

APPENDIX 1

CALCULATION OF THE GENDER DISPARITY INDICES

The various indices of gender disparity presented in this analysis are based on Sopher's method of measuring disparity in the possession any given characteristic between two groups (Sopher, 1974). The two groups in our case, obviously, are males and females in the age group 0-6 years. Mathematically, the disparity index (D_i) can be expressed as:

$$D_i = \log (X_2/X_1) + \log [(P-X_1)/P-X_2] \quad (1)$$

In this equation, X_2 is chosen such that it greater than X_1 , and P is a constant which generally assumes the value of 100, as the method is especially useful in situations where the variables have been expressed as percentages. This has been mostly the case in our calculations, except for the calculation of the gender disparity index in mortality where P has been taken as 1000, since mortality variables are measured in terms of the number of occurrences per thousand population.

The particular feature of this index which makes it very useful for our analysis is that it is additive in nature and a composite index can be derived from individual indices as follows:

$$Z = (1/n) \sum D_i \quad (2)$$

where, i runs from 1 to n (total number of indices included), and refers to the individual disparity indices.

Specifically, the NFHS presents several measures relating to each of the health related indicators selected in this analysis. Using Sopher's method, we could thus

incorporate the information on all these separate measures together usefully to form the following indices:

(a) The index of gender disparity in nutrition: This index includes the percent of children (males or females) underweight, percent stunted and percent wasted.

(b) The index of gender disparity in childcare: This index has only a single component- percent of children (12-23 months old) who have received full vaccination. Even though other indicators of childcare, like the percent of children who have received medical attention during specific ailments (diarrhoea or ARI), are available from NFHS, they vary according to the time of the year that the surveys have been conducted and hence are not comparable overtime (IIPS, 2007).

(c) The index of gender disparity in mortality: This includes the infant mortality rate (deaths between ages 0 and 1) and the child mortality rate (deaths between ages 1 and 4).

APPENDIX 2

TRENDS IN CONTRACEPTIVE USE (PERCENTAGE) AMONG CURRENTLY MARRIED WOMEN, 15-49 YEARS: 1992-2005

State	Any method	female sterilization	male sterilization	IUD	pill	Condom
Arunachal						
1990-92	23.6	10.3	0.4	4.6	3.2	0.7
1996-98	35.4	20.6	0.1	4.2	7.3	0.7
2003-05	43.2	22.5	0.1	3.4	8.1	2.8
Assam						
1990-92	43	12.2	2.4	0.9	2.8	1.7
1996-98	43.3	15.7	1	1.9	6.3	1.8
2003-05	56.5	13	0.2	1.3	10.3	2.3
Manipur						
1990-92	34.9	10.9	2.9	6.7	2.4	1.2
1996-98	38.7	14.4	1.1	6.8	2.2	1.3
2003-05	48.7	8.2	0.5	5.3	5.3	4.1
Meghalaya						
1990-92	20.7	9.4	0.6	2.2	2.4	0.5
1996-98	20.2	6.5	0	3.3	4.5	1.3
2003-05	24.3	9.5	0.1	1.5	4.9	2.4
Mizoram						
1990-92	53.8	44.5	0.1	5.1	2.5	0.7
1996-98	57.7	45.2	0.1	5.4	5.4	0.9
2003-05	59.9	42.9	0.0	4.7	10.6	1.4
Nagaland						
1990-92	13	6.3	0.1	2	2.1	2.1
1996-98	30.3	12.3	0	7.7	2.5	1.8
2003-05	29.7	9.9	0	5.2	4.7	2.6
Sikkim						
1990-92	-	-	-	-	-	-
1996-98	53.8	22.4	2.4	5.6	9.5	1.5
2003-05	57.6	21.2	4.5	3.0	12.8	4.1
Tripura						
1990-92	56.4	16.9	2.4	1.5	6.4	1.6
1996-98	55.5	26.1	0.6	1.9	13.5	1.4
2003-05	65.7	17.6	0.5	0.9	21.8	3.2

Source: Compiled from IIPS and ORC Macro, 1995; 2000; 2007

APPENDIX 3

INFANT MORTALITY AMONG THE NORTH-EASTERN STATES, 1990-92 TO 2003-05

State	INFANT MORTALITY			CHILD MORTALITY		
	1990-92	1996-98	2003-05	1990-92	1996-98	2003-05
Arunachal Pradesh	40.0	63.1	60.7	33.3	37.4	28.8
Assam	88.7	69.5	66.1	58.7	21.4	20.2
Manipur	42.4	37.0	29.7	20.2	19.9	12.6
Meghalaya	64.2	89.0	44.6	24.3	36.2	27.1
Mizoram	14.6	37.0	34.1	14.9	18.4	19.5
Nagaland	17.2	42.1	38.3	3.6	22.7	27.5
Sikkim	-	43.9	33.7	-	28.4	6.7
Tripura	75.8	-	51.5	31.2	-	8.2
India	78.5	67.6	57.0	33.4	29.3	18.4

Source: Compiled from IIPS and ORC Macro, 1995; 2000; 2007

APPENDIX 4

PERCENTAGE VACCINATED AMONG CHILDREN 12-23 MONTHS AND PERCENTAGE OF CHILDREN LESS THAN FOUR YEARS OF AGE SUFFERING FROM DIARRHOEA, NORTH-EASTERN STATES, 1990-2005

State	Percent vaccinated among children 12-23 months			Percent of children less than four years suffering from diarrhea		
	1990-92	1996-98	2003-05	1990-92	1996-98	2003-05
Arunachal	22.5	20.5	28.4	17.6	23.4	14.9
Assam	19.4	17.0	31.4	6.3	8.2	8.1
Manipur	29.1	42.3	46.8	12.4	16.6	9.9
Meghalaya	9.7	14.3	32.9	8.3	21.8	5.7
Mizoram	56.4	59.6	46.5	22.3	23.0	11.0
Nagaland	3.8	14.1	21.0	11.2	21.7	6.4
Sikkim	-	47.4	69.6	-	31.0	16.5
Tripura	19.0	-	49.7	3.6	-	8.3
India	35.4	42.0	43.5	10.0	19.2	9.0

Source: Compiled from IIPS and ORC Macro, 1995; 2000; 2007

APPENDIX 5

STABILITY OF ELECTED GOVERNMENTS (POLITICAL STABILITY) IN NORTH-EASTERN STATES OF INDIA

States	Years for which Legislative Assembly elections were conducted	Average tenure of elected government* (years)
Arunachal	1978, 1980, 1984, 1990, 1995, 1999, 2004, 2009	3.87
Assam	1951, 1957, 1962, 1967, 1972, 1978, 1983, 1985, 1991, 1996, 2001, 2006, 2011	4.62
Manipur	1967, 1972, 1974, 1980, 1984, 1990, 1995, 2000, 2007, 2012	4.09
Meghalaya	1972, 1978, 1983, 1988, 1993, 1998, 2003, 2008	4.5
Mizoram	1972, 1978, 1979, 1984, 1987, 1989, 1993, 1998, 2003, 2008	3.6
Nagaland	1964, 1969, 1974, 1977, 1982, 1987, 1989, 1993, 1998, 2003, 2008	4.0
Tripura	1967, 1972, 1977, 1983, 1988, 1993, 1998, 2003, 2008	4.56
Assam, Manipur and Tripura (Combined)		4.42
Arunachal Pradesh, Meghalaya, Mizoram, Nagaland, Sikkim (Combined)		3.99

Note: *(Total number of years between first and most recent State Legislative Assembly election) / (Number of times elections were held during this period).

Source: Election Commission of India, various years.

APPENDIX 6

VALUES OF THE INDEX OF ETHNIC DIVERSITY (HERFINDAHL-HIRSCHMAN INDEX) FOR THE NORTH-EASTERN STATES

State	Value of the Ethnic Diversity Index
Arunachal	0.97
Assam	0.99
Manipur	0.98
Meghalaya	0.67
Mizoram	0.46
Nagaland	0.16
Sikkim	0.97
Tripura	0.96

Source: Author's calculations based on number and relative population sizes of ST groups in respective states.

APPENDIX 7

Appendix 7.1: Regression Diagnostics for 1991 OLS Regression

1. Omitted Variable Test (ovtest and linktest)

Ramsey RESET test using powers of the fitted values of TFR, 1991

Ho: model has no omitted variables

F(3, 47) = 1.32

Prob > F = 0.2783

Linktest for Specification Error, 1991

tfr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
-----+-----						
_hat	1.867212	.9533424	1.96	0.055	-.0411099	3.775534
_hatsq	-.0983896	.1076814	-0.91	0.365	-.3139374	.1171582
_cons	-1.866272	2.078132	-0.90	0.373	-6.026105	2.293561

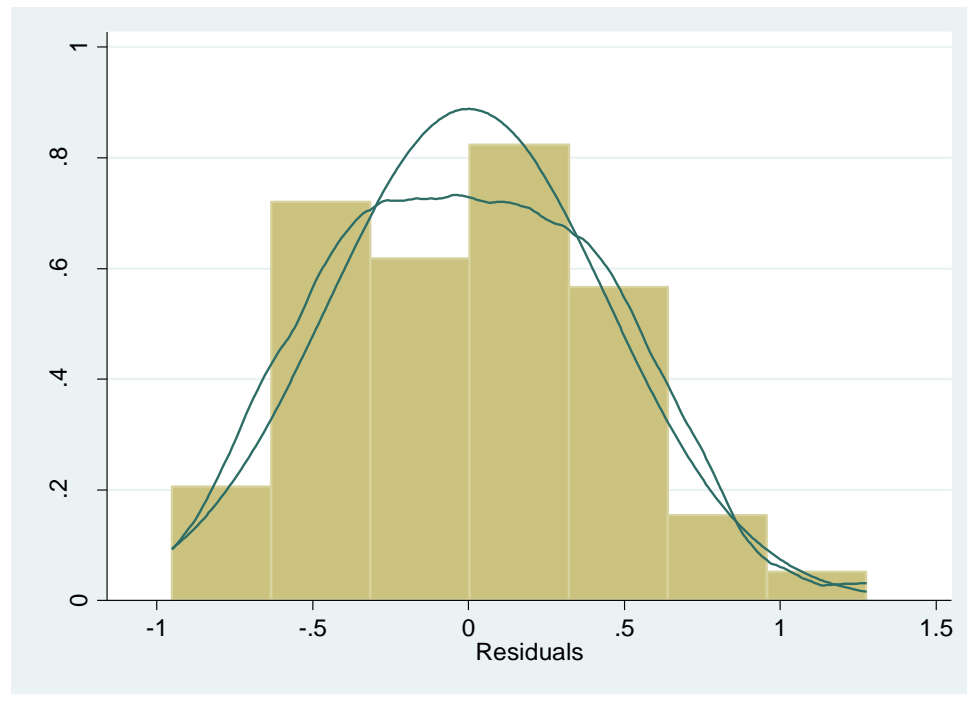
RESULT: No significant specification error or omitted variables in estimated OLS model for 1991.

2. Test for normality of residuals (Shapiro-Wilk W test for normal data and Kernel density plot of residuals)

Shapiro-Wilk W test for normal data, 1991

Variable	Obs	W	V	z	Prob>z
-----+-----					
e	61	0.98585	0.780	-0.537	0.70436

Kernel Density Plot of Residuals, 1991



RESULT: Residuals for 1991 OLS are normally distributed.

Appendix 7.2: Regression Diagnostics for 2001 OLS Regression

1. Omitted Variable Test (ovtest and linktest), 2001

Ramsey RESET test using powers of the fitted values of TFR, 2001

Ho: model has no omitted variables

F(3, 38) = 1.53

Prob > F = 0.2223

Linktest for Specification Error, 2001

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
tfr						
hat	-.1104569	.7375566	-0.15	0.882	-1.592632	1.371719
hatsq	.1310676	.0863163	1.52	0.135	-.0423915	.3045266
cons	2.167005	1.477795	1.47	0.149	-.8027349	5.136745

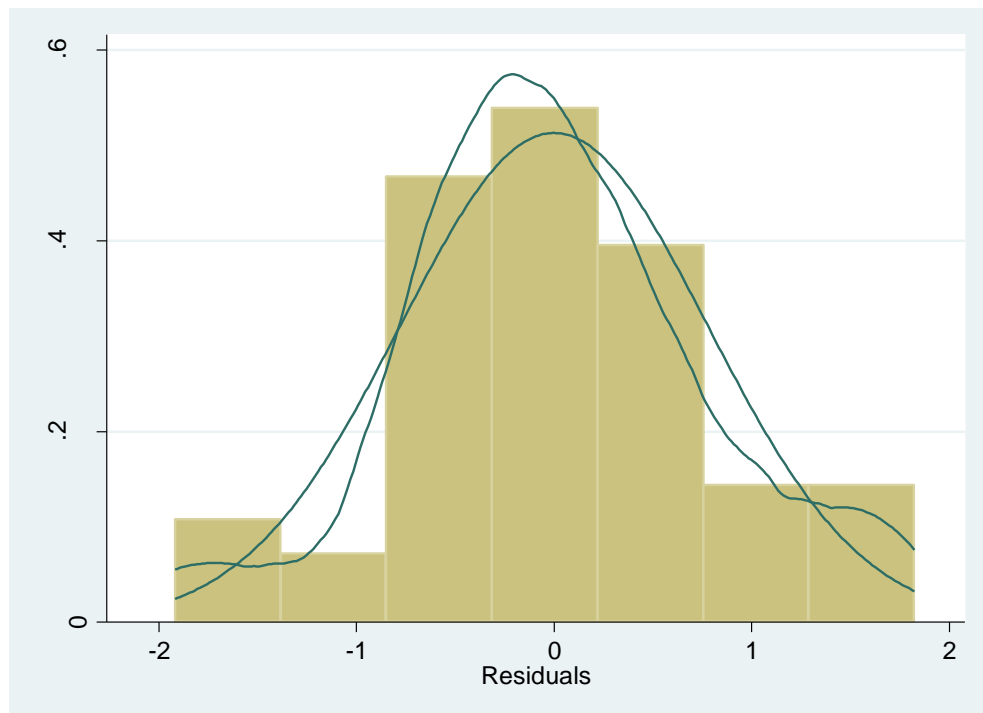
RESULT: No significant specification error or omitted variables in estimated OLS model for 2001

2. Test for normality of residuals (Shapiro-Wilk W test for normal data and Kernel density plot of residuals)

Shapiro-Wilk W test for normal data, 2001

Variable	Obs	W	V	z	Prob>z
e	52	0.97171	1.372	0.677	0.24927

Kernel Density Plot of Residuals, 1991



RESULT: Residuals of 2001 OLS are normally distributed.

APPENDIX 8

RESULTS OF ESTIMATION OF SPATIAL LAG MODEL FOR 1991 and 2001

Variables	1991	2001
Constant	0.788* (1.85)	-0.237 (0.04)
Female literacy rate	-0.031*** (4.25)	-0.039*** (3.15)
Gender gap in literacy	-0.027* (1.96)	-0.026 (0.89)
Child sex ratio	-0.001 (0.22)	0.009 (1.62)
Urbanization	-0.019*** (2.67)	0.005 (0.44)
Scheduled Tribes	0.011*** (3.00)	0.024** (2.54)
Christianity	0.014 (1.05)	-0.063** (1.99)
Crime	0.0001 (1.10)	-0.001 (1.42)
Ethnic diversity	-1.502*** (2.99)	-2.579*** (3.51)
Christianity and Scheduled Tribe interaction term	0.0000 (0.52)	0.001 (1.58)
Ethnic diversity and crime interaction term	-0.0001 (0.63)	0.001 (1.35)
rho	-0.0525 (0.10)	-0.218 (0.38)
R ²	0.68	0.68
Sample Size	62	52

Note: (a) Figures in parentheses are the absolute z ratios.

(b) * significant at 10 percent level, ** significant at 5 percent level*** significant at 1 percent level

(c) All standard errors are heteroscedasticity robust

Diagnostics for Spatial Dependence, 1991

Test	Statistic	df	p-value
Spatial error:			
Moran's I	2.158	1	0.031
Lagrange multiplier	0.430	1	0.512
Robust Lagrange multiplier	1.528	1	0.216
Spatial lag:			
Lagrange multiplier	0.006	1	0.940
Robust Lagrange multiplier	1.103	1	0.294

Diagnostics for Spatial Dependence, 2001

Test	Statistic	df	p-value
Spatial error:			
Moran's I	1.624	1	0.104
Lagrange multiplier	0.068	1	0.794
Robust Lagrange multiplier	0.755	1	0.385
Spatial lag:			
Lagrange multiplier	0.074	1	0.786
Robust Lagrange multiplier	0.761	1	0.383

Overall Result: Insignificant spatial dependence in the data.

APPENDIX 9

SOCIO-ECONOMIC AND REPRODUCTIVE DIFFERENTIALS BETWEEN SCHEDULED TRIBES AND OTHERS: 2003-05

States	Teenage pregnancy (percent who have begun child bearing)		Gender preference (men who want more sons than daughters)		Unmet need for FP		Current use of Contraception (any method)		IMR		UD5 Mortality	
	ST	OTHERS	ST	OTHERS	ST	OTHERS	ST	OTHERS	ST	OTHERS	ST	OTHERS
Arunachal Pradesh	12.3	22.9	35.9	23.6	17.3	18.5	41.2	49.4	67.6	48.7	100.9	78.6
Assam	11.9	20.3	19.0	18.8	12.8	10.9	56.6	55.5	59.0	74.0	83.2	100.9
Manipur	8.7	6.7	40.3	34.2	16.3	11.3	30.7	54.6	51.2	25.8	71.4	37.9
Meghalaya	8.4	7.4	20.3	24.1	25.7	12.8	20.1	43.5	-	-	-	-
Mizoram	10.1	-	-	-	-	-	-	-	-	-	-	-
Nagaland	4.7	24.7	28.7	25.8	26.4	23.2	31.6	33.4	45.8	33.8	-	-
Sikkim	12.2	5.0	16.4	15.3	15.7	20.7	60.1	49.0	28.9	48.7	35.9	59.9
Tripura*	24.4	18.7	22.4	11.9	17.8	9.7	53.7	33.4	44.8	29.0	-	-

Note: * refers to neonatal mortality

Source: IIPS, 2007