What Determines Performance Gap Index of Healthcare in Gujarat?

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Abstract

Health performance of Gujarat viewed in terms of the Human Development Index (HDI) portrays it as a medium performer in the country. However, the index of health component for Gujarat is found to be positively contributing to the HDI ranking of the state. It is, therefore, crucial to review the status of health performance of Gujarat among the other states for improving its relative standing in human development. In this context the present paper attempts to identify the gaps in performance of the health related outcome, output and input indicators from the best performers in each indicator. Moreover, the paper also reviews the trends in health performance of Gujarat over time and also estimates the effectiveness of the state in converting its health inputs to outputs and outputs to outcomes. The results indicate that the outcome indicators have improved in the absolute sense but have high performance gaps except the maternal mortality rate (MMR). Majority of the output and input indicators, however, show poor absolute performance and high performance gaps that have been expanding over time. The effectiveness of conversion of health indicators in Gujarat suggests that while the state has moved above average in conversion of outputs into outcomes, it has moved at a slightly below average level in converting its inputs to outputs over time. Improving the health status of Gujarat requires targeted efforts in specific areas such as controlling neo-natal deaths, improving coverage of children under immunization and address malnourishment. Additionally, building adequate health infrastructure and employing required manpower are also relevant.

Keywords: Performance gap index, Primary Healthcare in Gujarat, Health indicators in Gujarat, Health Outcomes, Health Inputs, Health Outputs.

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1. Introduction

The national average in health indicators for India conceals a huge variation in performance of states. Measures of health performance of states are given by the National Human Development Report (NHDR) 2001 and India Human Development Report (IHDR) 2011, which provide estimates of Human Development Index (HDI) for the states of India. Both these reports are not comparable not only with each other, but also with their internation counterparts[1]. The NHDR (2002) and IHDR (2011), however, provide consistent estimates of HDI for major states at given points of time. Accroding to the NHDR (2002), among 15 major states of the country, Gujarat's HDI ranking stood at 4th position in 1981, slipped down to 6th position in 1991 and remained the same in 2001 (Government of India, 2002). Morevoer, as per the IHDR (2011) Gujarat's rank among 18 major states was at 6th position during 2000 and remained at same level upto 2008 (Government of India, 2011).

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[1] The HDI for states calculated in the NHDR is based on a different methodology than the international HDR for the corresponding years. The indicators used for the calculation were - per capita consumption expenditure, literacy rate, adjusted intensity of formal education, life expectancy at age one and infant mortality rate. On the other hand the international HDR used per capita income, mean and expected years of schooling and the life expectancy at birth for calculating HDI. Moreover, the minimum and maximum values considered for each indicator for converting into the corresponding index also differ. Thus, these HDI values were not comparable to the values of countries given by the international HDRs for those years. For the subsequent years, IHDR has followed a modified set of indicators and also different maxi-min values for calculating the HDI for states in the country. These estimates, therefore, are not comparable to NHDR estimates of HDI. Further, the international HDI calculations have also undergone change in method in 2010 rendering the earlier HDI estimates non-comparable.

A recent study (Suryanarayana, Agrawal, & Prabu, 2011) has come up with the HDIs for Indian states calculated using the same methodology of the HDR 2010. These values, therefore, become comparable to the HDI values for other countries of the world given in the HDR 2010. The study also provides the indexes for individual components of HDI – income, education and health that are based on per capita gross national product (GNP), mean and expected years of schooling and, the life expectancy at birth respectively for the states. Moreover, the study estimates the inequality adjusted human development index (IHDI) and the respective indexes for all the three components adjusted for inequality. As per the above mentioned study the Indian states face an average proprotionate loss of 32 per cent in the overall HDI value due to inequality adjustment with Gujarat facing about 29 per cent loss. However, Gujarat is one of the states that has experienced an improvement in the rank in HDI after adjusting for inequality. Considering that the IHDI estimates are comparable internationally, an attempt has been made to study the peformance of Gujarat among the states of India in terms of the various indexes provided by the study. Table 1 shows the various inequality adjusted indexes for 18 major states. The table also includes IHDI values calculated using two of the three components and dropping the third one. E.g, IHDI$_{ie}$ implies the inequality adjusted index of income and education calculated by dropping the health component. Additionally all the states have also been provided ranks for all the different indexes in the table. The table shows that the top perfromers in terms of IHDI are states like Kerala, Punjab and Marashtra. The low performers include Chattisgarh and MP.

Gujarat, among these 18 states, ranks 6th in terms of overall IHDI. However,IHDI calculated by dropping the health index (IHDI$_{ie}$) reduces the rank of Gujarat from 6th to 8th. This points to a positive contribution of the health index of Gujarat towards IHDI ranking of the state.

Table 1: Inequality Adjusted Human Development Index (IHDI) for States of India Comparable to the International HDI in HDR 2010										
State	Income (i)	Education (e)	Health (h)	IHDI	Rank	IHDI(ie)	Rank	IHDI (eh)	Rank	IHDI (ih)	Rank
Andhra Pradesh	0.397	0.192	0.479	0.332	11	0.276	11	0.303	11	0.436	9
Assam	0.404	0.258	0.379	0.341	10	0.323	7	0.313	10	0.391	12
Bihar	0.364	0.187	0.411	0.303	15	0.261	17	0.277	13	0.387	13
Chhattisgarh	0.356	0.202	0.343	0.291	17	0.268	14	0.263	17	0.349	18
Gujarat	**0.413**	**0.243**	**0.475**	**0.363**	**6**	**0.317**	**8**	**0.34**	**7**	**0.443**	**6**
Haryana	0.445	0.244	0.485	0.375	5	0.33	5	0.344	5	0.465	5
Jharkhand	0.363	0.196	0.411	0.308	12	0.267	15	0.284	12	0.386	14
Karnataka	0.387	0.226	0.503	0.353	8	0.296	10	0.337	8	0.441	8
Kerala	0.449	0.41	0.764	0.52	1	0.429	1	0.56	1	0.586	1
Madhya Pradesh	0.366	0.194	0.343	0.29	18	0.266	16	0.258	18	0.354	17
Maharashtra	0.398	0.279	0.562	0.397	3	0.333	4	0.396	2	0.473	3
Orissa	0.341	0.199	0.38	0.296	16	0.26	18	0.275	14	0.36	16
Punjab	0.455	0.265	0.572	0.41	2	0.347	2	0.389	4	0.51	2
Rajasthan	0.409	0.179	0.4	0.308	13	0.271	13	0.268	16	0.404	10
Tamil Nadu	0.405	0.278	0.55	0.396	4	0.336	3	0.391	3	0.472	4
Uttar Pradesh	0.384	0.195	0.384	0.307	14	0.274	12	0.274	15	0.384	15
Uttaranchal	0.417	0.256	0.384	0.345	9	0.327	6	0.314	9	0.4	11
West Bengal	0.396	0.238	0.494	0.36	7	0.307	9	0.343	6	0.442	7
India	**0.389**	**0.229**	**0.452**	**0.343**		**0.298**		**0.322**		**0.419**	
Source: (Suryanarayana, et al., 2011)											

Moreover, the rank of the state remained unaffected when the education component is droped and falls when the income component is dropped[2]. The rank of Gujarat in $IHDI_{eh}$ is lower than the IHDI rank but it is higher as compared to the $IHDI_{ie}$ rank where the health component is dropped. Thus, the health index of Gujarat is contributing more positively towards the state's relative position in IHDI in the global context than its income index. In this context it would be relevant to review the health status of the state over time.

The health status of Gujarat has not been very satisfactory in comparison to the other states in the nation. The indicators such as life expectancy and infant mortatlity rate (IMR) for Gujarat do indicate improvement over time at the the absolute level but the relative standing among other states remained much lower. The life expectancy rose from 57 years in 1981 to about 67 years during 2008-10 and IMR reduced from 115 per thousand live births in 1981 to 44 in 2010 (Government of India, 2002), (RHS - MoHFW, 2012) and (Government of India, 2011). Gujarat's ranks for these indicators during 2008-10 among 20 major states in the nation, however, were seven and 11 for life expectancy and IMR respectively which meant that other states had done better than Gujarat. Among the other vital indicators such as maternal mortality rate (MMR), neo-natal mortality rate (NN) and under five mortality rate (U5MR) Gujarat ranked 6, 13 and 10 respectively during 2008-10, and for birth rate and death rate the ranks were 12 and six respectively (SRS Bulletin, 2011), (Government of India, 2011) and (Vital Statistics-Indiastat, 2010). Although Gujarat experienced an improvement in these

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[2] We have used of the ranking of Gujarat in terms of the various indexes for studying its performance among the states. Index values for the individual components have been calculated with respect to the international goal posts for income, education and health. Hence, at the international level it is found that the performance of Gujarat in the income and education index is poor but in terms of health index it performs much better. However, when the comparison is done among the Indian states it is found that Gujarat ranks higher in terms of income but in terms of health it has a relatively low rank.

indicators over time, other major states did much better than Gujarat during the same period. The poor relative performance of Gujarat raises various concerns and issues regarding the working of the healthcare system in the state.

The above mentioned health indicators related to mortality and life expectancy could be called the *health outcome* indicators. The performance of these indicators would largely depend upon the *health output* indicators such as child and maternal care indicators, and *health input* indicators related to health related infrastructure and manpower[3] (Hsiao, 2003). In context of a relatively poor health status of Gujarat among the states in India it would be relevant to examine the performance of health outcome indicators considering the status of health output indicators and health input indicators in the state. It would also be crucial to provide a comparative picture of the Indian states showing the relative standing of Gujarat in terms of health output and input indicators in order to identify specific areas in which the state is lagging behind.

The present paper attempts a comparison of the health performance of Gujarat relative to the best and the worst performers over time by constructing a 'Performance Gap Index' (PGI). The next section provides the methodology and calculation of PGI for Gujarat for major health outcome, output and input indicators. The third section considers the rate of improvement in absolute values of these indicators and in terms of PGI during two decades (1990-2001 and 2001-10) to examine whether there was any marked increase in the rate of improvement in Gujarat's performance over time. Fourth and the final section examines the

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[3] The categorization of *health indicators* is done such that the *inputs* in the health systems in form of the manpower and infrastructure are generating the *outputs* of maternal and child care. The *outcomes* are subsequent results that are caused as a result of the *input-output* phenomenon of the health system.

expenditure on health by governement of Gujarat over the last decade and the trend therein to conclude the discussion.

2. Health Status of Gujarat – The Performance Gap

The present section attempts to measure the gap in the health performance of Gujarat relative to the best and worst performing states in the country. This is done by measuring a gap of performance on each of the health indicators to show the relative standing of the state. The gap would indicate the distance that Gujarat has to cover to reach the best performance in the country in each indicator. A higher value of this index indicates more gap from the best and thereby a relatively poorer performance of Gujarat. The PGI for Gujarat in each indicator is measured using the following formula:[4]

Performance Gap Index (PGI) = [(Best Value – Gujarat's Value) / (Best Value – Least Value)] * 100

Table 2 below shows the PGI for Gujarat calculated for health outcome, output and input indicators for the latest years. These gaps can also be used to fix performance target with timeframe for each of the indicators.

Beginning with gaps in the outcome indicators we find that among the health outcomes of the state, expectancy of life at birth for males and females show significant gap of respectively 44 per cent and 41 per cent from the top performer. The performance gaps in IMR (63 per cent), NN (56 per cent) and U5MR (59 per cent) are also far more than the gaps for the total fertility

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[4]As an illustration, PGI of Gujarat for the IMR during 2010 requires the best performance 13 (Kerala), least performance 62 (M.P) and value of Gujarat 44; Therefore,

PGI (IMR) = [(13 – 44) / (13 – 62)] *100 = 63.2%

Thus, Gujarat has about 63% performance gap in terms of IMR.

rate (36 per cent), and the birth and the death rates (52 per cent & 27 per cent). It is only the maternal mortality where the performance gap is low at 22 per cent putting Gujarat relatively near to the top performer. Considering the mortality rates, we find that performance gap of IMR is very close to the gaps found in NN and U5MR. This is because the neonatal deaths form a significant proportion of the infant and child deaths. It would, therefore, be relevant to focus on the reduction of gap in NN through control of neonatal deaths and thereby reduce the gaps in IMR and eventually U5MR in the state.

As mentioned earlier, the performance of above discussed health outcomes will depend upon the status of health output and input indicators. Among the indicators determining health outputs we have percentage of malnourished children[5], percentage of children receiving various types of immunization, percentage of women being covered under ante-natal care (ANC) and post natal care (PNC), percentage of institutional deliveries and, percentage of deliveries attended by trained personnel or skilled birth attendants.

The gaps found in output indicators of malnourishment and coverage of children under immunization is a matter of concern for the state. The gap for stunted and underweight children is 84 per cent and 62 per cent respectively which is very high considering that Gujarat is income wise among the better off states in the country. The gaps for wasted children and children born with low birth weights are relatively low but still substantial.

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[5] The percentage children that are malnourished and those born with low birth weight are the *outputs* of the Integrated Child Development Scheme (ICDS) for providing nutrition supplement. It is targeted to malnourished children and, pregnant and lactating mothers.

Table 2: Performance Gap Index (PGI) for Health Outcome, Output and Input Indicators of Gujarat						
Indicators	**PGI- Gujarat (per cent)**	**Value Gujarat**	**Best Performer**	**Value**	**Least Performer**	**Value**
Outcome indicators (2008-10)						
Male Life expectancy	44	**67.2**	Kerala	72	Chhattisgarh	61
Female Life expectancy	41	**71**	Kerala	76.8	Assam	62.8
Neo Natal Mortality (NN)	56	**33.5**	Kerala	11.5	Chhattisgarh	51.1
Infant Mortality Rates (IMR)	63	**44**	Kerala	13	MP	62
Under 5 Mortality (U5MR)	59	**60**	Kerala	14	MP	92
Maternal Mortality Rate (MMR)	22	**148**	Kerala	81	Assam	390
Birth Rate	52	**21.8**	Kerala	14.8	UP	28.3
Death Rate	27	**6.7**	WB	6	Orissa	8.6
Total Fertility Rate	36	**2.5**	Kerala	1.7	Chhattisgarh	3.9
Output Indicators (2005-06)						
Undernourishment Related (Children Below three Years of Age)						
Stunted (too short for age)	84	**42**	Kerala	21	UP	46
Wasted (too thin for height)	31	**17**	Punjab	9	Maharashtra	35
Underweight (too thin for age)	62	**47.4**	Punjab	27	MP	60
Percentage Children with birth weight < 2.5 Kg.	36	**22**	Kerala	16.1	Haryana	32.7
Immunization Related (Percentage children of 13-23 Months Received)						
BCG	34	**86.4**	TN	99.5	UP	61
DPT	52	**61.4**	TN	95.7	UP	30
Polio	99	**65.3**	TN	87.8	Orissa	65.1
Measles	49	**65.7**	TN	92.5	UP	37.7
No Vaccinations	39	**4.5**	TN	0	Orissa	11.6
Percentage with vaccination card	71	**36.4**	Kerala	75.3	UP	20.3
All Vaccinations	62	**45.2**	TN	80.9	UP	23
Maternal Care						
Percentage pregnant women received ANC	19	**87.4**	Kerala	99.7	Bihar	34.3
Percentage of pregnancies with PNC	39	**61.4**	TN	91.3	UP	14.9
Percentage deliveries in Health facilities	55	**52.7**	Kerala	99.3	Chhattisgarh	14.3
Percentage deliveries assisted by Health Personnel	50	**63**	Kerala	99.4	UP	27.2
Input Indicators (2008-10)						
Infrastructure Related (Nos. per hundred thousand Population)*						
No. SCs [@]	55	**20.98**	Chhattisgarh	33.6	Bihar	10.5
No. PHCs [@]	62	**3.13**	Kerala	6.2	WB	1.5
No. CHCs [@]	33	**0.81**	Kerala	1.3	Bihar	0.1
Total Govt. Hospitals	96	**0.6**	Uttar	7.0	WB	0.3
No. of Beds on Govt. Hospital	64	**48**	Karnataka	104.3	UP	16.3
AYUSH Hospitals	99	**0.1**	Rajasthan	5.6	Assam	0.0
Beds in AYUSH Hospitals	86	**1.53**	Rajasthan	5.8	Maharashtra	0.5
AYUSH Dispensaries	81	**1.22**	Kerala	7.0	Bihar	0.3
Manpower Related (Nos. per hundred thousand Population)*						
ASHA (Per 1000 Rural Population) [@]	74	**0.86**	Chhattisgarh	3.1	TN	0.1
MPW [@]	22	**12.9**	Chhattisgarh	17.7	UP	1.1
ANM [@]	83	**18.5**	AP	38.4	UP	14.5
HA [@]	57	**2.19**	TN	5.1	Orissa	0
LHV [@]	52	**2.52**	Chhattisgarh	5.3	WB	0
Staff Nurse at PHC and CHC [@]	51	**4.01**	Assam	8.1	Jharkhand	0
General Doctors at PHC [@]	90	**2.94**	Jharkhand	9.1	MP	1.5
Specialist Doctors at CHC [@]	95	**0.22**	Kerala	4.4	TN	0
Total Doctors (Allopathic)	50	**76.91**	Karnataka	142.8	Jharkhand	9.8
Total AYUSH Doctors	66	**57.69**	Bihar	160.6	Assam	5.3
Total Nurses [@]	45	**145**	Kerala	256.5	Bihar	8.6
Notes: '*' – Population as per Census of India 2011; '@' – Only Rural Population is considered.						
Source: (Government of India, 2011), (Vital Statistics-Indiastat, 2010), (SRS Bulletin, 2011), (IIPS, 2007), (RHS - MoHFW, 2012), (Infrastructure - Indiastat, 2008-11) and (Manpower - Indiastat, 2008-11)						

It has been observed that Gujarat was one of the eight major states that account for 77 per cent of the undernourished children in the country during 1998-99 (Radhakrishna & Ravi, 2004). The prevalence of malnourishment among children could be related to the reduced growth potential and also the probability of increased mortality risk among children (Pelletier, Frongillo, Schroeder, & Habicht, 1995). A substantial performance gap (36 per cent) also exists in terms of percentage children born with low birth weight (< 2.5 Kg). Low birth weight could increase the risk of neo-natal deaths, which contribute significantly to IMR and U5MR. Moreover, it also points to the nutritional deficiencies existing among pregnant women. It is also believed that children of mothers suffering from undernourishment and energy deficiency tend to have greater risk of being malnourished (Radhakrishna & Ravi, 2004). Thus, improving the nourishment levels not only among children but also among mothers through significant nutrition interventions could be instrumental in reducing the gaps in the mortality indicator of the state.

The immunization indicators also show wide gaps in coverage under DPT and Measles at 52 per cent and 49 per cent respectively. The coverage under Polio immunization is extremely poor with almost a 100 per cent gap putting Gujarat at par with the poorest performer. Such a situation despite nationwide Polio eradication drives in the country places formidable challenge to the state's healthcare performance. It is also found that the gap in terms of the percentage children received all vaccinations (i.e. complete vaccination) is relatively greater than the gap for all individual vaccines except polio. The percentage of children received none of vaccinations in Gujarat is only 4.5 per cent, however, its performance gap as compared to top performer Tamil Nadu (with 0 per cent children with no vaccination) is 39 per cent.

These observations imply that a significant effort in improving immunization indicators in the state is required not just in individual vaccines but also for improving coverage of children under complete vaccination. One of the aspects that could be related to better immunization coverage is the existence of the vaccination cards. Gujarat faces a gap of 71 per cent in this aspect with only about one third of the children with vaccination cards in the state. The vaccination cards can provide more accurate information regarding the immunization record than the memory of the parents for individual vaccines (Bolton, Holt, Ross, Hughart, & Guyer, 1998). Thus, it becomes an important policy intervention and effort to ensure greater availability of vaccination cards for effective monitoring of immunization and achieve better coverage.

Among other output indicators there are maternal care indicators that are crucial for improvement of the MMR. The gap for percentage of ANC coverage is relatively low at only 19 per cent, but the gap of PNC is relatively higher at 39 per cent. The gaps for institutional deliveries and deliveries attended by trained personnel are also relatively high at 55 per cent and 50 per cent respectively. Gujarat is one of the better performing states in the nation in terms of MMR with only 17 per cent gap from the top performer. Thus, targeted policy level interventions to improve the maternal care indicators could further bring down the MMR to improve its relative standing in the nation.

In the recent times an effort in this direction is the '*Chiranjeevi*' scheme announced by the state government under which poor pregnant women could use obstetric services of selected nursing homes run by private doctors for their delivery free of cost. The scheme aims to bring down the numbers maternal and new-born deaths significantly though increased institutional deliveries (Mavlankar, Singh, Patel, Desai, & Singh, 2009). The increase in percentage of

institutional deliveries and/or deliveries attended by trained personnel acts as a necessary condition for reducing the MMR. Moreover, improving the preventive care through increased ANC and PNC coverage along with institutional delivery would be the sufficient condition for MMR reduction. The effectiveness of the preventive care may not necessarily be as much as the place of delivery, but it helps identifying and attending risks and uncertainties both before and more importantly soon after the delivery (Bhatia & Cleland, 1995). Moreover, preventive care in terms of the PNC, which has a relatively high performance gap than ANC in Gujarat, could be instrumental in identifying risks for a new-born's health thereby reducing the possibility of neonatal deaths.

Health input indicators that determine the health output indicators and thereby the health outcomes are critical. The performance gap in the infrastructure availability is relatively less for the number CHCs (33 per cent) but is relatively wide for the number of SCs (55 per cent) and PHCs (62 per cent) in Gujarat. These gaps could partly be attributed to the norms regarding the required numbers of SCs, PHCs and CHCs as per the Indian Public Health Standards (IPHS). According to these norms Gujarat would require 20 SCs, 3.33 PHCs and 0.83 CHC for every 1,00,000 population[6] (MoHFW, 2010). Gujarat already has about 21 SCs, 3.13 PHCs and 0.81 CHCs per 1,00,000 population which is almost same as required by the norms. However, the gaps exists due to the fact that the best performers in terms these health facilities i.e., Kerala and Chhattisgarh have relatively higher number of existing infrastructure than required by them as per the average norms. Moreover, this also raises a question regarding the existing norms and the possible need to relook and revise the same.

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[6] As per the norms set by IPHS, population covered by a SC would be 3,000 in hilly/tribal/desert area and 5,000 in plain area, and in the same way a PHC would cover 20,000 to 30,000 populations and a CHC would cover 80,000 to 1,20,000 population.

Considering the total healthcare infrastructure, the gap for the total government hospitals and the number of available beds in them is extremely high at 96 per cent and 64 per cent respectively. The performance gap of Gujarat in terms of the Indian system of medicine AYUSH (Ayurveda Yoga Unani Siddha Homeopathy) is also extremely large for the number of hospitals (99 per cent), beds (81 per cent) and dispensaries (86 per cent).

The performance gaps in terms of manpower availability (numbers per hundred thousand of population) in the public health system of the state are quite wide in case of paramedical staff and very high in case of the medical professionals. Other than the MPWs that has 22 per cent gap, the number of ANMs, HAs, LHVs, and staff nurses show large performance gaps ranging from 52 per cent to 83 per cent. The gap for the number of general doctors at PHC is 90 per cent and for the specialist doctors at CHC it is as high as 95 per cent. Moreover, considering the total number of doctors and nurses in the state, we find that the performance gaps are relatively lower at 50 per cent and 45 per cent respectively. However, the gap in terms of the total number of AYUSH doctors (66 per cent) is again quite high. The gaps for total and government doctors in Gujarat show that the non-availability of doctors is more severe in the public health care system than overall level in the state. This could be due to the lack of willingness of medical professionals to work in the public health setup and also the medical practice norms in the state that prevent government doctors to undertake private practice (Mavlankar, Singh, Patel, Desai, & Singh, 2009).

The performance gaps in the health input indicators are found to be much greater than the gaps in the health output and the outcome indicators. Considering the overall performance gap we find that the mean values of the PGI for outcomes and outputs are 44 per cent and 52

per cent respectively during 2006-09 and the mean for the input PGI is 66 per cent. Moreover, the standard deviations (SD) of the PGI in all these indicators range from about 14 for outcomes to 21 for outputs and 22 for the inputs. With not much difference in the SD the higher mean gap in inputs suggests a relatively worse performance of these indicators.

If we consider the infrastructure and manpower indicators separately, the former has 72 per cent mean gap and the latter has 62 per cent, mean gap with SD for both at 22. Taking a closer look at the outputs we find that the maternal care indicators have relatively less mean gap of 41 per cent with SD 16 and the child care indicators have 56 per cent mean gap and SD at 22. The childcare output indicators of immunization and malnourishment tend to have relatively greater dependency on the public healthcare inputs and poor performance in them could be attributed to large performance gaps in health inputs in the state.

However, an overall wider gap among inputs as compared to the outcomes and outputs points to a possibility of the health inputs in Gujarat being effective in converting into outputs and hence the outcomes. This observation could be further examined in details by considering the trend in the performance of various indicators in Gujarat at an absolute as well as the relative level. The next section provides a trend analysis for above mentioned healthcare indicators of Gujarat from 1990 to 2010.

3. Trend of Health Performance in Gujarat

For the purpose of examining trends in health performance of Gujarat we begin with a comparison of absolute changes in various health indicators. Table 3 provides the trends in various health outcomes, outputs and inputs for Gujarat and India for three different time

periods – 1990-93, 1998-01 and 2008-10[7]. Comparing the outcomes for all the periods we find that there is an improvement in most of these indicators during the given time period. Moreover, it can also be observed that most of the health outcomes in all three time periods for Gujarat have remained relatively better than the national averages.

The health output indicators pertaining to undernourishment indicators show fall in the percentage of malnourished children in the state in various categories. However, it can also be observed that during 2008-10 these proportions for India were lower for three out of four categories, which is unlike the earlier two time periods. The coverage of children under various immunizations shows increase overtime in coverage in BCG and Measles vaccines and a fall in DPT and Polio vaccines. A significant fall is also found in proportion of children without any vaccination. Moreover, the proportions of children received all types of vaccines in Gujarat has reduced significantly from 1998-01 to 2008-10. The immunization coverage has remained relatively greater than the national average for almost all years and types of vaccines except Polio where the national coverage is greater for the period of 2006-09. Finally, the trend in maternal care output indicators have also shown an improvement during the given time periods. The coverage of women under ANC, proportion of institutional deliveries and deliveries under the supervision of trained health personnel have significantly increased and are also greater than the respective national averages over time.

The input indicators for Gujarat, unlike the outcomes and output, have unsatisfactory trends in their performance. Under the infrastructure of the government health setup in rural areas we find a fall in number of sub-centres (SC) and primary healthcare centres (PHCs) per

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[7]The data on outputs for the time period 2008-10 is actually the data reported by National Family Health Survey 3 referring to the period 2005-06.

hundred thousand population in the country. The number of community health centres (CHCs) per hundred thousand population grew during 1990-93 to 1998-01 but has remained more or less the same in the period after that. The number of total government hospitals (rural +urban) has not changed at all between 1998-01 and 2008-10. However, there has been an increase in the number of beds in these hospitals per hundred thousand population. The infrastructure under the AYUSH shows a consistent reduction in the number of hospitals, beds and dispensaries both in Gujarat as well India over the years with Gujarat having poorer numbers than the national average.

The performance of Gujarat overtime could also be viewed in terms of its relative standing among the other states in the nation using the PGI for the different times periods. Table 4 provides such a comparison of the PGI for all the health indicators for 1990-93, 1998-01 and 2008-10. We may recall here that a higher value of the PGI would imply a larger distance from the best performing state and relatively poor performance of Gujarat. Therefore, an increase in the PGI overtime would imply worsening of the relative standing of the state among the others in the country. For health outcomes, the PGI of Gujarat for almost all the indicators has increased during the last two decades. The increase in the PGI is particularly significant in case of NN, IMR and U5MR. Thus, improvements in these aspects in other states are far more than in Gujarat. However, despite an expansion in PGI of mortality indicators, the gaps in male and female life expectancy and death rate have reduced during these years.

Indicators	Gujarat	India	Gujarat	India	Gujarat	India
Table 3: Health Outcome, Output and Input Indicators for Gujarat and India						
	1990-93		**1998-01**		**2008-10[#]**	
Outcome indicators						
Male Life expectancy	60.2	**59.7**	62.4	**61.6**	67.2	**65.8**
Female Life expectancy	62.0	**60.9**	64.4	**63.3**	71	**68.1**
Neo Natal Mortality (NN)	40.4	**47.2**	42	**44.0**	33.5	**39.0**
Infant Mortality Rates (IMR)	78.0	**77**	60	**66.0**	44	**47**
Under 5 Mortality	104	**109**	85.1	**94.9**	60	**69**
Maternal Mortality Rate (MMR)	-	**-**	202	**327**	148	**212**
Birth Rate	28.4	**29.6**	25	**25.4**	21.8	**22.1**
Death Rate	8.5	**9.8**	7.5	**8.5**	6.7	**7.2**
Total Fertility Rate	3.1	**3.6**	2.9	**3.2**	2.5	**2.6**
Output Indicators						
Undernourishment Related (Children Below three Years of Age)						
Stunted (too short for age)	48.2	**52**	43.6	**45.5**	42.0	**38.0**
Wasted (too thin for height)	18.9	**17.5**	16.2	**15.5**	17.0	**19.0**
Underweight (too thin for age)	50.1	**53.4**	45.1	**47**	47.4	**46.0**
Percentage children with birth weight < 2.5 Kg.	-	**-**	-	**-**	22.0	**21.5**
Immunisation Related (Percentage Children 13-23 Months Received)						
BCG	77.1	**62.2**	84.7	**71.6**	86.4	**78.1**
DPT	63.8	**51.7**	64.1	**55.1**	61.4	**55.3**
Polio	62.9	**53.4**	68.6	**62.8**	65.3	**78.2**
Measles	55.9	**42.2**	63.6	**50.7**	65.7	**58.8**
No Vaccinations	18.9	**30**	6.6	**14.4**	4.5	**5.1**
Percentage with vaccination card	32	**30.6**	31.8	**33.7**	36.4	**37.5**
All Vaccinations	49.8	**35.4**	53.0	**42.0**	45.2	**43.5**
Maternal Care						
Percentage pregnant women received ANC	75.4	**44**	86.4	**65.4**	87.4	**77**
Percentage of pregnancies with PNC	-	**-**	-	**-**	61.4	**41.2**
Percentage deliveries in Health facilities	35.6	**26**	46.3	**33.6**	52.7	**38.7**
Percentage deliveries assisted by Health Personnel	42.7	**34.2**	53.5	**42.3**	63.0	**46.6**
Input Indicators						
Infrastructure Related (Nos. per hundred thousand Population*)						
No. SCs [@]	26.84	**20.90**	22.95	**18.51**	20.98	**17.86**
No. PHCs [@]	3.36	**3.25**	3.16	**3.08**	3.13	**2.86**
No. CHCs [@]	0.59	**0.35**	0.76	**0.41**	0.81	**0.55**
Total Govt. Hospitals	-	-	0.62	**0.40**	0.60	**1.0**
No. of Beds on Govt. Hospitals	-	-	43.93	**38.76**	48	**44.6**
AYUSH Hospitals	0.13	**0.36**	0.12	**0.34**	0.1	**0.28**
Beds in AYUSH Hospitals	6.00	**7.16**	5.18	**5.93**	1.53	**1.8**
AYUSH Dispensaries	1.41	**2.72**	2.07	**2.30**	1.22	**2.0**
Manpower Related (Nos. per hundred thousand Population*)						
MPW [@]	16.0	**9.63**	11.44	**9.6**	12.9	**6.3**
ANM [@]	-	-	22.22	**18.1**	18.5	**25.0**
HA [@]	3.48	**2.73**	2.1	**2.7**	2.19	**1.97**
LHV [@]	3.58	**2.87**	2.7	**2.7**	2.52	**1.9**
Staff Nurse at PHC and CHC [@]	-	-	-	-	4.01	**3.86**
General Doctors at PHC [@]	3.25	**4.41**	2.99	**3.47**	2.94	**3.2**
Specialist Doctors at CHC [@]	-	-	3.43	**4.02**	0.22	**0.8**
Total Doctors (Allopathic)	52.2	**44.74**	66.5	**56.1**	76.91	**67.5**
Total AYUSH Doctors	-	-	78.9	**92.5**	57.69	**62.2**
Total Nurses	-	-	221	**18.1**	145	**86.2**

Notes: '*' – Population as per Census of India 1991, 2001 and 2011; '@' – Only Rural Population is considered;
'#' – Data on output indicators as per NFHS 3 (2005-06);   '-': Data Unavailable
Source: Table 2 above, (IIPS, 1995; 2000), (Infrastructure-Indiastat, 1990-93; 1998-01), (Mapower-Indiastat, 1990-93; 1998-01) and (Vital Statistics - Indiastat, 1990-93; 1998-01).

The gaps in output indicators of health in Gujarat show that in case of the proportion of under-nourished children, the gap for "wasted children" has significantly gone down and that for the underweight children has fallen marginally in the last decade after increasing during the nineties. However, the gap for the "stunted children" has shown a large increase mainly between 1998-01 and 2008-10. The immunization indicators reveal that the gaps in all indicators have increased over the period of time. These expansions are significant in case of Polio and Measles vaccinations, percentage children with vaccination card and children covered under all vaccinations. In case of children with no vaccination the gap fell during the nineties and again increased during the last decade. Thus, relative performance of Gujarat in the health output indicators has not been consistent over time.

Among the other output indicators the maternal care indicators portray a relatively better picture than the others for Gujarat. It is observed that the gaps in coverage of women under ANC, institutional deliveries and proportion of deliveries attended by trained health personnel have reduced over the last the two decades. It would be crucial to mention that most of the health outcomes and outputs of Gujarat have shown an improvement in their absolute performance and have also remained above the respective national averages. However, despite this we find that the performance gaps in most these indicators for the state have either expanded or remained the same. This implies that other states have performed better than Gujarat in terms of improvements in health outcomes and outputs over time. The trend in health input indicators of infrastructure and manpower would also be relevant to discuss. We find that the gaps in infrastructure of government health system have expanded over time. Gujarat was the top performer in terms of SCs during 1990-93 with zero PGI but has moved to lower level over the last two decades with the gap going up to 32 per cent. Moreover, in terms of CHCs, the PGI significantly reduced during the 1990s (24 per cent to 1.5 per cent) but increased again during the recent decade to 33 per cent.

Table 4: PGI Trend of Gujarat for Health Outcomes, Outputs and Inputs – 1990-93 to 2006-09			
Indicators	**Performance Gap Index- Gujarat (per cent)**		
	1990-93	**1998-01**	**2008-10**
Outcome Indicators			
Male Life expectancy	64	61	44
Female Life expectancy	60	60	41
Neo Natal Mortality (NN)	45	63	56
Infant Mortality Rates (IMR)	40	61	63
Under 5 Mortality	33	56	59
Maternal Mortality Rate (MMR)	-	14	22
Birth Rate	57	52	52
Death Rate	32	30	27
Total Fertility Rate	39	36	36
Output Indicators			
Undernourishment Related (Children Below three Years of Age)			
Stunted (too short for age)	62	65	84
Wasted (too thin for height)	82	57	31
Underweight (too thin for age)	63	65	62
Percentage children with birth weight < 2.5 Kg.	-	-	36
Immunization Related (Percentage Children 13-23 Months Received)			
BCG	25	23	34
DPT	40	45	52
Polio	42	49	99
Measles	27	36	49
No Vaccinations	28	19	39
per cent With vaccination card	46	65	71
All Vaccinations	29	46	62
Maternal Care			
Percentage pregnant women received ANC	34	19	19
Percentage of pregnancies with PNC	-	-	39
Percentage deliveries in Health facilities	68	60	55
Percentage deliveries assisted by Health Personnel	54	56	50
Input Indicators			
Infrastructure Related (Nos. per hundred thousand Population)			
No. SCs @	0	18	55
No. PHCs @	46	63	62
No. CHCs @	21	1.5	33
Total Govt. Hospitals	-	20	96
No. of Beds on Govt. Hospitals	-	66	64
AYUSH Hospitals	91	93	99
Beds in AYUSH Hospitals	78	77	86
AYUSH Dispensaries	93	85	81
Manpower Related (Nos. per hundred thousand Population)			
MPW @	26	57	22
ANM @	-	32	83
HA @	62	54	57
LHV @	66	67	52
Staff Nurse at PHC and CHC @	-	-	51
General Doctors at PHC @	83	78	45
Specialist Doctors at CHC @	-	81	90
Total Doctors (Allopathic)	61	76	95
Total AYUSH Doctors	-	68	66
Total Nurses	-	31	50
Notes: '*' – Population as per Census of India 1991, 2001 & 2011; '@' – Only Rural Population is considered.			
Source: Table 3 above			

An extremely large increase in the PGI has been observed in case of the total government hospitals (five times), however, the gap for the beds in government hospitals has only marginally gone up during 1998-01 to 2008-10. The gap in number of AYUSH hospitals, which as such was extremely high, also shows increase over time from 91 per cent in 1990-93 to 99 per cent in 2008-10. The PGI for the number of AYUSH hospital beds has also gone up marginally over the last two decades. It is only the number of AYUSH dispensaries for which the gap has reduced slightly over time.

The manpower indicators show a relatively better performance as the performance gaps in case of most medical and paramedical staff in the health system has reduced during the recent decade after an expansion seen in the earlier period from 1990-93 to 1998-01. However, the number of ANMs, specialist doctors at CHCs and the number of AYUSH doctors have experienced an increase in the performance gap during the given period of time. In fact for the ANMs the performance gap has more than doubled from 32 per cent during 1998-01 to 83 per cent during 2008-10.

The performance gaps of outcomes and outputs have deteriorated for most indicators with a selected few that have improved. The same is also true in case of the health inputs with the expansion in PGI being significantly large as compared to outcomes and outputs. Such trends raise the question mentioned earlier regarding the impact of inputs on outputs and on outcomes. Moreover, given a significant impact on each other's performances, the aspect of effectiveness in terms of conversion of inputs to outputs to outcomes would become relevant. In context of the relationships and impacts of these indicators, a higher or lower effectiveness in conversion of inputs to outputs and outcomes could lead to higher or lower performance. The next section attempts to estimate this effectiveness of such conversions empirically for

Gujarat. An attempt is also made to identify the changes if any occurred in the same over time for the state.

5. Effectiveness of health indicators in Gujarat

The effectiveness of conversion of input indicators to output and outcomes indicators could be examined on the basis of a definite relationship postulated between health outcomes, outputs and inputs. Statistical significance of such relationships would indicate whether or not these indicators have a significant impact on each other's performance in case of Gujarat. The results of such an analysis would also indicate the difference in effectiveness of conversion or efficiency of healthcare system of Gujarat as compared to other states.

As mentioned earlier, the performance of outcome indicators is a result of health system where there are health output and input indicators. It could, therefore, be argued that in a health system there exists a functional relationship between health inputs and outputs and, health outputs and outcomes (Hsiao, 2003). Moreover, considering the relationship between outcomes and output, the former would be impacted over time with improvement in the latter which in turn would depend upon the efficiency of the health system. Additionally, effectiveness of conversion of inputs to outputs would depend not only on the level of inputs like availability of manpower and infrastructure but also on various other socio-economic factors (Pandey, et al., 2004 and Patra, 2008). These would include level of education and awareness among people and, level of economic development and income of individuals. A comprehensive measure of all these factors is represented by the human development index but net of the health index, i.e. composite index of only income and education components (HDI_{ie}). We may, therefore, use it as a proxy to all other socio-economic factors impacting the effectiveness of conversion of health inputs to outputs.

The above mentioned relationships can, therefore, be written as follows:

$$\text{Outcomes} = f\,(\text{Outputs}) \qquad \dots \text{(i)}$$

$$\text{Outputs} = f\,(\text{Inputs, HDI}_{ie}) \qquad \dots \text{(ii)}$$

In order to estimate the effectiveness of conversions, a regression analysis using ordinary least square (OLS) method is done. For the analysis purpose the indicators for 15 selected states have been used. The absolute values of the indicators are converted to index of performance[8]. Moreover, composite indexes for the outcomes, outputs and inputs are calculated indicating overall performance of the set of indicators[9]. It is also crucial to mention here that the conversions of inputs to outputs would be relatively faster but the conversion of outputs to outcomes would only happen over time. Therefore, for the purpose of analysis we make use of the data on indicators such that, the inputs and outputs for states are considered for the years 1998-01 and 2005-06 and, the corresponding outcome indicators are considered for 2005-06 and 2008-10 respectively. The HDI_{ie} used for analysis is estimated using data from India Human Development Report 2011 for the years 2000 and 2008. (Government of India, 2011).

The results show that for the outcome-output regressions, the changes in the former are significantly determined by the changes in the latter in both the time periods. Moreover, there

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[8]Index of performance values are calculated as: (Actual Value – Least Value) / (Best Value – Least Value).

[9]The composite indexes of performance have been calculated by taking a weighted average of the indexes of individual indicators in each of the three types i.e. outcomes, outputs and inputs. The outcomes are categorized into life expectancy, mortality and birth & fertility, the outputs are categorized into maternal care and child care indicators and, inputs are categorized into infrastructure and manpower indicators. The indexes of each of these categories are the simple average of the respective indicators falling under them. Moreover, the composite outcomes, output and inputs indexes are calculated by providing equal weights to the respective categories.

is a direct relationship between the two. For the output-input regressions, outputs are significantly determined by HDI_{ie} but not by the inputs for both time periods individually. However, when HDI_{ie} is dropped, it results in input becoming significant determinant of the output in both the periods. This phenomenon could be attributed to the problem of multicollinearity between inputs and HDI_{ie}[10]. One of the possible solutions to this would be to pool the cross-sectional and time series data (Gujarati, 2003, p. 364). Therefore, an attempt is also made to conduct regressions by pooling the data for both the time periods 1998-01 – 2005-06 and 2005-06 – 2008-10. The results here show that while the pooled outcome-output regression has significant slope coefficient, the pooled output-input regression also shows significant coefficient for both input and HDI_{ie}. Moreover, all the above regressions also have significant R-square values. Lastly, a set of two regressions conducted by adding a time dummy in both relations resulted in insignificant coefficients of the time dummies indicating no major change in the structure and nature of relations due to difference in the time periods considered.
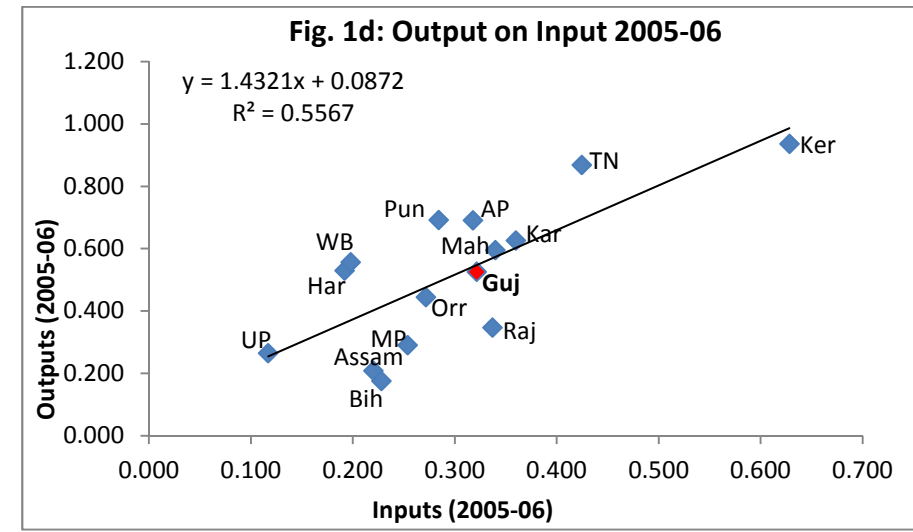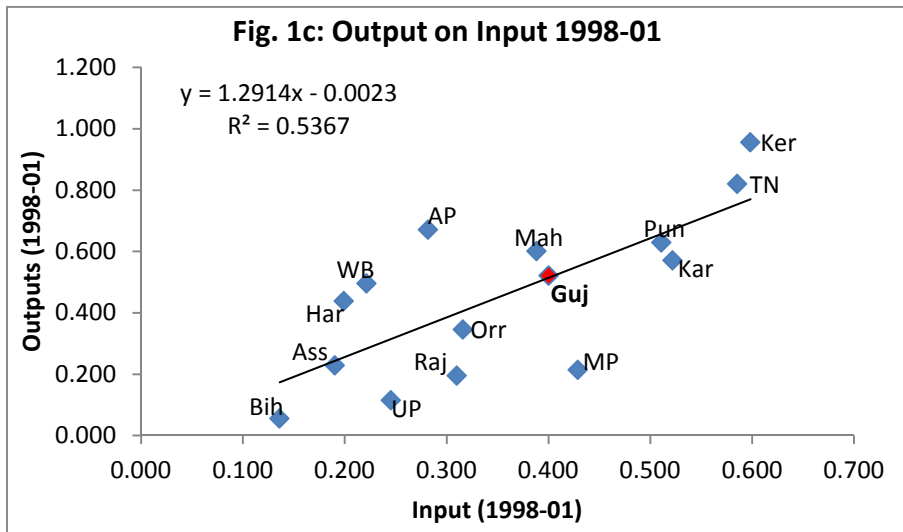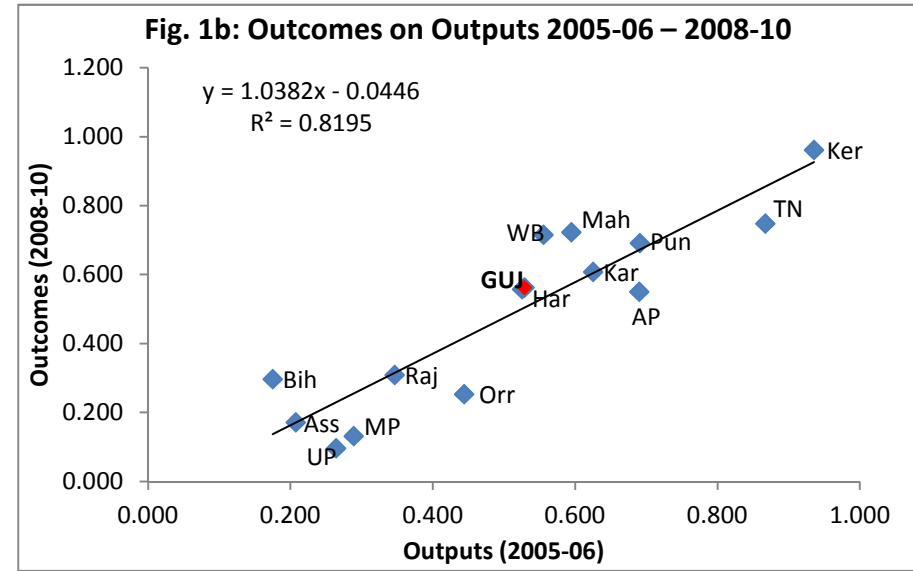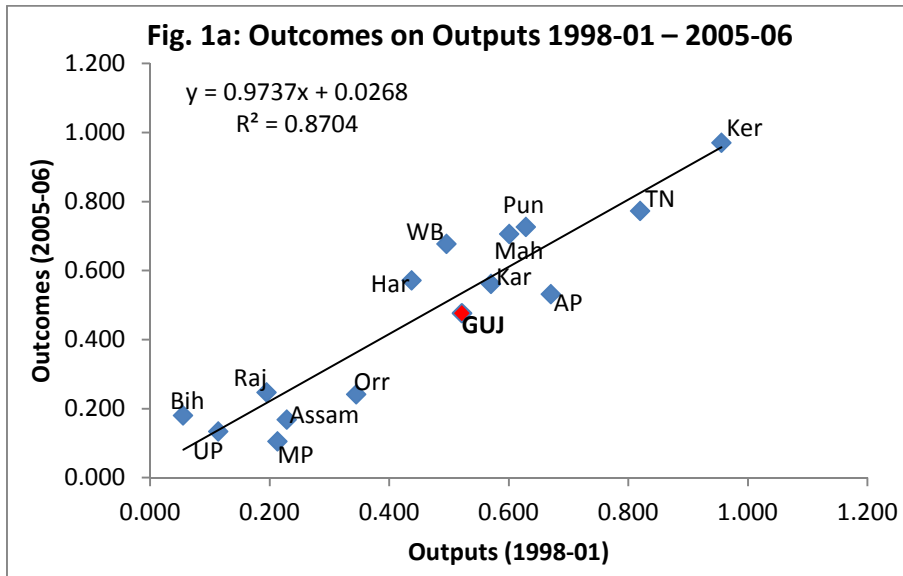
The above results of the regression analysis reveal that the outputs have significant impact on outcomes, and inputs have a significant impact on outputs. Moreover, apart from the inputs, HDI_{ie} also has a substantial impact on performance of outputs. This is not only observed in case of the two time periods separately analysed but also in case of a pooled data considering both the time periods. In this context it would also be relevant to examine the performance of Gujarat in converting its inputs to outputs and outputs to outcomes as compared to other

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[10]Coefficients of determination (R^2) between the input index for states and the respective HDI_{ie} for both time periods are statistically significant with R^2= 0.378 and 0.531 thereby indicating multicollinearity between the two.

states. This could be done using the X-Y scatter diagrams for output-outcome and input-output. Figures 1a to 1d show the same.

The diagram shows the relative standing of the states including Gujarat in terms of the composite indexes of outcomes, outputs and inputs. The figures also indicate the differences in the effectiveness of states in converting their inputs to outputs and outputs to outcomes for two time periods of 1998-01 – 2005-06 and 2005-06 – 2008-10. The trend line in the diagram indicates the average conversion such that a state away from the trend line would have above or below average effectiveness of converting its indicators.

It is found that Gujarat was slightly below average in converting its outputs to outcomes during 1998-01 – 2005-06 and it moved to an above average level during 2005-06 – 2008-10. Moreover, the average effectiveness of all states has marginally gone up as indicated by the slope coefficients (0.9737 to 1.0382). Thus, figures 1a and 1b suggest that Gujarat has experienced a higher rate of improvement in its effectiveness of converting health output to health outcome than the average of all major states in the country over the last decade. In terms of converting the health inputs to health outputs Gujarat was at an average level during 1998-01 but fell slightly below average by 2005-06. Here again the average effectiveness of all states increased substantially from 1.2914 to 1.4321 over the decade. Thus, the rate of improvement in effectiveness of converting health inputs to health outputs was lower in Gujarat than the average of all major states.

Fig. 1a: Outcomes on Outputs 1998-01 – 2005-06

$y = 0.9737x + 0.0268$
$R^2 = 0.8704$

Fig. 1b: Outcomes on Outputs 2005-06 – 2008-10

$y = 1.0382x - 0.0446$
$R^2 = 0.8195$

Fig. 1c: Output on Input 1998-01

$y = 1.2914x - 0.0023$
$R^2 = 0.5367$

Fig. 1d: Output on Input 2005-06

$y = 1.4321x + 0.0872$
$R^2 = 0.5567$

Source: Table 4 above.

It is worth noting that some of the poor performing states than Gujarat in terms of the actual indicator value and the performance indices have greater effectiveness in conversion of inputs to outputs and outputs to outcomes. For instance Bihar, which is a poor performer absolutely, has above average effectiveness in converting its outputs to outcomes. WB and Maharashtra performed above average and relatively better than Gujarat in converting outputs to outcomes. A relatively poor performer UP had below average effectiveness in converting inputs to outputs during 1998-01 and it reached the average level by 2005-06. Moreover, Haryana and WB which have poorer input indexes have above average effectiveness in converting its inputs to outputs for both the mentioned time periods.

6. Concluding Remarks:

The present paper attempts to provide a snapshot of the health status of Gujarat with respect to its health performance. The assessment of the health performance is done, using a performance gap index (PGI) built to show the relative standing of Gujarat among other states and the gap of its performance from the best performance in the country. Secondly, a comparison of the PGI of various health indicators is also done for Gujarat considering three different points in time and thereby showing changes in the indicators over two decades from 1990-93 to 1998-01 and from 1998-01 to 2008-10. The major observations coming out of the assessment suggest that, the relative performance of Gujarat in terms of gaps for health outcome indicators is quite poor with relatively high gaps found in NN, IMR, U5MR and birth and death rates and, it is only MMR for which the state's position is relatively better. In absolute terms, however, all these indicators show improvement in the state overtime though the other states have improved faster.

Among the health outputs the indicators of childcare i.e., malnourishment and immunization suggest poor absolute coverage and high performance gaps for the state with an expansion in the gaps over the specified periods. The maternal care indicators, however, show relatively better performance and low PGI and, also a fall in the gaps overtime.

The input indicators of health infrastructure and manpower show significant performance gaps for the number of available health facilities and medical & paramedical staff. Moreover, the PGI is observed to have widened overtime for majority of infrastructure related indicators and a few manpower related indicators. The mean values of the performance gaps suggest that mean PGI for inputs has always been larger in Gujarat and has also increased overtime particularly in infrastructure thereby contributing to widening of outcome gaps.

For an improvement in health status of individuals in Gujarat certain key areas need to be addressed. One of the major challenges for the state is of reducing IMR and U5MR.This could be primarily achieved through control of neonatal deaths (NN) as it is a major component of the infant and under five deaths. This could be done through improved coverage of women under ANC and more importantly PNC. The former would be crucial for identifying nutritional deficiency among pregnant women there by reducing chances of low birth weight and the latter would help identifying risks among new-borns and creating awareness to reduce these risks. The ANC and PNC intervention can also be effective in reduction in the maternal deaths and this could be further achieved by working towards increasing institutional deliveries and also deliveries attended by trained health personnel.

Another challenge in the direction of improving indicators of mortality is the performance of childcare output indicators. A significant effort is required to increase the coverage of

children under immunization and to reduce the proportion of malnourished children. The former needs more of manpower at the village level and popularizing vaccination cards. The recent initiative of introducing village level health personnel called the accredited social health activist (ASHA) under the NRHM (National Rural Health Mission) could be effectively used for this purpose.

The malnutrition could be addressed through an effective coordination of the public health and the integrated child development scheme (ICDS). Moreover, a PPP model could also be attempted for childcare programs as it has been done for increasing institutional deliveries. The public health system can be proactive in increasing awareness about and monitoring of such programs.

Achieving better health performance in Gujarat requires building the adequate health infrastructure and employing manpower which is currently not sufficient. It may be recalled that Gujarat had almost fulfilled the norms of IPHS for public health facilities in rural areas like sub centres and primary and community health centres. However, there are states such as Kerala and Karnataka who have relatively much larger numbers of these health facilities than required by the norms and these states also perform relatively much better in terms of the health outcomes and outputs than Gujarat. It is therefore, a matter of policy decision whether to consider the given norms as a benchmark or should the state go for an expansion of the given infrastructure.

In terms of the other infrastructure such as government hospitals and beds in both allopathic as well as AYUSH, there is a definite need to increase the availability in the state. Moreover, the issue of reducing the performance gaps in medical and paramedical manpower both

within the public health system and in the overall health system needs to be addressed at the earliest.

The process of expanding infrastructure and increasing manpower would require significant public expenditure to be incurred. The state budgets of the Gujarat in the last decade indicate that the proportions of revenue expenditure on the health sector to the total revenue budget was at 6.9 per cent in 1999-2000. This fell to 4.3 per cent during 2001-02 due to earthquake and again rose to 6.6 per cent in 2005-06. Towards the end of the decade this proportion was at 4.8 per cent in 2012-13(BE). These proportions for the expenditure on capital account to the capital budget were at 0.99 per cent in 1999-2000 which reduced to 0.03 per cent during 2005-06 and is estimated to be 1.39 per cent in 2012-13 (BE). The total health expenditure as percentage of the total budget in Gujarat was at 5.8 per cent during 1999-2000 which came down to around 1.3 per cent during 2005-06 and is estimated to be at around 2.47 in 2012-13 (BE) (RBI, 2002 to 2013).

Comparing the healthcare expenditure of some of the performing states, it was found that they have relatively higher proportions spent on the health sector. Table 5 shows the proportion of expenditure made on healthcare services as proportion to total expenditure for three of the better performing states along with Gujarat. It also shows the proportion of health expenditure with respect to net state domestic product (NSDP) of the state. The table shows that all the performing states have significantly high percentage of health expenditure on revenue account than Gujarat. Moreover, Gujarat is better than or at par with states like Kerala and Tamil Nadu in terms of capital and total expenditure on healthcare, however, Karnataka is way ahead in both of these. Considering the national average Gujarat is relatively better in terms of capital and total expenditure but not in revenue expenditure. The

health expenditure of the state measured as a proportion of NSDP is also lower to all the other selected states here. These trends suggest that in order to have better health status and performance of healthcare indicators, Gujarat has to put in significant efforts in terms of the public expenditure in the healthcare sector as well. The current levels of expenditures are not at par with the states performing way better than Gujarat in terms of health indicators. This also can be placed as a major challenge to the state towards achieving better health outcomes and finding its place in the top performers among the states in the country.

Table 5: Expenditure on Healthcare in Selected States of the Nation Including Gujarat: 2012-13 (in per cent)				
State	**Health Expenditure as a Percentage of**			
	Total Expenditure on -			**NSDP**
	Capital	**Revenue**	**Total Expenditure**	
Gujarat	1.39	4.84	2.47	0.81
Karnataka	1.62	5.31	3.33	1.10
Kerala	0.13	7.47	2.58	1.10
Tamil Nadu	0.75	5.12	1.83	1.00
India	**0.63**	**6.00**	**2.18**	**1.01**
Source: (CSO - MoSPI, 2013) and (RBI, 2013)				

Acknowledgement

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