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Growth, Health and Gender Imbalance : Evidence from India

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Growth, Health and Gender Imbalance: Evidence from India

Abhishek Kumar[1] and Arup Mitra[2]

Abstract

This paper revisits the issue of imbalanced gender ratio in the backdrop of the growth-health-poverty nexus which is widely documented in the literature. Based on the state level panel data from India the simultaneous equation model attempted in the study is indicative of the adverse impact of poor health condition on gender ratio, bringing out the gender inequality involved in the health status of the population. On the other hand, improvement in health services and health outcome can raise the survival of girl children and women, resulting in an increase in the overall gender ratio. Further, with higher gender ratio (decline in masculinisation) IMR is seen to decrease, suggesting the beneficial effect of greater presence of women in the population on survival of girl children, especially. Declining gender ratio in the process of economic growth is discernible, implying that growth alone is not sufficient to curb gender inequality. Female labour force participation rate is seen to have favourable effects on gender ratio, indicating the wide range of social and economic implications of women's access to resources.

Keywords: gender ratio, female labour force, growth, health, poverty

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1. Analytical Frame

Regions with higher male to female ratio usually witness greater control of women by men and subsequently insignificant avenue for women in the decision making process manifested in terms of a number of development indicators such as low enrolment in education, poor health status and insignificant participation in labour market. Higher fertility rates and greater domestic violence are seen as means of subjugating women. Besides, societies with more masculine sex ratio unravel higher crime rates in general (Mayer et. al., 2008) and more so against women (South et. al., 2012) though Oldenburg's (1992) perception of reverse causality that sex ratio tends to be more masculine in societies which are violence prone and thus require muscle power to protect property, may be more imaginary than being realistic. Scarcity of women does not necessarily raise their value, applying the simple supply-demand rule of economics to the gender division of population. In masculine societies women with poor socio-economic status are not able to raise their price or reduce the dowry amount in spite of being less in number. Men continue to enjoy the monopoly power in deciding the groom-price and to this pressure women simply succumb. Rather with access to education, health and income which in turn can empower them to reverse the poor social and cultural practices, women's status improves and also allows the female foetus to survive, contributing to a balanced sex ratio (Dyson and Moore, 1983). On the other hand, as mentioned above, women scarce societies impose more restrictions on them resulting in poor human capital formation, poor health and low labour force participation rate, 'reinforcing gendered female roles such as reproduction, domestic work and care work' (Kaur, 2013). Their large presence determines through demonstration effect their access on a large scale to education, health and overall empowerment and participation in the decision making process. So on the whole, a bidirectional causality running from improvement in female health, education and income to their survival, and from a balanced gender ratio to greater accessibility to development and empowerment can be expected.

Turning to economic growth we do not get to see its immediate positive impact on gender equality – the gender Kuznets curve in fact suggests an increase in gender inequality in the initial stages of growth and a decline only beyond a certain threshold limit (Eastin and Prakash, 2013). At higher levels of growth which provides improved health facilities and access to education women labour market participation may improve enabling them to have a say in the decision making process (Agarwal and Srivastava, 2009; Maitra, 2004). For example, when it comes to gender selective abortion, the educated mothers with job market participation and access to income can stand up to the challenges faced within the household. Besides, the nutrition and health status of the girl children improves significantly with a rise in mother's accessibility to resources. So both health outcome and gender ratio (female to male) can improve in relation to the availability of health infrastructure, women's education and awareness and their access to resources.

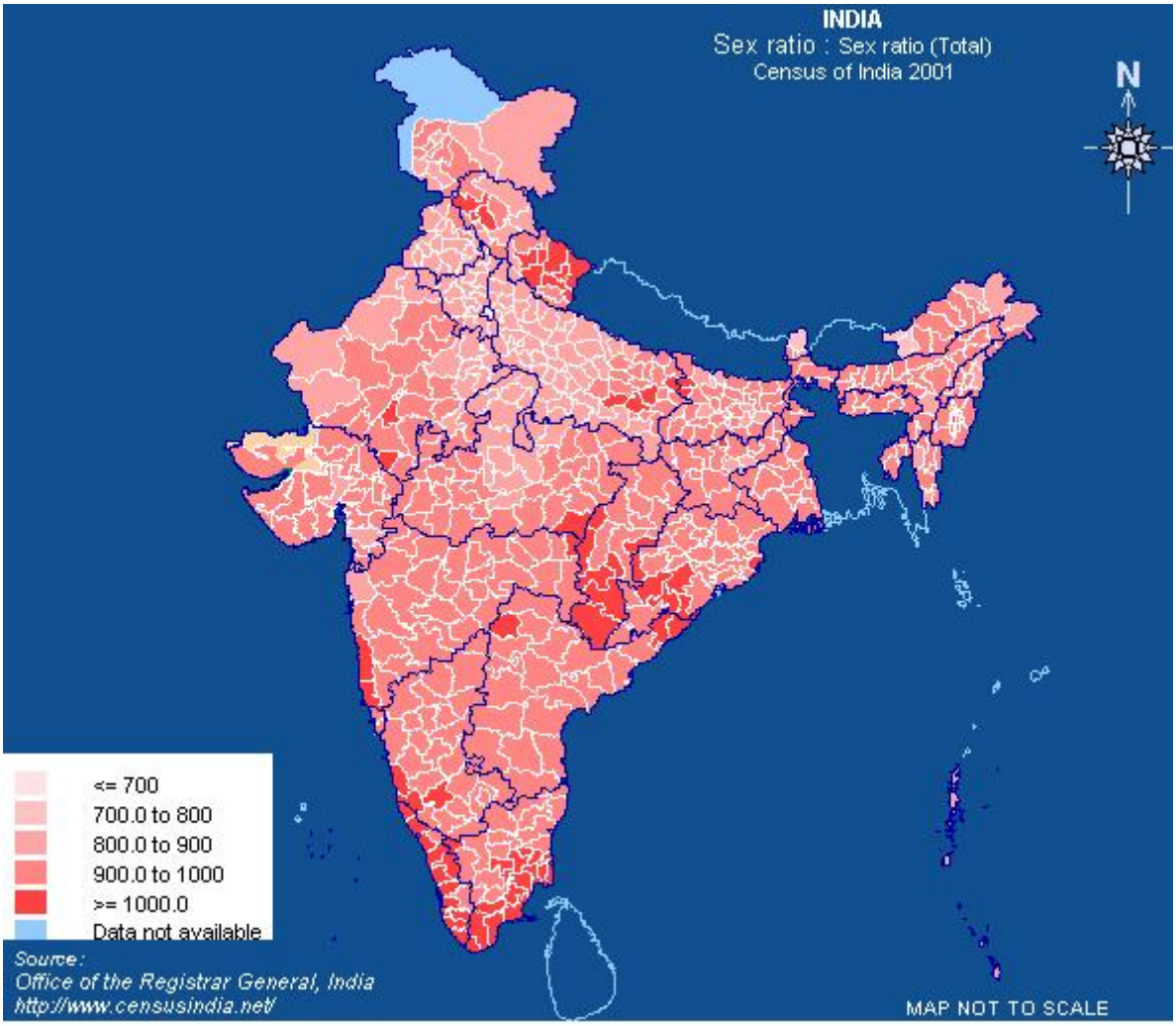
Though better health facilities benefit population of both the sexes females in particular show better results as they are in relatively speaking more vulnerable situations compared to the males (Das Gupta, 2003; Mitra, 2014). Given the gender biases the poor health infrastructure and services affect the female foetus, girl children and mothers selectively in underdeveloped societies. And with better health infrastructure, even without any significant change in the social biases, marked improvement can take place in the health outcomes of women, including a decline in maternal and infant mortality and thus, contributing to a balanced gender ratio (overall) in the region. As women suffer more from health poverty their

productivity could be lower than that of men. However, with improved health support as the female male gender ratio tends to rise, it can result in higher economic growth through higher participation of women in the labour market though higher economic growth is not seen to raise the gender ratio, particularly at the initial stages.

The direct association between consumption poverty and health poverty is natural as the lack of adequate nutrition hampers health and poor health reduces productivity which in turn reduces income and aggravates poverty (Gupta and Mitra, 2004). Improved health outcomes raise productivity and economic growth while higher economic growth through higher investments in health care improves health outcomes. In addition, Donald and Stark (1993) conceptualised the causality from health to growth in terms of delayed intergenerational transfer of wealth. In a society with higher life expectancy intergenerational transfer of property takes place late and during the waiting period the parents prefer to raise the skill levels of their children which in turn lead to productive investment as the skilled manpower makes the best use of the resources inherited. On the other hand, early transfer, particularly in societies with lower life expectancy, combined with low levels of skill results in poor economic growth.

2. Observed Patterns

Till 1991 the aggregate gender ratio (female-male) declined continuously and with an improvement in the gender ratio in 2001 the attention got shifted to its decline in the age group 0-6 (Bhat, 2002a and 2002b). Analysing the data from the 1991, 2001 and 2011 censuses Rajani and Kuzhiparambil (2012) noted that among the children the masculinisation has been increasing across regions. The epicentre areas of female child deficit are intensifying and the regions which were showing high child sex ratio are declining over time. On the other hand, the potential high child sex ratio epicentres have no positive effect on their neighbouring regions. Though it reflects on marginalisation of women in the process of growth and family planning measures being executed in terms of female foeticide or infanticide, there is need to recognise the complexity of the issue as Bhat (2002a) pointed out. The misreporting of age of the children of both the sexes which is related to various social and cultural practices contributes to this complexity. Nevertheless the issue of son preference at the expense of female foeticide is prevalent (see Map) which is spreading across regions, introducing both time and cross–sectional dimensionality into its complex manifestation (Bhat, 2002a and 2002b; Das Gupta, 2003; Mitra, 2014).



On an average, females have been found to enjoy a higher life expectancy due to their behavioural and biological factors. But gender inequalities can negatively affect health outcomes amongst females as long life does not imply a healthy life. On the other hand, gender equality can empower women and lead to favourable health outcomes for both women and children. But gender discrimination in nutrition, labour market, education and other opportunities prevent them from realizing their full potential (Das Gupta, 1987; Behrman, 1988; Basu, 1989; Hazarika, 2000; Choudhury et al., 2000; Pande, 2003). For instance, more women suffer from acute illnesses like diarrhoea and fever or chronic illnesses like diabetes, TB, and asthma than men because of discrimination in nutrition. The focus on gender discrimination in provision of health care services is a relatively new subject of enquiry. In case of a household when resources are scare, preferential treatment is given to sons as compared to daughters. Households are likely to use own income for treatment of boys and girls with equal probability. But under resource constraint conditions, chances of borrowing and sale of assets for financing the treatment of sons is higher (Behrman, 1988; Asfaw et. al., 2008). Similarly, gender differentials in utilization of health services exist for adults as well (Saikia et. al., 2016). Households which are relatively better-off are more likely to borrow to finance inpatient care of elderly male as compared to elderly female. Inability to access proper maternal and child health services during pregnancy due to the prevailing customs of the society affects not only the pregnancy outcome but the future health outcome of the unborn child in terms of body mass index, height and cognitive abilities (Namasivayam,

2012). Further, gender discrimination in immunization has resulted in higher female child mortality (Rose, 1999) and decline in sex ratio (Mayer, 1999).

How gender ratio compares with infant mortality rate (IMR) is an important question. Though the latter relates to mortality of age below 5 per 1,000 live births occurring among the population of the given geographical area during the same year, it is an overall indicator of health situation including the adults. So a decline in IMR and the improvement in the overall gender ratio are supposed to move together. In India, health outcomes were not impressive for a long time as a large percentage of the population could not afford quality treatment. Given the low level of living of almost half of the population the practice of preventive health care has been rather insignificant. Even the curative heath care support provided by the public sector is of poor quality while much of the private health care is highly expensive (Mohnan et. al., 2017). Further, inequality in health across gender is a major issue. The social and cultural practices expose women to higher health risks. Both female foetus and infants are at higher health risks due to negligence, less concern and poor nutritional support. Many of the diseases they suffer from remain undetected and untreated for long. Even at higher age brackets until women have crossed the child bearing ages they are not risk free as maternal health care facilities are often inadequate and lack quality, resulting in unattended complications relating to child birth and insufficient post natal health care (Nair and Panda, 2011).

With economic growth the gender empowerment, however, may not increase at least in the initial stages. In other words, one may come across a U shaped relationship between growth and gender ratio, conforming to gender Kuznets curve, which basically perceives a direct relationship between growth and gender inequality unless economic growth shoots up to higher levels (Eastin and Prakash, 2013). Even with respect to human development gender equality may not bear a positive relationship as the experience of Japan suggests. However, growth and the decline in IMR are expected to have a strong association because higher growth would generate greater volume of resources for developmental purposes. So economic growth, resulting in improvement in certain aspects of women's wellbeing through improvement in health outcomes cannot be ruled out.

Similarly poverty and IMR are supposed to bear a strong positive relationship as they refer to various aspects of wellbeing. Often poor levels of living coincide with poor health outcomes and better levels of living with better health status. Instead of being a mere coincidence the causality may run from poor health to low income/ consumption and vice versa. Meagre earnings and the lack of nutritious diet raise the health risk and health poverty. Similarly poor health status translates itself into lower productivity and lower earnings.

Besides, economic growth is expected to reduce poverty though rising inequality through its poverty aggravating role may neutralise the beneficial effects of growth. Further, high incidence of poverty reduces economic growth due to poor human capital formation and the lack of rapid productivity growth.

Before comparing the figures relating to different variables in the backdrop of these broadly observed patterns/views, it may be useful to bring in female labour force participation rate, which plays a key role in our model. A variety of factors have been considered as determinants of female labour-force participation rate. These include opportunities for informal employment which tend to decline with development (Bharadwaj, 1989),

technological and structural change, spouse's income (Sen, 1981)3, and the conflict between housework (including child care) and earning opportunities in the labour market, etc. Among various socio-economic factors, fertility, cross-regional cultural norms, attitude towards manual work, the relative incidence of low caste and tribal population, the size of the agricultural sector, cultivation techniques, crop patterns, poverty and technology are some of the determinants of female work participation rate (Agarwal 1985). Also, there can be a positive association between the participation rate and the percentage of workers engaged in the tertiary sector as activities in this sector provide greater employment opportunities for women and teen-age workers. However, low productivity activities are mostly concentrated in the tertiary sector, and hence, as the share of the tertiary sector in total employment increases, dropouts from the labour market are expected to be high, thus reducing the work participation rate (Nord, 1989). In our analysis we, however, treat female labour force participation rate as an exogenous variable. How health, poverty, gender inequality and economic growth respond to female participation rate is of considerable interest.

With improved access to resources through labout market participation (FLFPR) women are expected to develop the ability to utilise better health care support for themselves as well as for their children, particularly the daughters. This is expected to reduce gender inequality at least in certain spheres such as the masculine tilt in the gender ratio, even if the overall empowerment index could be low as is the case in Japan. The intensity of poverty in low income households may decline if women are able to get absorbed in better jobs. Else, women participation will not necessarily result in poverty reduction. Whether economic growth will respond positively to female participation rate has been a matter of great debate. With human capital formation as women labour participation picks up it tends to contribute significantly to economic growth. On the other hand, participation in petty jobs marginalises women further, without any rise in productivity and growth.

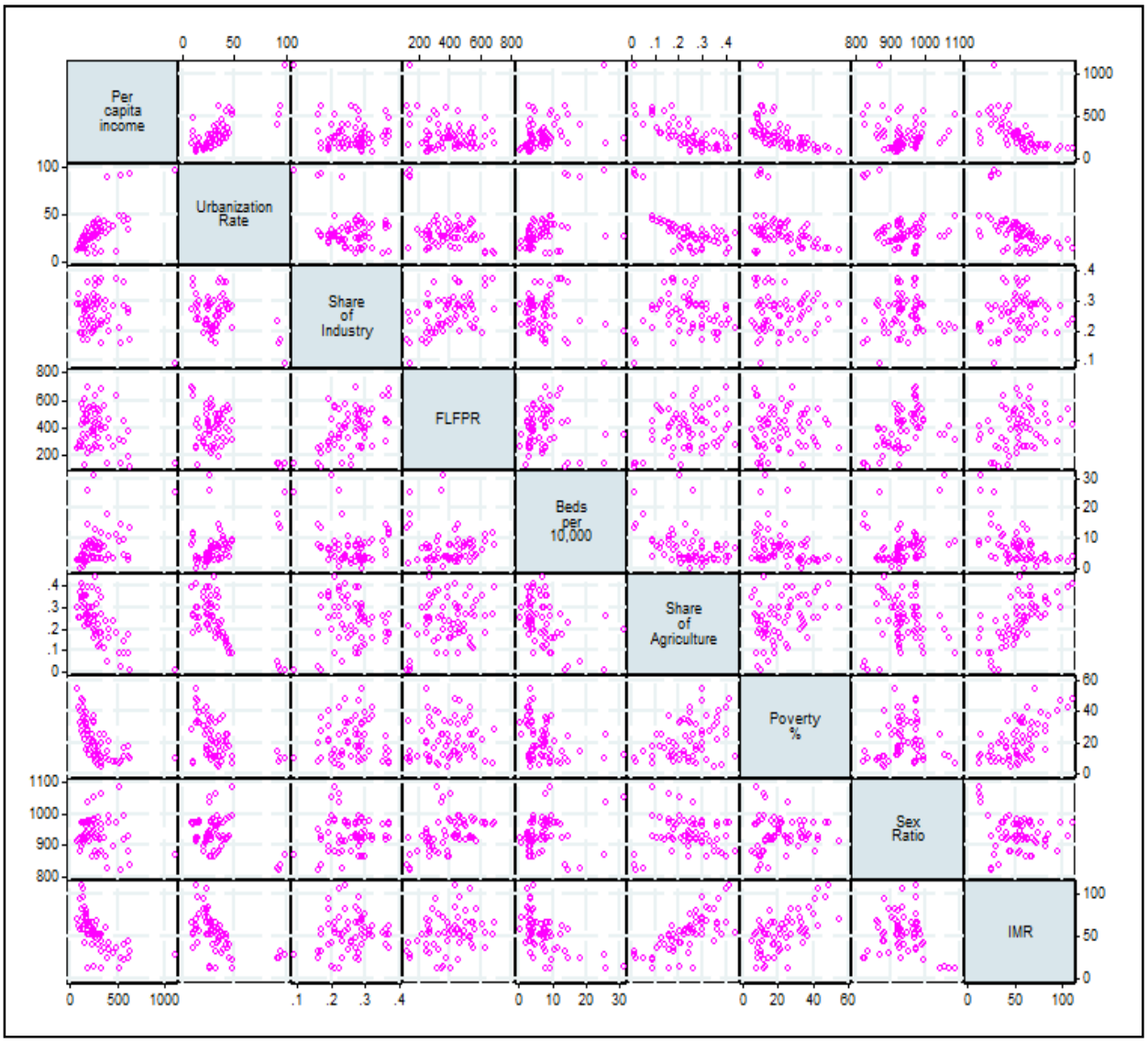
We use the data for sixteen major states in India for the years 1993-94, 1999-00, 2004-05 and 2011-12. The reason for selecting these specific years is related to the availability of male and female labour force participation rate. The major rounds of employment and unemployment survey of National Sample Survey were conducted during these years: 50th round (1993-94), 55th round (1999-00), 61st round (2004-05) and 68th round (2011-12). The major states which have been covered in this study are: Andhra Pradesh, Bihar, Delhi, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. The analysis is based on a panel of 64 observations with four observations per state, i.e., four cross-sections being pooled.

Data for infant mortality rate are taken from SRS for different years. For undivided states the figures have been combined to maintain uniformity. Information on urbanization and sex ratio has been taken from population census. Poverty figures were compiled by the planning commission. Data for health infrastructure are gathered from Economic and Political Weekly Research Foundation which are also available in different publications of National Health profile. The detailed description of data sources is included in the appendix.

[3] Sen (1981) in the case of Indian agriculture showed that women withdraw from the labour market as male income increases.

The figure below shows the scatter-plot matrix (Fig 1), depicting the association among the variables included in the analysis. Certain patterns are quite evident from the figure. For instance, a positive relationship is observable between per capita growth and urbanization. Similarly, per capita income is negatively related to poverty, IMR and share of agriculture. A positive association exists between poverty and IMR. Interestingly, sex ratio is negatively associated with per capita income and positively with female labour force participation rate. Also, IMR has a positive relationship with the share of agriculture and negative association with the number of beds per 10,000 people. Though the patterns are based on cross-sectional variations the association is quite strong and shows no change over time, i.e., different cross-sections pertaining to different time points unravel such associations. On the other hand, some of the scatters such as poverty and share of industry or sex ratio and share of industry are wide and do not display any systematic pattern, pointing to the limited role played by industry in reducing poverty or bringing in any significant improvement in social transformation. Similarly the share of agriculture and female labour force participation rate (FLFPR) display wide variations: there are states with both higher and lower share of agriculture. The rice growing states usually engage women alongside men in various phases of the cultivation process whereas in the wheat growing states women are less required despite agriculture being a predominant activity (Mohanty, 2008). However, such bivariate relationships, though they are suggestive and useful in conceptualising important correlates to begin with, cannot be considered for final analysis, particularly from policy angle, unless we introduce the control variables and more importantly, capture the complexity in terms of multiple directionality of causation.

Figure 1: Matrix plot of all the variables used in the analysis (1993-2011)



Source: See Appendix.

3. Econometric Modelling:

The econometric model based on the analytical links has been developed to give rise to the following equations in a simultaneous equation system:

Growth= f(Health, Industry Share, Urbanisation) (1)

Poverty =g(Growth, FLFPR, Health) (2)

Health=h(Health Infrastructure, Agriculture, Poverty, Sex Ratio) (3)

Sex Ratio=i(Health, Growth and FLPFR) (4)

In the equation for growth the exogenous variables included are the share of industry in total value added and the level of urbanisation. The agglomeration benefits are expected to result in higher productivity and growth, justifying the inclusion of urbanisation in the model. On the other hand, rapid productivity growth in the industrial sector compared to agriculture as seen in the work of Kaldor (1967) is expected to result in higher economic growth.

In the equation for poverty, female labour force participation rate is included as an exogenous variable. With the inclusion of women in the labour market household income is expected to rise which in turn can reduce poverty. Enhanced female labour market participation, particularly with improved human capital formation, mitigates the household strife to access livelihood opportunities and meet the minimum consumption requirements.

In the equation for health, the health infrastructure is taken to be a prerequisite. On the other hand, to decipher the rural urban differences in health facilities and health outcomes the share of agriculture has been included as an exogenous variable. With a rise in the share of agriculture in total value added the percentage of labour force dependent on agriculture increases. Mostly being based in the rural areas with inadequate health infrastructure this raises the health vulnerability.

Finally, in the equation for sex ratio (female-male) the female labour force participation rate is included as an exogenous variable to reflect on the beneficial effects of participation, leading to enhanced nutrition and accessibility to better health care, all translating into higher survival rate for females, particularly in the younger age brackets.

All the four equations are identified by the exclusion principle as well as the rank order condition. We, therefore, proceed for the estimation of the equations. Since the simultaneous equation model is based on panel data we have applied different techniques to estimate the equations. Treating each observation as independent of the other the simple OLS has been applied to each of the equations. Then the standard 2SLS technique has been followed to overcome the problem of endogeneity, i.e., the errors across equations may be correlated.

The reduced form equations are estimated by OLS in the first stage and then in the second stage OLS is again applied to the structural equations after replacing the observed values of the endogenous variables on the right hand side by their estimated values. Since the model is based on panel data and each observation is not independent of the other, particularly relating to those representing a given unit (state), the fixed effect model (region fixed effect) has been tried to control for the group effect. Finally with a view to overcoming the endogeneity issue

arising from the simultaneous structure in addition to the group effect related to panel data, the fixed effect 2SLS has been applied. The results are discussed below.

The main proxy for growth at the state level is represented by the state domestic product per capita. The health indicator is IMR. Consumption poverty is defined as the percentage of population below the poverty line and the gender ratio is taken as the number of females per 1000 males (all ages). Health infrastructure is captured through the number of beds per 10,000 population and industrialisation is measured in terms of the share of state domestic product originating from manufacturing sector.

As per the OLS estimates of the structural model both urbanisation rate and IMR are seen to influence the per capita income (Table 1). While IMR reduces growth urbanisation rate raises it. States at higher levels of urbanisation can experience higher magnitudes of growth due to the existence of agglomeration economies. Similarly, poor health outcomes reduce labour productivity and finally, growth. Poor IMR and consumption poverty are seen to be directly associated. Both economic growth and females labour participation rate unravel the beneficial effects of reducing poverty. IMR declines in response to better health infrastructure, higher poverty tends to raise IMR and with a rise in the share of agriculture in state domestic product IMR is seen to shoot up. With higher gender ratio (decline in masculinity in the gender ratio) IMR in seen to decrease, suggesting the beneficial effect of greater presence of women in the population on survival of the girl children, especially. From the reverse causality captured in the equation for gender ratio the adverse impact of poor health condition on gender ratio is distinct, bringing out the gender inequality involved in health status of the population, particularly at the younger age brackets. Economic growth however does not necessarily improve the gender ratio; rather the adverse effect is discernible. Very distinctly the positive impact of female labour force participation on gender ratio bears a great deal of social and economic implications.

By and large the same results are obtained when we apply the 2SLS technique to estimate the model (Table 2). However, the female labour force participation rate turns out to be insignificant in the equation for poverty ratio though the negative sign remains unchanged. Besides, the sign of poverty ratio in the equation for IMR becomes counter intuitive with the application of 2SLS. While poverty and IMR are expected to be directly associated, the results unravel an inverse relationship - the estimated values of poverty tend to reduce IMR. Nevertheless this possibility cannot be ruled out: regions with reduced poverty due to NREGA and other consumption support measures such as PDS etc. can still be associated with poor health outcomes. In the fixed effect (FE) model the positive association between poverty and IMR is borne out in both the equations for IMR and poverty ratio but the beneficial effect of gender ratio on IMR ceases to exist (Table 3).

As per the fixed effect two-stage-least-square estimates (FE2SLS) health is seen to reduce economic growth while urbnaisation rate contributes positively to growth (Table 4). Poverty is influenced by health status and vice versa. Health infrastructure improves health outcome which is found to be in a worse condition for those dependent on agriculture sector. Poor health results in lower gender ratio and growth does not result in an improvement in gender ratio. Higher gender ratio does not lead to a reduction in IMR but female labour force participation rate is seen to have favourable effects on gender ratio.

On the whole, the results are quite robust. With a few variations by and large similar results are obtained, using four different techniques. It may be noted that the region dummies used in

the fixed effect models are quite significant especially in the equations for growth and gender ratio. Though fixed effects across states are not noticeable, states grouped into five broad regions at least reveal such a pattern. It is only in the equation for health status the region dummies are mostly insignificant, indicating the lack of wide variations across space. In fact, most of the states are now conscious of health issues and whatever improvement has occurred, it does not seem to have witnessed wide variations.

Table 1: OLS Results of Structural Form Equations

	Per capita income	Poverty Rate	Sex Ratio	IMR
IMR	-272.78***	0.24***	-1.46***	
	(73.33)	(0.06)	(0.43)	
Share of Industry	25,485.46			
	(31,615.98)			
Urbanization Rate	534.41***			
	(167.44)			
Per capita income		-0.0003***	-0.001***	
		(0.00)	(0.00)	
FLFPR		-0.02**	0.19***	
		(0.01)	(0.03)	
Number of beds per 10,000				-0.82**
				(0.34)
Share of Agriculture				99.30***
				(16.96)
Poverty (%)				0.66***
				(0.16)
Sex Ratio				-0.07***
				(0.03)
Constant	19,595.07**	25.41***	974.38***	88.35***
	(9,359.74)	(5.94)	(32.20)	(24.63)
N	64	64	64	64
R2	0.61	0.51	0.43	0.71

Note: .01 - ***; .05 - **; .1 - *; figures in parenthesis are standard errors.

Table 2: 2SLS Results of Structural Form Equations

	Per capita Income	Poverty Rate	Sex Ratio	IMR
IMR fitted	-318.19**	0.03	-3.37***	
	(122.28)	(0.15)	(0.43)	
Share of Industry	24,580.12			
	(32,045.47)			
Urbanization Rate	506.07***			
	(146.64)			
Per capita income fitted		-0.0004**	-0.004**	
		(0.00)	(0.00)	
FLFPR		-0.02	0.20***	
		(0.01)	(0.03)	
Number of beds per 10,000				-1.74***
				(0.40)
Share of Agriculture				167.27***
				(30.49)
Poverty (%) fitted				-1.25**
				(0.51)
Sex ratio fitted				0.005
				(0.04)
Constant	23,178.75*	38.75***	1,142.69***	49.36
	(13,515.08)	(12.01)	(31.82)	(37.98)
N	64	64	64	64

R2	0.58	0.22	0.54	0.61

Note: .01 - ***; .05 - **; .1 - *; figures in parenthesis are standard errors.

Table 3: Results of Structural Form Equations Using Fixed Effect Model

	Per capita Income	Poverty Rate	Sex Ratio	IMR
IMR	-297.72***	0.23***	-1.05***	
	(77.32)	(0.07)	(0.29)	
Share of Industry	-268.07			
	(38,498.31)			
Urbanization Rate	428.72**			
	(179.94)			
Per capita income		-0.0001	0.0001	
		(0.00)	(0.00)	
FLFPR		-0.003	0.25***	
		(0.01)	(0.02)	
Number of beds per 10,000				-0.88**
				(0.37)
Share of Agriculture				90.73***
				(18.81)
Poverty (%)				0.86***
				(0.19)
Sex Ratio				-0.03
				(0.04)
North	36,878.53***	5.15	852.62***	53.59
	(12,944.70)	(6.24)	(25.82)	(35.64)
Central	28,926.03**	16.49**	907.11***	52.85
	(11,778.57)	(7.00)	(26.08)	(37.49)
East	27,125.50**	23.98***	936.27***	40.59
	(10,940.64)	(5.76)	(20.46)	(38.42)
West	32,527.05**	14.94**	860.01***	51.13
	(16,094.65)	(7.04)	(24.57)	(38.19)
South	26,703.29**	12.39**	928.96***	46.74
	(12,571.09)	(5.96)	(24.96)	(39.48)
N	64	64	64	64

R2	0.91	0.93	0.99	0.96

Note: .01 - ***; .05 - **; .1 - *; figures in parenthesis are standard errors.

Table 4: Results of Structural Form Equations Using Fixed Effect 2SLS

	Per capita Income	Poverty Rate	Sex Ratio	IMR
IMR fitted	-440.84***	0.27**	-2.68***	
	(117.06)	(0.13)	(0.26)	
Share of Industry	1,274.99			
	(36,347.68)			
Urbanization Rate	361.49**			
	(173.02)			
North	46,363.88***	0.79	1,006.90***	-10.47
	(16,600.69)	(12.13)	(23.03)	(45.13)
Central	41,167.29**	12.42	1,059.80***	-35.27
	(16,520.90)	(12.52)	(23.76)	(49.28)
East	37,077.86**	20.44*	1,068.48***	-56.39
	(14,818.40)	(10.56)	(19.77)	(51.24)
West	41,429.36**	10.86	1,001.92***	-30.68
	(18,999.51)	(11.73)	(22.38)	(48.21)
South	34,616.83**	8.90	1,049.17***	-32.38
	(15,410.82)	(10.52)	(20.84)	(50.52)
Per capita income fitted		-0.00002	-0.002***	
		(0.00)	(0.00)	
FLFPR		-0.003	0.26***	
		(0.01)	(0.02)	
Number of beds per 10,000				-1.07***
				(0.33)
Share of Agriculture				40.07*
				(23.82)
Poverty fitted				2.15***
				(0.42)
Sex ratio fitted				0.04
				(0.05)
Constant	64	64	64	64
R2	0.91	0.92	0.99	0.97

Note: .01 - ***; .05 - **; .1 - *; figures in parenthesis are standard errors.

Reduced Form Estimates

The policy issues can be analysed better from the reduced form estimates (Table 5). The beneficial effect of urbanisation in reducing poverty and raising growth is evident. However, urbanisation is seen to reduce the female-male ratio as the phenomenon of single male migration from the rural to the urban areas is sizable in the Indian context. Further, the low income households who decide to migrate are usually the vulnerable lot in terms of consumption, education and health (Mitra, 2010). This is true for the migrants at the place of destination and the non-migrant members of the same households who continued to reside at the place of origin. Therefore, higher level of urbanisation being associated with higher IMR does not come as a surprise. Higher level of industrialisation and urbanisation in a given state encourages more males to migrate in, which in turn may lead to a reduction in the female male ratio observed at the aggregate level. This could be the reason why we get to see an inverse relation between sex ratio on the one hand and urbanisation or industrialisation on the other. The female labour force participation rate is a significant determinant of the gender ratio. Earnings enhance women's access to food, health and education, particularly for their girl children, and also contribute to women empowerment and their involvement in the decision making process. All this results in an improvement in the number of females per 1000 males. Health infrastructure, as the results indicate, not only improves health outcomes but also contributes positively to the survival of females especially the girl children, thus raising the female-male ratio. As agriculture dependent households tend to have a poor health status its adverse impact on gender ratio is understandable in the face of inequality in accessing health services and consequently in terms of health outcomes. On the whole, improving female labour force participation rate turns out to be a key variable in reforming the overall conditions of women and their visibility in the society. Alongside health infrastructure needs to be strengthened strategically so that the gross inequality across gender in terms of its utilization is reduced. Why the role of industry in raising growth or reducing poverty has not been successful, as the reduced form estimates show, is a key issue that the policy analysis has to deal with.

Table 5: OLS estimates of reduced form equations

	Per capita Income	Poverty Rate	Sex Ratio	IMR
Urbanization Rate	386.06**	-0.20*	-2.79***	0.27*
	(154.41)	(0.12)	(0.36)	(0.15)
Share of Industry	-11,439.08	-1.08	-373.25***	42.21
	(35,042.25)	(25.97)	(94.10)	(35.84)
FLFPR	3.48	-0.02	0.16***	0.02
	(11.82)	(0.01)	(0.03)	(0.01)
Number of beds per 10,000	58.03	-0.24	2.94***	-1.33***
	(324.61)	(0.20)	(0.70)	(0.31)
Share of Agriculture	-70,564.47***	20.60	-364.30***	147.30***
	(21,848.95)	(24.73)	(80.75)	(34.04)
Constant	34,200.48**	32.12**	1,123.55***	1.30

	(13,297.32)	(12.56)	(48.36)	(16.77)
N	64	64	64	64
R2	0.60	0.23	0.60	0.62

note: .01 - ***; .05 - **; .1 - *; figures in parenthesis are standard errors.

4. Conclusions and Policy Implications

This paper revisits the issue of poor gender ratio - a phenomenon which is no more confined to a few pockets in the country. Notwithstanding an improvement in overall gender ratio the masculinisation has spread across regions and the epicentre areas of female child deficit intensified. Moreover, the regions which were showing high child sex ratio have witnessed decline over time instead of having positive spill-over effect on the neighbouring regions. Deterioration in the gender ratio is seen as a decline in women empowerment and it is indicative of marginalisation of women in the process of growth and family planning measures being executed in terms of female foeticide or infanticide. Given the inadequacy in health infrastructure and the gender inequality involved in accessing health services this paper develops a simultaneous equation system interconnecting four endogenous variables, namely growth, poverty, health status and gender ratio. Some of the exogenous variables considered in the model are health infrastructure, urbanisation and female labour force participation rate. How female participation in the job market can help improve the health status and contribute to gender empowerment - an important manifestation of which is gender ratio - is an important concern of the paper.

The findings confirm that urbanisation rate and IMR both influence growth: while IMR reduces growth, urbanisation tends to raise it. Due to agglomeration economies states at higher levels of urbanisation can experience higher magnitudes of growth while poor health outcomes reduce labour productivity and growth. Poor health status and consumption poverty are directly associated. The beneficial effects of economic growth and female labour participation rate on poverty reduction are evident. Health status improves in response to better health infrastructure, decline in consumption poverty and a reduction in dependency on agriculture. The adverse impact of poor health condition on gender ratio is also evident, bringing out the gender inequality involved in health status of the population. On the other hand, improvement in heath outcome can raise the survival of girl children and women, resulting in an increase in the overall gender ratio. Further, with higher gender ratio (decline in masculinisation) IMR is seen to decrease, suggesting the beneficial effect of greater presence of women in the population on survival of the girl children especially.

Declining gender ratio in the process of economic growth is discernible, implying that growth alone is not sufficient to curb gender inequality. Female labour force participation rate is seen to have favourable effects on gender ratio, bringing out the wide range of social and economic implications of women's access to resources. In fact, for women empowerment to materialise and for reversing the current patterns relating to gender ratio women participation in the labour market can be seen as an indispensable strategy. Their access to resources can enhance their role in the decision making process and help improve women's and girl children's wellbeing.

These results are quite robust. With a few variations by and large similar results are obtained, using four different techniques, OLS, 2SLS, FE and FE2SLS. The region dummies used in

the fixed effect models are significant especially in the equations for growth and gender ratio. Though fixed effects across states are not noticeable, states grouped into five broad regions, at least reveal such a pattern.

The policy implications can be envisaged in terms of the beneficial effect of urbanisation on poverty reduction and growth enhancement. On the other hand, for improving the gender ratio the female labour force participation rate is instrumental. Earnings enhance women's access to food, health and education, particularly for their girl children, which in turn contributes to their survival. Health infrastructure not only improves health outcomes but also raises the possibility of survival of females, especially the girl children, thus enabling the female-male ratio to increase. On the whole, improving female labour force participation rate is an effective way of reforming the overall conditions of women and their visibility in the society. Alongside health infrastructure has to be strengthened strategically so that the female accessibility to health services is enhanced and gender inequality in terms of utilization is reduced.

Appendix: Data Sources

The data points are 1993-94, 1999-00, 2004-05 and 2011-12.

1. **Infant Mortality Rate-** Source: Sample registration system. IMR for divided states have been combined.
2. **Population- Population Census, o**btained from website of MOSPI.
3. **Urbanization rate–** Data for census year **are** used and interpolation technique applied to fill figures for gap years (1993, 1999, 2004).
4. **Gender ratio-** Census data (1991, 2001 and 2011) are used for 1993-94, 1999-00 and 2011-12. Figures for 2004-05 have been interpolated using total population and percentage of females and males.
5. **Health infrastructure-** Figures relating to the number of government hospitals and beds in government hospitals are taken from Economic and Political Weekly Research Foundation (EPWRF) database. These figures can also be accessed from the website of Central Bureau of Health Intelligence, available in National Health Profile.
6. **Poverty state level-** Figures are available on website of planning commission. Figures for 2004-05 are based on Mixed Reference Period and for 2011-12 are based on Tendulkar Methodology.
7. **Female and male labour force participation rate-** Figures for Labour Force participation rate (principal plus subsidiary status) for population above 15 years are obtained from NSS reports for various years. The figures for urban and rural LFPR were combined by using the percentage of rural population (15 years above) and percentage of urban population (15 years above). The figures for divided states were combined by using the percentage of people 15 years and above.
8. **NSDP, per capita NSDP, sector wise %, growth rate-** Obtained from website of MOSPI. Figures are at constant 2004-05 prices. Sector wise percentage growth rate are based on own calculations using NSDP figures for each sector.
9. A region dummy was created with five categories: North, South, West, East and Central. North includes Delhi, Haryana, Himachal Pradesh, Punjab and Rajasthan. South includes

Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. West includes Gujarat and Maharashtra. East includes: Bihar, West Bengal and Odisha. Central includes Madhya Pradesh and Uttar Pradesh.

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