The Nexus between Public Health Care Expenditure and Health Outcomes in India

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Abstract

The issue of financing health care has assumed greater significance in the developing world. There are two broad approaches of financing health care - market-based and government (public) financed. Considering the social welfare obligations, market mechanism is unlikely to operate at the best interest of the people who live at the bottom end of the income distribution. Hence, from welfare perspective, the government needs to intervene more vigorously in the areas of education and health. Governments have assumed considerable importance in the provision of certain goods and services of which health care is of significant importance...in provision of health care services free of cost or at subsidized prices (Gertler 1990). There is a need to understand the relationship (nexus) between increasing public spending and improving health outcomes. Therefore, this paper makes an attempt to examine the impact of government expenditure on health care in health outcomes in India.

Keywords: Nexus, Health Care, Financing, Government, Outcome.

Introduction

In India, responsibility for health care is divided between state government and central government. They have different approaches to funding, different relationships with health service providers, and different responsibilities for various parts of health care. The two levels of government also have different capacities to meet the costs of services from their own revenue. Health care expenditure consists of expenditure incurred by the state governments on medical and public health and expenditure incurred by central government on family welfare programmes. In health care, the current separation of responsibilities means that no level of government has a detailed understanding of all aspects of the health system. Each level of government formulates policies in relation to its responsibilities, but they do not
necessarily take account of the health system as a whole. Ahluwalia (2000) in his article raises this issue while analysing the performance of Indian states. As a result, the increase in government health expenditure, due to increase in the national income, does not have a major impact on health outcome. The study is an attempt to examine the impact of government expenditure on health care in health outcomes.

**Objective**

The paper aims to find out whether public health care expenditure have a significant influence upon health outcomes in India that would reflect a nexus between public expenditure on health care and health outcomes achieved.

**Methodology**

The study is based on secondary data. This analysis is an attempt to study the relationship between health expenditure by the government and the accessibility of basic health care services by the people which is reflected as an outcome in terms of the demographic indicators like Crude Birth Rate (CBR), Crude Death Rate (CDR), Infant Mortality Rate (IMR), and Sex Ratio of the people. The Crude Birth Rate is the number of live births per 1000 people per year; Crude Death Rate is the total number of deaths per year per 1000 people; Infant Mortality Rate is the number of deaths of children under one year of age per 1000 live births and Sex ratio is described as the number of females per 1000 male. Government expenditure on health care includes revenue expenditure on medical, public health and family welfare and capital expenditure on medical, public health and family welfare. Main sources of the database are Planning Commission, India; Ministry of Statistics and Programme Implementation (MoSPI), Government of India; Ministry of health and family welfare, Government of India (MoHFW, GoI); National Health Mission, Government of India; Centre for Enquiry into Health and Allied Themes (CEHAT); Directorate of Economics and Statistics of respective state governments, India. The study Covers 21 states of India in finding out the impact of health care expenditure by the government on health outcomes. The states are Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal. The period of the study is 22 years i.e. from 1991 to 2012 as adequate data is available for this period which makes the study viable.
To examine the nexus between public health care expenditure and health outcome in different states of India, statistical tool of linear regression model has been used to give an idea about how increase in public health care expenditure (PHCE) causes change in the demographic indicators (CBR, CDR, IMR and Sex ratio) which are the outcome variables considered in the study. This study is a panel data analysis where the impact of growth rate of Public Health Care Expenditure (PHCE) on health outcomes will be found out and STATA 11.0 version has been used to perform this procedure.

Health Care Expenditure in India

In India, the provision of public healthcare is a responsibility shared by both the Central and State governments. Central government efforts at influencing public health have focused on the five-year plans, on coordinated planning with the states, and on sponsoring major national health programs. The following table shows the pattern of investment on health in India in different plan periods:

Table 1: Pattern of investment on health in India in different plan periods (Rs. in Crore)

<table>
<thead>
<tr>
<th>Period</th>
<th>Total Plan Investment Outlay (all heads)</th>
<th>Health</th>
<th>Family Welfare</th>
</tr>
</thead>
<tbody>
<tr>
<td>First plan (1951-56)</td>
<td>1960 (100)</td>
<td>65.2 (3.3)</td>
<td>0.1 (0.1)</td>
</tr>
<tr>
<td>Second plan (1956-61)</td>
<td>4672 (100)</td>
<td>140.8 (3)</td>
<td>5.0 (0.1)</td>
</tr>
<tr>
<td>Third plan (1961-66)</td>
<td>8576.5 (100)</td>
<td>225.9 (2.6)</td>
<td>24.9 (0.3)</td>
</tr>
<tr>
<td>Annual plans (1966-69)</td>
<td>6625.4 (100)</td>
<td>140.2 (2.1)</td>
<td>70.4 (1.1)</td>
</tr>
<tr>
<td>Fourth plan (1969-74)</td>
<td>15778.8 (100)</td>
<td>335.5 (2.1)</td>
<td>278.0 (1.8)</td>
</tr>
<tr>
<td>Fifth plan (1974-79)</td>
<td>39426.2 (100)</td>
<td>760.8 (1.9)</td>
<td>491.8 (1.2)</td>
</tr>
<tr>
<td>Annual plan (1979-80)</td>
<td>12176.5 (100)</td>
<td>223.1 (1.8)</td>
<td>118.5 (1.0)</td>
</tr>
<tr>
<td>Sixth plan (1980-85)</td>
<td>109291.7 (100)</td>
<td>2025.2 (1.8)</td>
<td>1387.0 (1.3)</td>
</tr>
<tr>
<td>Seventh plan (1985-90)</td>
<td>218729.6 (100)</td>
<td>3688.6 (1.7)</td>
<td>3120 (1.4)</td>
</tr>
<tr>
<td>Annual plan (1990-91)</td>
<td>61518.1 (100)</td>
<td>960.9 (1.6)</td>
<td>784.9 (1.3)</td>
</tr>
<tr>
<td>Annual plan (1991-92)</td>
<td>65855.8 (100)</td>
<td>1042.2 (1.6)</td>
<td>856.6 (1.3)</td>
</tr>
<tr>
<td>Eighth plan (1992-97)</td>
<td>434100 (100)</td>
<td>7494.2 (1.7)</td>
<td>6500.0 (1.5)</td>
</tr>
<tr>
<td>Ninth plan (1997-2002)</td>
<td>859200 (100)</td>
<td>19818.4 (2.31)</td>
<td>15120.2 (1.76)</td>
</tr>
<tr>
<td>Tenth plan (2002-07)</td>
<td>1484131 (100)</td>
<td>31020.3 (2.09)</td>
<td>27125.0 (1.83)</td>
</tr>
<tr>
<td>Eleventh plan (2007-12)</td>
<td>3246178 (100)</td>
<td>102254.6 (3.15)</td>
<td>---</td>
</tr>
</tbody>
</table>

Source: Various Reports of Planning Commission.
The central government has taken various initiatives to improve the public health care system in India, the government launched the National Rural Health Mission (NRHM) in 2005 which aim to provide quality health care for all and increase the expenditure on health care from 0.9 percent of GDP to 2-3 percent of GDP by 2012. In terms of financing of health expenditure, state governments contribute 15.2 percent, the central government 5.2 percent, third-party insurance and employer’s 3.3 percent, and municipal government and foreign donors about 1.3 (World bank 1995). According to the World Development Report (1993), it is found that out of the 6 per cent of GDP spent on health care in 1990, the private sector accounted for as much as 4.7 per cent (out of which 4.5 per cent was out-of-pocket expenditure of the households). The rest of 0.2 per cent was contributed by private employers and by other non-government contributions. Given that the private sector is the major provider of outpatient and inpatient care, the government is able to focus on more cost-effective preventive health care, such as immunization, antenatal care, prevention and control of diseases. As of 1990-91, a little more than 60 per cent of the resources had gone to curative services, 26 per cent to preventive services and the remaining percentage to administration and miscellaneous services (Reddy and V Selvaraju, 1994). 97 per cent of the resources had gone to consumption expenditure and 3 per cent to buildings, machinery and equipment. This shows that a very small percentage had gone towards capital formation which helps in improving services and efficiency in the hospitals (Reddy and V. Selvaraju, 1994). As of 1990-91, even though 74.3 per cent of the population was in the rural areas, 67 per cent of the resources spent on health care went to the urban sector and only 33 per cent of the resources went to the rural sector (Reddy and V. Selvaraju, 1994). This shows the neglect of rural areas by the government.

Regarding development of health infrastructure in India, the central government in recent years has adopted several policies. According to a report in Business Standard (29 March 1997), in India there were 407 doctors, 214 nurses, and 1600 beds per 10,000 people for a population of 930 million in contrast to which U.S.A. had 2340 doctors, 3204 nurses and 5900 beds for every 10,000 people in a population of 250 million or even Brazil which had 4300 beds for every 10,000 people, showing that the situation in India is really dismal. Currently, India has approximately 860 beds per million populations. This is only one-fifth of the world average, which is 3,960, according to the World Health Organization (WHO). Yet there is some infrastructural development in the health sector in India.
Results and Discussion

In this analysis, we use the growth rate of government expenditure on health as the explanatory variable and health outcomes which are considered here (CBR, CDR, IMR, and Sex Ratio) as the dependent variables.

First, we consider the demographic indicator Crude Birth Rate (CBR) and the growth rate of public health care expenditure (PHCE)

In equation form, it can be represented as,

\[ Y_{1t} = \alpha_1 + \beta_1 X_{1t} + U_t \]  

\[ \text{ (i) (t represents time period)} \]

Where \( Y_{1t} \) represents the CBR, \( X_{1t} \) represents the growth rate of public expenditure on healthcare and \( U_t \) is the error term.

The summary statistics table below gives the mean and standard deviation of the two variables \( Y_1 \) and \( X_1 \):

Table 2.1: Summary Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Y_1 )</td>
<td>23.2820</td>
<td>5.5450</td>
<td>13.1</td>
<td>36.3</td>
</tr>
<tr>
<td>( X_1 )</td>
<td>12.1807</td>
<td>14.7370</td>
<td>-50.9</td>
<td>108.5</td>
</tr>
</tbody>
</table>

Variable \( Y_1 \) is having the mean and std. deviation of 23.2820 and 5.5450 and variable \( X_1 \) is having the mean and standard deviation of 12.1807 and 14.7370.

In the following, we show the overall effect of growth rate of health care expenditure by the government on CBR in India:

Table 2.2: Effect of public health expenditure growth rate on CBR in India: 1991-2012

| Dependent Variable (CBR) (\( Y_1 \)) | Coefficients | Standard Error | Z value | p>|Z| |
|-----------------------------------|--------------|----------------|---------|-----|
| PHCE (\% ) (\( X_1 \))           | -0.0391      | 0.0092          | -4.26   | 0.000 |
| Constant                          | 23.7583      | 1.1135          | 21.34   | 0.000 |

Number of observations = 462, Number of groups = 21, Observations per group = 22
R sq. within = 0.0395, R sq. between = 0.0055, R sq. overall = 0.0129
Prob = 0.0000
From the above table, the estimated value of equation (i) is given by,

\[ \hat{Y}_{1t} = 23.7583 - 0.0391X_{1t} \]

(1.1135) (0.0092)

In the case of time series and cross section data, average effects of \( X \) over \( Y \) considering a unit change in \( X \) which causes changes in \( Y \) across time and space (state) has been interpreted by the coefficients of explanatory variables. From the above table, it has been found that CBR is negatively associated with PHCE growth rate. The above equation shows that a 1% increase in PHCE decreases CBR by 0.0391% and CBR is predicted to be 23.7583 when PHCE is zero. The \( R^2 \) value (overall) is 0.0129 (since it is a random effect estimation) which indicates that 1.29% of the dependent variable (CBR) can be explained by the independent variable (PHCE growth rate). The results show that the growth rate of PHCE has a significant (-) influence on CBR.

We now consider the demographic indicator Crude Death Rate (CDR) and the growth rate of public health care expenditure (PHCE).

In the form of an equation,

\[ Y_{2t} = \alpha_2 + \beta_2X_{2t} + U_t \] (ii) (t represents time period)

Where \( Y_{2t} \) represents the CDR, \( X_{2t} \) represents the growth rate of public expenditure on healthcare and \( U_t \) is the error term.

The summary statistics table below gives the mean and standard deviation of the two variables \( Y_2 \) and \( X_2 \):

**Table 3.1:** Summary Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Y_2 )</td>
<td>7.7277</td>
<td>1.5998</td>
<td>4</td>
<td>13.8</td>
</tr>
<tr>
<td>( X_2 )</td>
<td>12.1807</td>
<td>14.7370</td>
<td>-50.9</td>
<td>108.5</td>
</tr>
</tbody>
</table>

Variable \( Y_2 \) is having the mean and std. deviation of 7.7277 and 1.5998 and variable \( X_2 \) is having the mean and standard deviation of 12.1807 and 14.7370.

In the following, we show the overall effect of the growth rate of health care expenditure by the government on CDR in India:
Table 3.2: Effect of public health expenditure growth rate on CDR in India: 1991-2012

<table>
<thead>
<tr>
<th>Dependent Variable (CDR) (Y2)</th>
<th>Coefficients</th>
<th>Standard Error</th>
<th>t value</th>
<th>p &gt;</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHCE (%) (X2)</td>
<td>-0.0106</td>
<td>0.0033</td>
<td>-3.20</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>7.8569</td>
<td>0.0606</td>
<td>129.60</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

Number of observations = 462, Number of groups = 21, Observations per group = 22

R sq. within = 0.0228, R sq. between = 0.2305, R sq. overall = 0.0520

Prob = 0.0015

From the above table, the estimated value of equation (ii) is given by,
\[ \hat{Y}_{2t} = 7.8569 + (-0.0106)X_{2t} \]

It is found from the above table that CDR is also negatively associated with PHCE growth rate. The above equation shows that a 1% increase in PHCE decreases CDR by .0106% and CDR is predicted to be 7.8569 when PHCE is zero. The \( R^2 \) value (within) is 0.0228 (since it is a fixed effect estimation) which indicates that 2.28% of the dependent variable (CDR) can be explained by the independent variable (PHCE growth rate). The results show that the growth rate of PHCE has a significant (-) influence on CDR.

Let us, now, find out the effect of the growth rate of public health care expenditure (PHCE) upon the Infant Mortality Rate (IMR) in India.

In the form of an equation,
\[ Y_{3t} = \alpha_3 + \beta_3 X_{3t} + U_t \] -------- (iii) (t represents time period)

Where \( Y_{3t} \) represents the IMR, \( X_{3t} \) represents the growth rate of public health care expenditure and \( U_t \) is the error term.

The summary statistics table below gives the mean and standard deviation of the two variables \( Y_3 \) and \( X_3 \):
Variable Y₃ is having the mean and standard deviation of 53.4502 and 21.7693 and variable X₃ is having the mean and standard deviation of 12.1807 and 14.7370.

The effect of the growth rate of health care expenditure by the government on IMR in India as a whole is obtained by regression analysis and the results obtained are shown with the help of the following tabular representation:

**Table 4.2: Effect of public health expenditure growth rate on IMR in India: 1991-2012**

| Dependent Variable (IMR) (Y₃) | Coefficients | Standard Error | t value | p > | t| |
|-------------------------------|--------------|----------------|---------|-----|---|
| PHCE (%) (X₃)                | -.1503       | .0359          | -4.19   | 0.000 |
| Constant                     | 55.2816      | .6568          | 84.16   | 0.000 |

Number of observations = 462, Number of groups = 21, Observations per group = 22

R sq. within = 0.0383, R sq. between = 0.1570, R sq. overall = 0.0474

Prob = 0.0000

From the above table, the estimated value of equation (iii) is given by,

\[ \hat{Y}_3t = 55.2816 + -.1503X_{3t} \]

\[ (.6568) (.0359) \]

It is found from the above table that IMR is also negatively associated with PHCE growth rate. The above equation shows that a 1% increase in PHCE decreases IMR by .1503% and IMR is predicted to be 55.2816 when PHCE is zero. The R² value (within) is 0.0383 (since it is a fixed effect estimation) which indicates that 3.83% of the dependent variable (IMR) can be explained by the independent variable (PHCE growth rate). The results show that the growth rate of PHCE has a significant (-) influence on IMR.
Let us, now, find out the effect of the growth rate of public health care expenditure (PHCE) upon the Sex ratio in India.

In the form of an equation,

\[ Y_{4t} = \alpha_4 + \beta_4 X_{4t} + U_t \]  

(iii) (t represents time period)

Where \( Y_{4t} \) represents the Sex ratio, \( X_{4t} \) represents the growth rate of public expenditure on healthcare and \( U_t \) is the error term.

The summary statistics table below gives the mean and standard deviation of the two variables \( Y_4 \) and \( X_4 \):

**Table 5.1: Summary Statistics**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Y_4 )</td>
<td>940.8203</td>
<td>44.5944</td>
<td>859</td>
<td>1084</td>
</tr>
<tr>
<td>( X_4 )</td>
<td>12.1807</td>
<td>14.7370</td>
<td>-50.9</td>
<td>108.5</td>
</tr>
</tbody>
</table>

Variable \( Y_4 \) is having the mean and std. deviation of 940.8203 and 44.5944 and variable \( X_4 \) is having the mean and standard deviation of 12.1807 and 14.7370.

The effect of the growth rate of health care expenditure by the government on the sex ratio in India as a whole is obtained by regression analysis and the results obtained are shown with the help of the following tabular representation:

**Table 5.2: Effect of public health expenditure growth rate on sex ratio in India: 1991-2012**

| Dependent Variable (sex ratio \( Y_4 \)) | Coefficients | Standard Error | Z value | p>|Z| |
|-----------------------------------------|--------------|----------------|---------|-----|
| PHCE (%) \( X_4 \)                     | .0868        | .0278          | 3.12    | 0.002 |
| Constant                               | 939.7628     | 9.8710         | 95.20   | 0.000 |

Number of observations = 462, Number of groups = 21, Observations per group = 22

R sq. within = 0.0218, R sq. between = 0.0361, R sq. overall = 0.0021

Prob = 0.0018
From the above table, the estimated value of equation (iii) is given by,

\[ \hat{Y}_{it} = 939.7628 + 0.0868X_{it} \]

\[(9.8710) \quad (.0278)\]

From the above table, it is found that the PHCE growth rate has a positive impact upon the sex ratio in India. The above equation shows that a 1% increase in PHCE increases sex ratio by .0868% and sex ratio is predicted to be almost 940 when PHCE is zero. The \(R^2\) value (overall) is 0.0021 (since it is a random effect estimation) which indicates that .21% of the dependent variable (sex ratio) can be explained by the independent variable (PHCE growth rate). The results show that the growth rate of PHCE has a significant (positive) influence upon sex ratio.

**Major Findings, Conclusion and Policy Implications**

The study made an attempt to find out the effectiveness of the public healthcare system in India, where the performance of 21 major Indian states are assessed in generating health outcomes during the period 1991 to 2012. Government expenditure has a significant impact upon CBR and CBR is negatively related to health expenditure by the government. A 1% increase in public expenditure on health care decreases CBR by 0.0391%. Government health expenditure significantly influences CDR and the relation is negative. A 1% increase in public expenditure on health care decreases CDR by 0.0106%. IMR has a significant and negative relationship with government expenditure on health care. A 1% increase in public health care expenditure decreases IMR by 0.1503%. Sex ratio is found to be significantly positively related to government expenditure on health care in India. A 1% increase in public health care expenditure increases sex ratio by 0.0868%.

The ministry of health and family welfare is responsible for the implementation of health programmes on a national scale. The ministry is also implementing several World Bank assisted programmes. Although from the above analysis, India has shown improvements in terms of its health indicators, yet the role of the government in this regard is far from the satisfactory level. The private sector is assuming a growing role in both financing and delivery of health care. Health, being a state subject in India, state policies have an important bearing on the public health expenditures in India. Considering the social obligation of the government in the health development, private health care service delivery should be properly designed along with guidance of the ministries of health, but it should never be at the expense of an efficient and effective public sector. The increasing inefficiency
and mismanagement of the funds allocated to the public sector causes leakages of resources. Again, economic growth has made people better off and with increased demand; people will prefer private health care services due to better service delivery. This shift in demand also reduces the contribution of economic growth on public health care delivery services. The poor performance of health system in the public sector is due to the factors like mismanagement of the system and mismatch between personnel and infrastructural facilities, lack of medical educational meetings, lack of Continuing Medical Education (CME) and also lack of orientation programme for the medical personnel, lack of networking among and within institutions leading to lack of appropriate functional referral system, lack of appropriate intervention programme and inadequate financing in well targeted interventions etc.

Comparing India’s health care services with other developed and even developing economies of the world, stress should be given on the policymakers to formulate such programmes and policies as to improve the health scenario in the country. The government should increase the percentage share of its GDP on health care and also the expenditure on health as a percentage of government expenditure should be increased. The government hospitals should improve their infrastructure along with health care facilities to attract and build confidence among the patients. Considering health development as having an important return on economic development of the country, the government should encourage investment in the health sector. Health being the critical sector for achieving overall equitable human development in the country, conceptualization of public private partnership is needed for improving health service delivery in the country. Effective training should be provided for skill upgradation of the medical personnel. Further, there is a need for an effective mechanism to address demand for safe, affordable and timely available health care for all. The overall governance capabilities for policy implication and service delivery also needs to be strengthened and in order to maintain the social values of equity, accessibility, solidarity and fairness, the government should sustain its leadership role in the health sector.

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