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Child Malnutrition and Gender Preference in India: The Role of Culture

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Abstract

Background: Indicators of malnourishment among children include stunting and underweight. Son preference may result in increases in stunting among girls. Socioeconomic variables, such as mother's education level and wealth status, may affect the likelihood of stunting and son preference. The purpose of this study is to explore the role of son preference, mother's education, and wealth status on boys' and girls' stunting in India.

Method and material: Data from the Third National Family Health Survey (NFHS-3) of India are used in this study. Path analysis using OLS is conducted to examine the impact of son preference, mother's education, and wealth status on boys' and girls' stunting in India.

Results: Results indicate a significant difference in the mean levels of stunting among girls and boys. Mother's education and wealth status reduce son preference as well as stunting among both boy and girl children. However, gender preference for boys bears a net negative effect on the stunting level of girls. Preference for girls has no significant effect on girls' stunting scores.

Conclusion: The phenomenon of stunting in India is highly prevalent.. This study finds empirical support for the cultural explanation of malnutrition. The problem of stunting in India is much more than an issue of poverty. We conclude that malnutrition reduction policies should consider programs that address cultural factors that support son preference.

Keywords: Child; Malnutrition; Gender; India

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Introduction

In spite of significant universal economic development during the post World War II era, a large number of children world-wide remain malnourished. According to WHO, nearly 165 million children under age five are stunted [1]. Indicators of malnourishment among children include stunting and under weight, both of which are informed respectively by universal norms of age- specific height and weight specifications. This study focuses on the phenomenon of stunting in India as a large proportion of the stunted children world-wide reside in India [2]. The percentage of children below age five who suffer from stunting is almost twenty times the percentage of stunted children in a standard well-nourished population of children. Furthermore, surprisingly, the risk of stunting remains high among Indian children with adequate dietary intake [3]. Stunting is scaled in terms of standardized height-for-age scores known as HAZ scores using standard sex and age-specific median heights specified by the World Health Organization Child Growth Standards. The normative cut–off point is -2 Standard Deviations. All children below -2 SD are said to be stunted.

Three popular explanations among others account for the phenomenon of stunting in India. The first is economic which suggests that high levels of poverty and economic impoverishment in Indian society account for poor nutritional intake among children and hence the stunting [4,5]. A second explanation relates a lack of public health facities in India to high prevalence of diarrhea among children resulting in persistent malnutrition leading to high levels of stunting [6]. This public health explanation has gained wide spread political support

with Narendra Modi, the current Prime Minister,spearheading a national campaign called 'Swachh Bharat' (Clean India). This program purports to advance public hygiene through targeted extension of water availability and improvements in sanitary facilities while eliminating open defecation. It is visualized as a community-led rural sanitation program for improving access to sanitation facilities and eradicating the practice of open defecation by 2019.

The third is cultural. It is well-known that sex ratio among Indian children is inexplicably masculine. The Economist reported that a 100 million baby girls were missing in India [7], an echo of what Sen [8] termed as the "missing women" in India referring to the 41 million women and girls who "died prematurely due to mistreatment – resulting in a dramatically male-biased population" [9]. This bias in favor of the boy child results in not only excessive abortion of female fetuses but also continued neglect of the girl child. As the likelihood of malnutrition increases among the girl-child, the proportion of stunted children is likely to increase controlling for the environmental and economic vectors that may contribute to a high level of stunting among children in India. This explanation, though important, has not been adequately investigated [10]. The purpose of this study is to explore the role of son preference on stunting in India.

We present three expectations related to stunting. The first proposes that mother's education level and also her wealth status decrease the likelihood of stunting. Second, increases in mother's education and wealth respectively decrease son preference. Third, son preference increases the risk of stunting among girl children than among boys.

Methodology

Data

Data from the Third National Family Health Survey (NFHS-3) of India are used in this study [11]. The survey was commissioned by the Ministry of Health and Family Welfare, an agency of the Government of India. Conducted in all states during 2005-2006, NHFS-3 is the most recent survey available representative of households in India. The survey was administered verbally via questionnaires to male and female respondents separately; only the female sample was used for the purpose of this study. A majority of the research around son preference including the previous NFHS surveys has been done with female participants. The administrators interviewed 131,596 eligible women aged 15–49 years producing a response rate of 95%. This study uses a sub-sample of 17,239 households with a live child between the ages of approximately five and two respectively.

Four variables, mother's education (MotherEdu), wealth status (wealth), son preference (PrefBoy) and girl preference (PrefGirl) and stunting scores are operationalized as follows. The stunting scores are computed using the WHO age and gender specific standards (HAZ scores) [12]. The standardized stunting score, the dependent variable is $(X_i - X_{median})/SD$ from mean of the reference population. Children with stunting scores less than -2 SD are labeled stunted and those with scores less than -3 SD are considered 'severely stunted'. Note that as stunting scores increase the degree of child stunting decreases. Children with scores above -2 SD and well into the positive scores, are healthy and not stunted. Mother's education is measured as the number of years of schooling. Wealth status is a standardized measure of all household assets. The variable is divided into five different groups measured at the ordinal level. The five categorical levels are poorest, poorer, middle, richer, and richest. The variables 'PrefBoy' and 'PrefGirl' are measured at the interval level. The respondents were asked about the ideal number, separately, of boys and girls desired. The ideal number of boys desired as a proportion of the total ideal number of boys and girls desired is labeled 'PrefBoy'. Likewise, the variable 'PrefGirl' is derived as the proportion of ideal number of girls to the total number of children.

Analysis and Results

Path analysis provides an appropriate technique to test the expectations proposed in this study. To reiterate, it is hypothesized that wealth status and mother's education influence the ideal number of sons as measured by the variable 'PrefBoy'. These variables also influence 'PrefGirl'. Recall that our measure of stunting increases from negative values to positive values. The negative values (less than -2 SD) suggest the presence of stunting while values above -2 SD represent the absence of stunting. In sum, as stunting scores increase, the risk of stunting decreases. The variables wealth status and mother's education also influence directly the level of stunting as measured by the stunting scores. In addition, it is hypothesized that as the ideal number of sons increases, the girl child is more likely to suffer from stunting than boys. Thus, there is likely to be significant difference in the regression coefficient of stunting scores on PrefBoy. We anticipate ideal number of sons to have a positive effect on boy child and a negative effect on the girl child. These set of expectations, are diagrammatically presented in **Figure 1**.

In order to assess the effect of son preference on the phenomenon of stunting, we will evaluate two separate models with ideal number of boys as the intervening variable in the first, and ideal number of girls (measured as PrefGirl) as the intervening variable

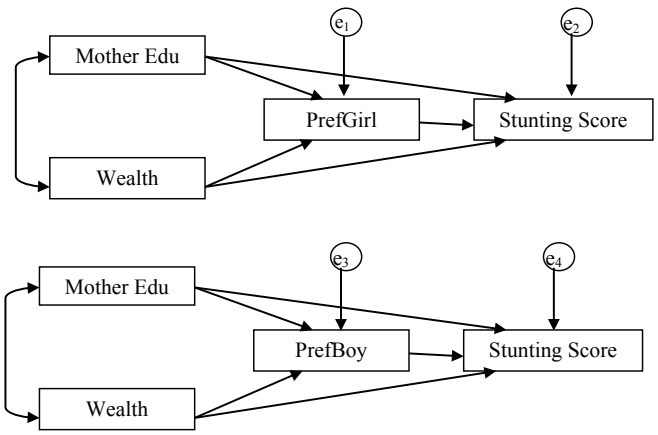

Figure 1 Two path models of stunting score evaluated for boy and girl child separately with households with a girl child and within the rest with a boy child

in the second. These two intervening variables with their direct effects on stunting scores are assessed separately for the two sub-samples of mothers with a current boy child at the time of the survey and another sub sample of mothers with a current girl child.

In empirically evaluating the proposed models as presented diagrammatically in **Figure 1**, we first evaluate a general model to assess if there is a significant difference in stunting scores between boy and girl child. This is necessary since the separate model of stunting suggested for boy and girl child presupposes a significant difference in stunting. Independent sample t-test of the stunting scores for the two groups of boy and girl child suggested a significant difference in the mean stunting scores at the ten percent level (t=1.681, df=12,189, p=0.93). In addition, for assessing the expected effect of gender on level of stunting, the dependent variable, stunting scores was regressed on the proposed determinants of stunting, wealth status, mothers education, along with the gender of the current child and gender preference (PrefBoy and PrefGirl), using a total of sample of respondents (n=17,239).

This model assumes that the outliers do not influence the slope coefficients. The presence of outliers is very likely in this sample taking into consideration the extreme wealth inequalities that characterize the Indian society [13]. Presence of outliers will be evaluated using the leverage values (hii). Values larger than (2p/n) where p is the number of parameters to be estimated are considered outliers. In the model evaluated, the number of parameters is three. If there are a large number of outliers, about ten percent of the sample, the model will be re-estimated using robust regression methods. Ordinary least squares estimation of the model marked a large number, more than 10 percent of the sample, as outliers with high leverage values. Since the robust regression approach is a preferred method of estimation in the presence of large number of outliers, the robust regression estimates of the model, rather than the OLS estimates are presented in **Table 1**. All the selected variables as well as a dummy variable for the sex of the child are significant.

Empirical tests of the first and the second hypotheses presented in this study were carried out by evaluating the path model presented in **Figure 1**. The path models are evaluated separately for the sub-samples of boy and girl child. Within the same sub-sample, two models are assessed separately with PrefBoy and PrefGirl as intervening variables illustrated in **Figure 1. Table 2** presents results from the test of the path model for the boys-subsample. It also presents the results from the path model with PrefBoy as the intervening variable. Mother's education level and wealth status reduce stunting among boy children as expected. However, preference for boys (son preference) has no significant effect on stunting scores. See **Table 2**. The estimates from the regression of PrefBoy on the two background variables, mother's education and wealth status, are presented in **Table 2**. Mother's education has no significant influence at the .05 level. Wealth status has a significant negative effect on PrefBoys; a result contrary to the expected. However, this result does support the general finding that even at higher levels of income, Indian children suffer from stunting.

Table 3 presents the estimates from the path model for the boys-subsample with PrefGirl as the intervening variable. Mother's education level and wealth status reduce stunting among boy children as expected. However, preference for girls has no significant effect on boys' stunting scores. See **Table 3**. The estimates from the regression of PreGirl on the two background variables, mother's education and wealth status, are presented in **Table 3**. Increases in wealth status and mother's education significantly increase preference for girls.

Tables 4 and 5 present results from the test of the path model for the girls subsample. **Table 4** presents the results from the path model with PrefBoy as the intervening variable and **Table 5** with PrefGirl as the intervening variable. Mother's education level and wealth status reduce stunting among girl children controlling for

Table 1 Robust regression of stunting level on selected determinants (Least Absolute Deviations Method)

Variables	Unstandardized Coefficients	
	B	Standard Error
Constant	4.633	0.741
MotherEdu	0.018	0.004
wealth	0.028	0.006
PrefBoy	-6.736	0.018
PrefGirl	-6.479	0.007
Sex of Child	-6.474	0.024

Table 2 Estimates from the path model of stunting (OLS estimates) -For the sample of boy children

Variables	Unstandardized Coefficients		Standardized Coefficients	t-value	P-value
	B	Standard Error	B		
Dependent variable: Stunting scores					
Constant	-2.379	0.046		-51.281	0.000
MotherEdu	0.109	0.001	0.125	9.948	0.000
Wealth	0.088	0.008	0.138	10.823	0.000
PrefBoy	-0.014	0.067	-0.002	-0.204	0.840
Dependent variable: PrefBoy					
MotherEdu	-0.003	0.002	-0.021	-1.648	0.099
Wealth	-0.006	0.001	-0.061	-4.711	0.000

Table 3 Estimates from the path Model of Stunting (OLS estimates)- For the Sample of Boy Children

Variables	Unstandardized Coefficients		Standardized Coefficients	t-value	P-value
	B	Standard Error	B		
Dependent variable: Stunting scores					
Constant	-2.396	0.036		-67.356	0.000
MotherEdu	0.109	0.001	0.125	9.843	0.000
wealth	0.088	0.008	0.138	10.815	0.000
PrefGirl	0.021	0.067	0.003	0.314	0.753
Dependent variable: Prefgirl					
MotherEdu	0.004	0.002	0.030	2.280	0.023
Wealth	0.006	0.001	0.061	5.031	0.000

Table 4 Estimates from the path Model of Stunting (OLS estimates)- For the Sample of Girl Children

Variables	Unstandardized Coefficients		Standardized Coefficients	t-value	P-value
	B	Standard Error	B		
Dependent variable: Stunting scores					
Constant	-2.248	0.046		-35.257	0.000
MotherEdu	0.117	0.013	0.129	8.803	0.000
Wealth	0.077	0.010	0.116	7.954	0.000
PrefBoy	-0.257	0.099	-0.029	-2.586	0.010
Dependent variable: PrefBoy					
MotherEdu	-0.008	0.002	-0.076	-5.085	0.000
Wealth	-0.004	0.001	-0.049	-3.273	0.001

Table 5 Estimates from the path Model of Stunting (OLS estimates)- For the Sample of Girl Children

Variables	Unstandardized Coefficients		Standardized Coefficients	t-value	P-value
	B	Standard Error	B		
Dependent variable: Stunting scores					
(Constant)	-2.478	0.050		-49.586	0.000
MotherEdu	0.117	0.013	0.129	8.831	0.000
wealth	0.077	0.010	0.117	7.976	0.000
PrefGirl	0.194	0.100	0.022	1.949	0.052
Dependent variable: Prefgirl					
MotherEdu	0.008	0.002	0.080	5.342	0.000
Wealth	0.004	0.001	0.049	3.316	0.001

mother's gender preferences as expected. See **Table 4.** However, in the girls-subsample, preference for boys significantly increased the risk of stunting among girls. In addition, mother's education and wealth significantly reduced the likelihood of son preference as expected.

Table 5 presents the estimates from the path model for the girls-subsample with PrefGirl as the intervening variable. Mother's education level and wealth status reduce stunting among girl children as expected. However, preference for girls has no significant effect on girl's stunting scores at the .05 level. See **Table 5**. The estimates from the regression of "PrefGirl" on the two background variables, mother's education and wealth status, are presented in **Table 5**. Increases in wealth status and mother's education significantly increase preference for girls.

Our results indicate that the net effect of gender preference on stunting levels appears to be particularly disadvantageous to the girl child. When the current child is a girl, the net effect of increases in ideal number of boys is associated with significant increases in stunting level of the girl child. In order to test if the effect of son preference (PREFBOY) is significantly different across the two sub-samples of girl and boy children, Chow test was conducted. The results from Chow test support the presence of slope differences in the effect of son preference on stunting scores across the two sub-populations. The direct and indirect effects of mother's education and wealth status are beneficial for the health of the girl child. On the negative side, the gender preference for boys bears a net negative effect on the stunting stature (growth) of the girl child in particular. This negative effect could be due to a number of background variables such as culture and religion. The effects of son preference on stunting when the current child is a boy are in sharp contrast with the effect of son preference on stunting when the current child is a girl.

Figure 2 highlights the findings from the regression models of stunting for the subsample of households with a girl child. The figure presents the slopes of the regression of stunting scores on son preference (PrefBoy) and on girl preference (PrefGirl) from the girls sub-subsample. The two slopes are clearly different. As son preference (PrefBoy) increases, the likelihood of stunting increases significantly. Increases in girl preference (PrefGirl) have a positive effect though not significant at the .05 level. In sum, as the proportion of ideal number of boys increases, girl children are more likely to suffer from stunting especially when the current child is a girl. We did not find similar significant association between level of stunting and preference for boys in the boys-subsample. Nearly fifty five percent of mothers in the girls-subsample and fifty-seven percent in the boys-subsample desired more boys than girls. **Figure 2** underscores our finding that preference for boys likely increases the risk of stunting among girls than among boys.

Conclusions and Discussion

Indian children are more malnourished and stunted than children elsewhere. Almost 90% of all the stunted children in the world live in Africa and Asia. While 43 percent of all children below age five in India are stunted, the comparative figure for less developed countries such as Bangladesh and Nepal are 41 and 39 respectively. Surprisingly about one third of all children from India's upper class households are stunted. Thus, the problem of stunting in India is much more than an issue of poverty. This perspective has given way to an approach toward eradication of malnutrition through improvement of public hygiene and sanitary facilities. This approach overrides to an extent prior policy emphasis on providing nutritional and educational services to mother of infants through well-known programs such as the Integrated Child Development Services [14]. A large proportion

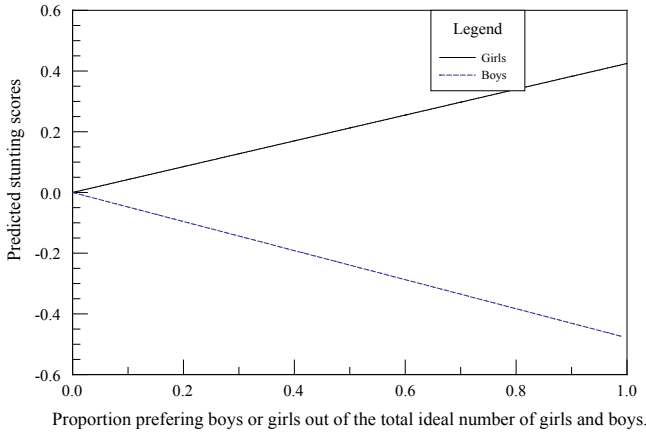

Figure 2 The effects of proportions of boys and girls desired out of total ideal number children on stunting scores: sub-sample of household with a current girl child only

of government funding currently to eradicate malnutrition is channeled into sanitation programs well supported by a number of sanitation policies. For example, the National Urban Sanitation Policy envisions all Indian cities and town attaining highest sanitation standards. The policy recommends a number of program sanitation programs to improve hygiene awareness, safe disposal of human and liquid waste, etc. On the legal front, the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act was passed in 2013. With the launch of the Swachh Bharat (Clean India) movement, allocation to the Ministry of Drinking Water and Sanitation increased by 24 percent from 2013-14. Current policies and programs suggest an emphasis on manipulating environmental factors at the neglect of the cultural. A large proportion of girl children are malnourished because they are girls. Jayachandran and Kuzimko [15] found that breastfeeding duration was the lowest for daughters and children without older brothers because their parents were trying for a son. Indian society is characterized by the presence of son preference [16]. But for a small number of states such as Kerala, almost all Indian states strongly resist change to patriarchal norms, which bestow a superior status to the boy child.

This study finds empirical support for the cultural explanation of malnutrition. Within the household there are norms for allocation of resources. Mothers characteristics matter. We found that mother's education contributes significantly to the health of the child. Controlling for two important characteristics, mothers education and wealth status, we found that not only most mothers prefer son to daughters but also that such biases increase the likelihood of malnutrition among children. We should point out that these findings are only preliminary as we have not controlled for a number of socio-economic factors that influence malnutrition among Indian girl children. Future studies should examine the factors that influence decision-making with regard to allocation of resources among children as well as parental expectations with respect to future returns.

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