



State Health Expenditures In India: An Analysis Of Their Impact On Health Outcome Indicators

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Abstract: The study aims empirically to analyze the effectiveness of state government expenditure on health and health outcome indicators. The study was conducted in the 15 major states of India from 2000 to 2021. The data was collected from the Reserve Bank of India, MHRD, NSO, and RGI. The study applied a fixed-effect panel data model. The Public Health and Medical and Family welfare expenditure and per capita income are used as independent variables as LEBM, LEBF, and IMR are used as outcome indicators. The empirical results show that there is a positive result for LEBM and LEBF. In the case of IMR, the results showed a negative sign which means reduction. To attain the goals of sustainable development it is essential to study the importance of state-wise public expenditure on health. It suggests that increasing public expenditure is more important to enhance health outcomes.

Index terms: per capita expenditure on health, per capita income, LEBM, LEBF, IMR, Fixed effects model

I. INTRODUCTION

It is also widely acknowledged that one of the main responsibilities of governments is to provide the most basic social services. The state should provide universal basic social services based on four fundamental justifications: moral, instrumental, consensual, and historical (Mehrotra S, V.J, and Delomonica E (2000) Pg.6-7). Such health determines both employment and health and reduces poverty, basic services should be universal consensus and increased government expenditure leads to boosting life expectancy. Examining the impact of public health spending on health outcomes across States and comprehending from a finance standpoint is the goal of the current study and also how SDG (sustainable Development Goals) has been achieved in India in the outlook of health.

II. REVIEW OF LITERATURE

Lekha S. Chakraborty (2003) studied the effects of governmental spending in a few developed and developing nations on human growth. The impact of per capita public expenditure on health on the Human Development Index (HDI), using the fixed effects model of pooled least squares for the early 1990s, showed that there is a positive functional link between the variables. H. Issa and B. Ouattara (2005) using panel data and OLS analysis on data spanning 160 nations from 1980 to 2000 investigated to evaluate the influence of private and public health spending and per capita income on IMRs. The study examines how health spending varies over the course of development and makes the case that while public spending is more beneficial in the early phases of development, private spending gets more beneficial and public spending gradually becomes less important as a nation advances.. Shaikh.I. Hussain (1996), regression analysis was applied in the study to evaluate the effects of shifting income and policy levels on birth weight and infant mortality rates. The time series of 1983–

1993 from a cross-section of 29 Chinese provinces served as the source of the data. OLS, Fixed and Random impacts are three distinct econometric approaches that are used to separate the relative impacts of each determinant of health improvement. The study found that when government policies and income levels are changing, there is a favorable impact on birth weight life expectancy and a negative impact on IMRs. Raghbendra Jha, et.al. investigated the effectiveness of public spending on health, education, and other development initiatives in lowering poverty in India. They used Fixed effects, Random effects, and OLS models using unbalanced panel data approaches and concluded that spending on health contributes to a decrease in poverty. Sanjeev Gupta, et.al (2004), investigated the connection between social spending and growth using panel data for 120 developing nations from 1975 to 2000. They revealed that spending on health has a direct, beneficial, and considerable influence on the building of health capital, which can ultimately result in faster economic growth. Additionally, they discovered that implementing policy interventions including enhancing governance, cutting back on disproportionate budget deficits, and controlling inflation can aid in assisting nations in achieving the Millennium Development Goals (MDGs). They concluded that reaching the MDGs will require more than just increased investment. World Bank (2005), World Bank report includes an analysis of infant mortality rate and health expenditure using panel data for the Indian States during 1980-99. The study finds there is not much impact of health expenditure on infant mortality

III. DATA AND METHODOLOGY

This study evaluates the effects of public expenditure on health mainly consisting of Medical and Public Health and Family

3.1 Indicators

Welfare expenditure and health outcome indicators are life expectancy at birth for males (LEBM) and Life expectancy at birth for females (LEBF) and infant mortality rate (IMR). Dependent variables are per capita health expenditure is calculated by total expenditure on health divided by total population and per capita income.

3.2 Sample

The data used for the analysis is secondary data. The period taken for 15 Indian States over twenty years i.e. 2000-2021. Since 15 States are considered in the study, for each State there is a set of two variables cross-sections and time. The methodology used in the study is the pooled least square panel data model (Fixed effects) for the effectiveness of the public health expenditure.

3.4 Data sources

Data sources used in the study are Sample Registration System (SRS) Bulletin, RGI various issues, Government of India; State Finances: Study of Budgets, Reserve Bank of India; Hand Book of Statistics, Reserve Bank of India; CSO (Central Statistical Organisation) GOI. Union Budgets.

3.5 Statistical Tools

We have gone through tests to select this model such as F-test for pooling data and the Baltagi-Wu LBI test used for serial correlation. Both tests were rejected at 1 % and values are present below

3.6 F-test for the Fixed Effects

	LEBM	LEBF	IMR
RRSS	0.401	0.614	51.757
URSS	0.021	0.040	3.225
df1	162	162	327
df2	149	149	314
F-stat	203.63	161.45	363.44
F-critical*	2.27	2.27	2.18
Ho	Reject	Reject	Reject
*At 1% significant			

3.7 Baltagi-Wu LBI test for Fixed Effects

Dependent Variables	Baltagi-Wu LBI statistic
LEBM	1.615
LEBF	1.852
IMR	2.264
@ 1% significant	

VI. TRENDS ANALYSIS OF PUBLIC EXPENDITURE ON HEALTH

The trends analysis of health expenditure and outcome indicators for the 15 States are presented in the following sections

4.1 Growth Rates on States' Health Expenditure

Table.1 Growth Rate (%)										
S.No.	States/Year	2000s			2020s			2000s and 2020s together		
		RE	CE	TE	RE	CE	TE	RE	CE	TE
1	Andhra Pradesh	16.50	03.02	16.15	11.32	24.60	13.99	14.30	13.20	14.24
2	Assam	18.89	15.32	18.24	9.28	-03.46	6.56	13.50	1.78	12.46
3	Bihar	17.02	0.05	16.04	5.16	7.41	5.22	10.41	3.44	10.03
4	Gujarat	14.47	4.57	14.38	11.42	32.24	11.63	12.49	15.36	12.53
5	Haryana	13.99	7.3	13.36	11.54	1.71	11.03	13.33	5.67	12.82
6	Karnataka	15.1	6.01	14.55	10.42	25.22	11	13.2	19.05	13.7
7	Kerala	13.6	7.04	13.35	11.17	19.15	11.5	12.53	14.67	12.64
8	Madhya Pradesh	15.03	14.1	15.02	8.40	7.01	8.32	12.03	11.55	12.03
9	Maharashtra	14.00	14.01	14.00	6.10	8.10	6.10	12.5	14.00	12.6
10	Orissa	11.6	11.41	11.6	10.02	8.50	10.1	11.53	15.50	12.1
11	Punjab	15.54	1.03	15.05	11.21	-32.41	10.43	14.02	-13.24	13.19
12	Rajasthan	15.18	11.10	15.10	10.51	-1.26	10.04	13.12	10.30	13.05
13	Tamil Nadu	15.10	4.42	14.33	9.10	12.51	9.01	12.03	10.40	12.04
14	Uttar Pradesh	17.40	18.44	17.50	9.02	-8.33	8.10	14.24	3.05	14.02
15	West Bengal	14.10	8.23	14.01	16.00	5.05	11.1	12.10	9.10	12.04
Source: Author's Calculations; RE Revenue expenditure-CE -Capital expenditure- TE Total Expenditure										

Table 1 consists of the data on the rate of growth in terms of compound for total health expenditure and also for revenue and capital expenditure on medical and public health of the 15 States for the period 2000 to 2021. Only two states (Andhra Pradesh and Uttar Pradesh) showed more than 14% of growth rate whereas Karnataka, Punjab and Rajasthan showed more than 13%. The remaining States had a growth rate below 13 percent except Bihar which is at 10.03%. The contribution of revenue expenditure in the growth rate was the highest than the capital expenditure except in the State Andhra Pradesh, Gujarat and Haryana. the growth rate showed a decrease over the whole period.

4.2 HEALTH EXPENDITURE AS A PERCENTAGE OF AGGREGATE EXPENDITURE

The percentage spending as a ratio to the aggregate expenditure of the States showed a declining trend (see

Table 2 Total Government Expenditure on Health as as a percentage of Aggregate Expenditure (%)					
S.No.	States/Year	2000-01	2006-07	2016-17	2021-22
1	Andhra Pradesh	4.7	3.4	12	17
2	Assam	4.7	3.4	4.7	5.9
3	Bihar	5.9	4.5	5.6	7
4	Gujarat	3.4	3.1	4.3	6
5	Haryana	3.3	3.1	5.7	6.7
6	Karnataka	5.1	3.3	3.7	5.2
7	Kerala	5.3	4.7	4.1	5.6
8	Madhya Pradesh	5.1	3.4	5.6	6.8
9	Maharashtra	3.9	3.2	3.8	5.3
10	Orissa	4.2	3	4.2	4.8
11	Punjab	4.5	3.4	5.4	6.8
12	Rajasthan	5.2	4.4	2.8	3.2
13	Tamil Nadu	4.9	4.2	5.1	6.5
14	Uttar Pradesh	4	5.1	4.2	6
15	West Bengal	5.6	3.9	4.9	5.3
Source: Finance Accounts: Budget documents of State Governments					

Table 2). When we observe total expenditure on health as a percentage of aggregate expenditure we notice that Bihar and Uttar Pradesh do fairly well here. In fact, Bihar comes across as one of the State with the highest ratio. High-income States like Tamil Nadu, and Gujarat have done well. States like Bihar, Assam, Andhra Pradesh, and Punjab showed very high fluctuation in total expenditure on health to aggregate expenditure ratio while some States like Maharashtra and Gujarat do not show much fluctuation. One thing which comes out is that in almost all the States total expenditure as a percentage of aggregate expenditure has not increased much during the period. During the period 2000-01 to 2021-22 health expenditure as a percentage of aggregate expenditure showed an increasing trend.

4.3 PER CAPITA EXPENDITURE ON HEALTH

Table 3 PER CAPITA EXPENDITURE ON HEALTH (Rs.)					
S.No.	States/Year	2001-02	2006-07	2016-17	2021-22
1	Andhra Pradesh	144.05	186.63	1254.5	2236.13
2	Assam	110.27	170.30	961.96	2129.06
3	Bihar	44.14	111.85	483.67	946.74
4	Gujarat	124.87	184.78	1182.81	2027.51
5	Haryana	127.43	187.34	1103.45	2329.93
6	Karnataka	162.66	210.02	1068.78	2290.74
7	Kerala	204.28	300.85	1732.67	3399.5
8	Madhya Pradesh	98.09	154.54	749.1	1480.94
9	Maharashtra	166.97	197.07	836.77	1547.93
10	Orissa	104.62	131.16	1101.16	2291.92
11	Punjab	235.47	243.16	1006.49	1181.6
12	Rajasthan	136.1	183.76	1106.68	2049.94
13	Tamil Nadu	160.51	216.25	1173.31	2571.89

14	Uttar Pradesh	66.1	209.39	724.97	1010.75
15	West Bengal	153.83	172.07	869.23	1712.11
<i>Source: Finance Accounts: Budget documents of State Governments RBI</i>					

From Table 3 in 2021-22, the differences had grown even sharper compared with 2006-07. As we see the per capita expenditure on health in Bihar which was the lowest was Rs 946.74 followed by Uttar Pradesh with 1010.75 in 2021-22, which was less than a quarter of the per capita expenditure on health of Kerala, and followed by Madhya Pradesh and Orissa where the per capita expenditure on health was less than half of the level in Kerala. We can observe that per capita spending in rich states is higher than the poor states except Punjab with Rs. 1181.6 in 2021-22.

4.4 PER CAPITA INCOME

Table 4 Per Capita Income (Rs.)					
S.No.	States/Year	2001-02	2006-07	2016-17	2021-22
1	Andhra Pradesh	16574	29797	94115	117464
2	Assam	12447	17579	53575	65726
3	Bihar	6554	8759	25455	28679
4	Gujarat	17227	38568	129738	170384
5	Haryana	24423	44423	150259	172657
6	Karnataka	17352	31967	131186	164471
7	Kerala	19809	38113	129251	148810
8	Madhya Pradesh	11150	17073	52782	61534
9	Maharashtra	21892	45582	133686	138490
10	Orissa	10208	20194	66416	81178
11	Punjab	25986	37087	105848	118227
12	Rajasthan	12840	21342	71324	80545
13	Tamil Nadu	20319	39166	123206	154557
14	Uttar Pradesh	9721	14241	40847	43420
15	West Bengal	16244	25400	60618	69890
<i>Source: Various Issues CSO, MSPI, Government of India.</i>					

Table 4 shows the comparison of per capita income of the 15 states of India. In 2021-22, the lowest per capita income is seen in the state of Bihar (28678) followed by Uttar Pradesh (43420). Per capita income below 80000 is shown in West Bengal, Assam, and Madhya Pradesh. The states with above 1 lakh per capita income are seen in Andhra Pradesh, Gujarat, Haryana, Karnataka, Kerala, Maharashtra, Punjab and Tamil Nadu. The trend shows that there are larger disparities in the income levels between the states.

V. OUTCOME INDICATORS

5.1 LEBM (LIFE EXPECTANCY AT BIRTH FOR MALES)

Table 5 LEBM (years)				
S.No.	States/Year	2001-05	2010-2014	2016-20
1	Andhra Pradesh	62.8	66.3	69.1
2	Assam	58.4	62.7	67.3
3	Bihar	64.2	67.8	69.7
4	Gujarat	63.7	66.6	68.1
5	Haryana	65	66.3	67.3
6	Karnataka	63.9	66.9	67.9
7	Kerala	70.5	72	71.9
8	Madhya Pradesh	58.9	62.5	65.5
9	Maharashtra	66.3	69.9	71.6
10	Orissa	59.6	64.7	69.1
11	Punjab	67.5	69.7	70.8
12	Rajasthan	63	65.5	67.1
13	Tamil Nadu	65.7	68.6	71
14	Uttar Pradesh	60.6	62.9	65.3
15	West Bengal	65.7	68.9	71.1
	India	63.1	66.4	68.6
<i>Source: various issues: Sample Registration System Bulletin RGI</i>				

The comparison of the data in Table 5 for the period 2001-05 and 2016-20 on life shows that all States have improved the rate of life expectancy. In 2001-05, almost all States had a life expectancy for males above 60 years except Assam, Madhya Pradesh and Odisha. Among all the States, Kerala is found to have the higher LEBM of 70.5 years for males in 2001-05. In contrast, Assam is found to have the lowest LEBM of 58.4 years.. The difference between the higher value and lower value of LEBM is 13.3 years in 2002-06. In 2016-2020 Kerala (71.9 years) showed the highest LEBM whereas Uttar Pradesh shows the lowest (65.3 years). During the years 2016-20, half of the 15 states were below the Indian average which is 68.6 years.

5.2 LIFE EXPECTANCY AT BIRTH FOR FEMALES (LEBF)

Table.6 LEBF (years)				
S.No.	States/Year	2001-05	2010-2014	2016-20
1	Andhra Pradesh	67.5	70.8	72.2
2	Assam	60.3	65.5	68.6
3	Bihar	64.1	68.4	69.2
4	Gujarat	67.8	71	73.2
5	Haryana	68.2	71.3	73
6	Karnataka	68.5	70.8	71.9
7	Kerala	76.7	77.8	78
8	Madhya Pradesh	60.5	66	69.5
9	Maharashtra	69.7	73.6	74.3
10	Orissa	62.1	67.1	71.4

11	Punjab	70.2	73.8	74.5
12	Rajasthan	66	70.2	71.7
13	Tamil Nadu	65.7	72.7	75.5
14	Uttar Pradesh	61.6	65.4	66.7
15	West Bengal	68.9	71.6	73.6
	INDIA	65.6	69.6	71.4
<i>Source:, various issues: Sample Registration System Bulletin RGI</i>				

The comparison of LEBF of major States for the period 1981-85 to 2002-06 is shown in Table 6. In Assam, Bihar, Madhya Pradesh, Orissa, and Uttar Pradesh less than 60 years are seen. Among all the States, Kerala is found to have the highest life expectancy at birth 76.3 years (2002-06). In contrast, Madhya Pradesh is found to have a life expectancy of 57.9 years. The high-income States showed better than the poorer States in the case of LEBF.

5.3 INFANT MORTALITY RATE

Table.7: Infant Mortality Rate (per 1000 live births)				
S.No.	States/Year	2000-01	2010-2011	2020-21
1	Andhra Pradesh	73	46	24
2	Assam	81	58	36
3	Bihar	69	48	27
4	Gujarat	69	44	23
5	Haryana	68	48	28
6	Karnataka	77	38	19
7	Kerala	16	13	6
8	Madhya Pradesh	117	62	43
9	Maharashtra	60	28	16
10	Orissa	124	61	36
11	Punjab	53	34	18
12	Rajasthan	79	55	32
13	Tamil Nadu	57	24	13
14	Uttar Pradesh	97	61	38
15	West Bengal	71	33	19
	INDIA	74	47	28
Source: Sample Registration System (SRS) Bulletin various issues				

Table 7 provides IMR for 15 States of India for the period 2000-2020. In 2020, Kerala had the lowest infant mortality rate 6 per 1000 live births; Madhya Pradesh other side had highest IMR of 43 infant deaths per 1000 live births. The thickly populated States of Uttar Pradesh, Bihar, Rajasthan, and Orissa all had infant mortality rates above 25. However, infant mortality rates have fallen for all States between 2001 and 2020 and the rate of decline has been higher in the ten years between 2010 and 2020 compared to the decade between 2001 and 2010. The decline has been irregular across some Indian States.

VI. RESULTS AND DISCUSSIONS

6.1 Public Expenditure on Health and Per Capita Income on LEBM

Table 8 Public Expenditure on Health and Per Capita Income on LEBM				
Variable	Coefficient	Std. Err.	t-Statistic	Prob.
TotalExpenditure on Health	0.028	0.00	(7.83)***	0.000
Per Capita Income	0.014	0.01	(1.86)***	0.035
Constant	3.825	0.04	(92.61)***	0.000
R ²	0.98			
adj R ²	0.97			
No. of Groups	15			
Total no. of observations	315			

Author's calculations; *, **, ***. denotes significant at 10, 5 and 1 percent respectively

Table 5.8 presents the results of the impact of public expenditure on health and per capita income on LEBM. The public expenditure on health has a strong positive and highly significant on LEBM. The coefficient of public health expenditure on LEBM is 0.028 and the t-statistic is 7.83 (significant at 1 % level). The LEBM increased 2.87 years when public health spending increased by 1% while maintaining the same per capita income. LEBM is positively and significantly (at the 1% level) impacted by per capita income. The coefficient of per capita income is 0.014. The t-statistic is 1.86; it is statistically significant at 1% level. It means that 0.014 % points increase in LEBM for 1 % increase in per capita income. According to the results, public expenditure on health is more significant than per capita income.

6.2 Public Expenditure on Health and Per Capita Income on LEBF

Table 9: Public Expenditure on Health and Per Capita Income on LEBF				
Variable	Coeff.	Std. Err.	t-Statistic	Prob.
Total Expenditure on Health	0.0265	0.0060	(4.34)***	0.000
Per Capita Income	0.0195	0.0140	(1.52)*	0.130
Constant	3.87	0.06	(56.17)***	
R ²	0.96			
Adj. R ²	0.96			
No. of Groups	15			
Total no. of observations	315			

Source: Author's calculations; *, **, ***. denotes significant at 10, 5 and 1 percent respectively

Here life expectancy at birth for females is given as a function of public expenditure on health and per capita income and the results are shown in (Table 9). The coefficient of public expenditure on health is 0.026. It means that LEBF increased by 0.025 % points per 1% in public expenditure on health. The t-statistic is 4.34, which means it is statistically significant at a 1% level. In short public expenditure on health has an influence

on LEBF. Similarly, for every 10% rise in per capita income, LEBF climbed by 0.0195 percentage points. At the 10% level, the coefficient is significant. Per capita income is less of an influence on LEBF than public health spending.

6.3 Public Expenditure on Health and Per Capita Income on Infant Mortality Rate

Table 10: Public Expenditure on Health and Per Capita Income on Infant Mortality Rate				
Variable	Coeff.	Std. Err.	t-Statistic	Prob.
Total Expenditure on Health	-0.045	0.02	(-1.71)***	0.011
Per Capita Income	-0.226	0.03	(-6.41)***	0.000
Constant	5.32	0.08	(63.62)***	0.000
R ²	0.95			
Adj. R ²	0.95			
No. of Groups	15			
Total no. of observations	330			

Author's calculations; *, **, ***. denotes significant at 10, 5 and 1 percent respectively

The estimated results for the 15 States are reported in Table 10. If our hypothesis holds, the result of these groups of States show that per capita income is more effective on IMRs than the public expenditure on health. A 1% increase in public health spending on health results in a 0.045 percentage point drop in IMRs, according to our findings that public health spending is substantial at the 1% level with the proper negative sign. Additionally, at the 1% level, per capita income is noteworthy. At the 1% level, per capita income is quite important; a 1% rise in per capita income results in a 0.22% drop in IMRs.

VII. SUMMING UP AND CONCLUSION

The study examined the effect of public health expenditure on health outcomes across the fifteen States using the pooled fixed effects model for the data from 2000 to 2021. According to the study, per capita income and per capita health spending had a beneficial impact on outcome indicators.. The per capita income was found to be more significant than health expenditure on IMR whereas in the case of life expectancy at birth health expenditure has shown more impact than per capita income. The results showed that the coefficients of pooled data revealed that public expenditure on health has a comparatively stronger impact than in per capita income on health indicators. The results can be summarized that higher public health expenditure improves health status. The results seem to show that IMR declines to improve health status, whereas LEB for males and females raised. Finally, the results designate that higher expenditure on health leads to better health.

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