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Health Policy, Inequity and Convergence in India

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Abstract

Existing situation in India is marked by laudable health indicators in terms of increased life expectancy which doubled since independence and eradication of some of the preventable diseases. Yet the main concern continues both for the policy makers and people in terms of inequity of health outcomes across rich and poor and rural and urban strata of the country. The objective of this study is to put to test the development paradigm that this inequity will converge and adjustment period will be lowered for equitable outcomes in health provided a fine tuning of health policy is carried out. The study makes use of information across twenty major states to analyze the process and speed of convergence by focusing on major determinant of health care. Our results indicate an affirmative answer to the tested development paradigm. It further chalks out the possible central and state level policy strategy to shorten the duration of convergence.

Keywords: *Health Care, inequality, states, policy, convergence*

JEL Codes: *I14 ; I15; I18*

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INTRODUCTION

Ever since independence, following the recommendation of the Bhore Committee, India has adopted a three tier system of health care services. This imbibed primary care at the village level and secondary and tertiary care through a referral system at district and further advanced care at respective state owned apex medical teaching hospitals. This has envisaged that the state owned health system will be able to provide the requisite care to all.

However, despite this planned strategy for health care sector, even after a long period of more than six decades, health outcomes of the country in relation to comparable South Asian countries like Srilanka, Maldives, Nepal and Bangladesh are lower. For instance, India's infant mortality rate in 2008 (52 per thousand live birth) was higher than these countries with their respective figures of IMR being 13, 24, 41 and 43 per thousand live birth. Similarly, in per capita terms for public expenditure (as percent of GDP), according to World Health Statistics (WHO, 2010), India ranked 164 in the sample of 191 countries. With its public spending at $29(PPP), India in this aspect compares around a third of Sri Lanka, less than 30 percent of China and 14 percent of Thialand.

Further due to poor quality and inaccessibility only 29.6 percent in urban areas and 36.8 percent in rural areas are using public medical care. There is an increasing proportion among middle class (nearly 61 percent) and upper middle class (nearly 66 percent) using private health care (IIPS and Macro International, 2007).

A comparative profile of rural and urban sectors across 19 states indicates that all the three types of mortality indicators namely infant mortality (IMR), child mortality (CMR) and under five mortality (UFMR), except for Kerala, are higher for rural areas relative to their counterparts in urban areas. Except Rajasthan (for IMR), this differential is very glaring for other states.The rank of Madhya Pradesh is the highest in terms of all the three mortality indicators whereas Uttar Pradesh and Tamil Nadu seem to be at the bottom leaving the exception of Kerala which has in fact the lowest mortality in the country (Table 1). Poorer states like Chhatisgarh, Jharkhand, Orissa and Assam comprise the top five mortality states as ranked by IMR. The better off states (relative to all India average in per capita income) are also having a better situation in terms of mortality indicators (Table1). A similar observation could be made in terms of urban mortality differentials where poorer states like Rajasthan (top IMR in urban areas), Assam, Bihar, Chhatisgarh and Jharkhand are the first top five mortality states in IMR (Table 2). By contrast, generally richer states like Gujarat, Maharashtra and Punjab are lower in the IMR ranks for urban areas. There is an improved position and mixed trend for middle income states like AP, and rich ones like Karnataka and Tamil Nadu which fall mostly under lower ranking IMR states with some variations in relative rankings pertaining to other mortality indicators of CMR and UFMR (Table 2).

Thus it is pointed out that even among the poorer or richer states there is a considerable disparity between rural and urban areas. Generally rural areas also have higher inequitable distributions as depicted by the Gini coefficients (Table 3). The inequitable distribution of income across rural and poorer areas also comes to the fore if we glance at the composition of the respective populations in terms of lowest and highest wealth index as provided by NFHS[1].

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[1] The wealth index is constructed by NFHS by combining information on 33 household assets and housing characteristics, such as ownership of consumer assets, type of dwelling, source of water, and availability of electricity, into a single wealth index. The household population is divided into five equal groups of 20 percent each (quintiles) at the national level from 1 (lowest, poorest) through 5 (highest, wealthiest). Since the quintiles of the wealth index are defined at the national level, the proportion of the population of a particular state that falls in any specific quintile will vary across states

Table 1: Rural Variables (Ranks) for Major States of India

States→	AP	AS	BI	CH	GU	HP	HR	JH	K	KE	MP	MAH	OR	P	R	TN	UK	UP	WB
Health Insurance	9	14	17	16	4	5	7	9	1	2	14	8	18	6	9	13	3	18	12
BPL Card Holders	1	14	4	8	7	17	18	5	2	6	10	11	3	13	16	19	9	15	12
Lowest Wealth Index	13	9	7	2	14	19	16	1	12	18	3	10	4	17	8	11	15	6	5
Highest Wealth Index	8	10	14	19	6	3	5	18	11	1	17	7	14	2	12	9	4	13	16
No education Male	3	13	1	7	11	18	10	2	6	19	4	16	8	9	5	14	17	14	12
No education Female	6	17	2	5	10	18	8	3	9	19	4	11	7	15	1	13	12	13	16
Underweight Children	16	14	3	4	5	15	12	2	13	19	1	11	8	18	7	17	10	6	9
Anaemia Children	6	10	1	7	3	18	4	5	7	19	2	11	13	14	9	16	17	12	15
Anaemia Women	5	2	3	9	7	11	17	1	14	19	8	15	6	18	12	13	10	16	4
Diabetes Women	13	16	5	6	10	7	4	14	11	1	19	15	12	8	17	2	9	18	3
Asthma Women	4	10	6	8	17	7	19	12	15	1	11	5	3	14	9	16	18	13	2
Goitre Women	5	8	6	14	12	13	10	3	7	1	9	15	17	11	18	2	19	16	4
Diabetes Men	3	12	4	10	19	14	18	16	8	2	7	13	6	9	17	5	11	15	1
Asthma Men	4	11	12	3	17	9	18	19	15	2	14	6	7	16	5	13	10	8	1
Goitre Men	3	2	6	15	16	10	8	18	7	1	5	12	17	9	18	11	13	14	4
IMR	7	5	8	2	9	16	13	3	14	19	1	10	4	15	6	17	11	17	12
Child Mortality	14	7	4	6	11	18	12	3	9	19	1	15	1	13	5	16	8	16	10
Under Five Mortality	8	6	7	4	9	16	13	2	12	19	1	14	3	15	5	17	10	17	11

Source: IIPS and Macro International (2007).

Table 2: Urban Variables (Ranks) for Major States of India

States→	AP	AS	BI	CH	GU	HP	HR	JH	K	KE	MP	MH	OR	P	R	TN	UK	UP	WB
Health Insurance	15	17	19	7	1	12	3	5	8	10	4	6	14	8	10	16	13	18	2
BPL Card Holders	1	14	5	6	9	16	13	11	2	3	7	12	4	16	10	19	18	15	8
Lowest Wealth Index	7	8	2	3	15	18	19	5	10	17	4	13	1	16	13	6	11	9	11
Highest Wealth Index	18	17	16	14	7	1	4	11	9	8	12	5	15	3	5	19	2	10	13
No education Male	2	15	1	14	16	17	10	5	8	19	4	18	13	3	9	11	5	11	7
No education Female	4	17	1	10	14	18	6	5	7	19	3	16	11	8	2	12	9	12	15
Underweight Children	12	14	2	7	3	17	6	4	8	19	1	8	11	18	10	13	16	5	15
Anemia Children	7	12	5	4	11	18	3	14	5	19	1	13	16	8	10	9	15	2	17
Anemia Women	3	2	1	9	11	7	18	5	13	19	15	16	6	17	14	8	10	12	4
Diabetes Women	6	16	5	11	14	3	15	8	13	1	9	18	10	12	19	2	7	17	4
Asthama Women	4	8	9	7	16	6	19	12	10	1	14	11	2	17	5	13	18	15	3
Goitre Women	4	13	9	16	7	19	5	18	10	1	17	12	14	11	8	3	15	6	2
Diabetes Men	3	13	16	17	2	12	15	10	8	1	19	9	4	11	18	7	6	14	5
Asthama Men	3	8	14	9	7	6	19	17	15	2	5	4	10	12	11	18	16	13	1
Goitre Men	6	7	18	18	3	2	9	11	13	1	8	12	14	15	4	16	10	17	5
IMR	12	2	3	4	11	19	16	5	10	17	6	15	9	8	1	13	18	13	7
Child Mortality	4	19	1	15	5	10	12	13	6	10	2	3	16	14	17	7	18	7	9
Under Five Mortality	6	18	1	17	3	10	12	16	4	11	2	7	15	14	19	8	13	8	4

Source: IIPS and Macro International (2007).

Table 3: Gini Coefficients for various health indicators: Major States of India

Gini Coefficients for Various Health Indicators	Urban	Rural
Health Insurance	0.207	0.429
BPL Card Holders	0.392	0.259
Lowest Wealth Index	0.481	0.416
Highest Wealth Index	0.135	0.516
No education Male	0.189	0.193
No education Female	0.164	0.161
Underweight Children	0.149	0.124
Anemia Children	0.069	0.059
Anemia Women	0.093	0.100
Diabetes Women	0.275	0.366
Asthama Women	0.275	0.297
Goitre Women	0.431	0.442
Diabetes Men	0.391	0.371
Asthama Men	0.318	0.355
Goitre Men	0.532	0.530
IMR	0.238	0.161

Source: Calculated based on IIPS and Macro International (2007).

With the population growth and increasing pressure on the health system, deficiency in the public health system became obvious with proliferation of a rather dominant private health care market and as empirical evidence indicated a major chunk of out of pocket expenses by common man went into private sector care. The major reasons being non-availability of man, materials and facilities in the prevalent public primary or secondary level health care institutions. Yet the main concern continues both for the policy makers and people in terms of inequity of health outcomes across rich and poor and rural and urban strata of the country.

OBJECTIVE OF STUDY

The objective of this study is to put to test the development paradigm that this inequity will converge and adjustment period will be lowered for equitable outcomes in health provided a fine tuning of health policy is carried out. This paper is divided into six sections. Besides the introduction and objective, the following section three comprises of review of major relevant studies. Methodology and data base are discussed in section four. This is followed by results and policy recommendations in sections five and six.

REVIEW OF LITERATURE

Generally convergence has been discussed in the context of growth models and per capita income across regions and countries. According to the neoclassical growth model, given the fully competitive markets and the availability of similar technology, for the same rate of investment every economy would grow at a similar rate determined by the exogenous technical progress and population growth. Assuming a production function with constant returns to scale and the diminishing returns of capital, economies with lower levels of initial productivity enjoy a higher rate of growth in productivity and as such will catch up with the more developed economies. The more recent work on explaining the process of catching up is extensive and advocates three possible and sometimes related forms of convergence: beta convergence, conditional beta convergence, and sigma convergence. β-convergence postulates that poorer countries will tend to grow faster than the richer countries. This is because of the diminishing marginal returns to capital in the richer countries, as the level of capital per labour is relatively high in these countries. Moreover, the further down a country is below its balanced growth path and the higher the lags in access to new technology the higher would be the expected growth when the country gains access to such technology (Romer, 1990). In the empirical literature, running a cross-section regression of the time-averaged per capita income growth rate on the level of per capita income in the initial period tests this. A negative sign for the respective coefficient reflects the existence of convergence.

The second type of convergence, conditional β-convergence, mainly takes into consideration the steady-state growth path of the country. If the structural conditions of countries were different the respective long-run growth rates would be different which may result in divergence or at best a very weak convergence. This type of convergence may be tested in the same way except that the regression should also include a set of explanatory variables which would define the steady-state growth path for per capita income. A negative coefficient for the per capita income in the initial period, in the presence of the extra conditional variables, suggests the existence of conditional β-convergence.

The third type, σ-convergence, envisages that the cross-country dispersion of per capita income levels across economies would tend to decrease over time implying a tendency amongst countries to equalization of per capita income in the long-run. That is, over time the dispersion around the steady-state value decreases. β-convergence is a necessary condition for σ-convergence but not a sufficient condition (Barro and Sala-i- Martin, 1995).

Thus the basic idea of convergence originates in growth models and discussed more in the context of per capita incomes. Applications in the context of health care are very limited. In what follows, therefore, we will focus on a review of studies, both across different countries and that for India, most of which will relate to discussion of income or related economic variables. Following this, we will also highlight some of the studies restricted to health care sector.

Relating to income variable, the study by Arbia *et. al.* (2005) highlight the convergence of per-capita income in the Italian provinces over 40 years. Following consolidated evidence, they have considered a structural break in the growth path of Italian provinces at the beginning of the seventies. All models over the entire period and over two different sub-periods (1951-1970; 1970-2000) have confirmed this fact. In fact, the growth rate is very high during the first years and drops dramatically after 1970. The speed of convergence estimated by using the spatial lag model is much lower than that obtained with the classical fixed-effect specification. A decrease in the β parameter referred to the initial condition, can be traced back to the introduction of a spatial lag term in the model, and indirectly confirms the positive effect of factor mobility, trade relationships, and knowledge spill-over on regional convergence[2].

Dholakia (2003) has examined the trends in regional disparity in economic and human development in India over the last two decades. It is suggested that while per capita income does not show any significant trend in regional disparity over the last two decades, seven out of nine human development indicators display a declining trend in regional disparity. Similarly, 12 of the other 16 related social and human development indicators show a marked decline in regional disparity during 1981-91. In a cross-sectional setting, Granger causality is tested by considering lags in the independent variable and interchanging the variables and a two-way causality between human and economic development is established with the structure of the relationship varying over time when human development indicators (HDIs) are the cause and per capita SDP is the effect, but in the reverse causality case, the structure of the equations is stable over time. HDIs have been also found to positively influence per capita SDP with a lag of about eight years, whereas per capita SDP affects the HDIs within two years, thus to

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[2] Likewise a number of other studies have dealt with regional convergence in different contexts. These include, for instance, studies by Eckey *et. al.* (2005) (on German labour markets), Neven (1995), Thomas (1995), Engel Rogers (1996), Thomas (1996), Helliwell (1998), Nitsch (2000), Martin (2001), Niebuhr (2002), Fingleton (2003), Arbia Paelinck (2003), Greunz (2003) and López-Bazo Vayá Artis (2004) (for other European context). In the Indian context, for instance, one may mention Cashin and Sahay (1996), Rao and Sen (1997), Marjit and Mitra (1996), Ghosh, *et. al.* (1998), Nagaraj *et. al.* (2000), Rao *et. al.* (1999), Subrahmanyam (1999), Bajpai and Sachs (1999), Singh and Srinivasan (2005), Adabar (2005), Ahluwalia (2000; 2002), Dasgupta *et. al.* (2000), Kurian (2000), Dhongde (2004), and Lall and Chakravorty (2004).

conclude that emphasis on economic growth is likely to address the issue of twin disparities in income and human development in the shortest time. It implies that emphasis on human development in states may lead to the postponement of rapid economic growth and also to some inefficiencies cropping up in the delivery of output.

Using NSS data on consumption for the 13th to the 53rd Rounds Jha (2000) examines the relationship between economic inequality, poverty and economic growth in the Indian states. Applying Gini coefficient, real mean consumption and the head count ratio for rural and urban sectors and average for 14 major Indian states , the study finds that there is (conditional) convergence (in terms of levels) in inequality and poverty measures across states. The study points towards greater dispersion in rural poverty across states over time. Inequality was found to be acting as a constraint on growth in the states with high Gini coefficients as well with poor growth performance. Therefore, the analysis emphasized economic growth for reduction of inequality and poverty. Their prescription for equitable distribution of consumption include widespread tax reform to make the tax structure more redistributive; improvement of efficiency of public expenditure and of the social safety net; and design of a good social sector policy framework promoting agricultural growth as opposed to nonagricultural growth, protecting the poor from the effects of macroeconomic shocks and building up of pressure groups of the poor.

Kurian (2000) has examined intra-state disparities and highlighted that the newly created states develop faster than the pre-partition states. The study points out a few successful cases where intra-state regional disparities were reduced considerably through public policies such as in Malabar region (Kerala), drought-prone districts of Haryana and the remotest villages of Himachal Pradesh. Likewise, Tamil Nadu was identified as the most successful state in reducing intra-state disparities despite substantial variation in natural endowments across different parts of the state.

Annigeri (2003) while estimating the district health accounts in Karnataka for the year 1997-98, observes that in terms of sources of funds, private funds account for about 52 per cent of the resources flowing into the district. Using population aged 0-6 years as observed in 2001, Gulmoto and Rajan (2002) estimate district level indirect birth and fertility rates for all districts of India. It is found that the fertility is lower than 3 children per woman for the southern and coastal states along with Punjab, Himachal Pradesh, Tripura and Manipur, high fertility districts (i.e., with more than 5 children per woman) are still widespread in north India. Yet existing evidence suggests that India is passing through the last phase of fertility transition, moving towards moderate to low fertility. Based on six indicators, viz., poverty ratios, hunger, infant mortality rate, immunization, literacy rate and enrollment ratios Debroy and Bhandari (2003) identify 69 backward districts. Each indicator throws up a set of districts. Based on poverty ratios, they find that backward districts in terms of human and economic development are also present, apart from the BIMARU states (Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh), in Gujarat, Maharashtra, Karnataka and Andhra Pradesh. Hunger also has a similar spatial distribution with less universality and more concentration in the East and the North-East. Lack of immunization was found to be prevalent in the BIMARU states. Districts with low literacy rates and enrollment ratios are found to be spread all over the country. Given that each indicator selected a different set of districts, thus, a backward district has been defined by them as one which is backward as per four out of the above six indicators. Accordingly, 69 districts so identified are distributed as follows: 26 in Bihar, 13 in UP, 10 each in Jharkhand and Orissa, 6 in Madhya Pradesh, 3 in Arunachal Pradesh, and 1 in Karnataka. Even the connections between 69 backward districts and the rest of the economy are found to be grossly inadequate, with poor national highways, state highways and railway networks.

Using the estimation procedure of the NSS 55th round, on variables for monthly household consumer expenditure and household size, Sastry (2003) shows that it is feasible to derive valid distributions for a majority of districts on the basis of Relative Standard Errors criteria. Finally, using two sets of data including NSS and district level data to conduct a convergence analysis of growth focusing on six variables: consumption expenditure, petrol sales, diesel sales, bank credit, bank deposits and cereal production and thus restricting to nine states, Singh et al (2010) find no evidence for divergence, but for conditional convergence in some cases. At the region level, partial measures of economic activity do not indicate any strong evidence for conditional convergence or divergence. However, there is clear evidence of conditional convergence in per capita consumption levels. According to them, the convergence result is strongest for urban households, the main significant conditioning variable is petrol consumption, which could be an indicator of the quality and quantity of road infrastructure (and which could also be related to access to urban areas) and dummy variables for the poorer states do not seem to indicate any worse than the benchmark average state (i.e., Andhra Pradesh). The district level results also indicate conditional convergence, but not absolute convergence. The conditioning variables used are measures of roads, literacy and credit, so the results are supportive of the importance of infrastructure and human development, as well as access to finance. The results for conditional convergence hold across states, as well as within most of the states in the sample, indicating that attention to improving these variables in districts, where they are at relatively low levels, can have a growth payoff, and improve the inclusiveness of growth, as measured by convergence of income levels across geographic regions.

The study by Chaurasia (2005) comprises of computing indexes of state-mean differences (SMD) and inter-state differences (ISD) in infant mortality rate across states. The individual-mean difference compares the infant mortality rate of a state with the average infant mortality rate of the 15 major states which are focus of attention in the analysis. Based on the estimates of infant mortality rate available through the sample registration system, this paper measures levels and analyses trends in inter-state inequality in the probability of death during infancy in India by rural and urban residence for the period 1981 through 2000. The analysis reveals that with the declining levels of infant mortality, the absolute inter-state inequality in the probability of death during infancy has also decreased for the country and for its rural and urban populations. In terms of relative inter-state inequality, however, the declining trend in inequality could be observed in rural areas only; in urban India, the relative inter-state inequality in infant mortality has tended to increase during the 20 years under reference. There is a need of a community based public health services delivery network in the urban areas to address the increase or stagnation in relative inter-state inequality in urban infant mortality rate in India.

The study by Banik and Banerjee (2011) has refuted the popular perception in India that economic reforms have benefited the rich more than the poor, leading to unequal income distribution as in Quah's twin peaks hypothesis. If economic reforms are pro-rich then we would see the emergence of twin peaks in the underlying income distribution function – clustering of rich people and clustering of poor people. On the other hand, a uniform growth process at a pan-India level will lead to the disappearance of any such clusters. Considering district-level per capita income data from the Planning Commission of India, in 1999/2000 and 2004/05, they find that income distribution has not changed; thus, the perception about economic reforms having benefited only the rich is not supported by the data. The results suggest that between 1999/2000 and 2004/05 there was no statistically significant difference in the median-adjusted income distribution functions. In fact, the income density function for 2004/05 became more platykurtic (with fewer extreme values) than it was during 1999/2000, suggesting that there has been a reduction in inter-district per-capita income disparity.

Study by Gächter and Theurl (2011) focus on within-country convergence of the health status for local community level in Austria for 1969-2004. Using age standardized mortality rates from 2381 Austrian communities as an indicator for the health status they analyze the convergence/divergence of overall mortality for (i) the whole population, (ii) females, (iii) males and (iv) the gender mortality gap. Convergence/Divergence is studied by applying different concepts of cross-regional inequality (weighted standard deviation, coefficient of variation, Theil-Coefficient of inequality).Various econometric techniques (weighted OLS, Quantile Regression, Kendall's Rank Concordance) are used to test for absolute and conditional beta-convergence in mortality. Regarding sigma-convergence, they find rather mixed results. While the weighted standard deviation indicates an increase in equality for all four variables, the picture appears less clear when correcting for the decreasing mean in the distribution. However, they find highly significant coefficients for absolute and conditional beta-convergence between the periods. While these results are confirmed by several robustness tests, they also find evidence for the existence of convergence clubs. The highly significant beta-convergence across communities might be caused by (i) the efforts to harmonize and centralize the health policy at the federal level in Austria since the 1970s, (ii) the diminishing returns of the input factors in the health production function, which might lead to convergence, as the general conditions (e.g. income, education etc.) improve over time, and (iii) the mobility of people across regions, as people tend to move to regions/communities which exhibit more favorable living conditions.

Shankar and Shah (2003) examine whether decentralized fiscal arrangements would lead to ever-widening regional inequalities. They conclude that regional development policies have failed in almost all countries, federal and unitary alike. Still, federal countries do better in restraining regional inequalities, because of the greater political risk which these disparities pose for such countries. Their findings also suggest that countries experiencing divergence tend to focus on interventionist policies, while those experiencing convergence have taken a hands-off approach to regional development and instead focus on promoting an economic union by removing barriers to factor mobility and ensuring minimum standards in basic services across the country.

Study by Duriaswamy and Mahal (2005) examines the determinants of economic growth and health using a panel data of 14 major Indian States for the period 1970/71-2000/01. Their findings indicate that States with a higher initial income have grown faster than States with a lower initial income. This has the effect of widening the gap between the rich and poor States. There is also a strong association between per capita income and health status (LEB and IMR) of the population. The nexus between growth, poverty and health based on cross-sectional data of Indian States over a period of time point an inverse relationship between poverty and LEB. There is a two-way causation between economic growth and health status. The effect of health measured by life expectancy is positive and significant on economic growth even after controlling for initial income levels. There is evidence of a significant effect of per capita income and per capita public expenditure on health on LEB. Average number of years of schooling emerges as the most significant determinant of LEB. The production function estimates indicate that the effect of health (LEB) on NSDP is very high, in fact, much higher than the effect of the conventional inputs of capital and labour. Increasing investment in health is a required policy intervention for accelerating the economy's growth rate. Growth-oriented policies would result in bringing about improvements in the health status of the population. Policies promoting growth would also have the desirable effect of reducing poverty. Overall, there is a compelling reason for stepping up both public and private investment in health which would pay off in the long run.

A study by Noorbaksh (2006) indicates that the extension of conversion hypothesis to the non-income components of HDI could be validated conceptually and empirically. The growth regression for the medium and low development countries shows an evidence of weak absolute convergence in development over 28 years. The same is established for sub-samples of medium and also low development countries. The measures of σ- convergence are in line with those for weak β-convergence. When the population sizes of countries are taken into account the results differ. The Gini coefficient for medium and low development countries shows a worsening of inequality while in the case of all countries sample we see little change in inequality over the 28 years time span of this study. A regional breakdown of the sample over time clearly showed that in 2002 almost all countries in the bottom 20 per cent of HDI are SSA countries—a situation worse than that of 1975. During the 1975 to 2002 period, the Asian and Latin American countries experienced considerable progress in human development. Regarding population mobility between mean-relative HDI bands there is little movement for the first three five-year periods from 1975 to 1990. It is during 1990-95 that we see some upward and downward mobility with the former being higher. This is mainly driven by a number of medium population size countries such as Pakistan and Iran moving one HDI band up and some less populated countries moving down. During the 1995-2002 periods, there is more upward mobility mainly caused by the highly populated China and Bangladesh moving up one band. This resulted in a considerable change in the middle sections of distribution. The change in distribution for the entire period of 1975-2002 shows considerable mobility again in the middle part of distribution depicting a case of 'twin peaks' with the previously dominant lower middle band peak in the beginning of the period being replaced by an upper middle peak at the end of the period. All this illustrates that there have been some signs of equalization in the distribution of HDI but a few populated countries mainly drive this. There are also signs of polarization particularly amongst the developing countries. While some countries, mainly in Asia and Latin America, have progressed considerably, SSA seems to have been caught in a deep trap of low human development with no signs of getting out of it. These countries are not moving in the direction of the MDG as expected and, if the current trends continue, by 2015 they would be worse off in some aspects such as poverty and nowhere near the goals for the remaining MDG. To ensure improvements in human development in poorer countries, which need this most, and a reduction in inequality far more effort under the MDG is needed. Given that poorer countries on their own lack the required resources for this purpose, far more rigorous efforts are required by international aid agencies and donor countries in order to change the current trends.

Methodology and Data Base

To study health status convergence/divergence we use life expectancy as indicator. As already mentioned in the review of literature above, we apply two widely recognized concepts in economics to study convergence/divergence, namely (i) absolute convergence (or beta convergence) and (ii) conditional beta convergence.

The concept of (absolute and conditional) beta-convergence relates the change in life expectancy to the starting level, implying an inverse correlation between the starting values and the rates of change.[3] These concepts were first developed within the framework of neoclassical growth models to explain the convergence in aggregate output between states (regions). In these models a common steady state in economic development (absolute convergence) results from the law of diminishing returns of capital inputs. Similarly, health status convergence across

[3] Thus, beta-convergence is a necessary condition for the existence of sigma-convergence, while sigma-convergence might not accompany beta convergence.

regions could be caused by diminishing returns to factor inputs in a regional health production function. The empirical work on beta-convergence stresses the role of differences in the characteristics of countries (e.g. productivity, quality of education etc.), resulting in the concepts of conditional convergence and convergence clubs(Sala-I-Martin , 1997; Mayer-Foulkes, 2001). Both concepts deny common steady states in the economic development. In our context this basically leads to two questions, namely (i) why regions may differ in their health status, and (ii) why such regional differences are expected to decrease (i.e. converge) over time. Regarding the first question, we expect life expectancy differences between regions due to disparities in terms of the input factors in the regional health production function, such as education, income, household structures, institutional aspects, health care provision, economic development (particularly urban vs. rural areas), and environmental factors. Furthermore, external shocks may lead to such differences, e.g. deviations in immigration rates across regions. With respect to the second question, due to the increasing emphasis of health policy on Health for All, we would expect convergence of life expectancy (i.e. health status) across states over time. Moreover, the diminishing returns of the input factors in the health production function might lead to convergence, as the general conditions (e.g. income, education etc.) improve over time. The mobility of people across regions might have a similar effect, as people tend to move to regions/communities which exhibit more favorable living conditions.

To measure absolute beta convergence in a cross section of Indian states, we employ the following statistical model,

$$\ln(y_{i,T}/y_{i,0}) = \alpha + \beta * \ln(y_{i,0}) + \varepsilon_i \qquad \text{... (1)}$$

where, $y_{i,T}$ is the life expectancy at birth (gap) in the state i at final time T, and $y_{i,0}$ is the level of life expectancy in the starting period. i corresponds to the state as the cross sectional unit, β is the convergence coefficient and ε_i represents an error term. Equation (1) examines absolute convergence/ divergence in the cross section. Conditional beta-convergence is estimated by the following equation:

$$\ln (y_{i,T/}\ y_{i,0})=\alpha + \beta * \ln (y_{i,0}) + \gamma * z_{i,0} + \varepsilon_i \qquad \text{... (2)}$$

Thereby $z_{i,0}$ features characteristics like education level, socio-economic level etc. at time t = 0 as further explanatory variables. Thus, they allow the convergence of regions to different steady states due to differences in the input factors of the health production function with respect to the level of education, household structures, economic development, income, or population origins etc. Thus, we assume that differences in the environmental conditions at time t = 0 influence the dynamics of convergence across states.

The evidence currently available on regional convergence in many countries is mostly based on cross-sectional regressions or fixed-effect estimates (Arbia, Basile and Piras, 2005). The results obtained vary depending on the sample period, the region included, and, in particular, according to the estimation method used. For instance, in their seminal paper, Barro and Sala-i-Martin (1992) base their models on parameters like the variance of logarithm (to identify a σ convergence) and the simple cross-section regression coefficients (to identify a β convergence) estimated using standard OLS procedures. However, one of the drawbacks of the cross-section approach is represented by its incapacity to solve the problem of omitted variables, especially in cross region studies where the conditional convergence analysis is limited by data availability for key variables, such as the secondary school enrolment ratio and the investment/GDP ratio. Another limitation of cross-section technique concerns the imposition of complete regional homogeneity in the parameters of the process that describes the evolution of per-capita income. Using panel data methods these two problems (omitted variables and homogeneity) can be easily overcome (Islam, 1995). In particular, panel data models allow for unobserved heterogeneity but confine differences across regions to the intercept of the model, while the economies are characterized by a common convergence coefficient. In particular, some authors introduced a panel fixed-effect specification to control for the effects of omitted variables (and of heterogeneity), while others introduced the role of spatial dependence or spatial interaction. We have used here the fixed effect version to estimate convergence.

Data sources and estimation

In order to study convergence, we have made use of life expectancy, per capita income, education, budgetary expenditure on health and infant mortality rates. The information is obtained from official publication of GOI, Ministry of health, Registrar General of India, RBI and National Family Health Survey 3. Period of coverage ranges from 1996-2011, in two cross sections of states for the period 1996-2001 and 2006-11 presented separately for males and females. The analysis covers 19 major states including Andhra Pradesh, Assam, Bihar, Harayana, Gujarat, Madhya Pradesh, Maharashtra, Punjab Karanataka, Kerala, Rajasthan, Orissa, Tamil Nadu, Uttar Pradesh and West Bengal. The convergence results make use of panel data.

Results and discussion

Results of our analysis are presented in the Tables below. The cross section results for absolute convergence relating to life expectancy for two cross sections of states for the period 1996-2001 and 2006-11 presented separately for males and females indicate an evidence of convergence for both the cross sections for both the males and females (Table 4). However, the statistical significance for the second period for males is not observed. The speed of convergence with the estimated coefficients is observed to be annually respectively .410 and .10 (for males) and .367 and .455 (for females) (refer Table 14).

Table 4: Absolute Convergence: Regression Results

Explanatory Variable \Statistic↓	Male LEXP		Female LEXP	
	Cross Section		Cross Section	
	1996-2001	2006-11	1996-2001	2006-11
Intercept	-.090 (-2.75)	.027 (0.82)	.082 (2.11*)	.103 (-3.59*)
Life Expectancy Initial Period	-.0207 (-2.75*)	-.005 (-0.71)	-.0185 (1.98**)	-.023 (-3.59*)
R_{-}^{2}	.318	.0375@	.172	.459
F Statistic and DF	7.54*, 15	.51,15	3.91**, 15	12.92†, 15

Source: Estimated; *= 5% Level of Significance, **= 10% Level of Significance, @ denotes R^2.

Table 5: Absolute Convergence: Regression Results HEXP

Explanatory Variable \Statistic↓	Non-Special Category States*		Special Category States**	
	Cross Section		Cross Section	
	2000-05	2006-11	2000-05	2006-11
Intercept	.118 (1.54)	.163 (4.23†)	-.215 (-3.13*	-.149 (-1.82)
Life Expectancy Initial Period	-.1167 (-2.32*)	-.107 (-3.84†)	.127 (2.66*)	.116 (2.11**)
R_{-}^{2}	.214	.462	.377	.257
F Statistic and DF	5.37*, 17	14.74†, 17	7.06*, 11	4.46**, 11

Source: Estimated; †= 1% Level of Significance; *These include Andhra Pradesh, Bihar, Chhattisgarh, Goa, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.** These include Arunachal Pradesh, Assam, Himachal Pradesh, Jammu and Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and Uttarakhand.

Table 6: Convergence Fixed-effect Model

(Numbers into brackets refer to the t-values)

LEXP males unconditional convergence (1996-2001)	
Constant	315 (4.00*)
Initial level	-.074 (-3.94*)
Sigma-u	.0003
Sigma-e	.0001
rho	.8810
F-test that all ui=0	2.18**
R^2within	.526
R^2between	.271
R^2overall	.225
Correlation (u_i, x_b)	-.923
Observations	30
Number of groups	15
Observations per group	2

Source: Estimated; *Denotes significance at 5%** Denotes significance at 10%.

The results for fixed effect panel model relating to life expectancy for males and females (Tables 6-10) indicate significant convergence with the speed being as 1.428 and 823 (refer Table 15). The conditional convergence for males pertaining to life expectancy indicates the significance of education and budgetary health expenditure by the government (Table 7). In the presence of these conditional variables the speed of convergence for males is estimated as 3.412. Likewise for females with the same variables as significant (Table 9) results indicate a speed of convergence as 2.033 (refer Table 14).

Table 7: Males Conditional Convergence (1996-2001)

(Numbers into brackets refer to the t-values)

LEXP males conditional convergence (1996-2001)	
Constant	.802 (4.10*)
Initial level LEXP	-.186 (-4.26†)
LN PCI	-0036 (-1.17)
LN HEXP	.004 (1.85**)
LN EDU	.001 (2.11**)
Sigma-u	.0111
Sigma-e	.0001
rho	.9900
F-test that all ui=0	2.98*
R^2within	.773
R^2between	.349
R^2overall	.228
Correlation (u_i, x_b)	-.988
Observations	30

Source: Estimated; † Denotes significance at 1%*Denotes significance at 5%** Denotes significance at 10%.

Table 8: Females Unconditional Convergence (1996-2001)

(Numbers into brackets refer to the t-values)

LEXP Females unconditional convergence (1996-2001)	
Constant	.180 (2.72*)
Initial level	-.042 (-2.65*)
Sigma-u	.0025
Sigma-e	.0012
rho	.8038
F-test that all ui=0	5.08†
R^2within	.3341
R^2between	.360
R^2overall	.341
Correlation (u_i, x_b)	-.616
Observations	30

Source: Estimated; † Denotes significance at 1%*Denotes significance at 5%** Denotes significance at 10%.

Table 9: Females Conditional Convergence (1996-2001)

(Numbers into brackets refer to the t-values)

LEXP Females conditional convergence (1996-2001)	
Constant	.416 (2.04**)
Initial level LEXP	-.107 (-1.86**)
LN PCI	.0008 (0.70)
LN HEXP	-.0002 (-0.08)
LN FEEDU	.007 (0.80)
Sigma-u	.0060
Sigma-e	.0013
rho	.9556
F-test that all ui=0	4.00*
R^2within	.459
R^2between	.271
R^2overall	.253
Correlation (u_i, x_b)	-.921
Observations	30

Source: Estimated; † Denotes significance at 1%*Denotes significance at 5%** Denotes significance at 10%.

Further across non special and special category states the results of absolute convergence for budgetary health expenditure (as percent of total budget of respective state government indicate convergence for the non-special category states for both the cross sections of 2005-06 and 2010-11 (Table 5). The speed of convergence is estimated as 2.208 and 2.033 (refer Table 14). The results of special category states, however, indicate divergence in cross sections (Table 5). In case of fixed effect panel data models a similar convergence is observed (Table 11) with speed now being as 2.287 for non-special category of states (refer Table 14). Divergence is again indicated for special category of states with fixed effect model (Table 11).

Table 10: Non-Special Category States Unconditional Convergence (2006-2011)

(Numbers into brackets refer to the t-values)

HEXP Non-Special Category States unconditional convergence (2006-2011)	
Constant	.390 (6.59†)
Initial level	-.286 (-6.97†)
Sigma-u	.0424
Sigma-e	.0317
rho	.641
F-test that all ui=0	2.18**
R^2within	.752
R^2between	.228
R^2overall	.437
Correlation (u_i, x_b)	-.6243
Observations	34

Source: Estimated; † Denotes significance at 1%*Denotes significance at 5%** Denotes significance at 10%.

Table 11: Special Category States Unconditional Convergence (2006-2011)

(Numbers into brackets refer to the t-values)

HEXP Special Category States unconditional convergence (2006-2011)	
Constant	-.347 (-3.64†)
Initial level	.236 (3.59†)
Sigma-u	.0396
Sigma-e	.0487
rho	.3981
F-test that all ui=0	0.79
R^2within	.563
R^2between	.199
R^2overall	.349
Correlation (u_i, x_b)	-.6356
Observations	22

Source: Estimated; † Denotes significance at 1%*Denotes significance at 5%** Denotes significance at 10%.

Panel results for per capita budgetary expenditure for revenue expenditure indicate convergence only for average income and rich states (Table 12 and 13) with the speed of convergence as 0.162 (Table 14). For poor states the statistical significance is not observed (Table 13). A similar result pertaining to capital expenditure is observed with both rich as well as poor states not indicating a statistically significant coefficient.

Table 12: Per Capita Budgetary Expenditure On Health (Rich And Average Income States) Unconditional Convergence (1990-2010)

(Numbers into brackets refer to the t-values)

Per Capita Budgetary Expenditure on Health (Rich and Average Income States) Unconditional Convergence (1990-2010)	
Constant	.265 (3.15†)
Initial level	-.033 (-2.06*)
Sigma-u	.0306
Sigma-e	.0510
rho	.2652
F-test that all ui=0	0.97
R^2within	.127
R^2between	.045
R^2overall	.026
Correlation (u_i, x_b)	-.5257
Observations	40

Source: Estimated; † Denotes significance at 1%*Denotes significance at 5%** Denotes significance at 10%.

Table 13: Per Capita Budgetary Expenditure On Health (Poor States) Unconditional Convergence (1990-2010)

(Numbers into brackets refer to the t-values)

Per Capita Budgetary Expenditure on Health (Poor States) Unconditional Convergence (1990-2010)	
Constant	.152 (1.13)
Initial level	-.013 (-0.48)
Sigma-u	.0210
Sigma-e	.0610
rho	.1064
F-test that all ui=0	0.42
R^2within	.0132
R^2between	.0194
R^2overall	.0001
Correlation (u_i, x_b)	-.348
Observations	24

Source: Estimated; † Denotes significance at 1%*Denotes significance at 5%** Denotes significance at 10%.

Table 14: Calculation for Speed of Convergence Absolute and Conditional Convergence

		Speed of Convergence (Lambda)*	Annual Rate of Convergence	Half Life
	beta	ln1-beta/ years		ln hal/lamda
Male LEXP(1996-2001)	-0.021	0.004	0.410	169.154
Male LEXP(2006-11)	-0.005	0.001	0.100	694.879
Female LEXP(1996-2001)	-0.019	0.004	0.367	189.065
Female LEXP(2006-11)	-0.023	0.005	0.455	152.410
Non-Special Category States				
HEXP(2000-05)	-0.117	0.022	2.208	31.399
HEXP(2006-11)	-0.107	0.020	2.033	34.094
Calculation for Speed of Convergence For Fixed Effect Models				
Absolute Convergence				
Male LEXP(1996-2001)	-0.074	0.014	1.428	48.547
Female LEXP(1996-2001)	-0.042	0.008	0.823	84.239
Conditional Convergence				
Male LEXP(1996-2001)	-0.186	0.034	3.412	20.317
Female LEXP(1996-2001)	-0.107	0.020	2.033	34.094
Absolute Convergence			0.000	0.000
Non-Special Category States			0.000	0.000
HEXP 2000-01-2010-11	-0.286	0.023	2.287	30.312
Per Capita Budgetary Exp on Health(1990-2010)				
Rich and Average Income States	-0.033	0.002	0.162	426.983
Poor States	-0.013	0.001	0.065	1073.297

Source: Estimated; * The parameter β is linked to the speed of convergence λ by the following relationship (s. Barro/Sala-i-Martin 2004, p. 462): $\beta = (1 - e^{-\lambda})$The speed of convergence in the OLS model.

This result is further substantiated if we plot the mean deviations of per capita public expenditure on health for both categories of states which indicate convergence for average and rich income group of states and divergence for poor states (Chart 1 and 2).

Chart 1: Deviation of PC Public Exp (from Mean Value Across All States) in Poorer States

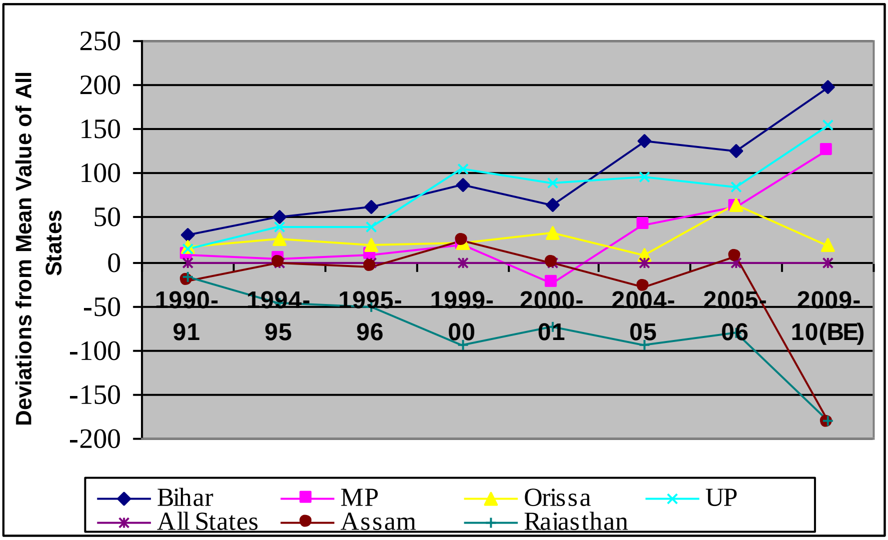
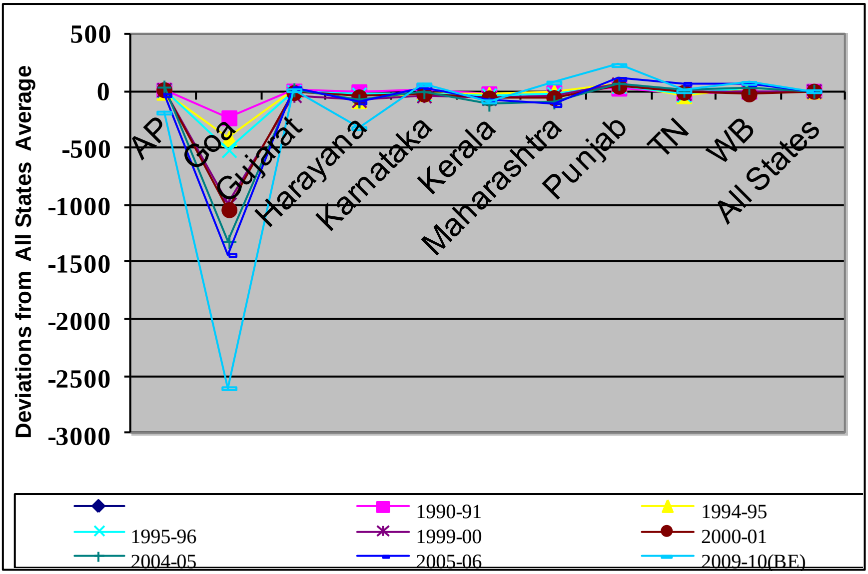


Chart 2: Deviation of Per capita Public Expenditure(from the mean value Across States) in Average Income and Rich States



Policy Recommendations

Keeping in view the above results, we suggest four policy measures to overcome divergence in poorer states and speed up convergence for average and rich category of states. These include:

1. Utilizing 13th Finance Commissions Incentive Grants
2. Making use of NRHM resources and not supplementing it for state government budgetary expenditure
3. Increasing the level of per capita health expenditure as envisaged in Health Policy (GoI, 2003)
4. Improving efficiency of resource use

According to 13th Finance Commission recommendations, the SRS measuring IMR for 2009 will be the base line from which improvement of each state will be measured. The annual improvement in these indicators, as determined from the SRS bulletin, statistical report for the succeeding years will be measured from the base line. It is suggested that reward for performance in such cases should be based upon a formula with two components: the first component is to reward positive movement in the value of the parameter and the second component is to provide a premium if such change is made above the median value of the parameter for all states. Thus, states are rewarded both for improvement in the parameter as well as the level at which the improvement is made. Each state’s eligibility will be determined annually, based upon improvement in the IMR index. An amount of INR. 5000 crores for this grant over a three year period between 2012 and 2015 have been recommended. Details of scheduling of this grant are presented in Table 16. Data pertaining to 2009-10, which will be available in 2010, will be the base line for computing eligibility for all the succeeding years. Disbursal of grants will commence from 2012-13. This will give the states a period of two years to make improvements. During 2012-13, the cumulative change in IMR between the years 2009, 2010 and 2011 for each state will be applied to the 13th Finance Commission formula (presented in Annex 12.10 to the Report). For 2013-14, the cumulative change between 2009 and 2012 will be applied to the formula. The same procedure will be followed for succeeding year. The grant will be released in three annual installments between 2012-13 and 2014-15. This will be after the publication of the annual SRS bulletin/report incorporating state wise IMR statistics for the relevant year (Table 15).

Table 15: Scheduling of IMR Incentive Grant

Year	Amount (Rs. crore) Calendar Year of Measurement	Year of Release of SRS report	
2010-11	Base Line	2009	2010
2012-13	1500	2011	2012
2013-14	1500	2012	2013
2014-15	2000	2013	2014

Source: GOI(2009), Thirteenth Finance Commission, 2010–2015, Volume I: Report, p.219.

Besides it some other states are also granted special grants as per their memorandum submitted to 13th Finance Commission. These include an amount of Rs. 250 crores to MP for critical health infrastructure in the state to improve the delivery of health care system in the state, an amount of Rs. 275 crores to Orissa for up-gradation of health infrastructure and a grant of Rs. 300 crore for construction of sub-centers, primary health centers and additions to the sub-divisional and district hospitals in the state for Rajasthan..

Secondly, it is pertinent that the States should increase their health expenditure along with NRHM grants. However, at present, despite the fact that states should provide matching contributions, the lack of any such stipulation that this contribution should be additional makes the states to follow a policy of substituting expenditure on health in other areas rather than envisaged under NRHM priorities. This thus defeats the very purpose of reducing deficiency in poorer districts and therefore does not lead to an improvement towards reducing divergence.

Thirdly, as mentioned in the Health Policy document, the need for increasing funds has not been captured in actual implementation. As such this public spending as percent of GDP in India has remained almost stagnant varying from 0.9 percent to 1.2 percent of GDP in the period of 1990-2010. Thus an additional budgetary effort is a necessity of the moment to cope with increasing requirements for the important area of health care. Moreover, even out of this low public expenditure about 28 percent has been on tertiary health care which in fact was targeted at 10 percent in National Health Policy.

Lastly, within the states, a further analysis by us earlier at the district level in MP and West Bengal (poorer states) and Karnataka, Maharashtra and Punjab (richer States), for instance, further indicate that outcomes in health sector are being influenced by an inefficient utilization of limited budgetary resources due to various factors comprising of misallocation of funds across inputs, low productivity and local political bureaucratic hurdles (Purohit, 2008, 2010, 2010 a, b, c). Thus any financing strategy aiming at reducing disparities should also take into account not only to overcome inadequacy but also inefficiency in allocation and utilization of health care inputs (Purohit, 2010).

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