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## The Changing Status of Daughters in Indonesia

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**Abstract:** In many nations, parents exhibit a variety of behaviors that favor sons over daughters. In this paper we provide evidence suggesting that in Indonesia there is no problem of “missing daughters” and that patterns of births, birth spacing and nutrition allocations do not suggest son preference during the cohorts born from 1940’s to the 1990’s. In contrast, gender differences in educational attainment and inheritance were quite prevalent in the recent past. These gaps have narrowed for secondary education and inheritance, and disappeared for primary education.

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Son preference influences parental decisions and child outcomes in many parts of the world. These outcomes range from the sex composition of the family and the spacing of births to the resources devoted to children of different sexes. In South and East Asia, perhaps 80 million young women are "missing" because they have been aborted, killed or neglected; that is, the proportion of young men alive is much higher than would be expected to occur under normal chances of survival with equal access to health care (Bardhan and Klasen 1999). At the same time, the publicity devoted to missing girls obscures considerable variation in the treatment of daughters across Asia and over time (Banister 1999).

This paper offers a comprehensive view of the relative treatment of daughters in Indonesia, using the 1993 and 1997 waves of the Indonesia Family Life Survey (IFLS). We examine multiple measures of son preference and the status of girls more generally. We study several birth cohorts to understand the evolution of practice in recent decades. The measures we study capture the actions parents, siblings and others take (often encouraged by customs, laws, or economic incentives) that favor sons over daughters.

An anthropological literature has examined the treatment of daughters in many villages, towns, and regions of Indonesia. We complement that location-specific research with statistical analyses covering a representative sample of most of the archipelago. We also complement and extend the extensive statistical research on son preference in other nations in three ways. First, we examine Indonesia, the most populous Muslim nation in the world and one that has received less attention than other large nations such as China, India, and Pakistan. Second, most past studies examine a single dimension of son preference (e.g., for a thorough study of differential bargaining power and child health, see Thomas, Conterras, and Frankenberg 1999). In contrast, we examine multiple indicators ranging from birth patterns to education to inheritance.<sup>1</sup> This approach is important because in many cultures the many indicators of adult gender discrimination and unequal status are only weakly correlated among themselves (Devi 1993; Whyte 1978).

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<sup>1</sup> We do not report some measures of the relative treatment of daughters, such as probability of receiving health care given symptoms of illness, because of the absence of retrospective data.

Finally, most studies examine only a single time period. In contrast, we examine the evolution the treatment of daughters over several generations.

There is no “missing girls” problem in Indonesia at present, or much evidence that son preference has affected the size and sex composition of families in the present, and only modest effects seem to have been present in the past. Furthermore, there is little evidence of discriminatory allocations of nutrition. Discriminatory educational treatment was present in the past, but has largely disappeared at the primary level, and narrowed considerably at the secondary level. Inheritance patterns also strongly favored sons in the past, and much less so by the 1990s.

These findings accord with much of the received understanding of son preference in Indonesia (e.g., Atkinson and Errington 1990; Banister 1999; Central Bureau of Statistics 1978; Dube 1997). But other researchers have not highlighted the importance of the Indonesian experience. The absence of son preference shows that societies can have distinct patterns of age-dependent gender outcomes; girls may be treated as well as boys, but women face substantial discrimination. In Indonesia discrimination and unequal treatment of adult women is well established; for example, 93 percent of managers of formal enterprises are male (higher than the average for nations with similar incomes), and over 98 percent of village heads are male (Sullivan 1994). How does equal treatment of boys and girls become unequal treatment of women and men? Our results suggest the need for more careful exploration of the mechanisms that determine son preference and gendered economic behavior more generally. In future work we will explore the extent to which government policies and exogenous economic changes were responsible for reducing gender inequality in education.

Moreover, if son preference is so prevalent in many regions of South and East Asia, why is the Indonesian experience (and that of other countries without son preference) different? Economists are often reluctant to discuss the origins of preferences, but clearly this is an important item that should be included on the research agenda. Are other countries such as Thailand and Sri Lanka where son preference is apparently absent in terms of sex composition of families (Abeykoon 1995; Wongboonsin and Ruffolo

1995), also gender-neutral in terms of resource allocations? Cross-national analyses are especially important in view of recent interest in gender equality as a determinant, as well as consequence, of economic growth.

Finally, much of the received understanding of the absence of son preference in Indonesia stems from work done on early census results, showing normal sex ratios. But the spread of contraception throughout the archipelago after the 1970s may have led to the emergence of demographic effects of a latent son preference. Once parents were able to more easily control their fertility, their preferences may have been more visible. It is important, therefore, to update the older studies with more recent data. We find that even with extensive contraception availability and use, there is still no manifestation of son preference in the demographic data.

Because son preference can take on many forms, we examine its several possible facets in turn. We start with a brief review of the anthropological literature on son preference in Indonesia, and then describe the IFLS dataset and the methods we use. The following sections present evidence on “missing girls;” provide tests of whether parents spaced births to obtain a desired number of sons; and examine whether sons received preferences in nutrition, education and inheritance. We conclude with cautions, implications, and recommendations for future research.

### **The Setting: Son Preference and the Status of Girls and Women in Indonesia**

Indonesia is the fourth most populous country in the world with tremendous cultural and economic diversity. From the end of the 1960s until the 1997 financial crisis, real per annual capita GDP growth rate was an impressive 3.9%. Even after this growth, per capita incomes were still only \$US 880 per year in 1996 (Asian Development Bank, 1997). During this period Indonesia had also seen remarkable improvements in health status (World Bank, 1993). Between 1960 and 1990 life expectancy at birth increased by 24 percent to 59 years and child mortality decreased 68 percent to 111 per thousand.

Partly because of this enormous diversity and change, anthropologists and sociologists have disagreed, sometimes quite sharply, on the appropriate characterization of daughters' status and that of women in general in Indonesia. Part of the disagreement stems from generalizing over the archipelago of more than 13,000 islands, and over the time period of the second half of the twentieth century, during which Indonesia has undergone rapid urbanization and industrialization.

There is considerable anthropological evidence, and debate, over the subordinate status of women, but much less discussion regarding son preference. The few observations we have been able to locate offer ambiguous assessments of the extent of son preference. Mulatsih (1994), for example, reported that women in three remote villages in East Kalimantan commonly thought that as a mother, a woman's job was to look after and socialize her children, especially socializing girls to follow in their footsteps as wives, homemakers, and mothers. In addition, she found that while men in the villages preferred to have boys rather than girls as children, women aspired to have both girls and boys. Sons gave women in the village prestige while their daughters would help them in the household.

On the status of women, the literature is considerable, and deals with many of the ethnic groups of Indonesia. Ihromi (1994), for example, notes that among the Toba Batak, "Daughters are married off to members of other lineages... and because their welfare is the responsibility of the men of those lineages, daughters do not inherit valuable goods." But Ihromi goes on to note that attitudes have changed rapidly; Batak people "no longer think that investing in a daughter's education is a waste" (1994:536).

In regards to Bali, while many writers have portrayed gender relations as relatively equitable, Parker (1997 p. 501) argues that:

... Balinese society is gendered and patriarchal. Some of the quotidian practices which, in combination, lead me to this conclusion are the patrilineal kinship system and the belief in reincarnation within patriline; virilocal residence patterns after marriage; inheritance customs under which women inherit nothing but their personal possessions; the practice of divorced men having custody of children; the practice of polygyny; control of women's physical mobility, particularly at night; and a version of the caste system which employs an ideology of subordinates' impurity, thus bolstering the superordinate position of men. In addition, local government (in the hamlet) is a matter for married men; and political leadership and structures of public and private authority, in local government, descent-groups and within families, allow men to control women.

Similar controversies exist in portraying gender relations among the ethnic Javanese, who make up roughly half the nation's population. In her study of family life in Java, Geertz (1961 p 128) made two contradictory observations on a single page. She noted, "The potential or actual participation of the wife in all aspects of the economic endeavor gives her a freedom and bargaining strength equal to that of her husband." But earlier on the same page she noted, "The father of the family traditionally receives better food and dresses better than the rest of the family. It is for him the one piece of meat is saved." Thus, it is not clear that men and women were equal in the city she studied.

While Geertz unwittingly pointed out a common discrepancy between her theory of equality and less-than-equal practice, the more common discrepancy posits male dominance in theory, if not always in practice. That is, according to many anthropologists, Javanese culture traditionally granted the father almost complete rights of control in the household. Yet the social requirements for Javanese men to communicate politely, coupled with the control women traditionally have over household finances, were thought to leave Javanese women with considerable de facto powers (Geertz 1961; Sullivan 1994).

Disagreements over the status of women at the national level likewise emanate from differences between rhetoric and reality in Indonesia (Sunundyo, 1998). For example, the constitution of Indonesia promises equal protection to all citizens (Blackburn 1999), but the structure of Indonesian local government is almost entirely handled by men. Showing how institutionalized these gender roles are, in each region leadership of the mass women's organization (PKK) was given to the wife of the most important local official (Wieringa 1992). Moreover, both government policy and rhetoric over the period of Suharto's regime, known as the New Order (1965-1997), consistently emphasized women's place in the home.

At the same time, some government policies were gender neutral on their face, but had disparate impact that favored girls and promoted equality. For instance, given that female enrollment was less than



male enrollment in 1970, the policy of achieving universal enrollment in the 1970s increased the relative education of women.

To take another example, Islam, the religion of 90% of the population, is interpreted by some as egalitarian and by others as patriarchal. The seemingly straightforward Islamic inheritance rule prescribing a 2:1 ratio for boys versus girls is obviously unequal; at this same time, it is less unfavorable to daughters than the tradition in some regions where all inheritances went to sons. Nor is Islam static; for example, since the 1980s more formalistic and Mideast-influenced versions of Islam have spread in popularity, bringing with them a more constraining view of the role of women and girls in society.

The disagreements among anthropologists and sociologists highlight the important role of sample surveys and statistical analysis in determining the nature, extent, and causes of bias against girls and women in Indonesia.

## **Data and Methods**

The data used in this analysis come from the 1993 and 1997 waves of the Indonesia Family Life Survey (IFLS) (Frankenberg and others 1995; and Frankenberg and Thomas, 1997). This panel survey has information on individuals in approximately 7224 households distributed in several hundred villages or neighborhoods.

The IFLS is a representative sample of 83% of the population in late 1993, covering 13 of 27 provinces in the country. Small provinces and politically unstable provinces such as Irian Jaya and the former East Timor were not sampled. After stratifying by urban and rural areas, households were randomly selected in 321 enumeration areas. Within households different members were interviewed according to various selection criteria to ensure adequate numbers of older respondents.

For most of the different facets of potential son preference, we analyzed three groups of individuals. Results were almost always consistent across samples; thus, we typically only report results from one or two of the samples.

The first sample consists of the household heads, their spouses, and their siblings. This group gives us family sex composition and other demographic information going back to the cohort born in the 1940s. These data must, of course, be treated with some caution. The ‘families’ for which we have data on are ones where a child grew up to become head of a household or the spouse of a household head, and survived to 1993. More worrisome is that the adults responded to questionnaires regarding their own schooling and biological siblings, but only reported data on siblings currently alive or deceased in the past year, and not on the deceased siblings who may have been present during their childhoods. Thus, for older respondents the number of siblings is much more likely to be significantly lower than for relatively younger adults. Indeed, the frequency in household rosters of adults over 60 declines rapidly.

The second sample consists of children of ever-married mothers, as reported in a retrospective pregnancy history for all women aged 15-49 in the sample households. With this retrospective history, we are able to reconstruct sex composition of families and other demographic information at different times.

The third group uses the roster of children and adults present in households in 1993. From this roster we constructed both children residing in the household (regardless of biological parents) and biological children of the household head (regardless of residence). We use the ‘residential’ sample to report on differential allocations of nutrition and health care (captured by height-for-age), education, and inheritances, because only persons residing in the household were measured for height and weight and asked about education and inheritances. We do not report demographic results for these families, because they are virtually identical to the results from the families of ever-married mothers.

The first two samples are based on a biological conception of family, while the third group analyzes a residence-based household. For demographic outcomes the former seems more appropriate, while for resource allocation outcomes the latter is perhaps more appropriate.

There are two sets of tests for son preference in intra-household resource allocation. The first set compares mean outcomes for sons and daughters. We examine a panoply of outcomes including births, mortality, number of siblings, likelihood of being youngest child, intervals after birth to birth of next child,

height, and education attainment. We rely on simple comparisons of unadjusted means whenever possible. Statistically significant differences in means are marked with asterisks.

The second set of tests looks for competition from siblings (Garg and Morduch 1998). Intuitively, if parents invest more in sons or if brothers are more successful competitors for scarce family resources, then children will have better outcomes if their siblings are sisters, not brothers. We present regression results testing if, after controlling for family size, the proportion of siblings who are brothers affects an individual's education and height. (Having brothers might increase the share of resources going to children generally; see Butcher and Case (1994), Kaestner (1997) and Hauser and Kuo (1998) for the mixed U.S. evidence.).

No single paper or dataset could capture the behavior of the entire population of Indonesia. Surveyed provinces contain vast heterogeneity, and our results reporting average behavior do not capture the differential experience of regions and ethnic groups. For many of the tests of differences in means, we also ran regressions with controls for family demographic characteristics, dominant local ethnic groups, dominant local marriage norm (virilocal, uxorilocal or ambilocal), and region. These controls almost never affected results. We leave a discussion of these preliminary results for Appendix 2 on regional and ethnic variation. A more complete analysis of variation within Indonesia is left for another paper.

One further source of evidence we use is a unique survey of attitudes carried out in the 1997 IFLS. This survey asked one respected elder in each of 270 of the enumeration areas about *adat*, local norms and traditional law. These local norms stand in contrast to the formal laws of the nation-state. In many parts of Indonesia the state is far removed, and *adat* norms bind and guide behavior. The *adat* questionnaire consisted of approximately ninety questions related to customs concerning gender. Each respondent was asked to state whether the custom held in traditional law and whether it was common practice at the time of the 1997 interview. Responses to each question have been recoded as zero if the custom favored girls or women (rarely the case) or was neutral (more common), and one if the custom favored boys or men. Appendix 1 discusses the results of this survey, and Table A1 gives the average values for the more

relevant questions. We will refer to the results for different measures of son preference in the relevant sections below. Note that while the received wisdom regarding the status of women in Indonesia is that gender status is much more equitable than in many other societies, the *adat* responses suggest that there are many areas in Indonesia where unequal treatment has been regarded as the norm.

### **Son preference and “missing girls”**

As in much of Asia, very strong preferences for sons in Indonesia might result in a skewed sex composition of the family. This might happen through infanticide and through relative neglect of girls in health and nutrition leading higher rates of female than male mortality during childhood. In Korea and China, sex-selective abortions following ultrasound or amniocentesis appear to reduce the number of daughters in the 1990s (Cho and Kim 1994; Coale and Banister 1994; Hong 1994). In Indonesia, the techniques were probably familiar to and affordable to only a tiny portion of parents during the period covered by our data.

The *adat* survey suggests that son preference was present in the past in about half the nation and has declined in many regions. Slightly less than half of the *adat* respondents thought that families preferred to have their first child be a boy in the past, while less than one-third thought that was the case in the present (Table A1). There was also a large decline in the pressure to have sons more generally. Interestingly, the “no pressure to have female child” response also increased; as families began to have smaller families, they were apparently increasingly content to have only sons. In addition, if a family were going to adopt, the likelihood that they would adopt boys increased rather than decreased.

The data presented in Table 1, on the sex ratio of children of various ages using a variety of samples, indicates there was, in fact, no measurable son preference. Given the biological norm of 1.05 boys born for every girl, an initial ratio of 51.2% would be expected. Higher mortality of girls would lead

to an increase in the percentage of boys. There appears to be no pattern of excess female mortality.<sup>2</sup> The first three columns use the pregnancy histories of 4890 ever-married women to count the number of boys and girls that survived in each age group at three points in time (1973, 1983, and 1993). The fourth column uses the pregnancy history administered to women in the second wave of the IFLS in 1997. In only one case out of twenty-one is the number of girls in an age group at a particular point in time statistically significantly less than the number of boys (3 year olds in 1993). Having one in 21 tests be statistically significant at the 5% level is almost exactly the rate predicted by mere chance. These results held for the sample of biological children of household heads, and for the sample of all children present in households regardless of their biological status. The data were also broken down according to urban or rural residence, with no differences.

Table 2 checks this finding by using the detailed pregnancy histories to find the sex ratio of children who died between 1970 and 1993. There is no evidence of higher mortality for daughters, and for infants the normal higher mortality for boys was evident.<sup>3</sup> These findings are consistent with larger scale findings, such as those reported in United Nations (2000, pp.158-63), that also find no disadvantages for Indonesian girls in patterns of infant or child mortality from the 1970's to the 1990's. Note that the most important feature of the table is the apparent decline in excess infant deaths for boys, from .63 to .56 of all infant deaths, over the twenty-year period. Results from this sample must be treated with caution, as many women from these birth cohorts were no longer living in 1993.

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2 This finding of no differential births or mortality in the past was further confirmed in data from a short pregnancy history form administered to older women over 50. Of these 2,423 women who had given birth to a child, the gender ratios of births and deaths were also basically 50:50.

3 Hill and Upchurch (1995) and (Klasen 1999) note that mortality rates should normalize for the known higher propensity of boy children to suffer excess mortality over girls. The bounds for the 95% confidence intervals for the mortality ratios found in Table 3 include the estimates of normal excess boy mortality presented in Klasen's Table 1, except for the 1960s cohort, where the Indonesia data display slightly lower female mortality than would be expected. The finding of no son preference is therefore quite robust. Hill and Upchurch do find that the Demographic and Health surveys show a slight female disadvantage in mortality in Indonesia, compared with a normal standard. But out of 34 developing countries, 24 have more disadvantage than Indonesia, and Middle Eastern countries and Pakistan have disadvantages three times the level of Indonesia's.

Increasing our confidence in these results, Martin, et al. (1983) analyze the 1976 World Fertility Survey for Indonesia. They also find the slightly higher child mortality for sons than for daughters that appears in nations without strong son preference. More generally, inspection of Census figures show similar counts of males and female children.

### **Son preference and the sex composition of families**

When parents prefer sons, then they are more likely to keep having children after the birth of a daughter or when their first children are largely daughters. In the extreme case of parents with a target number of sons, they will always try to have another child when the most recent child is a daughter. This logic suggests the proportion of families with completed fertility whose youngest child is a son should be higher than the proportion with a youngest child who is a daughter. In addition, girls should be more likely to be members of bigger households. Finally, when parents can affect birth timing, the spacing of births after a son should be longer. (For a review of these ‘optimal stopping’ hypotheses, see Clark 2000.)

Two qualifications limit the generality of these implications. First, many parents in Indonesia report a desire to have at least one daughter. This desire is particularly important in the few matrilineal regions, and in the larger number of regions where elderly parents traditionally live with a daughter and her family (Cameron 2000). Thus, we repeat all tests of son preference for families with at least one daughter, and look for daughter preference in families with only sons.

Second, even when son preference is prevalent, it may not show up in patterns of fertility if parents cannot easily control their fertility. When contraception use is rare, even areas where attitude surveys detect very high son preference often do not exhibit son preference in birth spacing or family size. When contraceptive use becomes more common, fertility patterns then often change in ways consistent with son preference (Rahman and DaVanzo 1993).

In Indonesia, contraceptive use was very low in the 1970s, and rather high in the 1990s. Only 20% of women responding to the IFLS 1993 questionnaire who were born in the period 1944-53 had

started using contraceptives when they were under 25 years old. In contrast, 50% of women born in the period 1954-63 started when they were under 25, and a full 86% of women born in the period 1964-73 had already started using contraceptives when they were under 25 (and this number would be expected to rise, as some of the women not using contraceptives were still under 25).

In any case, there is no evidence in the IFLS data supporting the three hypotheses about “optimal stopping” behavior. We first look at whether it was more likely that the last child of a family that had completed its fertility was a boy. Table 3 reports this statistic over six decades, from the 1940s to the 1990s. Only one of the cohorts has a percentage different from .50, and that only at the 10% level of significance, and it is the 1990s cohort in the sample where mothers indicated they had completed their fertility. These were younger mothers whose fertility had probably not ended for sure, even though they had indicated a desire not to have more children (especially considering that the average interval between births was on the order of 3.5 years). It may be that young mothers having boys were more likely to say that they had attained their desired family size, but in fact did not typically stop. (Recall moreover that the chance of having a boy is actually slightly higher than the chance of having a girl, so the test of equality of boys and girls is actually more generous than the correct test.) For the sample of ever-married mothers, there was no correlation between the sex of the youngest child and current contraception use (not shown).

We next look at whether there is a tendency for larger families to be composed of more girls, as “unlucky” parents who prefer sons continue to have children. Table 4 shows that, again, over the decades from the 1940’s to the 1990’s only one ratio of the size of family for boys over the size of family for girls is significantly different from one, and in the wrong direction (boys are more likely to live in larger families). None of the cohorts from the sample of children of ever-married mothers have ratios different from one.<sup>4</sup>

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4. In a separate table (available upon request), we find that there is no tendency for the percent of boys to decline as family sizes get larger, a fundamental implication of son preference, given the small size of Indonesian families overall.

Spacing between children is also basically the same for boys and girls at present, but seems to have been slightly skewed in the distant past. In table 5 we consider the intervals in years that follow the birth of a boy until the birth of the next child, compared with the intervals that follow the birth of a girl. We present the ratios of these intervals, again for cohorts where the older child was born in the decade indicated (from the 1940s to the 1990s). We calculate the ratio for several different intervals: first, all the intervals following a child; second, the intervals following children when there is at least one girl older sibling, not including the child just born herself (because in many parts of Indonesia elderly parents reside with a daughter, the anthropological literature suggests that son preference may be stronger when the family has at least one daughter); third, the intervals following a second child, if the first child is a boy (that is, are intervals longer after boy-boy combinations than girl-boy/girl combinations); and fourth, the intervals following a second child when the first child is a girl. (In the interest of saving space, we do not present the latter two sets of intervals.)

For the sample of children of ever-married mothers, we omitted intervals where the older child died prior to the conception of the new child, and so the next child was plausibly a ‘replacement’ for the previous child who died. Including these intervals (5.8% of all intervals) did not substantively alter the main results. But they do indicate some son preference for the earlier cohorts (1960s through the 1980s): compared with daughters, the intervals between the birth of a son and the next child are quite a bit shorter in cases where the son dies before conception of the following child. Parents did seem to hurry to replace sons.

For the childhood families of adults, the mean interval across the entire sample of intervals is of 3.4 years, identical to the intervals for the younger cohorts. (Actually, the mean interval falls from around 4.0 years for children in the 1940s to 3.0 years for the 1970s, partly due to the deaths of siblings meaning intervals getting miscounted because they are no longer anchoring separate intervals.)

The ratios of intervals are sometimes statistically different from one, but in ambiguous directions. For the earlier generations the intervals are longer following the birth of a boy, consistent with son



preference, but for the 1970s cohort the intervals are considerably shorter following a boy. The intervals following boys when there was at least one girl present were typically slightly lower than the overall intervals. Overall, we are left with an ambiguous result. In any case, the differences in mean intervals are fairly small, with the largest difference is on the order of six months. That suggests looking at the median intervals. Looking at median intervals has the additional advantage of being able to include the intervals after the last birth, by coding them as large intervals. Here we find that for all of the adult cohorts the median intervals are the same following a boy as for those following a girl (for the adults we only have year of birth and not month of birth, so intervals are whole numbers). For the more recent cohorts there is variation, but no pattern of differential spacing emerges.

As a caution, recall that the data on birth spacing for earlier generations rely on adults' reports of their siblings (and not on direct reports of their parents' fertility). In previous generations divorce rates were high in much of Indonesia, and families often formed and re-formed over time. In other parts of Indonesia, extended families were the norm, some with multiple wives and many with foster-siblings.

### **Son preference and nutritional status**

We have established above that there is not so much discrimination against daughters that they have experienced excess mortality or differential 'presence' in families. Nevertheless, allocations of resources to boys and girls may still be unequal.

We conduct three tests to examine the hypothesis of unequal nutritional allocation to sons and daughters. First, we examine the relative heights of adult males and females, because for adults height largely measures nutritional status as a child (Strauss and Thomas 1988). Second, we ask whether standardized height-for-age for children under 10 in 1993 were different for boys and girls. We standardize height-for-age using the NCHS/WHO reference norms calculated from a population of well-fed children. Specifically, we transformed each height observation into a z-scored height-for-age by subtracting the NCHS/WHO reference mean for each age and sex and dividing by the age- and sex-

specific NCHS/WHO reference standard deviation. Finding differences in these standardized measures is not necessarily indicative of unequal allocations, because children of different ethnic groups may follow different growth paths. At the same time, substantial evidence suggests that for young children, most differences in height-for-age is due to health, not genetic differences (for controversies on the use of the NCHS/WHO reference standards, see Klasen 2000). Third, in the section below on multivariate analysis, we examine whether children and adults who grew up in families with a higher proportion of male siblings were (controlling for family size) shorter on average.

Chart 1 presents the results of a smoothed estimate of the relationship between age and height, for men and women. (We use a lowess smoother, which computes a locally weighted polynomial regression at each age (StataCorp 1999).) As is apparent, there was no tendency for the gender differences in height to narrow for younger cohorts. We also calculated the ratio of median height of adult men to median height of adult women, for various age groups. There was virtually no change in the ratio from the first cohort (adults born in 1934-43) to the latest cohort (adults born in the 1970s); adult men remained about eight percent taller than women for all age groups. Note that this constancy is at odds with the implication of son preference, which is that as nutrition improves and both sexes grow taller, women would grow relatively taller and the gap would narrow.

Chart 2 graphs a smoothed estimate of the relation between z-scores of height-for-age for children under 10, using the NCHS/WHO reference values, and age. The chart shows that children in Indonesia in 1993 were considerably below the international norms (by almost two standard deviations).<sup>5</sup> Boys were farther below the norms than girls; again, we do not have evidence of son preference (these findings are consistent with those presented in Frankenberg, Surisatini, and Thomas 1996).

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<sup>5</sup> Six records with heights under ten centimeters (four inches) were discarded. The large differences in z-score between Indonesian children and the reference norm may be due to high incidence of infectious diseases, endemic malaria, and maternal stunting; such facts suggest environment, not genes, is responsible for much of the gaps in child anthropometrics. Indeed, restricting the sample of children to those from families with very high per capita expenditures reduces the gap by half; children in the very wealthiest families in the wealthiest enumeration areas had z-scores of around  $-1.00$ , instead of the overall average of  $-2.00$ .

Overall, unfavorable allocations of nutrition for girls do not appear to have been large in the past, and is absent in the present.

### **Son preference and education**

Matters are quite different when it comes to allocations of education. Indonesia's transition to near-universal primary education in the 1970s and 1980s was gender-neutral, implemented through an extensive program of school building and open access (Duflo 2000). Nevertheless, this policy had disparate impact that strongly favored groups with below-average education in 1970, including women.

In the past Indonesia had very wide disparities in enrollments and attainments between men and women. Chart 3 graphs the results of a smoothed (using a lowess smoother) estimate of the relation between educational attainment (years of schooling) and age. As can be seen, the large gap between older men and women narrowed and disappeared over the decades. For cohorts of men and women over age 50, men had roughly twice the education of women. In contrast, by the 1990s enrollment of young men and women was equal, and the gap in attainment was down to roughly one year for young adults in their 20s (see also Oey-Gardiner 1991).

These results are not unique to the IFLS. Data from the 1990 Census show an almost identical convergence in male and female rates of completing lower secondary school between those born in the 1920s and those born in the early 1970s (Knodel and Jones 1996). At the same time, Cameron (2000) find evidence of lingering unequal treatment of girls; when agricultural households were faced with negative shocks, they were more likely to withdraw 12-17 year old girls from school than boys.

### **Son preference and inheritance**

Inheritance is subject to a number of gender-related influences in Indonesia. First, as noted above, Muslim traditions and Islamic jurisprudence have sons inheriting twice the portions of daughters. In contrast, many local *adat* traditions continue to emphasize gender equality; for example, in the IFLS

survey about thirty percent of village elders reported exactly even divisions as traditional (rising to fifty percent of elders reporting equal division as current practice). Both sets of rules are often modified by the tradition that the child who cares for the parents inherits a larger share. In Java, where half of Indonesians live, the tradition is that the youngest daughter cares for the parents in their house, and then inherits the house. Generalization must be qualified by the enormous diversity of Indonesia. For instance, among the matrilineal Minangkabau, property traditionally passes from a mother to her daughters' families (Blackwood 1997; Whalley 1998).

With these thoughts in mind, we summarize in Table 6 inheritance patterns over time, focusing on respondents who have lost both parents.<sup>6</sup> Unlike the previous analyses, for the analysis of inheritance we stratify our sample based on the decade of the most recent death of a parent (as opposed to the age of the child). Thus, we are looking at trends in inheritances that took place in the 1950s, through the 1980-1993 period. The table presents the proportion of sons and daughters who have received any inheritance, and whether they received a house or land as inheritance. (Rupiah figures valuing inheritances were extremely problematic.)

The basic results are clear. Differences between sons and daughters are significant for the earliest decade, and not for the later decades. For people who lost their parents in the 1950s, sons were more likely to have a positive inheritance than were daughters (58 vs. 45 percent). Somewhat consistent with the Javanese custom of younger daughters inheriting the house, the gap in home inheritance was smaller in absolute terms, though the relative gap remained quite large. At the same time, consistent with gender discrimination, sons were far more likely to inherit land than were their sisters. The results on land inheritance are similar to the patterns Estudillo, et al., (1999) reported for the Philippines.

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<sup>6</sup> Unfortunately the quality of the inheritance data in the IFLS is not very good. Of adults aged 15 or over, 12,985 were interviewed about their parents. We consider in the table the 6883 adults where one parent had died and there was information about the age at death of both parents if they were both deceased. Roughly 40% of these adults reported inheriting something from their deceased parent(s), but only about 10% of these adults reported rupiah values of their inheritances.

These gaps declined over the next 40 years. By the 1980-1993 period, the gap in inheriting the family home disappeared and men were only 5 percentage points more likely to inherit land than were their sisters. Given that the absolute share of men who inherited land actually declined from 50 to 45 percent (presumably due in part to urbanization), it is remarkable that the proportion of daughters who inherited land rose from 29 to 40 percent. These results contrast sharply to the Philippines results, where the two-to-one advantage of sons over daughters in land inheritance remained from mid-century till the 1990s (Estudillo, Quisumbing, and Otsuka 1999).

Thus, consistent with the findings for education, Indonesia exhibited substantial gender discrimination in inheritance in the 1950s and 1960s, but the gender gap shrank markedly by the 1980s and 1990s. At the same time, economically and statistically significant gender gaps in inheritances remained at the end of our study period.

Our measures of inheritance leave off transfers to children while the parents were still alive. Thus, it is possible that the inheritance gap in favor of sons was counterbalanced by higher *in vivo* transfers to daughters. Similarly, the lower gender gap in inheritances in the 1960s and later periods than in the 1950s could be offset by lower gap in *in vivo* transfers. While we do not have data on past transfers, we do have some evidence on traditions of transfers from the *adat* survey. Here, traditions of dowries and bridewealth (transfers from groom's families to bride's families) showed no change over time (Table A1). Although amounts of such transfers may have lessened, this evidence makes it appear that lower gender differences in inheritances were probably not offset by changes in patterns of *in vivo* transfers.

### **The effects of a high proportion brothers**

In societies where sons receive large preferences, both sons and daughters will receive a greater share of the resources children receive if they have fewer brothers. The absence of differential birth rates or mortality enables us to use the percent of siblings who are boys as an exogenous determinant of family

decisions; that is, we can see whether children are better fed, better educated, or more likely to receive inheritances, if (given their number of siblings) more of the siblings are sisters.<sup>7</sup>

Garg and Morduch (1998) for example, find that both girls and boys in Ghana are substantially smaller if they have a high proportion of male siblings. The magnitude of this brother effect is quite large, they estimate that if children had all sisters (and no brothers) rather than all brothers, there would be 25-40% improvements in various health indicators.

We estimated basic regression models to determine if a higher proportion of brothers (for a given family size) reduced height, improved educational attainment, or increased the likelihood of inheritance. Standard errors take into account the clustering due to the complex survey design. Table 7 gives descriptive statistics for the variables included in the regressions. Explanatory variables fall into three categories: (1) demographic data on the person, such as age and gender; (2) number of siblings and percent of siblings who are brothers (for children we use the expansive definition of siblings as those in the household under 20, while for adults we use the siblings alive during the year of the survey), and birth order; (3) a number of family characteristics including schooling attainment of mother and father, age of mother (for children) or birth year of mother (for adults), whether person currently resides in urban or rural setting (we ignore the selectivity of migration), and whether person is Muslim. The control variables are also interacted with the gender of the person. We also experimented with numerous other versions of siblings, including younger siblings only, with little change in the basic results.

Table 8 gives the results for five regressions testing son preference by looking at whether the percent of siblings who are brothers affects outcomes. All of the regressions also include controls for province of residence (results not reported).

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<sup>7</sup> In general, sibling sex composition is only exogenous when controlling for family size because, as noted above, parents with son preference may keep having children if they have many daughters (Clark 2000). Only for populations as a whole is sex composition orthogonal to the total number of children. At the same time, as shown above, in Indonesia daughters do not on average live in larger families than do sons.

**Height for age:** We first look at nutritional outcomes, measured by height for age. Column 1 is for the sample of children under 10 with the dependent variable equal to z-scores for the NCHS/WHO (U.S.) standard. We have excluded children having heights more than five standard deviations away from the U.S. mean. Column 2 uses adult height as the dependent variable, and the sample is restricted to household heads and their spouses, for whom we have information on the number of siblings surviving. The number of siblings is subject to measurement error because it does not include siblings who died more than one year before the survey.

In neither of the regressions is the percent of brothers significant for either males or females. There are, however, several interesting results from the control variables. None of the demographic data on the person's family affect their height. The person's age is important, especially for children, who are being compared with growth curves for well-fed children in the U.S. For the younger cohort mother's education predicts significantly increases in height. In both of the regressions, if the person is in an urban setting height is greater. Women have lower heights than men, but girls do better than boys relative to the NCHS/WHO standard (though the differences is not significant).

**Education:** Turning to estimates of schooling attainment, column 3 presents the results of a probit regression explaining the current enrollment of children between the ages of 10 and 17, as of 1993, while column 4 has as dependent variable the years of schooling completed by adults. The most interesting result is that first daughters are less likely to be enrolled, for the sample of children, and attained less schooling, for the sample of adults. This result is consistent with the ethnographic finding in Indonesia and elsewhere that first daughters often help mothers with child care and domestic tasks, at the expense of their education.

For education there is some evidence of son preference due to competition among brothers. For the adult sample, men had lower education if they had a higher proportion of siblings being brothers. Interestingly, the coefficient is quite close to zero for females (that is, the sum of the main effect on %brothers and the interaction of %brothers\*female).

Turning to the control variables, surprisingly, having more siblings meant more education for the older cohorts; perhaps sibling size was correlated with wealth of the parents. Urban residents have higher schooling, though the effect is smaller for older women. The negative effect of being Muslim, strong for the older cohort, disappears with the universal enrollment experienced by the younger cohort. Father's schooling had a larger effect than mother's schooling, but both are strongly significant.

**Inheritance:** Finally, we turn to column (5), which reports the results of a probit model estimating the likelihood of receiving an inheritance. The percentage of brothers in the family has no effect on the likelihood of receiving an inheritance.

The control variables remain interesting. Consistent with the Javanese tradition that the youngest daughter care for her parents and receive a house, the youngest daughter is more likely to receive an inheritance than are her sisters. Urban residents are less likely to receive inheritances, a finding consonant with the absence of a farm to pass on to heirs. Girls are less likely to receive inheritances, though girls in Muslim families are not as disadvantaged. The more schooling the mother has, the more likely a girl will be to receive an inheritance.

These results are all robust to varying the control variables or to using statistical methods robust to outliers.

## **Conclusion**

We have examined a number of measures of son preference and the relative status of daughters. Chart 4 summarizes the findings, graphing the ratios for various measures, for earlier and later cohorts. In the past, daughters did not have excess mortality, birth of a daughter did not predict patterns of future childbirth, and women were not relatively malnourished (as indicated by their adult height). At the same time, norms favored sons in education and inheritance. Moreover, gaps in educational attainment and inheritance matched the norms, and women had far less education and were less likely to inherit land than



were men. Importantly, this complex pattern of results would not be apparent following the standard practice of examining a single facet at a time.

In the spheres where it was present, son preference has weakened in Indonesia. Despite the dissemination of contraception, the birth of a daughter still does not predict below-average time until the next child is born. Moreover, by the 1990s almost all girls (along with their brothers) attended primary school, and gender gaps in higher levels of education and in inheritance narrowed.

These results do not imply that Indonesia is a gender-less society in terms of economic or political outcomes; that conclusion would plainly fly in the face of a considerable body of evidence. But the gendering of economic and social life does not seem to be associated with some of the basic capacities fostered during childhood; son preference is neither a significant determinant of nutrition and (by the 1990s) of education. Our findings are consistent with the classic anthropological works on Bali, which held that children were basically gender-less when it came to basic provisioning, and were only treated as gendered gradually as they assumed social roles outside the family (Parker 1997).

Our study is subject to many limitations, each of which presents opportunities for future research. For example, we focus here on national averages. Future research will describe the heterogeneity across cultural groups, regions, and levels of educational and economic development (see Soeradji and Hatmadji 1994).

Understanding the clustering of cultural norms and of female outcomes is also crucial. Substantial evidence from other countries finds that where daughters live in husband's villages, parents have weaker incentives to invest in their daughter's health and education (Skinner 1997). Appendix 2 offers some preliminary findings that are surprisingly unresponsive to this effect: daughters do not fare relatively worse when they typically move away from their parents after marriage.

We study various measures going back to between 1933 and 1960. It is possible that the status of daughters may have been more distinct in earlier periods, and substantial convergence may have occurred prior to when our data start. Moreover, our data on families from the earlier cohorts used retrospective

data, which may introduce errors. Future research can try to use more data sources drawn from the earlier periods, though these tend to be fragmentary.

In our discussion we implicitly use numerical equality as a benchmark. Although this standard is adequate for description, equality may not always be the relevant benchmark for understanding if Indonesian parents are treating their daughters well compared to their sons. For example, if investing disproportionately in sons raises the family's income so much that daughters benefit, then unequal investments can be optimal for daughters. Moreover, if the daughters internalize norms of unequal treatment, they may prefer their brothers eat more than themselves. Welfare analysis of such situations is fraught with difficulties.

Our study ends in 1997, and tracks women's educational success in large part during the strong economic growth of the New Order regime (1965-1997). It is important to understand whether the financial crisis of 1997-1998 and the following economic and social collapse disproportionately hurt women (Frankenberg, Thomas, and Beegle 1999; Thomas and others 1999). Press reports cited disproportionately large harms for young women. Interestingly, a companion paper does not find disproportionate effects on women and girls (Gertler, et al., 2000).

This paper is descriptive. Future research should help understand the motives of families to invest in daughters and sons. It is important to understand how the interacting effects of the spread of mass education, orthodox Islamic teachings, globalization culturally and economically, industrialization, increasing access to modern contraceptives, urbanization, and the many other forces affecting Indonesia have influenced the relative treatment of sons and daughters.

Finally, daughters are less disadvantaged in Indonesia than in two very populous poor nations, India and China, and two other populous, and also poor, Muslim nations, Pakistan and Bangladesh. It remains an area of active research to identify the causal mechanisms underlying these important differences.

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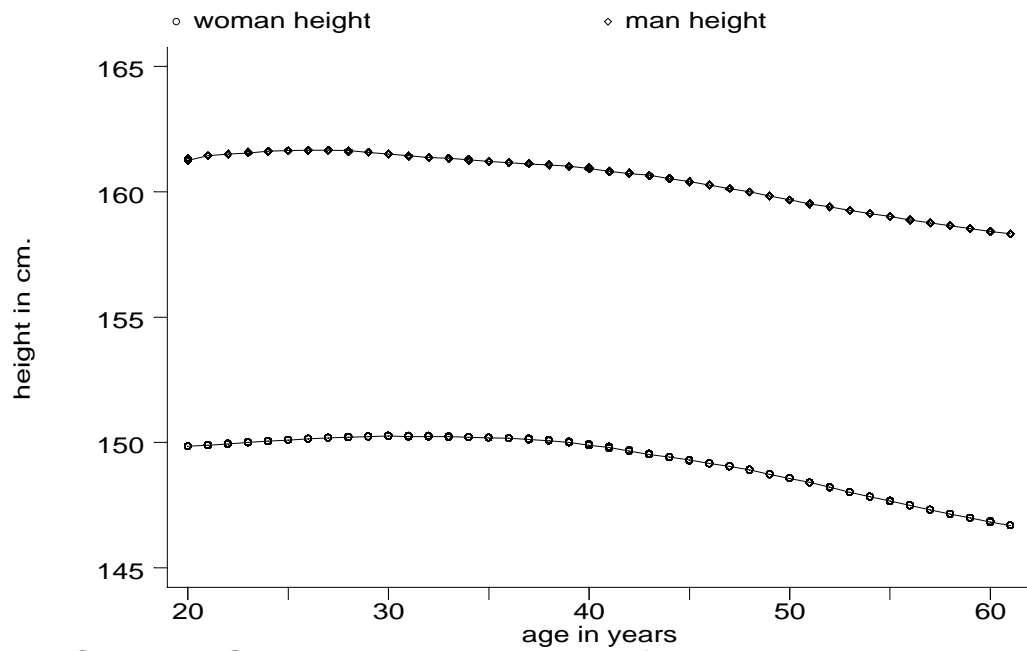


Chart 1: Smoothed regression of height against age



Chart 2: Smoothed regression of height z-score against age



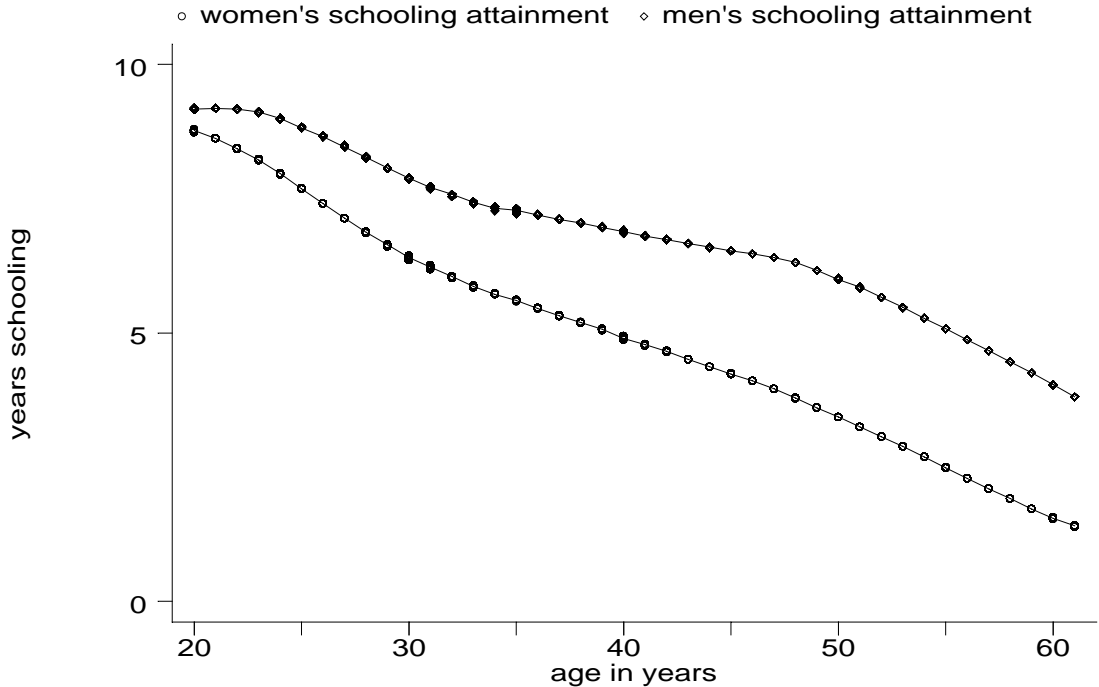
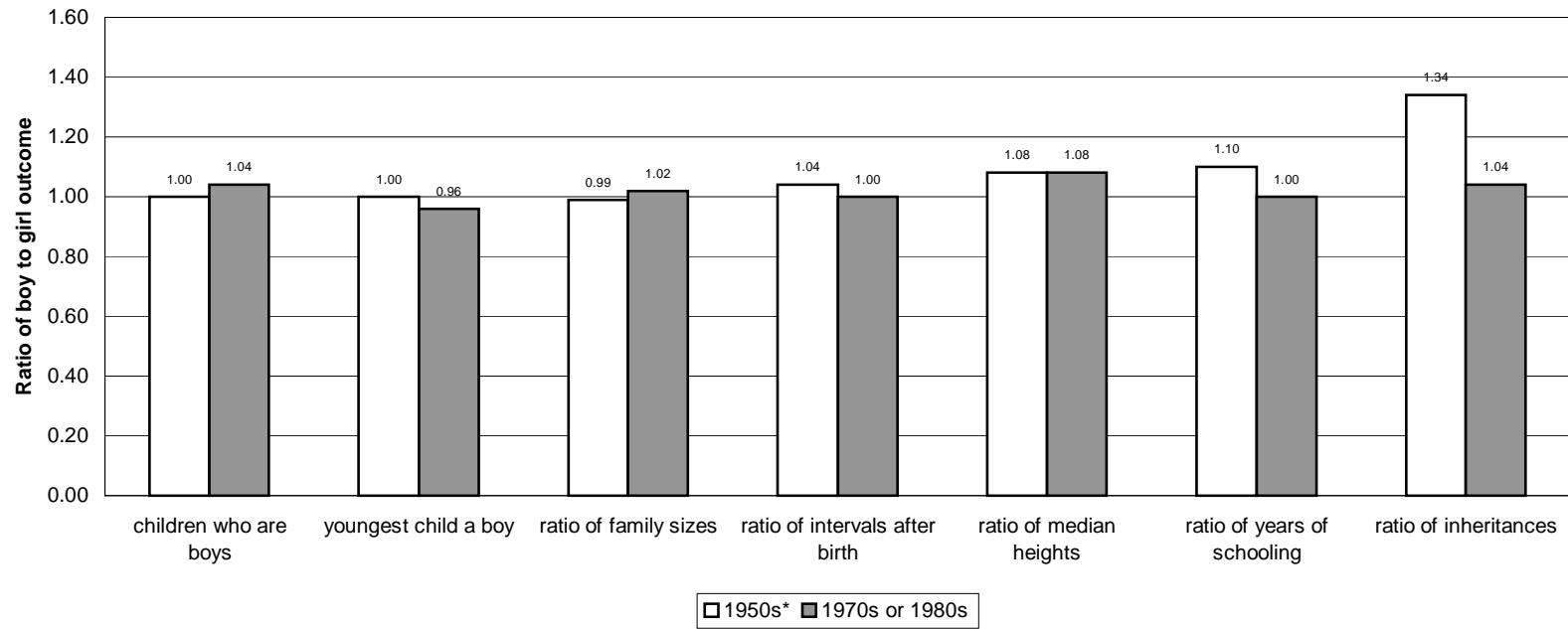


Chart 3: Smoothed regression of school years against age

Chart 4: Measures of son preference for older (1950s\*) and later (1970s or 1980s) cohorts



Note: All scales are measured so that unity implies gender equality, and ratios > 1 imply son preference.

**Table 1: Are there more boys than girls?**

	% boys of children under 5 alive in year indicated							
	(1) 1973		(2) 1983		(3) 1993		(4) 1997 (under age 3)	
	% boys	n	% boys	n	% boys	n	% boys	n
all children	0.50	1443	0.49	3643	0.51	3489	0.51	1420
age of child								
0	0.54	336	0.49	647	0.52	526	0.51	446
1	0.49	293	0.49	669	0.52	608	0.53	526
2	0.53	272	0.51	637	0.51	595	0.49	448
3	0.47	204	0.46	613	0.55*	615	.	.
4	0.46	197	0.49	528	0.47	565	.	.
5	0.43	141	0.50	549	0.51	580	.	.

Notes: Columns (1), (2) and (3) count children aged five and under who were alive in January of 1973, 1983, and 1993, as reported in the pregnancy history administered to 4890 women in the 1993 IFLS. Column (4) counts children aged three and under who were alive in January of 1997 as reported in the pregnancy history administered to 3142 women in the 1997 IFLS.

Table uses weights assigned to individual mothers.

\* indicates that the number of boys was different from the number of girls at the 5% level.

**Table 2: Do girls die more frequently than boys?**

	Percent of deaths that are boys							
	(1) children born in 1960s		(2) children born in 1970s		(3) children born in 1980s		(4) children born in 1990s	
	% boys	n	% boys	n	% boys	n	% boys	n
age at death								
infant	0.63*	108	0.59	415	0.55*	521	0.56	251
child aged 1-5	0.42	73	0.51	241	0.46	238	0.46	39

Notes: Columns 1, 2 and 3 are derived from the pregnancy history administered to 4890 women in the 1993 IFLS. Column 4 combines the reported deaths from the 1993 IFLS and the pregnancy history administered to 3142 women in the 1997 IFLS.

Table uses weights assigned to individual mothers.

\* means significantly different from .5 at the 5% level, in a two-sided t test.

**Table 3: Are youngest children more often boys? Percent of youngest children who are boys**

	age group of child											
	1940s		1950s		1960s		1970s		1980s		1990s	
	% boys	n	% boys	n	% boys	n	% boys	n	% boys	n	% boys	n
youngest child in family of household head or spouse	0.50	1851	0.50	2548	0.50	3396	0.48	2413				
youngest child of ever-married mother (when age over 4)							0.49	461	0.49	1640		
youngest child of ever-married mothers (when said stopped)							0.49	460	0.49	1992	0.53	1976

Notes: Table uses two sources: row (a) counts the percent boys of youngest siblings of the families of household heads and their spouses, using their responses to questions about siblings (so siblings do not include deceased siblings); rows (b) and (c) count the percent boys of youngest children of ever-married mothers who had completed fertility, determined in (b) by having the youngest son over four years of age, and in (c) by having responded negatively to a question about desire for more children.

Observations are weighted using household weights.

Cells with  $n < 30$  have been excluded

\* indicates significantly different from .5 at the 5% level, in a two-sided t test that takes into account the complex survey design (so no differences significant).

**Table 4: Do girls live in bigger families?**

Ratio of number of children in family for boys to number for girls

	age group of child					
	(1) 1940s	(2) 1950s	(3) 1960s	(4) 1970s	(5) 1980s	(6) 1990s
(a) siblings of household heads and spouses	1.02	0.99	1.00	1.04**		
n	9478	14709	14472	6716		
(b) families of ever married mothers			1.00	1.01	1.02	1.02
n			1076	4932	6812	2341

Notes: Row (a) uses data on siblings of household head and spouses.

Row (b) uses data from children of ever-married mothers, and includes families that have not completed fertility.

Mean size of family calculated using household weights.

\*\* indicates that size of family of girls is different from size of families of boys at 1% level of significance, using a Wald test for differences in means that takes into account complex survey design.

**Table 5: After a boy, do parents wait longer to have another child?**

category	Ratio of mean interval, in years, until next child following birth of a son to years following birth of a daughter					
	age cohort of older child					
	(1) 1940s	(2) 1950s	(3) 1960s	(4) 1970s	(5) 1980s	(6) 1990s
<i>families of heads and spouses</i> between all children	1.04 1.00 7438	1.04* 1.00 11956	1.02 1.00 10913	0.92** 1.00 4236		
when at least one girl	1.00 1.00 2147	1.02 1.00 6313	1.03 1.00 7400	0.93** 1.00 3585		
<i>families of ever-married women</i> between all children			1.09 1.07 945	0.95 0.97 4030	1.00 0.98 4360	1.03 287
when at least one girl			1.00 1.00 273	0.94 1.00 1902	1.01 1.05 2216	0.98 163

Notes: In each cell, first number is ratio of mean intervals, second is ratio of median intervals, third is number of observations.

Rows (1)-(2) use sample of families of adult heads of households and spouses of heads,

Rows (3)-(4) use sample of children of ever-married mothers, from pregnancy history administered to 4890 women in the 1993 IFLS, excluding intervals

where the previously born child died prior to conception of the next child

Intervals for families with at least one girl include intervals if previously there was a girl and not if current child is first girl.

If interval less than .66, or zero, or greater than 15, then excluded.

Median intervals include intervals after last child; mean intervals do not include last child.

No median interval for children born in 1990s, since almost all are youngest child of mother.

Intervals calculated using year of birth for rows (1)-(2), and year and month of birth for rows (3)-(4).

Mean intervals are constructed using household weights, median intervals are not.

\*, and \*\* indicate that interval till the next child following birth of a boy is significantly different from the interval following a girl, at the 5% and 1% level, respectively

using a Wald test for differences in means that takes into account complex survey design. For families of ever-married women, none of medians are significantly different, using a Wilcoxon ranksum test.

Table 6: Do girls inherit differently from boys?

	Ratio of response of men to response of women				
	Decade in which both parents deceased				
	1940s	1950s	1960s	1970s	1980s
number of observations	199	212	395	649	1168
inherit anything?	1.29	1.44*	1.11	0.94	1.12
(percent men inheriting)	0.58	0.55	0.51	0.57	0.56
(percent women inheriting)	0.45	0.38	0.46	0.61	0.50
inherited house?	1.36	1.98*	1.17	1.12	0.87
inherited land?	1.92**	1.53*	1.16	1.12	1.24**

Notes: Data comes from ILFS 1993 adult questionnaire.

\*\* and \* mean significant difference in gender means using Wald test that takes into account complex survey design, at 1% and 5% level, respectively. Data are weighted by individual weights.



Table 7: Descriptive statistics for variables in the regression analysis

	children aged 6-19			adults aged 20-60		
	mean	st. dev.	n	mean	st. dev.	n
Individual characteristics						
age in years	12.20	3.86	10848	36.28	11.62	15928
female	0.49	0.50	10848	0.52	0.51	15928
no siblings	0.11	0.32	10848	0.10	0.31	10727
first boy in family	0.34	0.47	10819	0.27	0.46	11391
first girl in family	0.33	0.48	10819	0.31	0.48	11391
last boy in family	0.25	0.43	10819	0.23	0.43	11391
last girl in family	0.25	0.44	10819	0.24	0.44	11391
Family characteristics						
percent of siblings who are boys	0.45	0.38	10848	0.43	0.35	11391
Muslim	0.90	0.30	10848	0.91	0.30	15928
rural	0.64	0.48	10848	0.64	0.49	15928
number of siblings	2.28	1.58	10848	3.37	2.55	11391
years schooling of mother	4.30	4.00	9266	1.41	2.84	8665
years schooling of father	5.64	4.58	8394	2.37	3.63	7936
age of mother of child, in 1993	38.35	8.41	9254			
Outcomes						
year of birth of mother (1900s)				29.22	15.29	8241
year of birth of father (1900s)				21.09	16.76	8054
height in cm. for females over 19				149.28	5.83	6262
height in cm. for males over 19				160.46	6.76	4858
height z-score for under age 10, US standard	-1.89	1.34	2561			
years of school for girls/women	4.39	3.05	5246	5.02	4.74	8288
years of school for boys/men	4.30	3.17	5157	6.68	5.04	7421
percent of girls enrolled	0.74	0.44	5263			
percent of boys enrolled	0.71	0.45	5287			
female inherit from dead mother				0.32	0.47	3593
female inherit from dead father				0.25	0.44	2409
male inherit from dead mother				0.38	0.51	2997
male inherit from dead father				0.23	0.44	2015
male inherit if both parents dead				0.39	0.49	3783
female inherit if both parents dead				0.42	0.52	3188

Notes: Values are weighted by individual roster weights that scale the sample to match the means by province, rural/urban and sex.

Table 8: The effects of a high proportion brothers

Column	1		2		3		4		5	
Dependent variable	Height-for-age z-score		Height (cm.)		Years of schooling		Years of schooling		Inherited from mother or father	
Sample	Children under 11		Adults		Youth 10-20		Adults		Adults	
Estimation	OLS		OLS		OLS		OLS		Probit	
	<u>coeff.</u>	<u>SE</u>	<u>coeff.</u>	<u>SE</u>	<u>coeff.</u>	<u>SE</u>	<u>coeff.</u>	<u>SE</u>	<u>coeff.</u>	<u>SE</u>
# siblings	-0.02	0.03	0.07	0.09	-0.06	0.05	0.1	0.06	-0.01	0.03
% brothers	0.07	0.12	-0.9	0.62	-0.22	0.17	-0.73	0.37*	0.12	0.18
Only child	0.05	0.1	-0.05	0.59	-0.16	0.15	-0.75	0.45	-0.03	0.15
First son	0.12	0.1	0.04	0.34	-0.01	0.11	-0.08	0.23	-0.13	0.11
First daughter	-0.08	0.1	-0.09	0.27	-0.29	0.12*	-0.71	0.15**	-0.09	0.11
Last son	0.01	0.08	0.04	0.37	-0.09	0.14	0.14	0.26	0.16	0.12
Last daughter	-0.09	0.1	-0.23	0.29	0.05	0.15	0.15	0.17	0.23	0.11*
Age	-0.09	0.01**	-0.1	0.02**	-1.03	0.24**	-0.04	0.01**	0.03	0.01**
Age*age	2.3	0.38**	-0.22	0.16	3.64	1.27**	0.1	0.09	-0.09	0.05
Muslim	-0.07	0.12	-0.63	0.6	-0.21	0.17	-1.33	0.37**	0.13	0.13
Urban	0.28	0.08**	0.73	0.35*	0.39	0.12**	2.18	0.32**	-0.34	0.08**
Mothers' age	0.04	0.03	0.01	0.02	-0.02	0.04	0.01	0.01	-0.01	0**
& its square	-0.03	0.04	-0.05	0.03	0.03	0.05	-0.05	0.02**	0.02	0.01
Mother's education	0.03	0.01**	0.07	0.07	0.08	0.02**	0.25	0.04**	0.04	0.02*
Father's education	0.01	0.01	0.01	0.06	0.11	0.02**	0.38	0.03**	-0.02	0.01
Female	0.42	0.28	-11.62	0.96**	0.53	1.73	-1.36	0.67*	-1.14	0.52*
#siblings * female	-0.06	0.05	-0.08	0.1	-0.03	0.06	-0.05	0.07	0.01	0.04
%brothers * female	0.1	0.15	1.46	0.81	0.3	0.22	0.91	0.46*	0.01	0.25
age * female	0.03	0.02	0.03	0.02	-0.09	0.37	-0.04	0.01**	0	0.01
& its square	0.69	0.53	-0.09	0.19	0.47	1.97	-0.17	0.1	0.09	0.06
Muslim * female	-0.07	0.1	0.04	0.54	-0.2	0.16	-0.14	0.41	0.77	0.19**
Urban * female	0.1	0.08	0.48	0.39	0.09	0.14	-0.73	0.25**	-0.1	0.12
Father's ed.* female	-0.01	0.01	0.03	0.07	-0.01	0.02	0.07	0.04	0.03	0.02
Mother's ed. * female	0	0.01	-0.03	0.08	0.03	0.03	0	0.06	-0.01	0.03
Constant	-3.01	0.54**	162.05	1.04**	6.71	1.36**	5.92	0.9**	-0.47	0.36
Number of obs	4	727	5	311	3	976	55	7	2	986
F-stat	11	0.48	142	0.33	15	0.88	63	46	6	0.91
Prob > F	0	0	0	0	0	0	0	0	0	0
R-squared	0	0.12	0	0.51			0	0.37		

Notes: \* and \*\* indicate statistical significance at the 5% and 1% level, respectively.

All regressions include dummy variables for provinces. Probit results are estimated coefficients, not marginal effects.

Child height is z-scored to U.S. (NCHS/WHO) norms. Adult height is in centimeters.

## Appendix 1: The Adat Survey

Table A1 presents results from the adat survey of 270 experts from rural enumeration areas, where the variables are recoded to be one if the practice favors sons, boys or men, and zero if it favors females or is gender neutral. Column 1 reports the results for traditional practice, column 2 for current practice.

As noted in the text, some traditions related to son preference showed enormous declines. Slightly less than half of the adat respondents thought that families preferred to have their first child be a boy in the past, while less than one-third thought that was the case in the present. There was a large decline in the pressure to have sons more generally. The tradition that boys receive education priority declined from 48 to 14 percent. In the bottom section, it can be seen that exclusive male decision-making about schooling also declined substantially. Furthermore, health care priority for boys virtually disappeared. Cases of unequal inheritance declined as well. Girls inherited more than boys according to only 12.5% of the respondents. But the fraction of areas where boys received more than half of their parents' estates declined from 69% to 48%. Since the instances where boys inherited 75% or more did not decline as rapidly, this suggests movement away from Islamic inheritance norms (where boys inherit twice their sisters' shares) towards more equitable splits.

There were similar changes in gender relations at the adult level. Declines in male-biased customs and norms were also apparent. Women were less restricted in births than they were before (births are now less likely to be at the home of the husband's family, and the incidence of forty days of seclusion following birth declined; women are less likely to have restrictions on bathing following birth). Marriage ages increased dramatically, with girls no longer expected to marry young. The 60 percent of the sample that reported female circumcision seems quite high. Anecdotal evidence suggests, however, that in Indonesia female circumcision almost always has involved a symbolic drawing of blood, and is different from the genital mutilation found in parts of Africa and South Asia that is the focus of most of the research literature and the press (Feillard and Marcoes, 1998).

In the group of questions relating to the status of women as adults and within households, there have also been improvements in status for almost every indicator, but there is still evidence of inequality.

Under local traditional laws, unmarried women still could not own land in roughly a fifth of the enumeration areas. Their husbands almost always had the right to not let them work. In a majority of cases women could not spend their income as they chose. In 42 percent of the enumeration areas, an older man could remarry if his wife died, but an older woman could not if she became a widow.

The adat survey has several limitations, particularly because it reports recall by a single village expert. Such experts may sometimes have replied in ways to appear more modern, if that is what they believed the survey-takers wanted to hear. Moreover, asking an elderly male about the current experience of young men and (especially) women may give inaccurate replies. Answers to this kind of question would depend heavily on the particular translation and explication into local languages, by different enumerators, of ambiguous terms such as ‘tradition’ or ‘current practice’. Even when respondents accurately reported widely held customs and norms, it is unclear how often the norms were followed in the past.

We have made some effort to check the validity of the adat responses, with mixed results. For example, we used the retrospective survey of ever-married women to extract whether they had picked their marriage partner at first marriage, or whether the groom had been selected by the parents. The averages across the enumeration area suggest the adat experts knew that there was more freedom for girls in the 1990s compared with the past. About 60% of the experts reported that in the past parents chose partners for girls, and indeed 30% of older women indicated that their parents had in fact chosen their husband, while for the present adat experts reported 15% arranged marriages and young women reported only 10% had experienced parental arrangements of marriages. Across the enumeration areas, when experts said that parents chose partners, they were indeed more likely to have chosen partners.

We also used the retrospective questionnaire to calculate women’s age at first marriage. This could then be compared with the opinion of the adat expert. In a simple regression of individual age at first marriage against the adat expert’s normative age in tradition and assessment of current age, both of the adat opinions are highly significant (i.e., correlated with age at marriage). When we partition the sample according to age, we find that for younger women the adat expert’s assessment of current practice had

twice the coefficient of the normative age of tradition, while for the older cohort there was no such difference between the coefficients. So the local experts do seem to indicate accurately the average age at marriage, relative to other localities. On the other hand, the difference between average age of first marriage for the women of an enumeration area was not correlated with the difference between the expert's assessment of traditional and current practice age at marriage. Moreover, the average of the differences between experts' opinions of traditional and current practice age at first marriage was on the order of 2.5 years, while the actual difference between older and younger cohorts was basically zero (i.e., women are either not actually marrying at older ages compared with the past, or they never did really marry so young as the expert believed, or, more likely, the expert's belief applies to periods much earlier than the 1970s).

To close, then, it is worth reiterating that opinions and individual assessments are not always generalizable into social practice. This only highlights the need for the analysis of survey data, to which we proceed.

## **Appendix 2: The Relationship between Investments in Daughters and whether Daughters Move to the Husband's Village**

The relative status of women varies substantially across the regions and ethnic groups within Indonesia. Moreover, many experts believe that the status of women varies closely with kinship patterns (Dube, 1997). Understanding whether this variation in gender and kin relations is correlated with, or causes, variation in son preference is rendered difficult by the multiple forms of son preference, kin relation, and gender relations, and by the fact that many authors disagree even on characterization of each phenomenon for particular groups. This appendix examines the extent to which daughters who marry traditionally move to their husband's village predicts low investments in daughters. (In a related analysis, Galasso [1999] uses the IFLS measures of average traditions in an ethnic group as instruments in predicting how mothers' bargaining power affects children's labor supply.)

The issue is further complicated because gender roles are constantly changing. Whalley (1998:234) notes that in Minangkabau areas, traditionally matrilineal with several important sources of female power, "... the rise of the nuclear household has led to the husband contributing more subsistence for his wife and children, allocating inheritance to his children, providing for the education of his children, having moral authority over his wife and children, and having a voice in whom his daughters marry." Conversely, in areas with few traditional sources of female power, the spread of new ideas, technologies and market access has often been equalizing for many women.

The adat survey contained a number of questions concerning the ethnic make-up of the enumeration area. Experts were asked what was the largest ethnic group, the relative sizes of the three largest ethnic groups in the village, and the languages spoken other than Indonesian. Table A2 gives a breakdown of the groups represented in the adat survey, and Table A3 lists how each ethnic group was coded, based on the responses of the experts to questions about ethnic groups and local languages.

The adat survey also contained a small component for determining the residential location of new conjugal units, a basic aspect of local family systems. Experts were asked, "Putting aside economic

constraints, where does the newly married couple live after the wedding?” If the expert indicated that the couple would live in the parents’ house, they were asked for how long. If the expert indicated that they would reside in the parents’ ‘place’, or in a new ‘place’, they were asked whether this ‘place’ was with the male’s or female’s parents or relatives. We have re-coded answers to these questions as follows. First, we coded the adat as ambilocal if the expert indicated that the couple resided “wherever they want”, or if they resided in “a new place for the couple,” or if they resided in the parents’ place but not ‘with’ anyone, or if the couple resided with relatives after the wedding but then went on their own later, or if the expert gave multiple responses (i.e. could live with relatives or parents of either male or female). Second, we coded as virilocal if the expert indicated that after the wedding the couple lived in the male parent’s house or in the male’s place, and then continued to live with the male parents or relatives, or if the couple started off in the male’s place and did not move into their own place until they had a house, child, or work. Third, we coded as uxori-local if the expert indicated that after the wedding the couple lived in the female parent’s house or in the female’s place, and then continued to live with the female parents or relatives, or if the couple started off in the female’s place and did not move into their own place until they had a house, child, or work. Of the 270 enumeration areas, 53% are uxori-local, 23% are virilocal, and 23% are ambilocal, traditionally. Thirty-four localities switched from uxori-local or virilocal to ambilocal. (One locality apparently switched from uxori-local to virilocal, plausibly due to measurement error.)

The three broad categories, virilocal, uxori-local and ambilocal, do not display many differences in terms of religion, family size, education, or education. Virilocal communities are less likely to be Muslim or urban. People in virilocal societies have more siblings; i.e. family sizes are slightly larger (about half a child). Women, girls, boys and men both have higher education levels in virilocal societies. There are no differences in average heights of adults. Women are less likely to have inherited and men more likely to have inherited in virilocal societies.

We include these measures of ethnicity and post-marriage residence in the regressions of Table 8 explaining possible effects of son preference. We also include a different measure of location, expected to

be strongly correlated with ethnicity and residence patterns, that corresponds to whether the enumeration area is located in Sumatra or Java, or whether it is in the 'islands' (this dummy variable is used in Thomas, Contreras and Frankenberg, 1999).

Table A3 reports the results for the ethnic, residence and location dummy variables, and their interactions with the girl dummy variable. We report only these coefficients, as the coefficients on the other variables rarely changed in sign, magnitude or statistical significance. We have not included province dummy variables in the estimation.

The results are not what we expected. Ethnic, residence and location dummies are of little importance in explaining intra-household resource allocations. As far as the residence variables, boys and girls in uxorilocal enumeration areas seem to have lower heights compared with the U.S. norms. Virilocal areas (where brides move away from their birth families) have more schooling for girls than boys. Uxorilocal areas have lower inheritances for girls. These findings are exactly the opposite of what one might expect, as virilocality is frequently hypothesized as the root of lower education and other resources allocated to girls in South Asia.

Turning to the ethnicity dummy variables, and their interaction with the female indicator, they are significant roughly one in five times, and no variables are significant in more than two regressions. The best summary of these results is that ethnic groups are not strongly correlated with the treatment of children and the relative status of daughters. That said, Minang girls seem to get more schooling and more inheritances, as one might expect in this traditionally matrilineal society. Sasak and Bugi children get less schooling. Betawi and Minang children are taller, as are Bugi adults.

Finally, the Sumatra/Java variable is correlated with lower height for children, but not for adults. But on education, Sumatran and Javanese girls do better, while island girls do worse. On inheritances, there are no gender differences.



**Table A1: Responses to *adat* questionnaire across enumeration areas**

	Mean of 0-1 responses	Tradition	Current practice
<i>Son preference</i>			
want male child for first child		0.48	0.28
pressure to have a male child		0.38	0.25
no pressure to have female child		0.76	0.84
husband might remarry if no male child		0.08	0.03
if adopt, boys more likely to be adopted		0.04	0.06
boys given education priority		0.48	0.14
boys given health care priority		0.05	0.01
girls stay home care for parents		0.35	0.31
boys get 75% or more of inheritance		0.16	0.14
boys more than 50% of inheritance		0.69	0.48
<i>Birth and marriage</i>			
birth and forty days at husband's parents		0.09	0.06
mother can't leave house after birth		0.72	0.36
mother can't bathe after birth		0.30	0.20
girls circumcised (not typically FGM)		0.67	0.61
man chooses marriage, woman doesn't		0.07	0.06
girls marry when under 17		0.49	0.06
grooms more than 3 years older		0.41	0.47
female's family gives to male (dowry)		0.31	0.29
female's family gives gifts at marriage		0.51	0.47
no strict bridewealth		0.57	0.59
wedding ceremony is in male's house		0.13	0.11
female's family pays for wedding		0.26	0.22
newlyweds live with male's family		0.25	0.22
<i>Intra-household status</i>			
woman cannot own land before marriage		0.27	0.19
woman cannot own land after marriage		0.11	0.06
woman cannot own business		0.07	0.03
woman cannot earn living outside house		0.13	0.01
woman must ask man permission to work		0.98	0.98
woman cannot spend earnings as pleases		0.60	0.54
husband decides how to spend earnings		0.17	0.16
man can marry two and no consent		0.15	0.06
woman cannot have two husbands		0.99	0.99
man manages household finances		0.38	0.30
wife alone doesn't manage household finances		0.63	0.66
man manages daily household expenses		0.07	0.04
man manages household luxury expenses		0.26	0.16
man manages medical expenditures		0.29	0.23
man manages transfers to relatives		0.16	0.13
wife alone doesn't do financial transfers		0.79	0.81
man decides about savings		0.23	0.15
man decides selling livestock and land		0.28	0.18
man decides about selling jewelry		0.10	0.06
wife alone doesn't sell jewelry		0.80	0.82
man decides about children's education		0.24	0.13
<i>Divorce and widowhood</i>			
husband gets all pre-wedding assets		0.04	0.04
husband gets all post-wedding assets		0.08	0.03
husband gets children		0.12	0.07
young widows don't remarry, widowers do		0.13	0.09
old widows don't remarry, widowers do		0.42	0.42
dead man's family, not wife, gets assets		0.38	0.37

Notes: All questions are coded so unity implies more son preference or lower female power. 'Tradition' refers to practices that were the norm before or are still required under 'traditional law'. 'Common practice' is the *adat* expert's assessment of the actual practice in 1997.

**Table A2: Breakdown of ethnic groups of enumeration areas**

Group	Frequency	Percent	Predominant tradition
Balinese	15	4.9	Virilocal
Banjar	9	3.0	Uxorilocal
Batak	10	3.3	Virilocal
Betawi	17	5.6	Uxorilocal
Bugis	9	3.0	Uxorilocal
Javanese	116	38.2	Uxorilocal & ambilocal
Madurese	9	3.0	Uxorilocal
Ming	15	4.9	Uxorilocal
Sasak	10	3.3	Virilocal
Sundanese	42	13.8	Uxorilocal & ambilocal
mixed	18	5.9	
other	34	11.2	
Total	304	100	

Note: "Frequency" refers to the number of the 304 enumeration areas that were predominantly of that ethnic group. A virilocal tradition implies brides usually move near the groom's families, uxorialocal implies grooms move near the bride's families, and ambilocal imply both are common.

**Table A3: Ethnicity and Outcomes by Gender**

Column	1		2		3		4		5	
Dependent variable	Height-for-age z-score		Height (cm.)		Years of schooling		Years of schooling		Inherited from mother or	
Sample	Children under 11		Adults		Youth 10-20		Adults		father	
Estimation	OLS		OLS		OLS		OLS		Probit	
	<u>coeff.</u>	<u>SE</u>	<u>coeff.</u>	<u>SE</u>	<u>coeff.</u>	<u>SE</u>	<u>coeff.</u>	<u>SE</u>	<u>coeff.</u>	<u>SE</u>
<i>A) estimates when include post-marriage residence pattern (Ambilocal is omitted group)</i>										
Virilocal	-0.1	0.09	-0.24	0.34	-0.08	0.14	-0.59	0.3	-0.02	0.1
Uxorilocal	-0.28	0.1**	-0.55	0.38	-0.05	0.17	-0.05	0.41	0.05	0.12
Virilocal*female	0.06	0.1	-0.49	0.34	0.03	0.15	0.52	0.24*	0.03	0.12
Uxorilocal*female	-0.01	0.12	0	0.42	-0.33	0.2	0.05	0.32	-0.46	0.15**
<i>B) estimates when include dominant ethnic group of enumeration area</i>										
Bali	0.54	0.17**	0.82	0.64	0.3	0.26	-0.51	0.6	0.15	0.19
Bali*female	-0.16	0.18	1.09	0.7	-0.01	0.43	-0.88	0.48*	-0.6	0.29*
Banjar	0.09	0.37	-1.18	0.85	0.1	0.25	-0.06	0.52	0.1	0.18
Banjar*female	-0.37	0.37	0.51	0.72	0.19	0.3	-0.07	0.44	-0.3	0.3
Batak	-0.17	0.21	-0.44	1.16	0.06	0.25	-0.24	0.87	0.2	0.32
Batak*female	0.12	0.17	-0.51	1.1	0.3	0.5	1.56	0.64*	-0.52	0.33
Betawi	0.33	0.12**	0.27	0.65	0.52	0.25*	0.43	0.54	0.06	0.18
Betawi*female	-0.07	0.16	0.01	0.68	-0.25	0.29	-0.02	0.37	0.27	0.25
Bugl	0.26	0.24	0.92	0.54	0.35	0.26	-1.3	0.54*	0.28	0.25
Bugl*female	0.32	0.21	0.49	0.85	0.01	0.29	0.39	0.46	0.2	0.32
Jawa	0.12	0.08	-0.25	0.4	0.08	0.18	-0.45	0.36	0.16	0.12
Jawa*female	0.12	0.1	0.49	0.4	0.35	0.21	0.18	0.29	0.26	0.14
Madura	0.27	0.3	-0.83	0.71	-0.18	0.51	-0.21	0.97	-0.1	0.23
Madura*female	0.53	0.41	1.07	0.76	0.01	0.53	-0.87	0.77	0.52	0.26*
Minang	0.31	0.15*	-0.03	0.77	0.09	0.26	-0.35	0.56	0.03	0.29
Minang*female	-0.16	0.16	-0.4	0.97	0.37	0.28	1.96	0.68**	0.5	0.3
Sasak	-0.33	0.2	-0.46	0.71	-0.1	0.34	-1.53	0.62*	0.27	0.2
Sasak*female	-0.01	0.24	0.67	0.82	-0.12	0.45	0.35	0.39	-0.49	0.25
Sundanese	-0.01	0.12	0.47	0.49	0.15	0.22	-0.05	0.44	0.28	0.15
Sunda*female	0.1	0.14	-0.45	0.57	0.16	0.26	0.11	0.38	-0.18	0.17
<i>C) estimates when include broad location</i>										
Sumatra	-0.13	0.08	-0.31	0.38	-0.06	0.13	-0.29	0.28	-0.26	0.11*
Islands	-0.09	0.09	0.39	0.34	-0.08	0.16	-0.07	0.33	-0.12	0.1
Sumatra*female	-0.2	0.08*	-0.05	0.42	-0.05	0.16	0.48	0.26	-0.11	0.13
Islands*female	-0.1	0.11	0.11	0.36	-0.08	0.18	-0.51	0.24*	-0.23	0.13

Note: All regressions contain the other variables listed in Table 8, coefficients for these variables are not reported.

Each panel A, B, and C reports coefficients from a different set of five regressions. Omitted group in Panel B is 'mixed and other' consisting of localities with very small ethnic groups or where no ethnic group constituted a majority. Omitted region in Panel C is Java.

\* and \*\* refer to significance at the 5 and 1 percent levels.