DETERMINANTS OF CHILD SEX RATIO IN SOUTHERN INDIA: A VILLAGE LEVEL ANALYSIS

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BONAFIDE CERTIFICATE

This is to certify that this project report titled "**Determinants of Child Sex Ratio in Southern India: a village level analysis"** is the bonafide work of **Mr. Mohana Kumaran.V** who has carried out the research under my supervision. Certified, further that to the best of my knowledge, the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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ABSTRACT

The South Indian states have a markedly higher sex-ratio and child sex ratio when compared to the other Indian states, and the Indian average. Studying the determinants of child sex ratio using village level data from the four South Indian states of Andhra Pradesh, Karnataka, Kerala and Tamil Nadu, and controlling for unobserved heterogeneity at village level, the following results were found: a) Female literacy rate which is normally considered a significant determinant was found to be insignificant b) Occupational nature of females indicated by marginal workers and main workers female were found to be significant determinants.

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CHAPTER 1

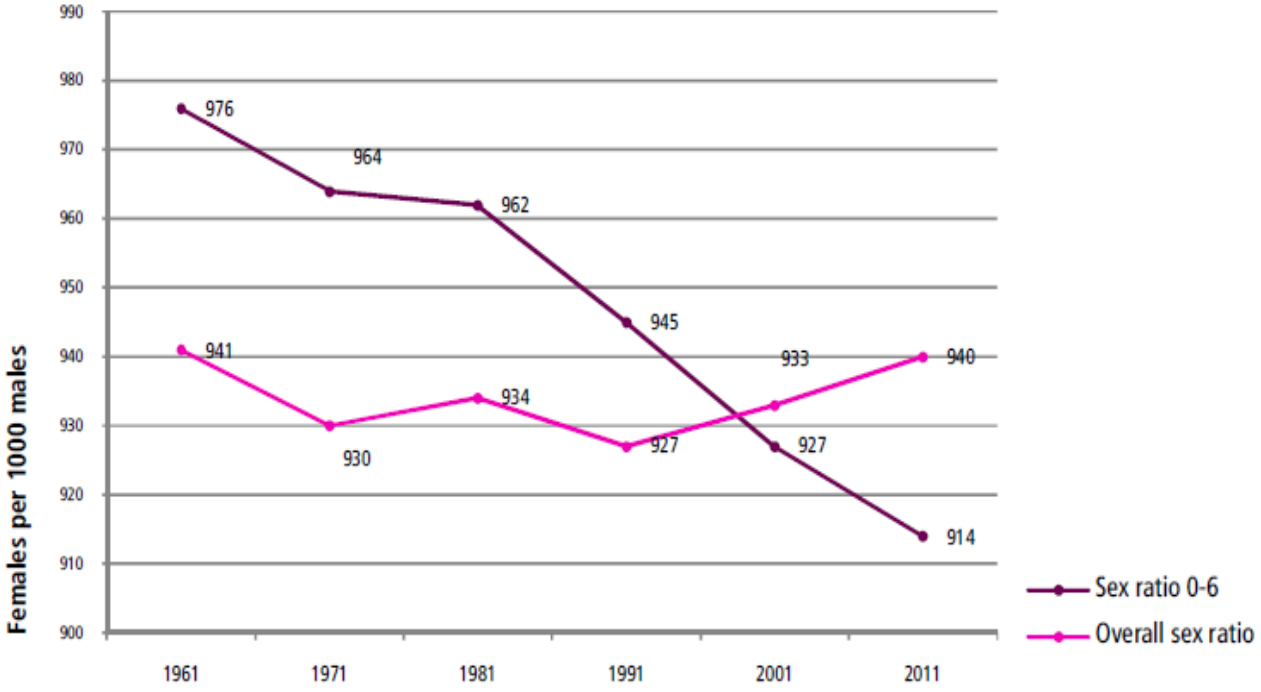
INTRODUCTION:

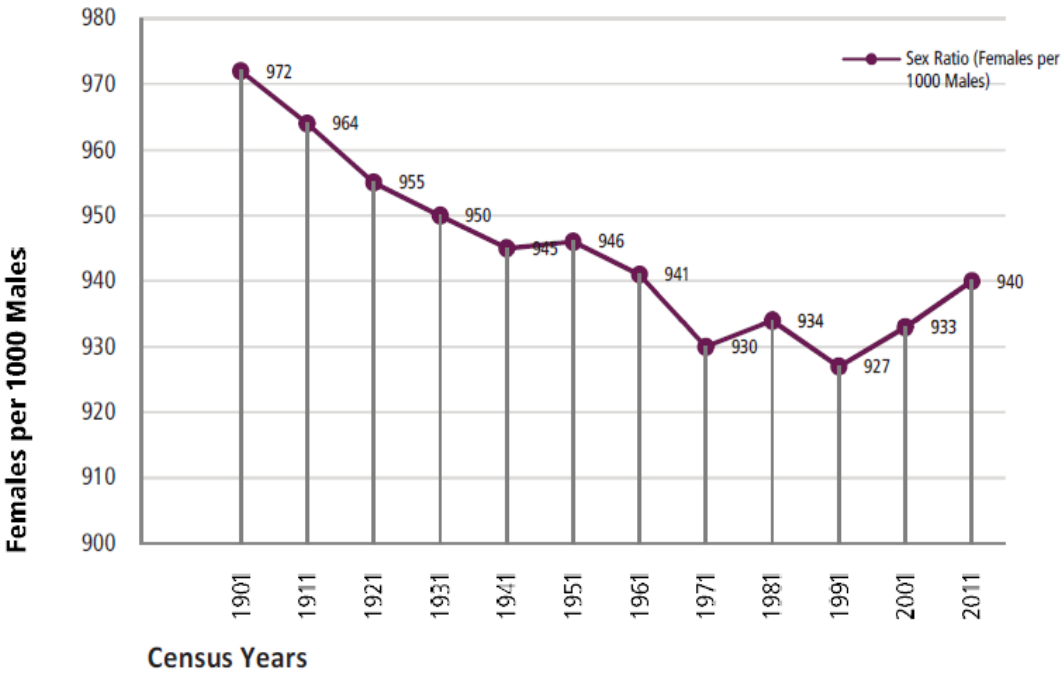
The decline in child sex ratio (0-6 years) from 945 in 1991 to 927 in 2001 and further to 914 females per 1,000 males in 2011, the lowest since independence is cause for alarm, and serious policy re-think. Over the last two decades, the *rate* of decline appears to have slowed but what began as an urban phenomenon has spread to rural areas. This is despite legal provisions, incentive-based schemes, and media messages. Indians across the country, bridging class and caste divides, are deliberately ensuring that girls are simply not born. This artificial alteration of our demographic landscape has implications for not only gender justice and equality but also social violence, human development and democracy.

Instead of evolving a comprehensive national policy response, state policy has, in the main, consisted of seeking to stem the supply of technology that enables sex selection through application of the law — the PCPNDT (Pre-conception and Pre-natal Diagnostic Techniques) Act, bans the use of diagnostic techniques for determining the sex of a fetus. The rationale is that stopping supply of the technology will reduce the demand — for determining the sex of the fetus and aborting if it is female.

On the one hand is the right of females to be born, and of society to protect and preserve a gender balance. On the other hand lies a woman's right under the Medical Termination of Pregnancy Act (enacted in 1971, revised in 1975) to have a safe and legal abortion as part of a whole gamut of reproductive rights. Access to safe and legal abortion for Indian women is already severely limited.

While the number of women per 1,000 men in India has touched its highest figure, 940, since 1971 when it was just 930, the corresponding number for girls below six is just the opposite — the lowest since Independence. Provisional Census data show that the child sex ratio, or the number of girls for every 1,000 boys in the age group 0-6 years, stands at a dismal 914, down from 927 in 2001. The child sex ratio has been in free fall since 1961, when it stood at 976.





India's standing as a country among other countries, is to be deplored. India ranks well below the global average and far below the OECD countries. The situation in immediate neighborhood of India reveals a mixed picture; Pakistan and China show male domination in the sex-ratio, whereas Bangladesh, Sri Lanka, Cambodia and Burma have more females in their populations.

1.1.Total Sex Ratio: Selected Countries (Source: World Factbook 2011)

Country	Total sex ratio(number of males per female)
Australia	1
Belgium	0.96
Canada	0.98
Germany	0.97
United States	0.97
Sweden	0.98
Netherlands	0.98
India	1.08
Pakistan	1.09
Bangladesh	0.93
Sri Lanka	0.97
China	1.06
Cambodia	0.96
Burma	0.99

Punjab and Haryana, which continue to have among the lowest child sex ratios at 846 and 830 respectively in 2011, have improved, up from 798 and 819 during Census 2001. Himachal Pradesh, Gujarat, Tamil Nadu, Mizoram and the Andaman and Nicobar islands are the only other states/UTs that have shown an increase in the child sex ratio.

Though the southern states, Kerala (959), Andhra Pradesh (943), Karnataka (943), and Tamil Nadu (946), all have stronger child sex ratios when compared to the national average of 914 in 2011, in comparison to the child sex ratio in 2001 it is saddening to see how there is very less improvement in Tamil Nadu, fall by a few points in Kerala and Karnataka and a 18-point fall in Andhra Pradesh. However, the decadal decline in child sex ratio of India is less steep from that of the previous decade (1991 to 2001). In 1991, it was 945 and fell to 927 in 2001, a fall of 18 points (1.9%). In 2011, it has fallen to 914, a fall of 13 points (1.4%).

This is only the tip of the demographic and social problems confronting India in the coming years. Skewed sex ratios have moved beyond the states of Punjab, Haryana, Delhi, Gujarat and Himachal Pradesh. Sex selection is now invading parts of the country that used not to practise it. It is an extreme expression of an attitude that says daughters are worth less than sons, a belief that is damaging both to women and to the next generation.

1.2.Child Sex Ratio: Select States (Source: 2001 and 2011 census data)

States/UTs	2001			2011		
	Total	Rural	Urban	Total	Rural	Urban
Punjab	798	799	796	846	843	851
Haryana	819	823	808	830	831	829
Chandigarh	845	847	845	867	862	867
Uttar Pradesh	916	921	890	899	904	879
Madhya Pradesh	932	939	907	912	917	895
Andhra Pradesh	961	963	955	943	942	946
Karnataka	946	949	940	943	945	941
Kerala	960	961	958	959	960	958
Tamil Nadu	942	933	955	946	937	957
India	**927**	**934**	**906**	**914**	**919**	**902**

From 1991-2001, no of districts in the lower ranges of child sex ratio has increased, while in the higher ranges it has decreased. In 1991, there were no districts with child sex ratio below 800 in India, but in 2001, 16 districts were found to be below 800.The number of districts which had Child Sex Ratio above 100 have gone down from 21, in 1991 to 8, in 2001.

1.3.Distribution of Districts by Ranges of Child Sex Ratio (Age Group 0-6 Years) in India
(1991 and 2001)

Ranges of Child Sex Ratio (0-6)	1991			2001		
	Number of Districts	Share of Population		Number of Districts	Share of Population	
		Absolute	Percent		Absolute	Percent
Total	577	836650839	100.00	577	1014651658	100.00
Less than 800	-	-	-	16	22078001	2.18
800-849	1	2573667	0.31	32	47845523	4.72
850-899	68	83487936	9.98	71	155663272	15.34
900-949	181	287907400	34.41	208	381362437	37.59
950-999	306	454010566	54.27	242	403834775	39.80
1000-1049	21	8671270	1.04	8	3867650	0.38

CHAPTER 2

LITERATURE REVIEW

Dyson and Moore(1983) led the studies on how there exists dichotomy in the kinship structure between north and south India, which was found to determine the degree of autonomy enjoyed by women, which in turn would translate its effect on fertility and infant mortality. In contrast to states in the north, southern states were characterized by lower marital fertility, later age at marriage, lower infant and child mortality, and comparatively low ratios of female to male infant and child mortality. The hypothesis and analysis put forward in this paper is often criticised for lack of economic and district controls and is examined with latest data time and again.

District and village level data on sex ratio at birth and infant mortality has been used to examine the extent of daughter deficit within the South-Indian state of Tamil Nadu. (Sharada Srinivasan and Arjun Singh Bedi,2006) A large proportion of daughter deficit has been shown to occur before birth. State level analyses are shown to hide intra state variation, thus making state level analysis of sex ratio seem a redundant exercise. The sex ratio pattern across orders and the number and composition of desired children suggest that in Tamil Nadu, parents intervene in higher order births either by sex-selective abortion or female infanticide, in an attempt to retain a small family while at the same time ensuring that at least one son is born. Daughter deficit is measured both before birth using SRB data from the census and after birth using IMR data. The paper helps highlight the intra state variations. Salem district is shown to have the lowest SRB and 0–1 sex ratio in the state. It also claims a place amongst the country's 10 districts with the lowest rural 0–6 sex ratio. Half the state's districts are shown to have daughter deficit.

The determinants of son-preference at the community level, which in turn affects the sex ratio are regional, state and village-level economic development as measured by access to roads, electricity and health care facilities; and village-level status of women as measured by female literacy and employment outside the home (Pande and Malhotra **(**2006**)**). This paper uses a rural sample of 50,136 ever-married women from the NFHS data (1992-93). Women's education was found to be the most significant factor in reducing son preference.

Hence, female literacy becomes a credible explanatory factor for child sex ratio. Son preference was captured through Mothers' gender preference for their family composition, measured by women's ideal combination of sons and daughters if they could start their families over; and Gender differentials in child health were measured by two variables: (a) *Severe stunting* (using the World Health Organization standard) as the height-for-age in a sample of 14,715 Children ages 6-47 months; and (b) *level of immunizations* among a sample of 25,549 children ages 12-60 months.

Female literacy rate and occupational status of male workers engaged as agricultural labourers have been shown to have a positive impact on sex ratio (Chakrabarthi and Chaudhuri(2011)) . Using, both district and village/ward level data, the determinants of child sex ratio (0-6) were determined at both the levels in Tamil Nadu. A regional diversity is established within the state. This paper concludes that, programmes intended to improve the status of women, particularly their education, would have a more desirable effect than short term responses like providing financial incentives.

CHAPTER3

POLICY MEASURES

The Pre-Natal Diagnostic Techniques (Regulation and Prevention of Misuse) Act, 1994

An Act to provide for the prohibition of sex selection, before or after conception, and for regulation of prenatal diagnostic techniques for the purposes of detecting genetic abnormalities or metabolic disorders or chromosomal abnormalities or certain congenital malformations or sex-linked disorders and for the prevention of their misuse for sex determination leading to female foeticide. This Act enables, cancellation of permits of ultrasound scanners which are misused. Though a very strong Act, effective implementation of it has been quite a problem.

Cradle Baby Scheme in Tamil Nadu

Cradle baby scheme, was introduced in 1992 as a measure against the high rate of female infanticide in the district (over 3000 that came to light every year).

Under the scheme, vulnerable locations within major towns were identified – primary health centres, government hospitals, temples, orphanages – and cradles were placed there. The idea was to suggest to parents of newborn babies (read daughters) who did not want to keep their children that there was an option available to killing them at birth.

The scheme kicked off in Salem, which had among the worst sex ratios in the state and was immediately extended to four other districts: Madurai, Theni, Dharmapuri and Dindugal.

Bhagyalakshmi Scheme in Karnataka

Karnataka was the first state in the country to announce and implement a group insurance scheme in 2006 for girls below poverty line. Under the Bhagyalakshmi scheme, any girl born after March 31, 2006, is eligible to get Rs.10,000 in her name and upon completion of 18 years, she is eligible to withdraw this amount with the interest. The scheme also has other benefits like health insurance, scholarship on passing Class X and more.

Bhagyalakshmi scheme landed in trouble after the Life Insurance Corporation of India (LIC), informed the State Government that it cannot assure the maturity amount to the beneficiaries from the coming year. Under the scheme, the Government provides insurance cover to girl children soon after the birth (one year after the birth). The first two girl children in a family will get the benefit. These children can also avail themselves educational loan and medical facilities using these bonds. The Karnataka government could not issue any new bonds this year.

CHAPTER 4
METHODOLOGY

Methodology(I):

Since, the Southern Indian states have markedly higher 0-6 sex ratio compared to other states in India, studying the data to show variations at village level is quite interesting. Using Village/Ward level data from 2001 census and pooling all four South Indian states together for village level data and using appropriate dummies, I use a simple linear regression model, for the 66,724 observations as follows.

$$Sexratio_{06} = \alpha + \beta_1 sc_{pop} + \beta_2 st_{pop} + \beta_3 f_{lit} + \beta_4 m_{lit} + \beta_5 f_{marg} + \beta_6 m_{marg} + \beta_7 f_{main} + \beta_8 m_{main} + \beta_9 f_{agri} + \beta_{10} m_{agri} + \beta_{11} an_{dummy} + \beta_{12} ka_{dummy} + \beta_{13} tn_{dummy}$$

Sc_{pop} is the ratio of the scheduled caste population to the total population, St_{pop} is the ratio of the scheduled tribe population to the total population, these variables are included to see if places with a higher proportion of marginalized castes has a positive impact on child sex ratio as demonstrated in previous literature, F_{lit} is the number of female literates per 1000 persons, similarly, M_{lit} is the number of male literates per 1000 persons. Throughout the literature female literacy is seen to be a prime determinant of child sex ratio.

F_{marg} and M_{marg} are the number of male and female marginal workers(workers working less than six months) per 1000 persons. F_{main} and M_{main} are the number of male and female main workers(workers working more than six months). F_{agri} and M_{agri} are the number of main male and female workers working as agricultural labour as a proportion of total main workers. These variables are included to see if the employment patterns affect the child sex

ratio in any village. An_{dummy} , Ka_{dummy} and Tn_{dummy} are state dummy variables, hence Kerala is taken as the base state.

Methodology(II):

For our estimation purpose, using the same variables, we form a panel, where the dimensions of the panel are district and village respectively. We control for unobserved heterogeneity at the district level. Standard errors are robust to heteroscedasticity.

CHAPTER 5

RESULTS AND CONCLUSION

Results(I)

Variable	Coef.	Std. Err.	t	P>t
sc_pop	0.0317591	0.0068962	4.61	0
st_pop	0.1097532	0.0055662	19.72	0
m_lit	-0.2860741	0.0272135	-10.51	0
f_agri	-0.1524564	0.035217	-4.33	0
f_lit	0.2046762	0.0267564	7.65	0
m_agri	0.0649047	0.0337296	1.92	0.054
f_margwork	0.0441666	0.0219882	2.01	0.045
f_mainwork	0.094773	0.0212668	4.46	0
m_mainwork	-0.0401542	0.0384176	-1.05	0.296
m_margwork	0.0066735	0.047229	0.14	0.888
An_{dummy}	0.0237097	0.0094812	2.5	0.012
Ka_{dummy}	0.0129475	0.0092785	1.4	0.163
Tn_{dummy}	-0.0006874	0.0092852	-0.07	0.941
constant	0.9905674	0.0143583	68.99	0

After running the regression the R-squared value of the model with linear regression is found to be quite low, this could be due to unobserved heterogeneity. Hence, any meaningful conclusion cannot be made with these results. We therefore shift to Methodology (ii).

Results(II)

Variable	Coef.	Std. Err.	t	P>t
sc_pop	0.0258667	0.0101398	2.55	0.012
st_pop	0.0820185	0.017887	4.59	0
m_lit	-0.2375139	0.0862338	-2.75	0.007
f_agri	-0.0360951	0.0474386	-0.76	0.449
f_lit	0.0862414	0.0816834	1.06	0.294
m_agri	0.0100105	0.0358036	0.28	0.78
f_margwork	0.0566774	0.0330508	1.71	0.09
f_mainwork	0.0714184	0.0263262	2.71	0.008
m_mainwork	-0.0873681	0.0570809	-1.53	0.129
m_margwork	-0.063778	0.0634474	-1.01	0.317
cons	1.031544	0.0176265	58.52	0
R-Squared	0.3006			

Using panel data with district and village as dimensions, and controlling heterogeneity at the district level, R-Squared is 0.3006. Sc_{pop} and St_{pop} are found to be significant, hence as demonstrated in previous literature marginalized castes have a positive impact on the child sex ratio, explained by their positive coefficients . F_{lit} , female literacy is found to be insignificant. M_{lit} , male literacy is found to be significant and also has a negative coefficient. F_{marg} (Marginal work female) and F_{main} (Main work female), both are found to be significant and both have a positive coefficient hence having a positive impact on the child sex ratio. M_{marg} , M_{main} , F_{agri} and M_{agri} which are Marginal work male, Main work male, Agricultural Labourers female and Agricultural Labourers female respectively are found to be insignificant.

5.1. Top and bottom quartile Tamil Nadu, 1991 and 2001

Name	1991	2001	Name
Thiruvarur	977	979	The Nilgiris
Pudkkottai	976	972	Chennai
Kancheepuram	974	970	Thiruvarur
Viluppuram	974	968	Kanniyakumari
Kanniyakumari	970	964	Ramanathapuram
The Nilgiris	968	963	Coimbatore
Nagpattinam	968	963	Nagpattinam
Coimbatore	966	961	Kancheepuram
Karur	945	937	Perambalur
Dindigul	934	930	Dindigul
Erode	929	930	Karur
Madurai	928	926	Madurai
Dharampuri	905	891	Theni
Theni	896	889	Namakkal
Namakkal	891	869	Dharampuri
Salem	830	851	Salem

Villuppuram and Pudukkotai found in the top quartile in 1991 among districts in Tamil Nadu, are nowhere to be found in the top quartile in 2001. Chennai and Thiruvarur have entered the top quartile in 2001. The bottom quartile in 1991 and 2001 remain almost the same, Salem is still the district with the worst child sex ratio 830 in 1991 and 851 in 2009. Dharmapuri, Theni, Namakkal and Salem still remain the four worst districts in terms of child sex ratio. These are the districts that form the infamous infanticide belt in Tamil Nadu.

5.2. Top and bottom Quartile of Karnataka, 1991 and 2001.

	1991		2001
Chickmagalur	978	Kodagu	977
Kolar	971	Kolar	976
Tumkur	970	Bijapur	971
Hassan	967	Mysore	970
Dakshina Kannada	966	Bidar	967
Bijapur	956	Bangalore Rural	941
Belgaum	955	Bangalore Urban	940
Dharwar	952	Gulbarga	937
Bangalore Rural	950	Mandya	937
Uttar Kannada	949	Belgaum	924

In Karnataka, Kolar is the only district that remains in the top quartile, whereas in the bottom quartile Bangalore rural and Belgaum remain. Uttara Kannada is the worst district in terms of child sex ratio in 1991. Belgaum is the worst district in Karantaka in terms of child sex ratio in 2001.

Conclusion:

Contrary to the expected result female literacy which was expected to be significant was found to be insignificant, but both Marginal work female and Main work female are found to be significant. Hence, among the policies that improve the status of women, emphasis on policies which improve the occupational status and nature, of women is much needed.

In order to facilitate women's increasing participation in the workforce (both self-employment as well as salaried employment) and to improve their economic status, however, a number of existing measures will have to be strengthened or new measures introduced. Some of these are 30 per cent reservation policy for women should be made statutory as in the case of SC and ST reservation. It should also be extended to all categories of staff. Removal of constraints with regard to its implementation and periodical monitoring are

essential. It is essential to remove biases in promotional opportunities in the case of gender-differentiated cadres and increase the representation of women in leadership positions of trade unions of mixed cadres.

A few other traditions also need to be changed, such as the gender-based allocation of jobs in some departments (example, in Tamil Nadu all health inspectors are men and village health nurses (VHNs) are women in the Department of Public Health), provision of parental medical cover to male staff but not to female staff, and absence of maternity leave for unwed mothers and single women seeking to adopt.

Marginalized castes (SC/ST) still tend to have a positive impact on child sex ratio, the analysis behind why they do, is an interesting case for further study.

CHAPTER 6

Sources of Data:

1. Census of India 1991 and 2001.

2. Provisional Population Totals 2011.

References:

1. S.Srinivasan and A.S.Bedi (2006), "*Daughter Elimination in Tamil Nadu, India: A Tale of Two Ratios*" Journal of Development Studies, Vol. 44, No. 7, 961–990

2. A.Chakrabarti and K.Chaudhuri (2011), "*Gender Equality in Fertility Choices in Tamil Nadu A Myth or a Reality?"* Journal of South Asian Development, 6(2), 195-212

3. R.Pande and A.Malhotra (2006), "*Son preference and Daughter neglect in India: What happens to living girls?"*

4. T.Dyson and M.Moore (1983), "*On Kinship Structure, Female Autonomy and Demographic Behaviour in India*" Population and Development Review, 9(1), 35-60

5. *Tamil Nadu Human Development Report* (2003), Government of Tamil Nadu, Social Science Press, New Delhi.

6. *Andhra Pradesh Human Development Report* (2007), Government of Andhra Pradesh, Centre for Economic and Social Studies, Hyderabad.

7. *Kerala Human Development Report* (2005), Government of Kerala in association with State Planning Board, Government of Kerala.

8. *Karnataka Human Development Report* (1999), Government of Karnataka in association with Planning and Statistics Department, Government of Karnataka

APPENDIX

Table of explanatory variables.

Symbol	Variable	Description
$Sexratio_{06}$	Child Sex Ratio	Ratio of female to male population under 7.
st_{pop}	ST population (%)	Proportion of Scheduled Tribe population to Total population
sc_{pop}	SC population (%)	Proportion of scheduled caste population to total population
m_{marg}	Marginal Work male	No of males involved in work less than six months a year(per 1000 persons)
f_{marg}	Marginal Work female	No of females involved in work less than six months a year(per 1000 persons)
m_{main}	Main Work male	No of male workers working more than six months(per 1000 persons)
f_{main}	Main Work female	No of female workers working more than six months(per 1000 persons)
m_{agri}	Agricultural Labourers male	No of Main male workers working as agricultural labourers
f_{agri}	Agricultural Labourers female	No of Main female workers working as agricultural labourers
m_{lit}	Male Literacy rate	No of male literates (per 1000 persons)
f_{lit}	Female Literacy rate	No of female literates (per 1000 persons)