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Determinants Of Public Health Expenditure In Some Selected States Of India: A Panel Data Approach

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Abstract

Public health expenditure varies significantly across the Indian states. The attempt is made to assess the relationship between the health expenditure and its determinants, such as State Gross Domestic Product (SGDP), infant mortality, capital receipts, revenue receipts and internal borrowing, in nineteen states of India. For this purpose, we use 12 years data, 2010-2021, from various issues of state finance reports and run the panel regression. After careful analysis of the data, results indicates that the some of the states are doing well and they are spending more percentage of their total revenue receipts while some of them having less over the health issue. The State Gross Domestic Product (SGDP) and revenue receipts by the states having statistically significant impact over the total health expenditure by the states of India while internal debt having insignificant impact over the total health expenditure. Therefore, it is recommended to the state governments of India that they must have focued to increase the SGDP and Revenue receipts while they should have to reduce the internal borrowing and depends on other resources.

Kay Words: Health Expenditure, Indian States, Revenue Receipts, Panel Data.

Introduction

To access better health services are included in a basic human right and without it one cannot survive and contribute positively to the society and economy of a country in general. Therefore, it is very important for a country to provide a basic and universal health services for their citizens. In this regards many theories and scholars (such as Sen and Dreze) have argued that without basic health services a country cannot achieved the sustainable growth. As per the World Health Organization (WHO) the health financial system grows much faster than the world economy and spent about 7.3 trillion in the year 2015 and it is near to 10 per cent of the world income. Moreover, the development rate of health expenditure from 2000-2015 was 4 per cent while the financial growth rate was 2.8 per cent (WHO, 2018). These days, to keep fiscal issue in limit, most of the developed and developing countries are reducing their budgetary allocation over the basic health care services. In this situation, it is quite difficult for the people to have access to the basic health care facilities (Samadi et. al., 2013). The rising cost of health care facility is the matter of grave concern of the policymakers in both developed and developing countries. Therefore, they are more interested to identify the main factors affecting these cost (Rezaei, et. al., 2016). The justification of government expenditure over the public health is based on its impact over the economic growth and further its impact over the per capita income (Lamartina, 2010).

In 2021 Indian economy was nominally worth 3.04 trillion USD and it is the sixth largest economy by the market exchange rates and as per PPP it is the third largest economy in the world (IMF, 2022). Its average annual Gross Domestic Product (GDP) growth rate of 5.8 per cent over the past two decade, and it reached 6.1 per cent in the year 2011-2012 (IMF, June 2021).

India has multi-layer universal health care system, and its public health system is entirely

taken care by the government (IMF, 2022). The public health services are essentially free for all residents' citizens except for small, often symbolic co-payments in some services (Lamartina, S., and Zaghini, A., 2010). For better access to health services in 2018, Indian government has introduced a national publicly funded health insurance called Ayushman Bharat. The objective of the programme is to cover the bottom 50 per cent (500 million people) of its population working in the unorganized sector and offer them free treatment at both public and private hospitals (IMF, April 2022). Moreover in 2019, the total net spending over the healthcare services by the government is 36 billion USD or 1.23 per cent of its GDP (IMF, 2020)**.** India had allocated 1.8 per cent of its total GDP to health in 2020-2021.

In 2015, the total expenditure over health care as a proportion of GDP was 3.89 per cent (World Bank, April 2015) and out of it only 1.8 per cent of GDP was spent by the government (World Bank, 2015). Out of the total health care financed, only one fifth of healthcare services are financed by the government and remaining, about 75 per cent, is by the private payment and this is the contradiction from the most other countries of the world (Bhardwaj, et. al., 2014). In 2007, India was ranked 184 out of 191 countries in the amount of public expenditure on healthcare out of the total GDP (Bhardwaj, et. al., 2014).

India is a federal republic with 28 states and 8 union territories. After independence, the Constitution of India recognized health is in the state list. Though, the Fifteenth Finance Commission Chairman N.K. Singh said that health should be shifted to the concurrent list under the constitution of India.

However, between the states of India there is a lot of disparity in term of expenditure on health by the respective state governments. Table 1 revealed the percentage of health expenditure in terms of total expenditure by the selected states government. From the table 1, one can see the Punjab is on number one in terms of the percentage of its total expenditure on health from its total expenditure and Jammu & Kashmir, Himachal Pradesh, and Kerala are occupied second, third, and fourth place while West Bengal having 19th rank in terms of the percentage of its expenditure on health from the total expenditure and Gujrat, Uttar Pradesh, Madhya Pradesh secured 16th, 17th and 18th place. However, in terms per capita expenditure on health (in INR), Himachal Pradesh having at on number one place and Jammu & Kashmir, Kerala and Punjab having 2nd, 3rd and 4th places while Bihar secured the last place (Although the Jammu and Kashmir has been declared by the central government as its Union Territories on 31 October 2019, However, we treat it into our analysis as state because the data was taken into the consideration for this study from 2010-2021). However, Uttarakhand, Chhattisgarh, and Uttar Pradesh are having 16th, 17th and 18th rank in terms of per capita expenditure on health.

Table 1- Percentage of Health Expenditure by the State Governments and the Rank (In terms of their total expenditure on Health:

STATE	Percentage of the total Health Expenditure (In terms of Total Expenditure)	Rank (In terms of total Expenditure)	Per Capital Public Health Expenditure (INR)	Rank (in terms of per capita expenditure in INR)
Andhra Pradesh	1.80696324	7	322.78	15
Bihar	2.60658589	5	52.61	19
Chhattisgarh	1.74302391	8	266.35	17
Gujrat	1.16601187	16	344.25	14

Haryana	1.57116321	10	700.06	6
Himachal Pradesh	3.28744777	3	973.54	1
Jammu & Kashmir	4.55115194	2	871.79	2
Jharkhand	1.46995369	11	366.37	12
Karnataka	1.30669063	14	672.03	7
Kerala	2.64164297	4	824.12	3
Madhya Pradesh	1.06318717	18	573.62	9
Maharashtra	1.32851525	13	549.31	10
Odisha	1.39022861	12	643.2	8
Punjab	5.7108711	1	738.3	4
Rajasthan	1.603123	9	492.91	11
Tamil Nadu	1.26294149	15	702.54	5
Uttarakhand	2.00090509	6	288.61	16
Uttar Pradesh	1.07897906	17	189.83	18
West Bengal	1.04655113	19	354.77	13

Source: Author's calculations based on data from various State Finance Reports, Reserve Bank of India, and Registrar General of India.

So, in this study we tried to understand that what are the various factors/determinants are primarily responsible to determine the expenditure on health by the selected 19 states of India.

Review of Literature

Literature review use to give useful insight for the conducting of any study and therefore it is very important to revisit the various eminent scholars' works pertaining the area of research. For this purpose, this study also used various research articles for the identification of the research gap.

Bhat & Nishant (2006) in their study found out that the elasticity of government health expenditure with respect to the GDP is less than one and the coefficient varies between 0.47 per cent to 0.68 per cent. The results shows that the health services are not luxury goods rather it is necessary. The same results have been rectified by Rahman (2008) and Hooda (2015). Pradhan and Bagchi (2015) have used Vector Error Correction Model (VECM) and examined the short run and long run relationship between per capita government expenditure health expenditure and Gross Domestic Product of Indian states. In 2016 and 2017 Behera and Das reached on same conclusions. In another study's findings revealed that there is as strong association between Gross Domestic Product and Health Expenditure and stress on it that the healthcare services are falls under necessary services because the income elasticity of it is less than one (Abbas and Hiemenz (2011, Murthy and Okunade (2016) and their finding verify the findings of Bhat & Nishant (2006). Hitiris and Posnett (1992); Toor ad Butt (2005); Rezaei et. al. (2016); and Akca et al., (2017) have identified that the Gross Domestic Product is variable that is primarily responsible for the any changes in the level of health expenditure. Other studies have been pointed out that there is long run relationship between economic growth and government health expenditure (Bhat and Nishant, 2006; Rahman, 2008; and Hooda, 2015). From the above literature review, most of the studied established that the GDP is the most important determinants of the government health expenditure.

However, on the other side there are many studies have been conducted by various eminent scholar and they concluded that the Co2 emission, Foreign Direct Investment (FDI) and inflow of migrant's revenue are also playing and important role to determine the government expenditure on health, Yazdi et

al., (2014) Apergis et al. (2017), and Lu et al., (2017).

Another set of studies have been focused on the habitant is the one of the important factors to determine health expenditure and they concluded that the urbanization is one of the important factors to induced continuous increase on health expenditure, (Siddiqui et al., 1995); Toor & Butt, 2005; Abbas & Hiemenz, 2011; Samadi & Rad (2013); and Rezaei et al. (2016). Kasthri A. (2018) explore the determinants of access to health care and identified and analyses the possible barriers to access the financial, geographical, social, and system related domains. After the analysis of the data he gave the concept of Five A's. Awareness, Access, Absence, Affordability, and Accountability.

Ram M. and Kumar A. (2021) also assessed the determinants of health-care expenditure in the eastern region of Uttar Pradesh and used secondary data from National Sample Survey Office (NSSO) of 75th round on social consumption related to health and they used Heckman two-step selection model was used to analyse household and individual decisions to seek care. One of the findings of the study revealed that the majority of people visited private hospitals in the region which increased the health-care spending at large and it burdened financially to the vulnerable section of the society.

The summary of above literature review shows that the various eminent scholars used the different-different tools, techniques, and variables to analyse the determinants of health expenditure i.e., sociological, geographical, demographical and corban emission and they reach on their own conclusions. However, the current study is used the panel data regression model and focuses on some other variables to explain the determinants of health expenditure in some selected states of India i.e., capital expenditure on health, revenue expenditure on health, capital receipts, revenue receipts, internal loan, state Gross Domestic Product (SGDP), and infant mortality. Though the period of the current study is from 2010 to 2021 however it covered 19 states of India which are having almost the more than 90 per cent of the total population of India.

Objectives of the Study

The objectives of the study have been given below:

1. To study the effects of capital receipts and revenue receipts on the health expenditure in Indian states.
2. To establish the casual relationship between internal loan, infant mortality, and health expenditure in Indian states.
3. To identifying the relationship between State Gross National Product (SGDP) and the health expenditure by the states.

Hypotheses

The hypotheses of the study have been based on the given objectives of study which are given as follow:

Ho1: Capital Receipts and Revenue Receipts are does not have any significant impact over the health expenditure in Indian States.

Ho2: Internal Loan and Infant mortality, have no significant impact over the health expenditure.

Ho3: States Gross National Product has no significant over the health expenditure of Indian states.

Methodology

To find the better solution of the given objectives of the study. The study used secondary data of 12 years (2010-2021) which are sourced from the various states finance reports of Reserve Bank of India (RBI), Sample Registration System various issue, Government of India, and Registrar General of India. For the analysis of the determinants of health expenditure, the study has use Fixed Effect Model (FEM) and Random Effect Model (REM) and further a Hausman Test has

been conducted to check the feasibility of the model/results. The model for the panel data regression can be expressed as follow:

$Y_{it} = \alpha + \beta_1 SGDP_{it} + \beta_2 InfMort_{it} + \beta_3 RR_{it} + \beta_4 CR_{it} + \beta_5 ID_{it} + \mu_{it}$……1(FEM)

$Y_{it} = \alpha + \beta_1 SGDP_{it} + \beta_2 InfMort_{it} + \beta_3 RR_{it} + \beta_4 CR_{it} + \beta_5 ID_{it} + \mu_{it}$……2(REM)

Where,

Yi= Health Expenditure,

SGDP= States Gross Domestic Product,

InfMor= Infant Mortality,

CR= Capital Receipts,

RR= Revenue Receipts,

ID= Internal Debt,

For the estimation of the above equation, one can need to transform into the regression equation.

$Y_{it} = \alpha + \beta_1 X_{it1} + \beta_2 X_{it2} + \beta_3 X_{it3} + \beta_4 X_{it\,4} + \beta_5 X_{it5} + \mu_{it}$…….3(FEM)

$Y_{it} = \alpha + \beta_1 X_{it1} + \beta_2 X_{it2} + \beta_3 X_{it3} + \beta_4 X_{it\,4} + \beta_5 X_{it5} + \mu_{it}$……4(REM)

Results Presentation and Discussion

We run the panel regression using data on 19 Major Indian states from 2010-2021. Due to the data limitation, other states could not be included in the analysis. However, it should be noted that our sample includes all the major Indian states that covers almost more than 90% of the total population.

Total state expenditure on health has been used as the dependent variable in our model. We included the absolute value of the health expenditure in our study and therefore, one can see the larger states expenditure on health is lesser than the smaller ones (due to the large size of population and small size of population respectively).

Table-2: Fixed Effect Model Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12644.72	1824.8	6.9293	0.0010*
SGDP	0.038654	0.019593	1.972847	0.0518**
INF_MOR	-0.026012	0.003961	-6.567028	0.0014*
RR	0.030995	0.006059	5.115173	0.0000*
CR	0.021413	0.006813	3.149253	0.0365**
ID	0.041551	0.016626	2.499164	0.0616***

R-squared	0.744079	Mean dependent var	236414.1
Adjusted R-squared	0.687208	S.D. dependent var	267113.1
S.E. of regression	149390.6	Akaike info criterion	26.83887
Sum squared resid	1.21E+12	Schwarz criterion	27.26664
Log likelihood	-886.1021	Hannan-Quinn criter.	27.00814
F-statistic	13.08354	Durbin-Watson stat	1.533568
Prob(F-statistic)	0.000000		

Note: Dependent Variable: Health Expenditure by the state governments. *, **, and *** represent statistical significance at 1%, 5% and 10% level respectively

Sources: Author's Calculation based on various states finance reports (RBI).

We start by checking whether Random Effects model (FEM) or Fixed Effects model (REM) should be used. The Hausman test ruled in favour of the REM (table 4). Fixed Effects

Model result has been reflected in above table no 2. Health expenditure by the state governments increases with an increase in state income (SGDP) and therefore it is statistically significant at 5 per cent level (table 2) this results has been supported by various previous studies done by eminent scholars (Bhat and Nishant, 2006; Rahman, 2008; and Hooda, 2015). Infant mortality in the Indian state and health expenditure by the state government has negative and statistically significant at 1 per cent level (table 2). The revenue receipts and capital receipts by the states government are important determinants of health expenditure by the states government in India and it is statistically significant at 1 per cent and 5 per cent respectively (table 2). Internal loans also come out to be a statistically significant determinant of health expenditure and it is also statistically significant at 10 per cent level (table 2).

Table:3 Random Effect Model Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	75484.03	1658.1	45.52441	0.0001*
SGDP	0.056056	0.026944	2.804631	0.0364**
INF_MOR	-0.355856	0.012856	-27.68809	0.0006*
RR	0.031712	0.005958	5.322979	0.0000*
CR	0.000351	0.006677	0.052582	0.9582
ID	0.045479	0.036079	1.260531	0.2123

R-squared	0.694400	Mean dependent var	66303.58
Adjusted R-squared	0.669351	S.D. dependent var	250868.6
S.E. of regression	144622.0	Sum squared resid	1.28E+12
F-statistic	27.72144	Durbin-Watson stat	1.432612
Prob(F-statistic)	0.000000		

Note: Dependent Variable: Health Expenditure by the state governments. *, **, and *** represent statistical significance at 1%, 5% and 10% level respectively
Sources: Author's Calculation based on various states finance reports (RBI).

Table No 3 shows Random Effect Model (REM) regression results and this results also supports that the State Gross Domestic Product is one of the important determinants of health expenditure by the Indian states. While other variables such as infant mortality and revenue receipts are having negatively and positively statistically significant over the health expenditure by the Indian states respectively. However, the others such as capital receipts and internal debt are having positive effect but statistically insignificant.

We check the feasibility of model that whether the FEM or REM is appropriate for the estimation on given data or not and for this purpose we run Hausman Test with the results of REM and found that the probability value of Chi Square is 88 per cent and guidelines say that if the value of Chi Squire is more than 5 per cent then we accept the null hypothesis that the Random Effect Model (REM) is good for the analysis of the data pertaining health expenditure of Indian states and its other determinants (table n.4). Therefore, we run another test of Random Effect Model (table 5) and found out that the SGDP and RR are having positive and statistically significant impact over the health expenditure by the Indian States at 10 per cent, 1 per cent. While infant mortality having negative and

statistically significant at 1 per cent. However, the CR and ID are having positive but statistically insignificant over the health expenditure. While the goodness of fit explaining the effect of independent variables over the dependent variable is about 74 per cent, while probability value of F test is statistically significant at 1 per cent level which is shows that the model specification is perfect.

Table:4 Hausman Test Results

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	1.747432	5	0.8829

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
SGDP	0.138654	0.056056	0.009355	0.3931
INF_MOR	1788.2603	-173.585629	3465611.71	0.2920
RR	0.030995	0.031712	0.000001	0.5166
CR	0.001413	0.000351	0.000002	0.4338
ID	0.041551	0.045479	0.000040	0.5333

Note: Probability of Chi-Sq is more than 5 per cent.
Source: Author's Calculation based on various states finance reports (RBI).

Table:5 Random Effect Model after Hausman Test

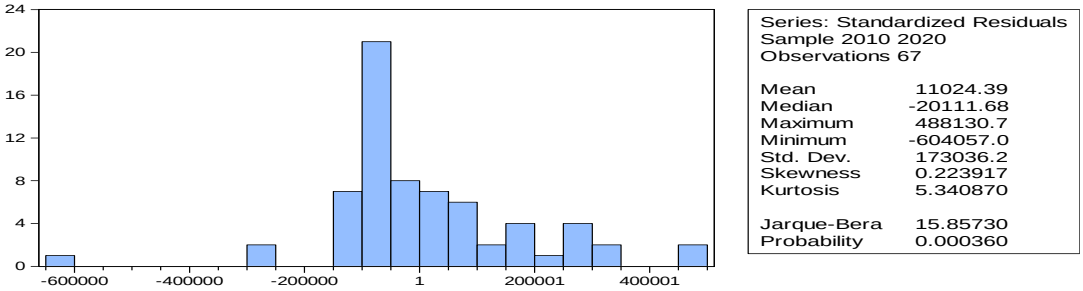
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	75484.03	1658.1	45.52441	0.0001*
SGDP	0.156056	0.126944	1.229329	0.0864**
INF_MOR	-0.455856	0.022856	-19.94469	0.0005*
RR	0.031712	0.005958	5.322979	0.0000*
CR	0.052351	0.036677	1.427352	0.5582
ID	0.035479	0.026079	1.360443	0.2123

R-squared	0.744079	Mean dependent var	236414.1
Adjusted R-squared	0.687208	S.D. dependent var	267113.1
S.E. of regression	149390.6	Akaike info criterion	26.83887
Sum squared resid	1.21E+12	Schwarz criterion	27.26664
Log likelihood	-886.1021	Hannan-Quinn criter.	27.00814
F-statistic	13.08354	Durbin-Watson stat	1.533568
Prob(F-statistic)	0.000000		

Note: Dependent Variable: Health Expenditure by the state governments. *, **, and *** represent statistical significance at 1%, 5% and 10% level respectively
Sources: Author's Calculation based on various states finance reports (RBI).

Furthermore, we also conduct the normality test to check whether the data are normally distributed or not and we found out that the value of Jarque-Bera is more that 15 per cent (figure 1) and it is significant at 1 per cent level and the guidelines say that if the value of Jarque-Bera is more than 5 per cent then we reject the null hypothesis that data are not normally distributed and accept the alternative hypothesis that the data are normally distributed. Therefore, we concluded that data are normally distributed.

Figure-1 Normality Test



Source: Author's Calculation.

Conclusion and Suggestions

The article tries to identify the determinants of health expenditure in 19 Indian states for the time period 2010-2021 using panel model analysis. The findings of the study revealed that richer states spend more compared to the poorer ones. Other economic variables such as SGDP, revenue receipts, capital receipts, and internal debt shows a positive impact on health expenditure by the 19 Indian states, in case of SGDP the results have been backed by other previous studies done by Bhat and Nishant, 2006; Rahman, 2008; and Hooda, 2015. While infant mortality and health expenditure sharing negative relationship. Therefore, we advise to the states government that they should focused more on their resources such as revenue receipts and capital receipts rather on internal debt so that they may able to spend more on health and health care services in the states.

Finally, we acknowledge the fact that increasing health expenditure per se will not guarantee an increase in human capital stock and a higher economic growth rate. The quality of health care facility is equally important, especially for the people from low-income households because most of them rely on the government to provide health facility.

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Conflict of Interest

The author declares no conflict of interest.

Compliance with Ethical Standards

Not Applicable.

Ethical Approval

This article does not contain any studies with human participants or animals performed by any of the author.

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