Economics Bulletin

Volume 40, Issue 3

Child marriage: some facts from selected Indian states

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Abstract

Child marriage of daughters, a social evil still prevails in many parts of India. The present study explores some causes of this social evil using DLHS4(District Level Health Survey) data while taking into account the state level variation in incidence of child marriage.We find that the probability of marriage of a girl child before legal age decreases for a son-dominant household where son dominance is instrumented using a dummy variable indicating the sex of first born child. Also, marriage pattern of parents, in terms of age difference and education difference, has influence on early marriage of girl children. Further, we observe that the incidence of child marriage is high among the poor measured in terms of asset ownership, in tribal and Muslim families.Data exploration shows that tribal populated North-East states of India, though matriarchal in nature are characterized by higher incidence of girl child marriage compared to other states in India.

We are deeply indebted to the anonymus referee and associated editor for their comments that help us to revise the paper.
Citation: Tanusree Mishra and Tanmoyee Banerjee (Chatterjee), (2020) "Child marriage: some facts from selected Indian states", *Economics Bulletin*, Volume 40, Issue 3, pages 2093-2110
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Submitted: February 05, 2020. **Published:** August 08, 2020.

1 Introduction:

Child marriage is a complex socio-cultural variable which is determined by a set of values, belief, attribute, behavior shared by a group of people from one generation to another; it varies over time and space. One age-old social problem in India is the practice of child marriage of daughters before the legalage of marriage. According to UNICEF[1] ,child marriage is most prevalent in South Asia, where around half (45%) of all women aged 20-24 years reported being married before attaining the age of 18 and our country India has the highest number of child bride (one third of the global total). However, in Indian context the only ray of hope is the fact that the proportion of women aged20-24 years who were marriedbefore age 18 has declined from 47 per cent to 27 per cent from 2005-06to 2015-16[2].Given this backdrop, we try to explore the factors at the household level (as well as at the state level)leading to the perpetual existence of girl child marriage in different states of India, using data from the District Level Household &Facility Survey (DLHS-4)[3] of the Government of India.

The child marriage of girls not only leads to the abuse of girl children, it severely impedes the girl children'sbasic human rights (Raj (2010); Raj et al.(2010); Mikhail (2002)).It obstructs the education opportunity of the girls, and creates severe health complications through early pregnancies for the girl as well as for the child (Jensen and Thronton (2003); Rajet al., (2010)).Child marriage of girls is considered on the ground of social norm or custom and parents often believe that chastity of girls may be ruined if they delay their marriage(Bicchieri et al. (2014)). Also, parents have to pay a lower amount of dowry if girls are married off young, thus child marriage prevails (Srinivasan et al.(2015)). In rural Tamil Nadu daughter's aversion mainly caused due to proliferation of dowry. Thus, fear of having many female children leads to drastic decline in fertility (Smith et al. (2008)).The paper by Hodgkinson (2016)gives a detailed overview of child marriage regarding performance of different organizations in controlling the incidence and severity of child marriage of girls. According to Abbhi et al. (2013), decline in overall sex ratio is one of the major causes of child marriage in India. Ghosh(2011) has given a detailed study of child marriage in Malda district of West Bengal using a field survey. Bhabha and Kelly (2013) assess the obstacles to education due to child marriage of daughters using data from Gujarat and Maharashtra. Another study by UNICEF[4]gives a detailed overview of child marriage in India using NFHS data.A study by the Human Rights Centre (Freccero and Whiting (2018)) provides detailed findings on prevention of child marriage on humanitarian context[5]. The district level study (DLHS-3(2007-08)) across all India by Srinivasan et al.(2015) explores the variation of trends and patterns of child marriages. According to the findings ofGoli (2016), socio-economic and demographic factors varies across states in India, thus deriving some specific causes of child marriage is difficult. His state wise analysis (using NFHS1 and IHDS 2

[1]Source: https://www.unicef.org/protection/files/Final_India_Unicef_Rosa_Online.pdf

[2] Source: International Institute for Population Sciences and Macro International, *National Family Health Survey* (NFHS-4), 2015–16: *India Fact Sheet*, IIPS, Mumbai, 2016, p.2.

[3]The District Level Household and Facility Survey (DLHS-4) is a nationwide survey which was conducted during 2012-13.The Ministry of Health and Family Welfare (MoHFW), Government of India has designated the International Institute for population Sciences (IIPS), Mumbai as the Nodal agency for organizing and carrying out the District Level Household and Facility Survey. ***The survey excludes the AHS (Annual Health Survey) states (Uttar Pradesh, Chhattisgarh, Madhya Pradesh, Uttarakhand, Jharkhand, Orissa, Bihar, Assam, Rajasthan)***. Around 1400 households with a population of approximately 7000 per district are framed to be covered under this programme.

[4]file:///C:/Users/admin/Downloads/Child-Marriage_India_for-digital_0215.pdf

[5]https://www.girlsnotbrides.org/wp-content/uploads/2018/07/child_marriage_report_june20181.compressed.pdf

data) reveals huge interstate variation in the likelihood of child marriagein India.Apart from some of the major states which accounts for higher prevalence of child marriage (Uttar Pradesh, Rajasthan, Bihar and Madhya Pradesh), North East states also revealhighincidenceof child marriage.

India is a country with patriarchal form of society where a son is considered as an asset for the family. From their early childhood, daughters face various types of oppression and they are denied of their basic rights (Barcellous et al.(2014)). The reason can be explained as follows: in the Indian family system, it is expected that a son will provide economic support to the parents during their old age, whereas daughters impose burdens on the parents as the family has to provide a dowry during marriage (Clark (2000)). Another reason for daughter neglect may be the patrilocal marriages in India, where a daughter would move to her husband's home after marriage (Dimond-Smith et al. (2008)). This attitude towards female child leads to abortion of the child and an additional child if the first child is a girl which has caused a skewed sex-ratio in India (Clark (2000); Rehman (2014); Kuglar and Kumar (2017)).According to Dreze and Kingdon(1999) parents are often reluctant to send their daughters to school as daughters will get married and leave their paternal home. Using NFHS-2 data Clark (2000)[6] confirmed the hypothesis that girls from larger families are actually belonging to families that do not want girls. According to Pande and Malhotra (2006), whether parents discriminate against a daughter depends on the sex of her older siblings specifically[7].

Given the existing literature, present study focuses on the interstate variation in the child marriage in India using DLHS 4 data set. Our special focus is on the incidence of child marriage in son dominant families. Broker et.al. (2018), Jejeebhoy et. al (2015) noted that gender specific sex selection is a serious problem across states of India due to existence of son preference. As a result, sex ratio at birth in India is heavily biased and stood at 900 females per 1000 males in 2015[8], far below the ideal sex ratio of 952 females per 1000 males.[9]This biased sex-ratio in India clearly indicates towards theexistence of "missing women" as conceptualized by Sen(1992). Today there are over 200 million women were 'missing' worldwide due to sex selective abortion and death of females[10].

In this context, we probe deep in to the menace of girl child marriage in families having more boys than girls.Also, we will look in to the connection between the marriage patterns and marital attributes of the parents and the incidence of the child marriage in the family. To the best of our knowledge, this issue has not been addressed in the literature. Following Dalmia (2011)[11] the present study considers the age and education difference between husband and wife as two attributes to take into account of the parental marriage pattern. Type of marriage affects the bargaining process between the husband and wife. Our objective is to find to what extent this phenomenon affects early marriage of girl child in the family.Given the existing studies, present paper will contribute to the existing literature by linking the issue of child marriages of daughters to marital patterns of the parents and son dominance in the families along with other socio-

[6]According to Clark (2000), due to practice of differential stopping behavior, couple has children continually, until the couple reaches their desired number of sons. This process creates a negative relationship between family size and proportion of sons.

[7]The empirical research by Adsera (2012) using NFHS-3 data shows that when son preference increases from 0 to 1 (desired number of sons/ desired number of total children) then the difference of time spent on household core work hour by the daughter and the son increases by 2.5 hours.

[8] Source: NitiAayog India. https://niti.gov.in/content/sex-ratio-females-1000-males

[9] Source: World Health Organization. http://origin.searo.who.int/entity/health_situation_trends/data/chi/sex-ratio/en/

[10]https://www.weforum.org/agenda/2015/10/where-are-all-the-women/

[11]Sonia Dalmia (2011) has found 'age' for female and 'years of schooling' for male as a marital trait significant for marital matching in India which supported the view of transferable utility in marriage assignment of Becker Shapley Shubik model.

economic and demographic factors using DLHS-4 data. To the best of our knowledge, the effect of parental marriage pattern and son-dominance in the families are not considered in the literature while investigating the issue of child marriage. Also, we will take account of interstate variation in likelihood of child marriage across states of India. To this end, we face two problems. First, the problem of endogeneity; this arises as we deal with the issue of girl child marriage in the son dominant families. The existing literature clearly shows that due to gender specific sex selection in India, the number of sons to the number of children in the families is an endogenous variable and we need to take this account in our model. Secondly, we need to choose the multilevel regression model instead of traditional logit or probit analysis to consider the interstate variance in the incidence of child marriage.Hence, we have estimated a simple instrumental probit model with clustered standard error at the state level and also a multilevel instrumental probit model using gsem module in STATA 15. In both these models following the studies by Lee(2008), Schultz(2012), Rosenblum(2013), Kugler and Kumar (2017) we use sex of first born as an instrument for gender composition of children in the family.

The result shows that marriage decision of a girl child is negatively related to more number of sons in the family. Further, we find that greater holding of assets saves the girl child from being a bride before attaining the legal age. Age difference of parents has significant impact on the decision of early marriage of daughters. Also, it is found that child marriage is more prevalent among tribal communities. Rest of the paper is divided as follows: Section 2 describes the data and the variables; Section 3 describes the methodologypertaining to empirical analysis. Section 4 dealswith the results of the models and lastly Section 5 concludes the paper.

2. Data and Variables:

The District Level Household Survey (DLHS-4) of the Government of India, a nationwide survey was conducted during 2012-13 to interview ever-married women aged between 15-49 years. In the present paper, we have worked with the household data and ever-married women data[12]. We have merged[13] the two data sets with our selected variables. The merged data sets contain48,194observations with 16 states.[14]

Outcome Variable

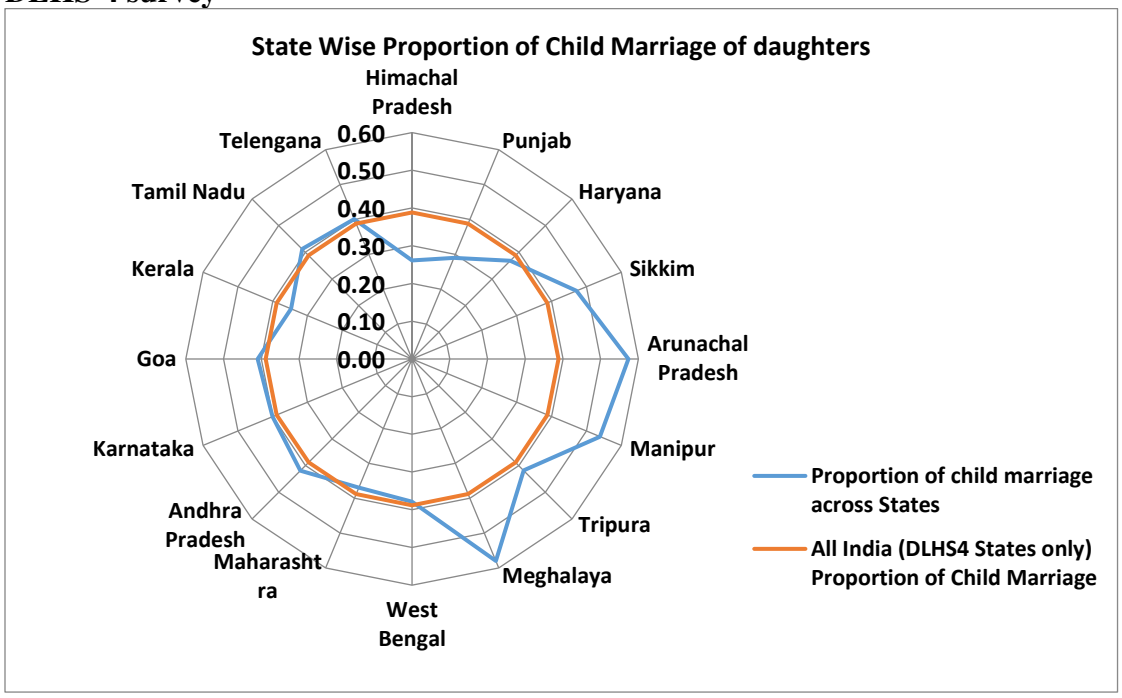
Our main outcome variable of the study is the incidence of child marriage in the families, which is a binary variable assuming a value equal to unity if the household has arranged marriage of at least one daughter at the age of above 6 years and below 18 years. The radar diagram given in Figure 1 depicts the state wise distribution of the incidence of child marriage of daughters.

[12]The household questionnaire contains information on all members of the household and the socioeconomic characteristics of the household, assets possessed, etc. The ever-married women's questionnaire contained information on women's characteristics, socioeconomic conditions, maternal care, contraception and fertility preferences, reproductive health, etc. The Household data contain 391772 observations covering 23 states. The ever-married women data contain 319695 observations covering 21 states.

[13]Before merging we have consolidated the sample by retaining only women whose relationship with the household head is coded as wife (82 % of the respondents) and where household head is husband (100% of the respondents). For merging we have used the unique primary key (prim_key) and the line number of each household member along with the same of the individual woman in ever-married women data.

[14]To obtain the sex of the first born child of each couple we have used the variable "Birth order of the child only for live birth". But the DLHS dataset contains huge number of missing responses for this Birth order variable. Among the 1,77,820 families only 49,143 has responded. Thus, after removal of the missing responses the sample size reduced to 48,194.

Figure 1: Proportion of Child Marriage of daughters across the States of India included in DLHS-4 survey



Source: Author's drawing based on DLHS4 Data

We observe that the North East States like Meghalaya, Arunachal Pradesh, Tripura, Manipur and Sikkim are showing more incidence of child marriage of daughters than the all India (all DLHS4 states) proportion among all other states. The same result is also obtained fromNFHS-4 (2015-16) survey data[15].The North East states of India are predominantly tribal states[16] having different culture, customs, social norms and rituals. Among various tribes,*Khasi* and *Garo* tribes of Megahalayaare well known for their matrilineal form of social character. Interestingly, in some North-East states where *Hajong* tribes are present bride-price is paid at the time of marriage[17].The exchange of bride-price is present in parts of Manipur and Arunachal Pradesh aswell[18]. Secondly, in Manipur, among *Meitei*society, there is one traditional type of marriage where boy and girl will elope,(*"NupiChenba"*) or girl will be abducted (*"NupiChingba")*[19].Adherence to this tradition by the Manipuri society can be considered as a possible reason behind child marriage in this state[20].Thirdly, in North East tribal states pre-marital sex is allowed among men as well as among women (Agarwal (1994)).Subaiya (2008) using NFHS-3 data set observed higher incidence of pre-marital sex among women and men in North East states.The practice of pre-marital sex in adolescence without proper sex-education leads to teenagepregnancy. NFHS-4 (2015-16) survey data revealed high rate of teenage

[15]Source:http://ncpcr.gov.in/showfile.php?lang=1&level=1&sublinkid=1671&lid=1677
[16] Source: http://censusindia.gov.in/Census_And_You/scheduled_castes_and_sceduled_tribes.aspx
[17]Source:http://southwestgarohills.gov.in/peopleculture.html
[18] Source:- pao.net/epSubPageExtractor.asp?src=manipur.Arts_and_Culture.Traditional_marriage_institutions_of_Kabuis_2
[19] Source: https://indianexpress.com/article/research/age-of-consent-in-manipur-was-low
[20] Source:http://e-pao.net/epPageExtractor.asp?src=features.Love_vis-a-vis_Arrange_Marriage_in_Meitei_Meetei_Society_A_View.html

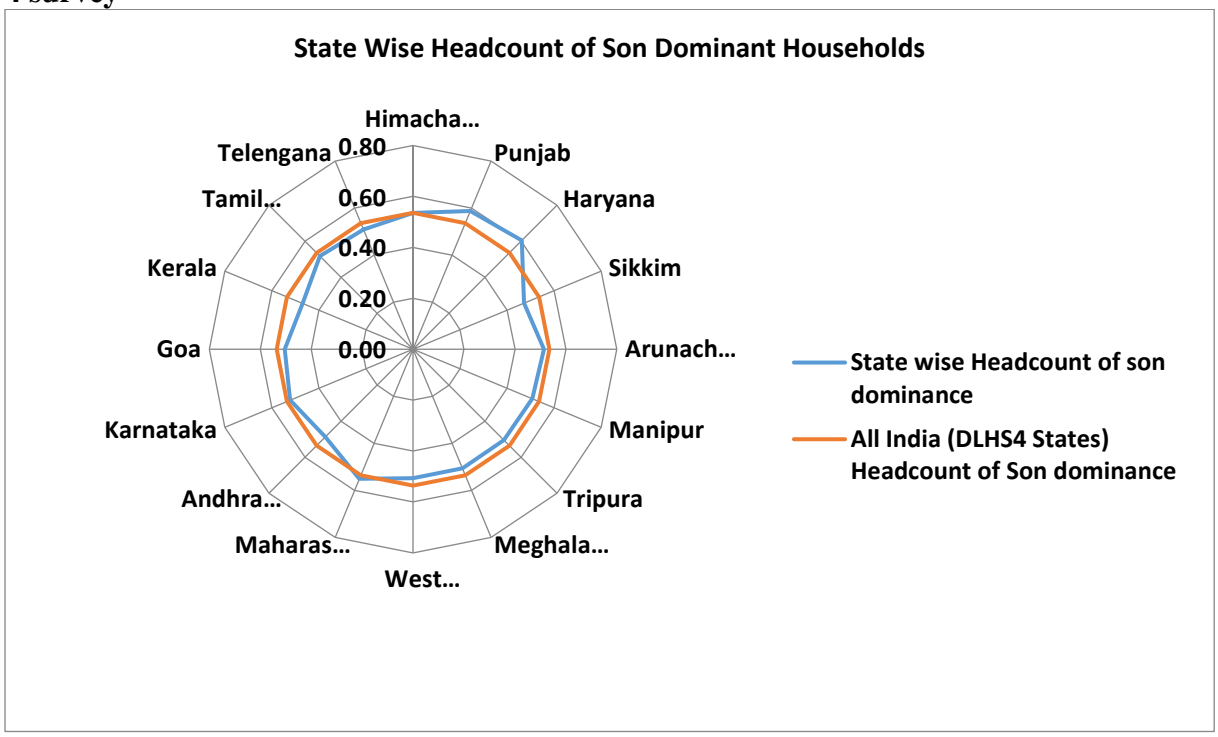
pregnancy among North East states like Meghalaya, Manipur and Tripura[21].This teenage pregnancy may lead to early marriage of daughter to suppress the possible social scandal.

Control Variables:

Son Dominance

One objective of this study is to find the relationship between son dominance in the family and early marriage of daughters in the family. Among the families with both son and daughter, if there is more number of sons than daughter, we define a son dominance dummy equal to unity, and it is zero otherwise. It is observed that around 46.45 percentages of the families are not son-dominant[22].Figure 2 gives the headcount of son-dominant families across states of India included in DLHS-4 survey.

Figure 2: Head-count of Son-dominant households in the States of India included in DLHS-4 survey



Source: Author's drawing based on DLHS4 Data

Further, we define a variable 'son pro' which is the proportion of son among the living children in a family. This variable is used as an endogenous regressor in the subsequent econometrics analysis.The literature shows that gender based sex selection clearly affects the composition of children in the families in the patriarchal society that believes a boy child is an asset whereas a girl child is a liability to the family. Also, due to the 'stopping rule'' families tend to have children until they have desired number of sons (Clark, 2000). Thus, the gender composition of a family is endogenous. Following the existing literature we have used sex of first born as an instrument of gender composition of the children in the family. According to Rosenblum (2012)

[21]http://ncpcr.gov.in/showfile.php?lang=1&level=1&sublinkid=1671&lid=1677

[22]This fact may uphold the view of Clark (2000) that a couple continue to have children until they obtain their desired number of sons, thus may end up with more number of daughters and less number of boys in India.

parents whose first child is male will stop having children sooner than parents whose first child is female and will have a higher proportion of sons compared to parents of a first-born daughter.Our sample also corroborates this fact as shown in the following table.

Table 1: Son dominance and Sex of first born

Sex of first born child	Son Dominance		
	No	Yes	Total
Daughter	22,386	11,116	33,502
Son	0	14,692	14,692
Total	22,386	25,808	48,194
Cramér's V = 0.6168			

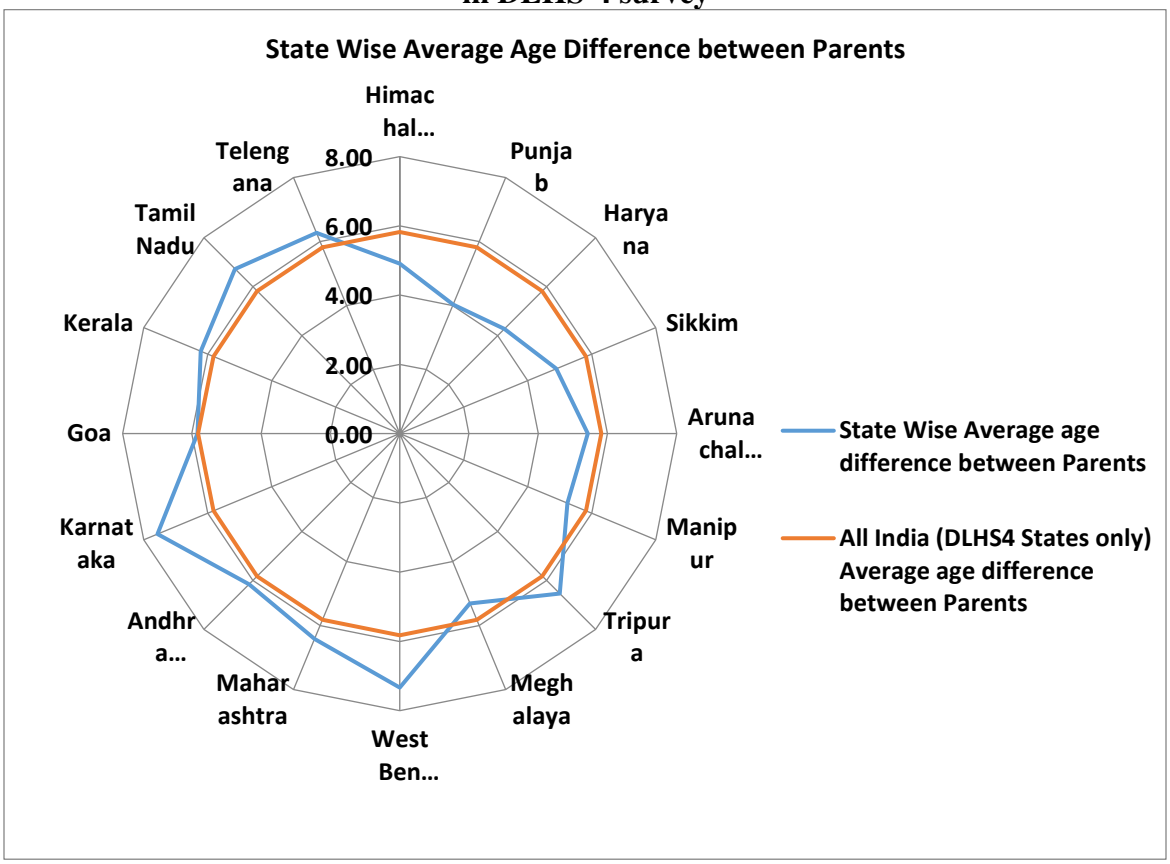
Source: Author's calculation based on DLHS4 Data

Thus, the families where gender of first born is male, are son dominant families.

Type of marriage of the couples

Next, we have incorporated marital attributes of parents to find the relationship between marriage pattern of parents and early marriage of girl child. We have taken education difference and age difference of parents as control variable in the study.Figure 3 gives the state wise average age difference among the parents.

Figure 3: Average Age Difference between husband and wife in the States of India included in DLHS-4 survey



Source: Author's drawing based on DLHS4 Data

Interestingly, North East states except Tripura, show positive assortative marriage pattern in terms of age. While considering education difference between spouses we have formulated a control variable education gap, which is zero if parents are equally educated (33.21% of the sample) and assumes value equal to unity if husband is more educated than wife (46.49% of the sample) and assumes value equals to two if wife is more educated than husband (20.30% of the sample).We observe that if we consider only households where wife is more educated, then more than 44 % of them positively responded to the child marriage of daughters.

Other Exogenous Controls:

We have included land ownership and Asset and Infrastructure endowment score[23], Religion and Caste as control variables in the model. Table 2 gives the details of reason for inclusion of these variables:

Table2: Details of the exogenous controls included:

Exogenous controls	Rationale behind inclusion of the variables	Related References
Land Ownership and Asset and Infrastructure Endowment	Since there is a positive link between wealth and desire for male child, so we have included this variable to check the impact of possessing sufficient assets on the condition of girl child in the family.	Gaudin (2011), Arokiasamy and Goli(2012)
Religion: Hindu (0), Muslim (1) and Other (2) **&** ***Caste:*** Scheduled Caste(SC) (0), Scheduled Tribe(ST) (1), Other Backward Caste(OBC) (2) and Other (3)	Institution of religion and caste are assumed to be the most traditional factors responsible for decelerating the wellbeing and development of the girl child, moreover, higher caste continues to have a desires for sons over daughters throughout the generations. We have included these two variables in order to check whether daughter's early marriage is typical to any religious or social group.	Borooah and Iyer (2004), Parab(2016), Ghosh (2011), Edlund (1999) , Gupta (2011), (Singh and Vennam, 2016)

Next, Table 3 gives the descriptive statistics of the control variables included in the model.[24]

Table 3: Descriptive Summary Statistics

Variables with description		Mean	Std. Dev.
	A. Outcome variable		
Child marriage	= 1 if daughter gets married between age	0.388	0.487

[23]For details of the asset infrastructure and endowment score see appendix 1 table A1.

[24] For association between the variables please see appendix 2, tableA2, A3 and A4.

	6-18 years, 0 otherwise.		
	B. Explanatory variables		
Proportion of son	Number of son/total number of children	0.507	0.162
Sex of the first born child dummy	= 0 if the first born child is daughter 1 if the first born is son	0.305	0.460
Caste Categories	0.SC	0.233	0.423
Different caste categories are	1.ST	0.140	0.347
coded as follows and reference	2. OBC	0.375	0.484
category is SC (0)	3.Other	0.252	0.434
Religion	0.Hindu	0.727	0.445
Different categories of religion are	1.Muslim	0.089	0.285
coded as follows with	2. Other	0.184	0.387
reference category Hindu (0)			
Land Ownership dummy	Yes=1	1.655	0.475
Households having any land of their own	No=0		
Asset and Infrastructure - Endowment Score	Different household level information on assets and house infrastructure	0.364	0.177
Age difference	Difference of current age of husband and wife	5.955	4.007
Education Difference	0.Equally Educated	0.332	0.471
Difference of education of husband and	1.Husband more		
wife.	educated	0.465	0.499
The reference category is same	2. Wife more		
education level (0)	educated	0.203	0.402

Source: Author's calculation based on DLHS 4 Data

For relation between the variables in terms of Cramer's V and Correlationcoefficient see appendix 2.

3. Methods and Empirical Analysis:

Our empirical model is designed to search whether daughters of age more than 6 years but less than 19 years are married off before the age of 18 years,from son dominant families while taking into account the random effects caused from interstate variance.Individual level factors as well as state level factors influences the determinants of any issue that we desire to analyse from demographic data (Goldstein(2004), Novak and Pahor(2017)). The DLHS-4 data is based on multistage stratified unequal probability sampling, thus, traditional technique of logistic/probit regression may give over, or underestimated resultsand the observations are often correlated as they emerge from several levels of hierarchy (Khan and Shaw (2011)).

Along with this we have an endogenous explanatory variable in the model which requires use of instrumental variable estimation technique. Thus, we actually estimated the same model in thefollowing ways:

Model 1: Instrumental Variable Probit Model (IVProbit) with clustered standard error

Instrumental variable probit model estimates probit regression with endogenous regressor which can be correlated with the equation error term. Further, the households are nested within the states. Thus,the error terms at the household levels may be correlated within a state. Further, instrumental probit estimation in STATA requires that the endogenous regressor cannot be a binary variable. Hence we have used son proportion in the family (son pro) as the endogenous regressor in the model. The IV probit model with endogenous regressor is defined as follows:
Let Y_{ij}be a variable that takes value =1 if child daughter marriage has occurred in i-th household nested in jth state, where j = 1,….., M clusters or states, with i consisting of i = 1, …., n_j households. Formally the model is defined as :

$$\text{Prob}(Y_{ij} = 1|sonpro, \vec{X}_{hhcontrols_{ij}}) = \Phi(\beta + \rho\ sonpro + \vec{\zeta}\vec{X}_{hhcontrols_{ij}})$$

Where Φ is standard cumulative normal. Alternatively, the model can be written as

$$Y_{ij}{}^{*} = \beta + \rho\ sonpro + \vec{\zeta}\vec{X}_{hhcontrols_{ij}} + u_{ij} \qquad (1)$$

Here we cannot observe $Y_{ij}{}^{*}$.

We observe $Y_{ij} = \begin{cases} 0\ if\ Y_{ij}{}^{*} < 0 \\ 1\ if\ Y_{ij}{}^{*} \geq 0 \end{cases}$

The reduced form of 'son pro' in linear form is

$$sonpro = \pi_0 + \pi_1 sex\ of\ first\ born_{ij} + \vec{\Pi}\vec{X}_{hhcontrols_{ij}} + v_{ij} \qquad (2)$$

$\vec{X}_{hhcontrols_{ij}}$is the vector of exogenous explanatory variables that includes household specific socio demographic and economic controls explained in Table 2 and two variables defining the marriage type of the parents: Education difference and age difference of the parents. Also, β, ρ and $\vec{\zeta}$ are structural parameters whereas $\pi_0, \pi_1$and $\vec{\Pi}$ are reduced form parameters. The variable $sex\ of\ first\ born_{ij}$ is used as the instrument. The error-terms, following multivariate normal distribution, are corrected by clustering at the state level.We estimated the model with maximum likelihood estimator with clustered robust standard error under STATA15.[25]

Model 2: Multilevel Instrumental Variable Probit Model (IVProbit)

Here the unit of analysis is that the household is nested within a state. Since the incidence of child marriage varies across the states and each household is clustered within the states thus they share common cluster-level random effects. Hence, we also estimated the multilevel instrumental variable probit model which captures both fixed effects and random effects from variances at different levels.We usegsem module of STATA 15 estimated the model with path diagram. Under this methodology equation (1) is revised as follows in (3):

$$Y_{ij}{}^{*} = \beta + v_{0j} + (\rho + v_{1j})\ sonpro + \vec{\zeta}\vec{X}_{hhcontrols_{ij}} + u_{ij} \qquad (3)$$

Here v_{0j} is the deviation of the cluster-specific intercept from the fixed intercept and v_{1j} is the deviation of the cluster-specific slope from the fixed slope and $v_{0j} \sim N(0, \sigma_0^2)\ iid$ and $v_{1j} \sim N(0, \sigma_1^2)\ iid\ i\text{ndependent of } v_{0j}$.The other notations and equation (2) remains same as Model 1[26].Estimated results of Model 1 and Model 2 are present in Table 4 and Figure 4 gives the path-diagram for Model 2.

[25]https://www.stata.com/manuals13/rivprobit.pdf

[26] We have to estimate both the models because the gsem module does not provide the marginal effects.

4. Results:

Table 4: Estimation of Model 1 and Model 2

		Model 1: Instrumental Variable probit Regression			Model 2: Multilevel Instrumental Variable Probit model	
		Incidence of Child Marriage		Proportion of Son among children	Incidence of Child Marriage	Proportion of Son among children
Explanatory Variables:		**Coefficients with clustered-robust standard error**	**Margins with Delta Method Standard Error**	**Coefficients with robust clustered standard error**	**Coefficients with clustered robust standard error**	**Coefficients with clustered robust standard error**
sonpro: Proportion of son in family (Endogenous Regressor)		-1.999***	-0.169***	---	-1.432***	---
		(0.109)	(0.039)		(0.146)	
Caste category:	2.ST	0.192***	0.067***	0.003	0.052*	0.003
Base: 1.SC		(0.069)	(0.023)	(0.005)	(0.027)	(0.005)
	3.OBC	-0.037	-0.008	-0.009***	-0.057**	-0.009***
		(0.025)	(0.009)	(0.002)	(0.025)	(0.002)
	4.General	-0.089***	-0.027***	-0.010***	-0.073**	-0.010***
		(0.025)	(0.009)	(0.002)	(0.031)	(0.002)
Religion	1. Muslim	0.199***	0.062***	0.018***	0.205***	0.018***
Base: 0. Hindu		(0.028)	(0.010)	(0.006)	(0.032)	(0.006)
	2. Other religion	0.041	0.009	0.009**	-0.035	0.009**
		(0.053)	(0.019)	(0.004)	(0.028)	(0.004)
Land Ownership dummy		0.140***	0.051***	-0.001	0.134***	-0.001
		(0.030)	(0.009)	(0.003)	(0.021)	(0.003)
Asset and Infrastructure Endowment score		-1.380***	-0.479***	-0.035***	-1.431***	-0.035***
		(0.067)	(0.025)	(0.008)	(0.066)	(0.008)
Age difference between parents		-0.016***	-0.006***	-0.001	-0.016***	-0.001
		(0.003)	(0.0009)	(0.0003)	(0.002)	(0.0002)
Education Difference	1.Husband	-0.157***	-0.056***	0.001	-0.152***	-0.001
between husband and wife:	more educated	(0.024)	(0.008)	(0.001)	(0.024)	(0.001)
Base: Equally Educated	2. Wife more	-.225***	-0.082***	0.002	-0.228***	0.002
	educated	(0.033)	(0.011)	(0.001)	(0.031)	(0.002)
Sex of First born dummy	=1 if first child	---	---	0.255***	---	0.255***
(Instrument)	is son			(0.003)		(0.003)
	=0 otherwise					
Constant		0.122	---	0.449	1.016	0.449
		(0.128)		(0.008)	(0.124)	(0.008)
Number of observations = 48,194		corr(e.sonpro,e.child_marriage)= 0.172			M1[state] =1	
		(0.015)			(constrained)	
		sd(e.sonpro)=0.112			c.sonpro#M2[state]=1	
		(0.002)			(constrained)	
		Wald test of exogeneity (corr = 0):			var(M1[state])=0.151	
		chi2(1) = 123.07			(0.049)	
		Prob>chi2 = 0.0000			var(M2[state])=0.264	
		Wald chi2(11) = 3361.63			(0.094)	
		Log pseudolikelihood = 6911.982			cov(M1[state],M2[state])= -0.186***	
		Prob>chi2 = 0.0000			(0.063)	
		Akaike's information criterion: -13793.96			var(e.sonpro)=0.013	
		Bayesian information criterion: -13662.22			(0.0003)	
					Log pseudolikelihood = 6907.9265	

Standard errors in parentheses; Std. Err. adjusted for 16 clusters in state;*** p<0.01, ** p<0.05, * p<0.1. M1[state] and M2[state] are latent variables, where var(M1[state]) measures variability of fixed coefficient across states and var(M2[state]) measures variability of slope coefficient of the dependent variable child marriage dummy with respect to 'sonpro'.
Source: Author's estimation of model with DLHS-4 data set using STATA 15 software

Figure 4: Path analysis corresponding to Model 2

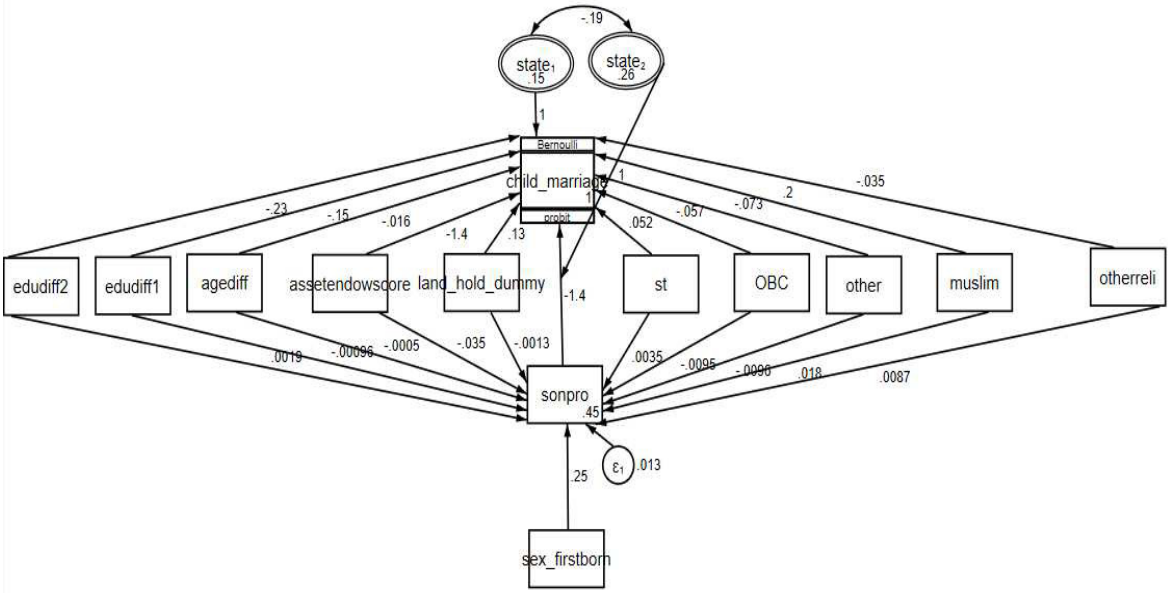


Figure 3 shows the path diagram corresponding to multi-level IV-probit model as described in Table 4.

Discussion of Results:

From Table 4 we observe that in Model 1, Wald test of exogeneity rejects the null hypothesis of no endogeneity in the model (chi2(1) = 123.07 with p value=0).

Model 2 showsthe existence of inter-state variance in incidence of child marriage as the variance of random intercept term is 0.151>0. Thus, the incidence of child daughter marriage varies across surveyed states of India.

Effects of son dominance on the Condition of the Girl Child

Our analysis shows that the incidence of child marriage decreases with rise in the proportion of son in the family at state level, in Model 1 and in Model 2, where this endogenous covariate is instrumented by a dummy variable: sex of first born child in the family. That is, more the number of sons among the total children, the likelihood of early marriage of the girls decreases,

while we control for all other socio economic and demographic factors. From the marginal effect as reported by Model 1, the probability that a daughter is married off before 18 years decreases by 16.9 percentage points in families where son proportion increases by 1 unit at 1 % level of significance.Thus, having more sons may not be the cause for early marriage of the daughters. The reason could be attributed to social norm and belief system.Firstly, due to the 'stopping behaviour' in order to have desired number of sons, a family may end up with more number of daughters than sons.As a result, the family arranges early marriage for these 'unwanted daughters'.Secondly, in a daughter dominant family, parents try to marry off their daughters in order; as a result elder daughters are married off early. Thirdly, the literature shows that level of dowry increases with age of bride (Anderson (2007), Dang et al. (2018)). As a result, in daughter dominant families parents try to marry off their daughters early. Also, Pande and Malhotra (2006) argued that more number of brothers in the family might be regarded as the protection of the girl child from early marriage as the parents has achieved their goal of more sons.Further, the estimated variance of random slope coefficient as reported by Model 2 is positive, implying an interstate variation in effect of son dominance in family on the incidence of child daughter marriage.

Effects of Religion

Both Model 1 and Model 2 show that the likelihood of child marriage is higher in Muslim households vis-à-vis the Hindu families.The Model 1 shows the positive margin of 6.2 percentage points indicating that the daughters from households of Muslim are more likely to be married off (significant at 1 % level) at early age compared to the reference category Hindu, while controlling for all other socio-demographic variables.The fact is in line with the findings of Equality Now (2014) and Adebowale et al. (2012). This also confirms the descriptive findings from the data[27]. Interestingly, this observation is in contrast to the idea of consensual marriage system of Islam where both parties have the freedom and capacity to giveconsent[28].

Effect of Land Ownership:

The incidence of child marriage increases if the household does not own any land at the state level as reported in Model 1 and Model 2. Further, from Model 1 the marginal effect indicates that the probability increases by 5.1 percentage points for households without any land holding. The sample contains around 65.5 percent of the households without any land holding and amongthe families reported for early marriage of their daughter 67.73 percent households have no land.

Effects of Asset and Infrastructure Endowment:

Both Model 1 and Model 2 show that higher level of asset holding reduces the phenomenon of child marriage. The likelihood of child marriage decreases by 48 percent if asset endowment score increases by one percentage point as shown by Model 1.The families with low level of asset values consider girls as their burden for which they have to pay dowry at the time of marriage. Thus, they try to marry off their daughters at early stage of life. Alternatively, in North-East states where bride price is received by the girl's family, the poor families may have incentive to marry off their daughters early. However, if the family is well endowed with

[27]Among the Muslim households, 45.49% families recorded an incidence of child marriage, while this percentage is 37.35% among the Hindus.

[28] Source: https://www.girlsnotbrides.org/wp-content/.../IRW-Islamic-persepctive-on-CM.pdf

resources and basic amenities of life, they might prefer delaying the age at marriage of their daughters.

Effects of Marital attributes of parents:

In terms of age gap of parents, with negative assortative matching, the probability of child marriage decreases as reported by Model 1 and Model 2. The margin reported by Model 1 shows that the probability of child marriage decreases by 0.6 percentage points if age difference of parents increases by one year.Thus, in the families where the age gap between the parents is high (negative assortative marriage), incidence of child marriage in the family is low.

Education difference among parents is measured through completed years of schooling of the couples. The probability of child marriage decreases with negative assortative matching in terms of education. However, marginal effects from Model 1 shows that if father is more educated than mother, then child marriage decreases by 5.6 percentage point whereas it reduces by 8.2 percentage point when mother is more educated than the father compared to equally educated parents. This result is very interesting and brings out the importance of spreading education among the women. An educated woman, who is more aware regarding the vices of early marriage of daughter, will try to protect her daughter.

Effects of Caste:

In case of caste, incidence of child marriage is higher in scheduled tribe(ST) families but lower among households fromgeneral caste (other)compared to the reference category scheduled caste(SC). The marginal effect reported by Model 1 shows that the probability of child marriage of daughters is 2.7 percentage point lower in general caste families but 6.7 percentage point higher in ST families than the SC families.As we have mentioned earlier,according to 2011 census of India the North-East states with higher incidence of child marriages are mostly populated by scheduled tribes.Thus, this result indicates that different traditions and other complex social dynamics of tribal societies in India have raised the incidence of child marriage in recent years.

Determinants of Proportion of Son in the family

The results from Model 1 and Model 2 show that, sex of first born dummy is positively significant implying that in families with first male child have higher number of sons in the family. Also, proportion of son in the family is higher among Muslims and other religion group compared to Hindu households. Interestingly, families with lower asset endowment tend to have less number of sons in the family while controlling for other socio economic and demographic factors. Finally, households belonging to general caste and other backward castes have lower son proportion vis-à-vis the scheduled caste families.

5.Conclusion:

Results from our present study indicates that girls are married off early in the families with more number of girls rather than in son-dominant families while taking in account the interstate variation effect. We observe that, high age difference of parents, high asset level reduces the incidence of early marriage of daughters.But in Muslim families and among schedule tribes the incidence is high.Also, wefind higher level of asset holding reduces the incidence of child daughter marriages. This result has an interesting policy implication.The direct cash transfer mechanism to households can be usedto act as a baitmechanism to push the girl-child towards completing her education at least up to higher secondary level, thereby delaying the marriage and after which she must receive a lump sum amount. This is exactly done in the

KanyashreePrakalpa (2013) and RupashreeProkalpa (2018) adopted by government of West Bengal or the scheme 'ApniBetiApnaDhan' launched by the government of Haryana in the year 1994[29].Various government policies aimed at daughter protection and welfare of the girl child has been applied in India[30]. These programmes try to keep the girls in school and delay the marriage age.However, only announcement of new programmes should not be enough, the local self- government (Panchayat), other government officials at the village level should work in tandem to properly implement these programmes. The result indicates that an educated mother is more likely to reduce the incidence of child marriage in the family than an educated father. This has a policy prescription towards providing better education facilities for women, which in the long run will help to reduce the social evil of girl child marriage. Also,the parents should be informed regarding the adverse health effects of early marriages of daughters.A general awareness must be developed among the parents so that they must realize that the early daughter marriage is a social evil. Sometimes existing social norms and practices induce parents to marry off their daughters before legal age. The government should take necessary steps to raise the consciousness among the parents against these age old practices, so that the innocent girl children are not deprived of their childhood.

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[29]https://www.icrw.org/wp-content/uploads/2016/10/IMPACCT_Hires_FINAL_3_20.pdf

[30]Rajiv Gandhi Scheme for Empowerment of Adolescent Girls (RGSEAG)- SABLASupport to Training and Employment Programme for Women (STEP), RashtriyaMahilaKosh (RMK), SWADHAR: Scheme for Women in Difficult Circumstances, Working Women Hostel Scheme, Kishori Shakti Yojana (KSY), Ujjawala - Scheme to Combat Trafficking, BetiBachaoBetiPadhaoYojana, SukanyaSamriddhiYojana, BalikaSamriddhiYojana

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Appendix 1:

Construction of Asset and Infrastructure Endowment Index:

First we have prepared scores of each individual household for 4 separate dimensions. The dimensions and the indicator variables are listed below:
Each of the Indicator variables are binary in nature (0/1).

Table A1: Details of the dimensions and variables included for Asset and Infrastructure Endowment Score:

Dimensions	Weight	Whether Household have	Weight
Possession of vehicles	1/4	1.Bicycle	1/3
		2.Motorcycle/Scooter	1/3
		3.Car/Jeep	1/3

Possession of Electronic asset	1/4	1.Washing Machine	1/5
		2.Refrigerator	1/5
		3.TV	1/5
		4.Cooler/AC	1/5
		5.Computer without Net connection	1/5
Possession of communication gadgets	1/4	1.Computer with Net connection	1/3
		2.Telephone	1/3
		3.Mobile	1/3
Possession of Infrastructure facility	1/4	1.Access to LPG as fuel for cooking	1/5
		2.Access to electricity connection	1/5
		3.Access to toilet facility[31]	1/5
		4.Access to water pump/tube well	1/5
		5. House made of Puccka building material[32]	

After calculating the scores for each of the dimension we created the Asset Endowment Score using weighted sum of the 4 indices. This is explained below with the example:
For the dimension:Possession of vehicles = 1/3 × (Bicycle + Motorcycle/Scooter +Car/Jeep)
Asset and Infrastructure Endowment Score = ¼ × (Vehicle Score + Electronic Asset Score + Communication Gadget Score + Infrastructure Score)

Appendix 2:

Table A2: Biserial correlation coefficient:

Variables	***Labels***	**Age difference**	**Asset infrastructure-endowment score[33]**	**Proportion of son[34]**
Education Difference	Equally educated	0.028	0.0008	-0.003
	Husband more educated	-0.038	-0.004	0.005
	Wife more educated	0.015	0.004	-0.004
Religion	Hindu	-0.060	0.009	-0.005
	Muslim	-0.076	0.016	0.0216
	Other	0.125	-0.022	-0.009
Caste category	SC	0.025	0.109	-0.003
	ST	0.046	0.210	0.010
	OBC	-0.108	-0.013	0.015

[31]Access to Toilet facility = 0 if household members goes to open field
1 if household has any type of toilet
[32]House made of Puccka house building material = 1 and = 0 if the material is semi Puccka, Kacchha or other
[33]Correlation coefficient of age difference and asset infrastructure-endowment score is -0.0568
[34]Correlation coefficient of age difference and proportion of son is -0.0173
Correlation coefficient of asset and infrastructure score and proportion of son is 0.0176

	Other	0.059	-0.259	-0.022
Land Ownership		-0.025	0.051	0.005
Sex of first born child		0.007	-0.088	-0.717

TableA3: Association between the variables using Tetrachoric Correlation Coefficient:

Variables	**Child marriage**	**Sex of first born child**	**Land**
Child marriage	1		
Sex of first born child	-0.322	1	
Land	-0.066	-0.022	1

TableA4: Association between the variables using Cramer's V

Variables	***Religion***	***Caste***	***Education difference***
Child marriage	0.054	0.117	0.065
Sex of first born child	0.0704	0.082	0.018
Religion		0.301	0.023
Caste			0.043