equal access to health facilities inside and outside the tea estates.[1]

Most of the data used in this paper are obtained from a survey of 3,700 female tea workers drawn randomly from all 23 estates that we conducted in 2002-2003. The survey collected detailed information on the background of the respondent, her husband, and their parents. Information on the schooling and marriage choices made for each of the children, their current

[1]Our strategy in this paper is most closely related to Basu's (1990) study, which compared health seeking behavior between two regional groups residing in the same slum in New Delhi. While she attempted to control for differences in socioeconomic status and access to health services across these groups in her analysis, the additional advantage of the setting that we have chosen is that caste groups have identical incomes and access to the same medical facilities in the relatively isolated tea estates.

residential location, as well as their occupation was collected. For the purpose of this paper, however, the most relevant section of the survey deals with the health status and treatment of each child aged 15 and under. Information on the last illness experienced by the child, the treatment choices that were made, and the cost of the treatment was collected. In this research setting, where income and access to medical facilities do not vary by caste, we find that low caste households are significantly *more* likely to treat their children in expensive outside facilities and consequently end up spending significantly *more* on their treatment, reversing the pattern that we would expect to find elsewhere in the country.

Why do low caste households invest more in their children's health in the tea estates? The explanation that we put forward for this result is based on the idea that sickness and ill-health lower the child's future human capital. Health inputs dampen this negative effect. It can then be shown, holding income and access constraints constant, that groups with a greater return to human capital will invest more in their children's health.

Our explanation for why the returns to human capital are higher among the low castes as a group is based on the idea that a household in the tea estates can invest its scarce resources in an extended-family network, located in its ancestral location in rural Tamil Nadu, or in the nuclear family, particularly in the children's human capital. The low castes were historically severely disadvantaged, both economically and socially, and these caste disparities persist today, both in rural and in urban India (Ayres and Simon 2003, Deshpande 2002). In these circumstances it is easy to see why low caste households in the tea estates might want to distance themselves from their home communities and invest less in their extended-family networks. Low caste children are consequently less likely to marry into their networks and to end up living and working in their ancestral locations where the returns to human capital are relatively low.[2] This argument is consistent with the findings in a companion paper (Luke and Munshi 2005) that low caste households invest more in their children's education than high caste households. Along the same lines, we see in the current paper that low caste households invest more in their children's health as well.

Although much of the paper is devoted to establishing a link between social affiliation and the demand for health services, we are also interested in studying how health investments in children vary by gender. In contrast with the results from many previous studies (e.g., Kishor 1995, Das Gupta 1987), we find no differences by gender in treatment choice or treatment cost, both for low castes and high castes, in the tea estates. At the same time, previous results in Luke and Munshi (2005) show that educational attainment continues to be be higher for the boys, although the gender-gap is narrower among the low castes. One explanation for these results is based on the idea that labor market conditions, which favor the boys, largely determine investments in education. In contrast, investments in health might also determine future marriage-market outcomes, both for boys and girls, narrowing the gender-gap for health. Households in the tea estates earn substantially more than what they would in their origin locations in rural Tamil Nadu. In addition, both men and women have access to full-time year-round employment in the tea estates and the women actually earn significantly more than the men. Given the well known propensity for women to invest in their children, particularly the girls, when resources are made available to them, and given the relatively high standard of living in the tea estates, this is precisely the setting in which we might first expect to see gender equity in this traditional society. We conjecture that notions of fairness within the household might be stronger for health investments than for other expenditures, such as schooling,

[2]Returns to human capital are also low in the tea estates. However, employment opportunities are extremely restricted in the estates and typically one or at most two children in each family end up working there. For most children the choice is between the ancestral location in rural Tamil Nadu and the market economy elsewhere in the country.

providing an alternative explanation for the especially promising results that we obtain in this paper.

2 Institutional Setting

2.1 Caste and Health in India

A plethora of studies in the population and public health literature assess the effect of caste status on morbidity, mortality, and health treatment in India. Many of these studies use data from the National Family Health Survey (NFHS), a nationally representative survey of nearly 90 thousand women aged 15-49 that was last conducted in 1998-99. The aim of the NFHS is to provide estimates of fertility, family planning, infant and child mortality, and maternal-child health and service utilization throughout the country. The survey has consequently been used to identify the determinants of child mortality (Subramanian et al. 2006, Kravdal 2004), child health-care utilization (Thind 2004), and maternal health-care utilization (Rani and Bonu 2003, Navaneetham and Dharmalingam 2002). A crude measure of caste status – whether or not a household belongs to a group of lower castes designated as *Scheduled Castes* by the Government of India – is included as a determinant of health care and health outcomes in all these studies, together with religion, gender, age, education, location (rural versus urban), and measures of the household's standard of living. As expected, mortality rates are higher and health care utilization is routinely lower for the scheduled castes, but these studies make no attempt to explain why caste affiliation might matter.

In parallel with the NFHS-based research described above, a second strand of the literature has relied on smaller surveys conducted in specific local settings (see, for example, Kabir et al. 2003, Kumari 2005, Bhatia and Cleland 2001, Bhargava, Chowdhury and Singh 2005). This parallel literature has also focussed on infant-child mortality and treatment behavior, and once again scheduled caste households invariably lag behind in terms of health outcomes and expenditures.

In contrast with the previous literature we will study treatment choice in a special setting where incomes and access to health services do not vary by caste and we will also provide a specific explanation for why the demand for health services might vary across castes. Before proceeding with that analysis we verify that the unconditional caste-gap identified in so many previous studies holds up with NFHS (1998-99) data from Tamil Nadu, where the tea estate workers come from, as well.

The NFHS collects treatment information on at most two children of the female respondent who are under the age of three and suffered an episode of diarrhea and/or respiratory illness in the two weeks prior to the survey. The number of such illness episodes for the sample of children drawn from Tamil Nadu is too small to admit a statistical comparison by caste. However, the entire birth history of each female respondent, together with each child's age at death (where applicable), is also collected, allowing us to compute child (under-5) mortality statistics. These statistics are reported in Table 1, where we see as usual that child mortality is significantly higher for the low castes. Table 1 also reports the number of children ever born, and once again in line with patterns elsewhere in the country, fertility rates are higher for the low castes. Recall that the NFHS sampling frame is restricted to women aged 15-49 and we see from the table that the average age for both low and high caste women is about 32 years. Although the fertility statistics underestimate ultimate family size for both caste groups, we would expect completed fertility to be associated with a significant caste-gap as well.

Low caste men and women have less schooling than the high castes in Table 1. The schooling-gap is particularly wide for the men, although the caste difference is also significant at the 10 percent level for the women. The relatively low level of educational attainment among the high

caste women may be a consequence of their low labor force participation rates, which mechanically lowers their returns to schooling. The men are the main bread-winners in these households and almost all of them work. The NFHS does not collect income data directly, but notice that low caste men are much less likely to hold a skilled job, which together with their lower educational levels would suggest that they will tend to earn lower incomes. We cannot tell whether the caste differences in child mortality in Table 1 are simply a consequence of lower household incomes among the low castes. For the remainder of the paper we will consequently focus attention on a special setting in which incomes do not vary across caste groups to assess whether caste affiliation continues to matter, nevertheless, for health treatment and outcomes.

2.2 Caste and Health in the Tea Estates

The tea estates are covered by the Plantations Labour Act of 1951, which stipulates that the owners of all the plantations in the country must provide drinking water, sanitation, medical facilities, primary education, and housing to the workers and their families. The level of healthcare and education to be provided by the employers was left to the discretion of each state government.

The communist party came to power in Kerala in 1954 and has ruled the state, with brief spells out of power, since that time. The protection of workers' rights was one of the important planks upon which the communist government was voted into power (Baak 1997), and not surprisingly it set strict standards of implementation of the Plantations Act. The workers in our estates receive free housing and health services, day-care is available in each estate, and the workers' children are schooled free of cost through grade four.

The health care system includes a small hospital in each estate and a company General Hospital located close to the main town. Each estate hospital is equipped with facilities for minor operations, including childbirth, and is staffed by trained doctors and nurses. The General Hospital has an Intensive Care Unit and multiple operation theaters. It is staffed by internists and specialists in all major medical areas. The health system places strong emphasis on maternal and child health care, including prenatal care, close monitoring of high-risk pregnancies and births, family planning, and child immunization and nutrition programs.[3] All these facilities, including the medicines that may be prescribed, are available free of cost to all the workers and their children (up to age 18). Other relatives are also permitted to use the medical facilities, but they must pay for consultation and medication.

Apart from the health facilities provided by the company, the workers can also treat their children outside the estates in private clinics or in a government hospital located in the main town. The health facilities available to the workers are, at least on paper, equal to if not superior to those that we might expect to find elsewhere in the country. Moreover, low caste and high caste households live together in company-provided housing and so have equal access to health facilities inside and outside their estate. We will also see in a moment that household incomes do not vary by caste in this special setting. We would thus expect superior health outcomes in the tea estates as compared with what we previously observed for Tamil Nadu in Table 1, as well as a narrowing of the caste-gap in those outcomes.

Table 2 reports child mortality, fertility, and household characteristics, separately by caste in the tea estates. The low caste and high caste categories that we construct for the tea workers are based on historical circumstances and the local social context and so do not coincide precisely with the caste classification adopted by the NFHS. While the inequities of the Indian

[3]The high quality of health services is reflected in positive health outcomes. For example, the infant mortality rate in the tea estates was 19 in 1999-2000 (Tata Tea 2000), versus 48 in Tamil Nadu and 68 for the entire country in 1998-1999 (IIPS 2000).

caste system are well known, a particularly egregious feature of this system in South India was the institution of agrestic slavery, which condemned the members of certain agricultural sub-castes or *jatis* to a lifetime of servitude. The slave castes went by different names in different areas; in the Tamil-speaking region there were two main slave castes, the Pallars and the Paraiyars (Kumar 1965). The emancipation of the slaves in 1864 coincided with the opening up of the tea estates, and not surprisingly the bulk of the initial migrants to the High Range were (former) slave castes. At the same time, structural changes in rural Tamil Nadu brought about by the colonial administration in the nineteenth century displaced many high caste workers from their traditional occupations, leading them to migrate to the tea estates (Kumar 1965). A wide mix of castes is consequently represented in the tea estates today, although two-thirds of the workers belong to the former slave castes. These lowest of the low castes are quite distinct from all the castes above them in the social hierarchy and so we classify Pallars and Paraiyars as “low castes” for the analysis that follows, including all the other castes as “high castes”(Luke and Munshi [2005] provide additional justification for this classification).

The statistics in Table 2 cannot be compared directly with the NFHS statistics reported earlier in Table 1 for a couple of reasons. First, as noted, our context-specific low-caste classification does not precisely coincide with the Indian government's Scheduled Caste classification, which is used by the NFHS and other official data sources. Second, the female tea workers in our survey range from age 22 to 58 with an average age of 38 years, which is six years greater than the corresponding statistic for the NFHS respondents. The total number of children ever born is evidently not comparable across Tables 1 and 2. Nevertheless, it is worth noting that fertility rates do not differ by caste in the tea estates, in contrast with the pattern in Tamil Nadu. More importantly for the purpose of this paper, child mortality does not vary by caste either, in contrast once again with the significant caste-gap reported in Table 1. Child mortality in Table 2 is also substantially lower than in Table 1, consistent with the view that the estate workers and their families have access to health care of relatively high quality.

A comparison of individual characteristics, by caste, in Table 2 reveals other differences between households in the tea estates and Tamil Nadu. Low castes report significantly more schooling than the high castes in the tea estates, reversing the pattern found elsewhere in the country and in Table 1. As discussed in the Introduction, we have reason to believe that returns to investment in human capital are higher for the low castes, but a more detailed justification for this claim is postponed to the next section. Incomes also do not vary by caste in Table 2, once again in contrast with the usual pattern. We see that child mortality rates do not vary by caste in a setting where incomes and access to health facilities are held constant across these social groups. The analysis that follows will extend this result to study treatment choice in response to a variety of child illnesses in the tea estates; we will see that the low castes actually invest significantly more in their children's health than the high castes, reversing the usual pattern in India.[4]

2.3 Illness in the Tea Estates

The survey collected detailed information on the health and treatment of all the respondents' children aged 15 and under. The respondent was asked to report the last illness that each child suffered from. Most studies of health seeking behavior collect data on a single treatment choice per illness. In practice, however, it is common for individuals to seek treatment from multiple providers, sequentially or concurrently (eg. Feierman 1985). An important feature of our survey was that information on the first and second (where relevant) treatment was collected. The identity of the health care provider first chosen to treat that illness, with the accompanying cost

[4]The fact that child mortality does not vary by caste is not necessarily inconsistent with the observation that low castes invest more in child health. The company health system places strong emphasis on child immunization and nutrition programs, which might dampen the effect of differences in parental inputs on child mortality.

(including transport, medicine, etc.), was always obtained. For those cases in which subsequent treatment was sought elsewhere, information on the identity of the second provider and the cost of treatment was also collected. Differences by caste in treatment choice only emerge in the second treatment, emphasizing the importance of collecting the treatment history.

One concern with the analysis reported below is that different caste groups might self-report the incidence of ill-health or the type of illness differently. The survey elicited information on when the last illness occurred, which allows us to assess whether the frequency of (reported) illness varies by caste. As can be seen in Table 3 the distribution of the timing of this last illness is almost identical for low caste and high caste children. Moreover, almost all the children were treated for this illness, suggesting that the reported illnesses are sufficiently severe and that their severity does not vary by caste.

A total of 84 illness types were reported by the respondents. After consulting with physicians based in India, these illnesses were aggregated into 13 categories (with sample prevalence in parentheses): **1.** cough and throat infection (14%); **2.** headache and fever (52%); **3.** injury and accident (7%); **4.** ear, nose, and throat (5%); **5.** gastrointestinal (6%); **6.** respiratory (3%); **7.** typhoid and jaundice (1%); **8.** childhood disease, including measles, mumps, and chicken pox (2%); **9.** fits (epilepsy) (1%); **10.** tumors and operations (2%); **11.** pain (4%); **12.** skin conditions (2%); and **13.** chronic conditions (1%). The first four categories were further classified as “routine” illnesses (78%), while the remaining nine categories were classified as “non-routine” illnesses (22%). The basic idea behind this distinction is that the non-routine illnesses are less common, potentially serious, and more difficult to treat, and later we will see that a second treatment is much more likely to be sought for these illnesses. Not surprisingly, treatment costs are also higher for the non-routine illnesses.

We saw in Table 3 that the frequency of illness does not vary by caste. However, when we compare treatment choices by caste, separately for routine and non-routine illnesses, we must also assume implicitly that the classification of these diseases does not vary systematically by caste. Suppose, for example, that low caste and high caste parents classify conditions differently but treat them the same. Then observed differences in treatment by caste for a given illness type (routine or non-routine) will be entirely spurious. Alternatively, suppose that the type of illness varies across broad caste groups. In that case, we could easily imagine that the caste group in which a greater fraction of the children are afflicted with expensive non-routine illnesses will spend less at the margin on those illnesses since household incomes do not vary by caste.

To rule out these confounding effects, we proceed to verify that the type of illness does not vary by caste in Table 4. This table reports the mean for various child, household, and community characteristics, separately for routine and non-routine illnesses. For binary variables, the table reports the proportion of the sample in each illness category. If assignment to the routine and the non-routine category is independent of a given characteristic, then the statistics reported in Columns 1 and 2 will be the same. For example, the proportion of high caste children in both the routine and the nonroutine illness categories is 0.31 (the proportion of high caste children in the sample), which implies that the pattern of reporting by type of illness does not vary across castes. Along the same lines we see that the pattern of reporting by type of illness does not vary across a number of individual and household characteristics; the gender of the child, the education of the parents, and household income. The only exception is the child's age; older children are more likely to suffer from non-routine illnesses. Later in Section 3 we will study how the treatment decision varies with distance to the household's ancestral location in Tamil Nadu as a way of providing additional support for the view that networks far away shape human capital investments in the tea estates. Notice from Table 4 that

the pattern of reporting by type of illness does not vary by caste or distance to the origin, yet treatment choices will vary substantially along both these dimensions.[5]

3 Caste and Child Health Investments

3.1 Treatment Choices

Previously we mentioned that a household could choose between the company's medical facilities and private clinics or the government hospital. While these are the main treatment options available in the tea estates, the parents could also visit a traditional healer, treat the children at home, or get medicine directly from the chemist without a prescription, an illegal but common practice in India. These last two options are low cost and most likely perceived to be of low quality; hence, for the analysis that follows, the private clinic, the government hospital, and the traditional healer will be included in the “outside” category. The company facilities, chemists, and self medication will be included in the “inside” category.

There is a widespread perception among the workers, cutting across caste lines, that the company medical staff are indifferent to their health problems and that the overall quality of service is lacking. This is not surprising since the company hospitals operate effectively like “public” facilities in the tea estates, and it is well known that public providers have less of an incentive to exert effort than private providers. There is also a tendency for patients to view free services as being of relatively poor quality. At the same time, private providers are more likely to behave according to their patients' expectations, possibly resulting in the inappropriate use of medications and procedures and increased expenditures (Das and Hammer 2004). For our purpose what matters is that there is a perceived difference in quality between the “inside” and “outside” facilities, which is shared across workers and which is associated with a substantial difference in expenditures. While households might favor low cost treatment options, notably the estate hospital, for the first treatment, the emphasis should shift to higher (perceived) quality choices when a second treatment is required. Consistent with our classification by quality, “outside” providers are much more likely to be sought out for the second treatment than for the first.[6]

The average cost of treatment for routine illnesses from the survey is Rs. 17 for inside treatment versus Rs. 499 for outside treatment, whereas the corresponding costs for non-routine illnesses are Rs. 264 versus Rs. 1984 (costs by type of treatment are significantly different at the 5 percent level in both cases). The choice of treatment appears to have important cost and (perceived) efficacy implications. This is what we turn to next.

3.2 Treatment by Caste: Empirical Evidence

Table 5, Columns 1-2 compare treatment choices for routine and non-routine illnesses. Starting with the first treatment in Panel A we see that the more complicated non-routine illnesses are significantly more likely to be treated outside. We noted above that the cost of treatment outside is significantly higher for each illness type, and non-routine illnesses are more expensive than routine illnesses with each treatment choice, so the total cost of treatment (in logs) is not surprisingly significantly higher for non-routine illnesses.[7] The parents are also much more

[5]While medical facilities might be uniform across estate hospitals, distance to the General Hospital and to the private facilities situated in the main town could potentially vary by caste. We verified, however, that this is not the case; the average distance to the town in km (with standard errors in parentheses) is 15.47(0.20) for the low castes and 15.60 (0.26) for the high castes.

[6]The following treatment choices were listed for the first treatment: self (2.5%), chemist (2.5%), company hospital (81.5%), local healer (0.5%), government hospital (0.5%), private clinic (12.5%). The mix of choices for the second treatment was as follows: self (0.5%), chemist (3.0%), company hospital (39.0%), local healer (2.0%), government hospital (3.0%), private clinic (52.5%).

[7]A substantial fraction of treatments (in the estate hospital) are reported at zero cost, despite the fact that the cost is meant to include expenditures on transportation, etc. Consequently we add one to all costs before taking logs. The log transformation is required because the distribution of expenditures is extremely skewed and so we would like to put less weight on the extremely high (outlying) expenditures.

likely to have taken their children for subsequent treatment with these illnesses, which we would expect because they are more likely to be serious and so difficult to treat.

Panel B combines the first and second treatment to construct a binary variable indicating whether the child was ever taken outside for the last illness. As with the first treatment, the children are much more likely to have ever been treated outside for the non-routine illnesses, at significantly higher cost.

Table 5, Columns 3-6 report the statistics just described for low castes and high castes separately for routine and non-routine illnesses. There are absolutely no differences by caste for the routine illnesses. The first treatment choice for the non-routine illnesses also does not differ by caste. But notice that the low castes are substantially more likely to send their children for a second treatment, although the caste differences are not significant at the 5 percent level. Once we combine the first and second treatment, the low castes are 50% more likely than the high castes to ever send their children with non-routine illnesses outside for treatment, and this difference is significant at the 5 percent level. Low castes spend 50% more on the treatment of non-routine illnesses than high castes, and these differences are significant at the 5 percent level as well.

The regression analysis that follows subjects the estimated caste-gap to greater scrutiny by controlling for child and parental characteristics that could directly determine treatment choices. A major virtue of the empirical setting that we have chosen is that occupations, and hence incomes, do not vary by caste in the tea estates. However, we saw in Table 2 that schooling levels are higher among the low caste workers. Luke and Munshi (2005) show that low castes are also less likely to have married a relative from their ancestral location in Tamil Nadu in the traditional fashion and so it follows that the low caste workers and their spouses are less likely to be first-generation arrivals in the tea estates. It is entirely possible that more educated parents have different beliefs about the treatment options that are available than less educated parents, or perhaps their children receive preferential treatment outside the tea estates. First-generation arrivals similarly might have different beliefs or might be treated differently by the company's medical staff than more established workers who have more experience with the estate facilities. The regressions that we report below include parents' education and whether they are first-generation arrivals in the tea estates, as well as the child's age and gender. The results that we report below indicate that the estimated caste-gap in Table 5 is hardly affected by the inclusion of these additional controls.

We estimate regressions, separately for routine and non-routine illnesses, of the form

$$y_i=\alpha C_i+X_i\beta+\epsilon_i$$

where y_i measures treatment choice either by the type of treatment (outside=1, inside=0) or the cost of treatment. C_i measures the child's caste (high=1, low=0), X_i includes child and parental characteristics as discussed above, and ε_i is a mean-zero disturbance term.

Table 6, Columns 1-4 report results from a preliminary regression specification with the child's caste, age, and gender as regressors. All the regressions are estimated separately for routine and non-routine illnesses, with treatment choice as the dependent variable in Columns 1-2 and log-cost as the dependent variable in Columns 3-4.

Caste has no effect on treatment choice with the routine illnesses in Column 1, but low castes are significantly more likely to send their children outside for treatment with the non-routine illnesses in Column 2. Since we use the linear probability model to estimate these regressions, the coefficients are easy to interpret; the low castes are 10 percentage points more likely to send their children outside for non-routine illnesses, matching the statistics that we reported

earlier in Table 5. Repeating this exercise with log-cost as the dependent variable, the caste effects are qualitatively similar to what we obtain with treatment choice, with a caste-gap of 50 percent in the log-cost (significant at the 5 percent level).[8] The age and gender effects in Columns 1-4, however, are less easy to interpret. Age has a positive and significant effect on both treatment choice and treatment cost with the routine illnesses, possibly because older children are treated differently or perhaps due to heterogeneity within the set of routine illnesses. Age effects in contrast are absent for the non-routine illnesses. Gender with one exception (treatment choice for routine illnesses) has no effect on treatment choice or treatment cost. In particular, there is no evidence that health investments favor the boys, as has been found in many other studies.

Appendix Table A1 verifies that these results are robust to alternative classification of the outside treatment category and non-routine illnesses. Gastrointestinal, childhood diseases, and pain are included in the routine category, resulting in a substantial decline in the number of observations in the non-routine category. Nevertheless, the caste-gap in treatment choice and cost remains large and significant. This caste-gap is maintained with an alternative provider classification, moving traditional healers from the outside to the inside category as well.

We next proceed to include parental characteristics as additional controls in the treatment regressions. Educational attainment and a first-generation indicator variable are included for each parent in Table 6, Columns 5-8. The estimated caste effects are hardly affected by the inclusion of the parental variables. Moreover, neither schooling nor arrival status has a consistently strong effect on treatment choice.[9] In contrast, educational attainment of both the father and the mother have a large and significant effect on children's educational attainment in our companion paper (Luke and Munshi 2005).

By collapsing the first and second treatment rounds we are able to characterize treatment choice as a binary variable: whether or not the child was ever sent outside for treatment. This characterization has the advantage of parsimony, but it does not allow us to identify precisely where households differ in their decisions; recall from Table 5 that a caste-gap only emerges in the second round for the non-routine illnesses. We consequently proceed to report results from a sequential logit model of treatment choice in Table 7. The first round choice – in versus out – is estimated as a logit model, while the second round choice, conditional on having chosen in or out in the first round, is estimated as a multinomial logit model. The set of second round choices is do nothing, treat inside, or treat outside, with the first choice specified to be the comparison group.

Looking across the columns in Table 7 a significant caste-gap is only observed in round 2, conditional on having sent the child inside for treatment in round 1, allowing us to isolate the source of the difference in health investments. Notice that this caste- gap is significantly wider for non-routine illnesses (column 8) than for routine illnesses (column 3), matching the patterns in Table 5 and Table 6.

The results thus far indicate that low caste households invest significantly more in their children's health than high caste households, reversing the caste-pattern that we would expect to find elsewhere in the country. Table 8 subsequently estimates the effect of gender on

[8]As a robustness test we ran quantile regressions with cost in levels as the dependent variable. A very large proportion of the observations, particularly for routine illnesses, report zero expenditures. We thus ran 0.75 quantile regressions rather than the more standard median regression to control for outlying expenditures. The pattern in Columns 3-4 continues to be obtained: there is no caste gap for routine illnesses but low castes spend significantly more on nonroutine illnesses.

[9]Mother's schooling increases the probability that the child is sent outside and the cost of treatment for routine illnesses, but goes in the opposite direction for non-routine illnesses. Father's schooling has the opposite effect of mother's schooling in each case. First-generation arrival status does not have a statistically significant effect on treatment choice or cost with one exception; the child is less likely to be sent outside (with lower accompanying expenditure) for routine illnesses if the father is a first-generation arrival.

treatment for routine and nonroutine illnesses, separately by caste. With the exception of routine illnesses where boys are *less* likely to be sent outside for treatment for both castes, no significant differences by gender are observed in Table 8.[10] This gender equality contrasts with the results reported in the companion paper for investments in education. There we find that boys have higher educational attainment than girls, particularly among the high castes.

While health and education are both important components of human capital, they do not necessarily track together perfectly. As noted, women have until recently been largely denied access to the formal labor market in India. Investments in education, which improve future labor market outcomes, consequently will have much higher returns for boys. In contrast, investments in health will pay off directly in the future on the marriage market as well, where girls might benefit disproportionately. Notions of fairness within the household might also be stronger for health investments than for other expenditures, including children's education. Thus, while boys continue to have higher educational attainment than girls in the tea estates, gender has no effect on health treatment.

3.3 Treatment by Caste: Theoretical Interpretation

Our explanation for the difference in health expenditures across castes is based on the idea that returns to investment in human capital are greater among the low castes in the tea estates. Let the relationship between health inputs and the human capital of the only child in the household be characterized by the function

$$f(h,r) = w_0 - r(1 - h^{\alpha}),$$

where ω_0 measures the the child's human capital in the absence of illness, r measures the decline in human capital due to illness, and h measures health inputs. For the particular specification for the $f(h, r)$ function that we have chosen it is easy to verify that the usual properties are satisfied: $f_h(h, r) > 0$ and $f_{hh}(h, r) < 0$, as long as $\alpha < 1$.

The child's parents choose h to maximize

$$\theta f(h,r) - ch,$$

where c is the unit cost of health inputs and θ measures the returns to human capital, which we assume (without justification for the time being) to be greater for the low castes. Applying the implicit function theorem to the first order condition associated with this maximization problem,

$$\frac{dh}{d\theta} = \frac{-f_h(h,r)}{\theta f_{hh}(h,r)} > 0. \quad (1)$$

This tells us that the optimal health input $h^*(r, \theta)$ will be increasing in θ, matching the caste differences in health expenditures reported above. Notice that we have ignored differences in illness types (routine versus non-routine) and treatment technologies (inside versus outside) for the time being. Notice also that we have implicitly ruled out caste discrimination by health care providers by specifying that the mapping from health inputs to human capital $f(h, r)$ is independent of θ. In principle differences in treatment choices across castes, particularly the decision to send the child inside or outside, could be influences by such discrimination and we will return to this point below.

Why are the returns to human capital greater among low castes in the tea estates? Luke and Munshi (2005) describe a simple model in which parents in the tea estates can invest their scare

[10] Recall that the caste-gap only emerges for the case where the child is sent inside for the first round and then outside for the second round in Table 7. Closer inspection of the estimates in that table indicates that a gender-gap also emerges with that choice alone, with the girls actually being favored.

resources in their extended-family networks, located in their ancestral homes in rural Tamil Nadu, or in their children's human capital. Because high castes are generally wealthier than low castes in rural Tamil Nadu, it follows under reasonable conditions that the returns to investment in the rural networks will be lower for the low caste workers. Parents that invest in the nuclear family are moving from the traditional network-based economy to the modern market economy, where returns to investment in human capital are essentially independent of caste. Since household incomes do not vary by caste in the tea estates, the preceding discussion tells us that low caste workers should invest more in their children's human capital and less in the network than high caste workers.

The portfolio allocation problem just described is complicated by the fact that the returns to investment in the network and in human capital will depend on whether the children end up marrying a relative, in the traditional fashion. Marriage to close relatives is a distinctive feature of the South Indian kinship system, with overlapping extended family networks linking the entire sub-caste or *jati* (Karve 1953, Dumont 1986, Trautman 1981). Marriage to a relative reduces information and commitment problems, increasing the returns to investment in the network. At the same time, marriage to a relative lowers the return to investments in human capital since the child is more likely to end up living and working in the ancestral location where employment opportunities are limited. Luke and Munshi (2005) show that the benefit from marrying the children to a relative will be greater among the high castes, under reasonable conditions, reinforcing the caste differences in the tradeoff between the extended family and the nuclear family described above.

Up to this point we have assumed that preferences within the household are perfectly aligned. The extreme poverty among the low castes, and the slave castes in particular, has been accompanied by a culture characterized by high levels of domestic violence and male alcohol abuse (Kapadia 1995, Kooiman 1989, Geetha 2002). Women suffer disproportionately in this culture and it is easy to see why the low castes female workers in the tea estates might want to use their influence within the household to distance themselves and their children, particularly the girls, from the home network. Luke and Munshi (2005) use this argument to motivate their empirical finding that a relative increase in female income increases children's schooling and lowers the probability that they will marry a relative among the low castes, but not the high castes, once again reinforcing the caste-differences described above. For the purpose of this paper, the important insight from the preceding discussion is that high caste children will be more likely to end up living and working in their ancestral locations in rural Tamil Nadu where the returns to human capital are relatively low.

Table 9 reports marriage choices, residential locations, and educational attainment for the female respondents' children aged 16-45, separately by caste and gender. The basic marriage rule in Hindu society is that no individual can marry outside the endogamous sub-caste or *jati* and we see in Table 9 that both low and high castes continue to follow this rule. Notice, however, that the propensity to marry a relative is much lower among the low castes, consistent with the discussion above. This result does not follow mechanically from the fact that the low castes are more likely to marry outside their *jati*; indeed the opposite pattern is obtained, presumably due to the continuing stigma associated with marrying into the former slave castes. Notice also that low caste children are significantly less likely to reside in their ancestral locations than high caste children (conditional on having left their parental homes). Human capital measured by educational attainment is consequently higher for the low castes as expected, particularly for the girls, matching the patterns reported for the parents in Table 2.

3.4 Extensions to the Model: Illness Types and Treatment Technologies

The preceding discussion provided us with theoretical justification and empirical support for the claim that the returns to human capital are higher for the low castes. These differences in

the returns to human capital allow us to explain why low caste parents spend more on their children's health than high caste parents in the tea estates. Allowing for illness types (routine versus non-routine) and treatment technologies (inside versus outside), the results in Section 2 provide us with three stylized facts:

F1: Both castes spend more and are more likely to choose the outside treatment option for nonroutine illnesses.

F2: The caste-gap in health expenditures and treatment choice is wider for the non-routine illnesses.

F3: Caste differences show up in the second round of treatment.

Our objective in the analysis that follows will be to extend the theoretical framework to explain each of these stylized facts. To begin with, continue to assume that there is a single treatment technology and so the objective will be to explain differences in health expenditures across types of illnesses as described in **F1** and **F2**. Assume a continuum of illnesses indexed by the parameter r in the $f(h, r)$ function, with non-routine illnesses associated with a greater r. Non-routine illnesses have a stronger (negative) impact on the child's human capital and so we would expect the marginal effect of an increase in health inputs h to be greater for those illnesses; $f_{hr}(h, r) > 0$. It is evident that the particular functional form that we specified for $f(h, r)$ above satisfies this condition.

Applying the implicit function theorem to the first-order condition associated with the parents' health investment problem, as we did earlier in equation (1),

$$\frac{dh}{dr} = \frac{-f_{hr}(h,r)}{\theta f_{hh}(h,r)} > 0. \tag{2}$$

It follows immediately that parents within each caste group invest more for non-routine illnesses as in **F1**. To compare the caste-gap across different types of illnesses, differentiate equation (1) with respect to r:

$$\frac{d^2h}{drd\theta} = \frac{\theta f_{hh}(h,r)\left[f_h(h,r)\cdot f_{hhr}(h,r) - f_{hr}(h,r)\cdot f_{hh}(h,r)\right] + f_{hr}(h,r)\left[(f_{hh}(h,r))^2 - f_h(h,r)\cdot f_{hhh}(h,r)\right]}{\theta^2 (f_{hh}(h,r))^3}.$$

The preceding expression is difficult to sign without placing additional restrictions on $f(h, r)$. Applying the same parametrization as above, $f(h, r) \equiv \omega_0 - r(1 - h^{\alpha})$, it is straightforward to verify that the first term in square brackets in the numerator on the right-hand-side of the equation is zero and the second term in square brackets is negative. Since $f_{hr}(h, r) > 0$ and $f_{hh}(h, r) < 0$, it follows immediately that $d^2h/drd\theta > 0$; the caste-gap is wider among the non-routine illnesses as in **F2**.

Now allow for alternative – inside and outside – treatment technologies. The outside technology is more effective than the inside technology in the sense that a unit increase in health inputs with that technology has a greater effect on human capital. But this technology is also associated with a fixed cost, k, which measures the time and transportation expenses that must be incurred when the child is treated outside the tea estates. The mapping from health inputs to human capital is described by the augmented function $f(h, r, \lambda) \equiv \omega_0 - r(1\text{-}\lambda h^{\alpha})$, where λ measures the effectiveness of the technology; $\bar{\lambda}$ for the outside technology and $\underline{\lambda}$ for the inside technology, with $\bar{\lambda} > \underline{\lambda}$.

The choice of technology is determined in two steps. In the first step the parents choose health investment h to separately maximize

$$\theta f\left(h, r, \bar{\lambda}\right) - ch - k \tag{3}$$

$$\theta f\left(h,r,\underset{\_}{\lambda}\right)-ch \tag{4}$$

and subsequently determine the optimal investments $h^*\left(\bar{\lambda},r,\theta\right)$ and $h^*\left(\underset{\_}{\lambda},r,\theta\right)$ for each technology from the first-order conditions corresponding to equations (3) and (4).

In the second step, $h^*\left(\bar{\lambda},r,\theta\right)$ and $h^*\left(\underset{\_}{\lambda},r,\theta\right)$ are substituted in equations (3) and (4) to determined which technology actually gets chosen. The choice of technology will depend on the tradeoff between the increased effectiveness of the outside technology and the greater fixed cost that goes with it. In general, the parents will choose the outside technology if

$$\left[\theta f\left(h^*\left(\bar{\lambda},r,\theta\right),r,\bar{\lambda}\right)-ch^*\left(\bar{\lambda},r,\theta\right)\right]-\left[\theta f\left(h^*\left(\underset{\_}{\lambda},r,\theta\right),r,\underset{\_}{\lambda}\right)-ch^*\left(\underset{\_}{\lambda},r,\theta\right)\right]>k. \tag{5}$$

The only source of heterogeneity across households in this model is associated with the fixed cost *k*. Let the distribution of *k* be independent of caste (θ) and illness type (*r*). It then follows that the probability that a randomly selected household will send its child outside for treatment is increasing in *r* if the left-hand-side of inequality (5) is increasing in *r*. Applying the Envelope Condition this will be the case if

$$\theta\left[f_r\left(h^*\left(\bar{\lambda},r,\theta\right),r,\bar{\lambda}\right)-f_r\left(h^*\left(\underset{\_}{\lambda},r,\theta\right),r,\underset{\_}{\lambda}\right)\right]>0. \tag{6}$$

It is easy to verify that this condition is indeed satisfied for the parametric specification of the $f(\lambda, h, r)$ function that we have chosen, completing the second part of **F1**. We showed above, with a single technology, that non-routine illnesses are associated with greater expenditures. The additional result that non-routine illnesses are more likely to be treated with the more expensive outside technology will only reinforce this observation.

To characterize the caste-gap in treatment technologies across different types of illnesses, we begin by demonstrating that the low castes are more likely to send their children outside for any given illness. Following the same argument as above, the probability that a randomly selected household sends its child outside for treatment is increasing in θ if the left-hand-side of inequality (5) is increasing in θ. Applying the Envelope Condition once again, this will be the case if

$$f\left(h^*\left(\bar{\lambda},r,\theta\right),r,\bar{\lambda}\right)-f\left(h^*\left(\underset{\_}{\lambda},r,\theta\right),r,\underset{\_}{\lambda}\right)>0. \tag{7}$$

It is straightforward to verify that this condition will be satisfied for the particular specification of the $f(h, r, \lambda)$ function that we have chosen and we expect that it will be satisfied more generally as well (as long as $f_{h\lambda}(h, r, \lambda) > 0$).

The caste-gap in the chosen treatment technology derived above will be increasing in *r* if the lefthand-side of inequality (7) is increasing in *r*. Using the specification of the $f(h, r, \lambda)$ function that we have chosen, substituting the expressions for $h^*\left(\bar{\lambda},r,\theta\right)$ and $h^*\left(\underset{\_}{\lambda},r,\theta\right)$ obtained with that specification in inequality (7), and then differentiating with respect to *r* it is straightforward to verify that this is indeed the case, completing the second part of **F2**. We showed with a single technology that the castegap in expenditures is increasing in *r*. The widening caste-gap in the choice of treatment technology with higher *r* that we have just derived would only reinforce this result.

Finally, to explain why caste differences start to emerge in the second round of treatment (**F3**), introduce some initial uncertainty about the type of illness. We saw in Table 5 that parents

are more likely to send their children outside, even in the first round, for non-routine illnesses, so their priors cannot be uniform across illnesses. Nevertheless, as long as they place sufficient weight on the probability that any given illness is routine, caste differences will be small in the first round, regardless of the type of illness. Once the uncertainty is resolved with the first treatment, the caste-gap will emerge most strongly for the non-routine illnesses in the second treatment. In contrast, the caste gap should remain small for the routine conditions.

3.5 Alternative Explanations

Our interpretation of the caste-gap in health investment is that differences in network quality shape residential choices, which in turn generate higher returns to investment in human capital among the low castes. This explains why the low castes are more likely to seek expensive outside treatment for their children. But other interpretations of this result are also available. For example, there might be a perception among the low caste workers that the company's medical staff discriminate against them, leading them to seek the relative anonymity of medical services outside the tea estates. Shared historical experience at the level of the caste might also have resulted in a caste-specific culture that influences treatment choices, although we would expect the high castes to invest more in health in this case, as they do elsewhere. Finally, while high castes might invest more in their children's health than low castes in general, the high caste workers might not be representative of the population that they are drawn from.

While the ability distribution among the earliest migrants might have varied by caste, we expect such differences to have disappeared over the subsequent 150 years during which the economic environment was uniform across castes in the tea estates. The entry of fresh workers through marriage is unlikely to have substantially affected this process of homogenization, given the positive assortative matching typically associated with the marriage market. The tea pluckers in the estates are paid on a piece-rate basis and so their incomes will reflect measures of ability such as hardwork and diligence that would also be reflected in the investment decisions that they make for their children. It is consequently noteworthy that incomes do not vary by caste in the tea estates (the same result is obtained for first-generation workers). It is only with a particular set of choices – notably education and health – that the high castes seem to lag behind.

Even if the low castes and the high castes in the tea estates have the same ability distribution there are other reasons, such as caste discrimination by health care providers, for why they might make different choices for their children. To provide independent support for the network-based interpretation of the caste gap we proceed to study variation in treatment choice by distance to the household's origin location in rural Tamil Nadu *within* castes. The idea here is that distance to the origin mechanically determines the strength of the household's ties to the extended family network. Households that are geographically closer to their networks will be more closely tied to them and their children will be more likely to end up living and working in their ancestral locations where the returns to human capital are relatively low. Luke and Munshi (2005) show that children's educational attainment is indeed increasing with distance to the origin, whereas the probability that the child will marry a relative, be sent to school in the origin location, and will ultimately settle there, is declining with distance. Along the same lines, we expect to find a positive relationship between distance and outside treatment, particularly among the non-routine illnesses, if home networks are indeed influencing returns to human capital in the tea estates.

The low castes tend to be disproportionately represented in the distant locations (not reported), and so the treatment regressions in Table 10 include a full set of *jati* dummies to account for the potentially confounding effect of caste on treatment choice. Some urban locations around the city of Chennai display anomalous treatment choice and treatment cost patterns, and so we account for those locations with a Chennai dummy in the table. Apart from these additional

controls, and the distance to the household's origin location, the child's age and gender are included as regressors as usual.

Nonparametric regressions (not reported) reveal a linear relationship between treatment choice and the log of the distance to the origin location. Log-distance has a positive and significant effect on the probability that the child will be treated outside for non-routine illnesses consistent with our network-based interpretation in Table 10. The distance coefficient is positive for the routine illnesses as well, but is smaller in magnitude and statistically insignificant. Log-distance also has a positive and significant effect on treatment cost, with a much larger coefficient for the non-routine than the routine illnesses as expected. The age and gender coefficients in Table 10 are qualitatively similar to the corresponding coefficients in Table 6. Taken together with the results in the companion paper – that households from more distant locations invest more in education and are less tied to their origin networks through marriage – the strong distance effect in Table 10 provides independent support for the view that home networks are shaping health investments in the tea estates.[11]

4 Conclusion

This paper assesses the role of social affiliation, measured by caste in India, in shaping investments in child health. The special empirical setting that we have chosen allows us to control nonparametrically for differences in income, access to health services, and the incidence and type of illness across low caste and high caste households that would otherwise undermine any attempt to identify a caste-group effect.

We find that low caste households spend more on their children's health than high caste households in the tea estates. The explanation for this result that we put forward is based on the idea that while these households have the same income and access to the same facilities in the tea estates, the quality of home networks in Tamil Nadu will vary by caste. Low caste households with access to inferior networks will distance themselves from their home communities, which implies that their children are less likely to end up residing in their ancestral locations where the returns to human capital are relatively low. Higher returns to human capital among the low castes translate into larger investments in child health.

The results in this paper present an optimistic view of the development process, at least as it is unfolding in the tea estates. First, low caste households invest more in child health than high caste households, reversing the caste pattern we would expect to find elsewhere. Second, health expenditures do not vary by gender within either caste group, in contrast once again with the male preference that has been documented elsewhere. This is a special setting in terms of the economic opportunities for men and women and access to welfare services, and so what we find in the tea estates may be a consequence of the gender- and caste-neutral context, rather than the situation as it currently exists elsewhere in the country. Nevertheless, the analysis in this paper and our companion paper indicates that transferring resources to historically disadvantaged groups – low castes and low caste women in particular – could have a positive impact on overall investments in human capital, while at the same time reducing, if not reversing, historical inequities.

[11]We also experimented with a more flexible specification that allowed for the interaction of the high caste dummy and the distance variable, but the coefficient on the interaction term was small in magnitude and statistically insignificant. In general, the decline in network ties with distance is a consequence of the reduced ability of the network to monitor its members and enforce cooperative behavior. These results suggest that this decline is independent of the overall quality of the network.

Table A1

Treatment and Caste - Robustness Tests

Alternative classification:	**routine**				**outside**			
Dependent variable:	**treatment outside**		**log-cost**		**treatment outside**		**log-cost**	
Type of illness:	**routine**	**non-routine**	**routine**	**non-routine**	**routine**	**non-routine**	**routine**	**non-routine**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
High caste	−0.024	−0.134	−0.057	−0.688	−0.013	−0.102	0.022	−0.713
	(0.018)	(0.054)	(0.080)	(0.346)	(0.014)	(0.030)	(0.091)	(0.150)
Age	0.004	−0.002	0.041	0.049	0.004	0.001	0.045	0.038
	(0.001)	(0.003)	(0.013)	(0.038)	(0.001)	(0.005)	(0.015)	(0.027)
Boy	−0.033	−0.017	−0.093	−0.432	−0.029	−0.011	−0.098	−0.117
	(0.006)	(0.033)	(0.080)	(0.627)	(0.009)	(0.022)	(0.094)	(0.252)
Constant	0.187	0.401	0.969	2.701	0.167	0.301	0.895	1.935
	(0.011)	(0.021)	(0.124)	(0.165)	(0.017)	(0.040)	(0.137)	(0.154)
Number of observations	2,474	278	2,215	244	2,172	580	1,936	523

Note: Standard errors in parentheses. Standard errors are robust to heteroscedasticity and clustered residuals within each *jati*.

Treatment outside = 1 if the child is sent to the private clinic, the government hospital, or the traditional healer, 0 otherwise.

Cost of treatment is measured in Rupees.

Routine and non-routine illnesses were defined in Table 4.

Low caste refers to former slave castes - Pallars and Paraiyars. High caste includes all other *jatis*.

Sample restricted to children age 15 and under residing at home.

Decline in observations in Columns 3-8 is due to missing values for some of the regressors.

Alternative classification of routine illness includes gastrointestinal, childhood diseases, and pain in that category.

Alternative classification of outside moves traditional healer from outside to inside category.

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Table 1

Caste and Health in Tamil Nadu

Individual:	**female respondent**		**husband**	
Caste:	**low**	**high**	**low**	**high**
	(1)	**(2)**	**(3)**	**(4)**
Child mortality	0.086	0.065*	--	--
	(0.006)	(0.003)		
Number of children ever born	2.64	2.29*	--	--
	(0.05)	(0.03)		
Age	31.93	32.39	37.77	38.51*
	(0.26)	(0.14)	(0.31)	(0.17)
Schooling	3.42	3.54	5.28	7.14*
	(0.06)	(0.03)	(0.13)	(0.08)
Percent employed	62.88	45.34*	97.79	98.42
	(1.46)	(0.83)	(0.45)	(0.21)
Percent holding skilled job	13.46	38.09*	37.22	60.12*
	(1.30)	(1.21)	(1.48)	(0.83)

Note: standard errors in parentheses.

Low caste includes all Scheduled Castes as classified by the Government of India. High caste includes all other castes.

Child mortality is measured as the ratio of under-5 deaths to the number of children ever born.

Schooling is measured in years. Percent holding skilled job is computed using employed individuals only.

* denotes rejection of the equality of means at the 5 percent significance level.

Table 2

Caste and Health in the Tea Estates

Individual:	**female respondent**		**husband**	
Caste:	**low**	**high**	**low**	**high**
	(1)	**(2)**	**(3)**	**(4)**
Child mortality	0.055	0.055	--	--
	(0.003)	(0.004)		
Number of children ever born	2.99	2.99	--	--
	(0.02)	(0.03)		
Age	38.46	38.34	41.90	41.92
	(0.16)	(0.24)	(0.17)	(0.26)
Schooling	3.84	3.34*	5.97	5.56*
	(0.07)	(0.09)	(0.06)	(0.09)
Income	21.46	21.43	18.58	19.02
	(0.09)	(0.13)	(0.19)	(0.28)

Note: standard errors in parentheses.

Low castes refers to former slave castes - Pallars and Paraiyars. High castes include all other *jatis*.

Child mortality is measured as the ratio of under-5 deaths to the number of children ever born.

Schooling is measured in years. Annual income is measured in thousands of Rupees.

* denotes rejection of the equality of means at the 5 percent significance level.

Table 3

Illness Incidence

Descriptive statistics:	**Percentage**	
Caste:	**low**	**high**
	(1)	**(2)**
Time of last illness		
Last week	14.48	14.65
Last month	23.17	24.22
Last 3 months	19.28	20.65
Last 6 months	16.32	14.19
Last year	11.20	9.46
More than one year	15.55	16.84
Treated	98.57	97.79
	(0.003)	(0.005)

Note: standard errors in parentheses.

Sample restricted to children age 15 and under residing at home.

Low caste refers to former slave castes - Pallars and Paraiyars. High caste includes all other *jatis*.

Decision to treat is not siginificantly different by caste at the 5 percent level.

Table 4

Type of Illness

Descriptive statistics:	**Means/ Proportions**	
Type of illness:	**routine**	**non-routine**
	(1)	**(2)**
Panel A: Child's characteristics		
Age	8.27*	8.94*
	(0.09)	(0.17)
Boy	0.51	0.51
	(0.01)	(0.02)
Panel B: Household characteristics		
Mother's schooling	4.56	4.42
	(0.07)	(0.13)
Father's schooling	6.29	6.13
	(0.06)	(0.13)
Household income	39.40	38.95
	(0.18)	(0.36)
Panel C: Network characteristics		
High caste household	0.31	0.31
	(0.01)	(0.02)
Distance to origin	3.62	3.56
	(0.03)	(0.07)

Note: standard errors in parentheses.

Sample restricted to children age 15 and under residing at home.

Schooling is measured in years. Income is measured in thousands of Rupees per year.

Low caste refers to former slave castes - Pallars and Paraiyars. High caste includes all other *jatis*.

Distance to origin location by road is measured in hundreds of km.

Illness Classification:

A. Routine

1. Cough and throat infection: cough, sinus, throat pain, throat infection, tonsils
2. Headache and fever: fever, infection, headache, loss of appetite
3. Injury and accident: injury, leg injury, accident, bee sting, hand injury, dog bite, glass cut, head injury, hip injury, spider bite, bleeding, toe nail, hemorrhoids
4. ENT: ear pain, tooth pain, ear infection, eye problem, nose pain

B. Non-Routine

1. Gastrointestinal: diarrhoea, vomitting, dehydration, dysentary
2. Respiratory: respiratory, breathing problem, chest pain, nose bleed, asthma
3. Typhoid and jaundice: low weight, typhoid, jaundice
4. Childhood diseases: mumps, measles, chicken pox
5. Fits: epilepsy, fits, mental
6. Tumors and operations: appendix, stroke, ear operation, head tumor, child birth, heart operation, hip operation, kidney problem, leg tumor, neck tumor, chest operation, operation, heart pain, leg operation, nose operation, jaw operation, stomach operation, throat tumor, throat operation, tumor, stomach tumor, urinary problem
7. Pain: leg pain, back pain, body pain, finger pain, leg and hand pain, neck pain, stone pain, stomach pain
8. Skin conditions: allergy, boils, skin problem
9. Chronic conditions: anemia, blood pressure, giddiness, diabetes, ulcer, deaf

* denotes rejection of the equality of means at the 5 percent significance level.

Table 5

Illness Treatment

Descriptive statistics:	**Means/ Proportions**					
Type of illness:	**routine**	**non-routine**	**routine**		**non-routine**	
Sample:	**full**		**low castes**	**high castes**	**low castes**	**high castes**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Panel A: First treatment						
Outside	0.12	0.17*	0.12	0.12	0.17	0.17
	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.03)
Log-cost	0.88	1.38*	0.85	0.94	1.43	1.25
	(0.04)	(0.11)	(0.05)	(0.08)	(0.14)	(0.20)
Went for second treatment	0.13	0.23*	0.13	0.12	0.25	0.19
	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.03)
Panel B: First and second treatment						
Outside	0.19	0.28*	0.19	0.18	0.32	0.21*
	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.03)
Log-cost	1.23	1.99*	1.22	1.26	2.20	1.48*
	(0.05)	(0.13)	(0.06)	(0.09)	(0.16)	(0.21)

Note: Standard errors in parentheses.

Routine and non-routine illnesses were defined in Table 4.

Low caste refers to former slave castes - Pallars and Paraiyars. High caste includes all other *jatis*.

Treatment outside = 1 if the child is sent to the private clinic, the government hospital, or the traditional healer, 0 otherwise.

Cost of treatment is measured in Rupees.

Treatment statistic in Panel B indicates whether the child was ever sent outside.

Cost statistic in Panel B is based on total expenditures over both rounds of treatment.

Sample restricted to children age 15 and under residing at home.

* denotes rejection of the equality of means at the 5 percent significance level.

Table 6

Treatment by Caste

Dependent variable:	**treatment outside**		**log-cost**		**treatment outside**		**log-cost**	
Type of illness:	**routine**	**non-routine**	**routine**	**non-routine**	**routine**	**non-routine**	**routine**	**non-routine**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
High caste	−0.017	−0.105	0.022	−0.713	−0.007	−0.118	0.058	−0.760
	(0.015)	(0.030)	(0.091)	(0.150)	(0.015)	(0.031)	(0.095)	(0.148)
Age	0.004	0.001	0.045	0.038	0.006	−0.001	0.058	0.040
	(0.002)	(0.004)	(0.015)	(0.027)	(0.002)	(0.004)	(0.012)	(0.029)
Boy	−0.032	−0.021	−0.098	−0.117	−0.038	−0.015	−0.123	−0.108
	(0.009)	(0.018)	(0.094)	(0.252)	(0.011)	(0.018)	(0.092)	(0.243)
Mother's schooling	--	--	--	--	0.010	−0.006	0.050	−0.030
					(0.003)	(0.003)	(0.018)	(0.031)
Father's schooling	--	--	--	--	−0.007	0.011	−0.019	0.076
					(0.003)	(0.005)	(0.008)	(0.026)
Mother first generation	--	--	--	--	−0.031	−0.068	0.032	−0.394
					(0.026)	(0.042)	(0.134)	(0.234)
Father first generation	--	--	--	--	−0.067	0.095	−0.366	0.364
					(0.018)	(0.052)	(0.165)	(0.328)
Constant	0.174	0.327	0.895	1.935	0.163	0.297	0.726	1.614
	(0.017)	(0.029)	(0.137)	(0.154)	(0.029)	(0.043)	(0.092)	(0.295)
Number of observations	2,172	580	1,936	523	2,153	575	1,920	518

Note: Standard errors in parentheses. Standard errors are robust to heteroscedasticity and clustered residuals within each *jati*.

Treatment outside = 1 if the child is sent to the private clinic, the government hospital, or the traditional healer, 0 otherwise.

Cost of treatment is measured in Rupees.

Routine and non-routine illnesses were defined in Table 4.

Low caste refers to former slave castes - Pallars and Paraiyars. High caste includes all other *jatis*.

Sample restricted to children age 15 and under residing at home.

Decline in observations in Columns 3-8 is due to missing values for some of the regressors.

Table 7

Treatment by Caste (Sequential Logit Regression)

Type of illness:	**routine**					**non-routine**				
Treatment round:	**round 1**	**round 2 (round 1=in)**		**round 2 (round 1=out)**		**round 1**	**round 2 (round 1=in)**		**round 2 (round 1=out)**	
Treatment choice:	**out**	**in**	**out**	**in**	**out**	**out**	**in**	**out**	**in**	**out**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
High caste	−0.005	0.108	−0.271	−0.848	0.479	−0.024	0.191	−1.382	0.323	0.799
	(0.141)	(0.155)	(0.105)	(1.300)	(0.446)	(0.188)	(0.165)	(0.410)	(0.638)	(0.561)
Age	0.049	−0.018	−0.018	0.088	0.012	0.001	0.036	0.005	0.065	0.011
	(0.016)	(0.018)	(0.008)	(0.054)	(0.050)	(0.034)	(0.023)	(0.011)	(0.116)	(0.049)
Boy	−0.084	0.084	−0.384	−0.671	0.260	0.079	−0.085	−0.314	−0.052	0.138
	(0.073)	(0.147)	(0.149)	(0.365)	(0.327)	(0.194)	(0.363)	(0.165)	(0.835)	(0.775)
Number of observations	2,169	1,901	1,901	268	268	580	480	480	100	100

Note: Standard errors in parentheses. Standard errors are robust to heteroscedasticity and clustered residuals within each *jati*.

Treatment choices: out = 1 if the child is sent to the private clinic, the government hospital, or the traditional healer, in=1 otherwise.

Round 1 is estimated as a logit model with out=1 and in=0. Round 2 is estimated as a multinomial model with no treatment as the comparison group.

Routine and non-routine illnesses were defined in Table 4.

Low caste refers to former slave castes - Pallars and Paraiyars. High caste includes all other *jatis*.

Sample restricted to children age 15 and under residing at home.

Table 8

Treatment by Caste and Gender

Dependent variable:	**treatment outside**				**log-cost**			
Type of illness:	**routine**		**non-routine**		**routine**		**non-routine**	
Caste:	**low**	**high**	**low**	**high**	**low**	**high**	**low**	**high**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Boy	−0.032	−0.031	−0.026	−0.003	−0.101	−0.091	−0.086	−0.152
	(0.007)	(0.026)	(0.022)	(0.053)	(0.143)	(0.202)	(0.456)	(0.326)
Age	0.002	0.008	0.003	−0.007	0.051	0.034	0.059	−0.014
	(0.0003)	(0.003)	(0.006)	(0.005)	(0.028)	(0.014)	(0.038)	(0.048)
Constant	0.189	0.127	0.304	0.276	0.852	1.010	1.734	1.688
	(0.012)	(0.031)	(0.042)	(0.066)	(0.268)	(0.193)	(0.011)	(0.316)
Number of observations	1,507	665	404	176	1,337	599	367	156

Note: Standard errors in parentheses. Standard errors are robust to heteroscedasticity and clustered residuals within each *jati*.

Treatment outside = 1 if the child is sent to the private clinic, the government hospital, or the traditional healer, 0 otherwise.

Cost of treatment is measured in Rupees.

Routine and non-routine illnesses were defined in Table 4.

Low caste refers to former slave castes - Pallars and Paraiyars. High caste includes all other *jatis*.

Sample restricted to children age 15 and under residing at home.

Table 9

Children's Marriage, Residential Location and Education

Gender:	**male**		**female**	
Caste:	**low**	**high**	**low**	**high**
	(1)	**(2)**	**(3)**	**(4)**
Married within *jati*	0.87	0.86	0.93	0.89*
	(0.02)	(0.02)	(0.01)	(0.01)
Married to relative	0.40	0.56*	0.48	0.57*
	(0.02)	(0.03)	(0.02)	(0.02)
Resides in ancestral location	0.28	0.36*	0.28	0.39*
	(0.02)	(0.03)	(0.01)	(0.02)
Schooling	9.47	9.32	9.36	8.82*
	(0.06)	(0.09)	(0.07)	(0.09)

Note: standard errors in parentheses.

Low caste refers to former slave castes - Pallars and Paraiyars. High castes includes all other *jatis*.

Marriage statistics are computed for married children aged 16-45.

Residential location is computed for children aged 16-45 who have left the parental home.

Schooling is measured in years for children aged 16-45.

* denotes rejection of the equality of means at the 5 percent significance level.

Table 10

Treatment by Distance to Origin

Dependent variable:	treatment outside		log-cost	
Type of illness:	routine	non-routine	routine	non-routine
	(1)	(2)	(3)	(4)
Log-distance	0.028	0.042	0.188	0.386
	(0.030)	(0.014)	(0.090)	(0.221)
Age	0.004	0.001	0.045	0.039
	(0.003)	(0.003)	(0.015)	(0.031)
Boy	−0.028	−0.032	−0.048	−0.084
	(0.010)	(0.023)	(0.042)	(0.208)
Constant	0.006	0.056	−0.181	−0.534
	(0.169)	(0.084)	(0.572)	(1.320)
Number of observations	2,141	577	1,913	520

Note: Standard errors in parentheses are robust to heteroscedasticity and clustered residuals within each *jati*.

Treatment outside = 1 if the child is sent to the private clinic, the government hospital, or the traditional healer, 0 otherwise.

Cost of treatment is measured in Rupees.

Routine and non-routine illnesses were defined in Table 4.

Distance to origin location by road is measured in km.

All regressions include a full set of *jati* dummies and a dummy for urban locations around Chennai.

Sample restricted to children age 15 and under residing at home.

Decline in observations from Table 5 is due to missing distance values.