

# Public Health Expenditure and its relation with Health Status – Evidence from the North Eastern states of India

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## Research Article

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# Abstract

Health of the people is considered highly significant for the socio-economic development of a nation. Investment on health is an investment on human resource development. Hence it is necessary to allocate adequate funds to the health sector in a planned and wise manner. To get a clear picture about the health scenario of north eastern states of India, this paper first tries to analyse the trend of public health expenditure made by both state and central government after the launch of NRHM in the year 2005. Despite the fact that health expenditure exhibits a positive trend but it is yet to reach its target of investing 2–3% of GDP. More focus is to be drawn towards the development of this sector. Therefore it becomes very important to know the relation between health expenditure and health status. Dynamic panel analysis is used and found that health expenditures and health status exhibits positive relation, health status of the people increases with increase in expenditure.

## 1. Introduction

Health as defined by World Health Organisation (WHO) is a “State of complete physical, mental and social wellbeing, and not merely the absence of disease or infirmity” (Constitution of the World Health Organization, 1948). This is a definition that recognises the many dimensions of health and wellbeing. Health is considered to be an integral component of economic growth (Sen, 1999; Bhatia, 2013; Sinha et al. 2016; Menon, 2017). One cannot ignore the importance of health as it is a major input for development and there arises the immense need to study the health of the population. Good health will affect growth by increasing worker’s productivity, as it will increase average life expectancy of workers and subsequent human capital accumulation and also by reducing the burden of disease (Menon, 2017). Sen (1999) stated that if other things remain constant, good health and economic prosperity will always support each other as healthy people can more easily earn an income and people with a higher income can more easily seek medical care, have better nutrition, and have the freedom to lead healthier lives. Eliminating disparity and also achieving the targets of better health outcomes are the major goals which will ultimately improve the health and well-being of the population. With this aim in mind, Government of India launched the NRHM i.e. National Rural Health Mission in the year 2005. It was specially designed for the poor and vulnerable sections of the society so that they could get the basic primary healthcare services. The programme was implemented all over the country with special focus on 18 states consisting of all the North Eastern states. An immense need was felt for health care initiative for the urban people and therefore in the year 2013, National Health Mission (NHM) was launched by Government of India with two sub-mission i.e. National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM).

## 2. Health And Development- Findings From Theoretical And Empirical Studies

Nobel laureate Kenneth Arrow (1963) brought attention towards economics of health and helped to establish health economics as a field. He stated that as there is prevalence of uncertainty related to health of individuals, also utmost care is to be taken while making decisions relate to health, so it be studied separately. Enhancement of health of the people must be accepted universally as a major objective for

development (Sen, 1999). Good health is a global concern and is high on the agenda of every country (Kaul and Faust, 2001; Smith and MacKellar, 2007). Also, Bhatia (2013) considers health of the people to be of highest significance for the socio-economic development.

A study by Menon (2017) finds that in India, improving nutrition has increased workers' productivity. But it is seen that India's public spending on health care hovers around 1% of the country's GDP for many decades whereas it was targeted to be around 2–3 percent of India's GDP. Most countries like Ghana, Thailand, Sri Lanka, China and South Africa spend 2–4% of GDP on health (Ghosh, 2019). Developing countries like Bhutan invested 2.6% of its GDP on health in the year 2015. Government of India is thus facing the pressure to increase the budgetary allocation to the health sector (Bhat and Jain, 2004). Berman and Ahuja (2008) states that government spending on health declined prior to 2004 but after the launch of NRHM in 2005, expenditure on health increased. Bhat and Jain (2004) studied the relation between per capita income and health care expenditures for the states of India and found that for every 1 percent increase in state per capita income, the state level health expenditure has gone up by 0.684 percent. Choudhury (2018) states that India spends very less on health care compared to other countries in the world. Health care expenditure can significantly influences the health status of the people through improved life expectancy at birth, reducing death and infant mortality rates (Novignon et al., 2012).

Thus, even after implementing various policies and programmes, many researchers finds poor and unsatisfactory health conditions of the people in India. This highlights the need for proper monitoring so as to ensure wise use of resources. Growing concern may be seen in the form of increase in public expenditure, improvement in health infrastructure and facilities, creating awareness for nutrition etc. From the study of various earlier works by the researcher it is found that focus on the health scenario of North East Indian states is very limited. Moreover it is important to know how health expenditure can have an impact on the health status of the people. This calls for a study to analyse the pattern of expenditure made on health for the eight states of North East India also to see the association of health expenditure and health status.

### **3. Objectives**

Quality health is an important factor for human development and development of the country as a whole. Recent years evidenced that both central and the state government have given tremendous attention to develop the health sector of India. Recognizing the importance, prominent steps were taken such as the launch of National Rural Health Mission (NRHM). High on the agenda of the government is the provision of 'health for all'. Thus this paper tries to focus on the scenario of the North East Indian states. Therefore the main objectives of this paper are-

1. To study the trend of public health expenditure for the states of North East India
2. To analyze the effect of health expenditure on the health indicators for North Eastern states of India.

### **4. Methodology**

The present study considers all the eight states of North East India i.e. Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. The data have been analyzed based on secondary sources for the year 2005-06 to 2014-15 from various official sources like SRS bulletins, RBI State Finance etc. The variables taken into consideration are Public Health Expenditure and health status. Health Expenditure includes the funds from both central and state government under two main accounts- Revenue Expenditure Account and Capital Expenditure Account under which two major heads are considered- Medical & Public Health and Family Welfare (National Health Accounts, India; Ahmed and Honakeri, 2012). Expenditure at constant prices is taken into consideration. On the other hand, Health Status can be used as a general term for the state of health of an individual, group, or population measured against defined standards (Roberts, 1998; WHO). Health Status in this present study is represented by three variables, viz. Infant Mortality Rate (IMR), Birth Rate (BR) and Death Rate (DR). Health Status and the indicators exhibits an inverse relationship i.e. health status increases when there is a fall in the value of the health indicators.

Values of the health indicators may vary with certain factors like population, area etc. A state with very high population may have more deaths of infants, reflecting a high IMR compared to a less populated state. To eliminate this problem an index has been created. For example the index calculated for IMR is

$\sqrt{\left(\frac{IMR}{Population} \times \frac{IMR}{Area}\right)}$ . Similar formula is used for other indicators too expecting that it will eliminate the effect of differences in population and area.

For analyzing the first objective Ratio, Percentage and Graph is used and for the second objective Dynamic Panel Analysis is been used (Piper, 2014; Younsi et al., 2016; Labra and Torrecillas, 2018). Dynamic panel model is a special case of panel data models which contains one lagged dependent variable as the independent variable. Inclusion of the lagged dependent variable adds history to the model which helps to know the impact of the past behavior or pattern on the present. Dynamic panel uses lagged dependent variable as a predictor variable which represents the possibility to determine the influence of the past. Without the lagged variable, the independent variables represent the entire set of information that is producing observed outcome whereas with the inclusion of lagged variable, the equation has the entire history representing that any measured influence is conditional on its history.

## 5. Results And Discussion

### 5.1 Trend of Public Expenditure on Health for the States of North East

Government of India has continuously increased public health expenditure over the years which indicate that increased importance is given to uplift the health care sector (Berman and Ahuja, 2008; Ahamed and Honakeri, 2012). With the launch of NRHM in 2005, it was planned to increase the health expenditure by 2–3% of GDP. Even though expenditure as a percentage of GDP has increased but is less than the targeted value, as seen from Table 1.

Table 1  
Public Health Expenditure as a percentage of GDP for India

Year	Percentage of GDP
2005-06	1.13
2006-07	1.11
2007-08	1.10
2008-09	1.16
2009-10	1.22
2010-11	1.16
2011-12	1.18
2012-13	1.18
2013-14	1.29
2014-15	1.41
Source: World Health Organization Global Health Expenditure database	

It is found that compared to many other countries India spends very less in health (Rao and Choudhury, 2012). Countries like Canada, Austria, Afghanistan, Brazil etc. which spend 10–11 percent of the GDP on health care (World Health Statistics, 2009). For the development of a region it is very important to develop the health sector. Focusing on the scenario of North east, it is seen that the health expenditure for the states of North east has increased over the years which can be considered as a positive sign of development. Looking at the growing population of the states is it a real necessity to increase the expenditure on health.

Considering health expenditure in terms of constant prices taking 2004-05 to be the base year we find an upward rising trend for all states over the years 2005-06 to 2014-15. Significant investment is observed for the state of Assam when compared with other north east states, which could be due to the fact that Assam has the highest population among all other states. Therefore keeping in mind the population of Assam, it is mandatory to make more expenditures compared to other states. Hence it is very difficult to directly interpret about the adequateness of public spending on health for states with differences in population, area and NSDP. To get a clearer picture ratio of health expenditure to NSDP is considered.

Figure 2 shows the relative position of health investments of the eight states. Fluctuations are seen in all the states. It means that Assam may be investing more on health sector in absolute terms because of its higher population and greater land area compared to other states whereas in relative terms health investment in Assam is similar to that of its neighbouring states like Meghalaya, Nagaland, Tripura etc. and much less than others like Mizoram, Manipur. Mizoram spends more compared to other states which has increased to around 6% of NSDP on health in 2009-10. Highest Compound Annual Growth Rate (CAGR) was

found in Manipur (11.43%) followed by Arunachal Pradesh (7.88%). Finally after analysing considering the various factors, it can be concluded that health expenditure by the government has increased in the years for all states of north east.

## 5.2 Effect of health expenditure on the health indicators for North Eastern states

Health expenditure is increased with the hope that increasing expenditure will improve the health scenario of the region (Bhatia, 2013; Novignon et.al, 2012). As health expenditure is found to be increasing over the years, it becomes very important to know whether this funds are properly used. Therefore this study uses dynamic panel model to find the relationship exist between increasing health expenditure and health status of north east. Dynamic Panel models are popular in many areas of economic enquiry as it provides new insights (Piper, 2014). This model includes lag of the dependent variable as one of the independent variable on the right hand side of the regression equation which represents the possibility to determine the influence of the past. Use of such models in health sector is prevalent as it includes correlation with history of the model and health indicators are very much dependent on the past scenario.

Let us assume the Dynamic panel data model to be –

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Y_{it-1} + U_{it}$$

For  $i = 1 \dots n$ , representing the cross section i.e. the states of north east ( $n = 8$ ). Again,  $t = 1 \dots T$  represents time period which is annual data of 10 years in the model.  $Y_{it}$  is the dependent variable;  $\beta_0$  is the unobserved individual and time specific effect;  $X_{it}$  is the independent variable;  $Y_{it-1}$  is the explanatory variable which is the lagged value of the dependent variable;  $U_{it}$  is the error term.

For the present analysis, three models have been formulated-

**Model 1:**  $IMR_{it} = f(\text{Health Expenditure}_{it}, IMR_{it-1})$

**Model 2:**  $\text{Birth Rate}_{it} = f(\text{Health Expenditure}_{it}, \text{Birth Rate}_{it-1})$

**Model 3:**  $\text{Death Rate}_{it} = f(\text{Health Expenditure}_{it}, \text{Death Rate}_{it-1})$

Arellano- Bond Serial Correlation test has been performed to check the correlation between the model errors. The test result showed that there is no autocorrelation. For dynamic panel model the variables should be non-stationary at level but after first differencing it should be stationary. To check the stationary of IMR, Birth Rate, Death Rate and Health expenditure, Panel unit root test was performed. It is seen that the variable were non stationary at level but transforming them to 1st order difference, they became stationary.

Table 2  
Results of Dynamic Panel Analysis

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
Variable	Coefficient (Probability)	Coefficient (Probability)	Coefficient (Probability)
Constant	0.002772 (0.1766)	0.000363 (0.2498)	0.000418** (0.0291)
Health Expenditure	-3.65E-08** (0.0295)	-1.74E-09 (0.6971)	-3.25E-08** (0.0434)
Lag Variable	0.947112*** (0.0000)	0.972157*** (0.0000)	0.943965*** (0.0000)
R <sup>2</sup>	0.969870	0.998082	0.988124
Adjusted R <sup>2</sup>	0.968997	0.998026	0.987780

From all the 3 models of our analysis it is found that there exist an inverse relation between health expenditure and health status indicators considered like IMR, Birth rate and Death rate. It implies that when expenditure increases all the three indicators fall which is considered to be good for the economy. Health status increases with the increase in the expenditure on health care. Also it is found that significant relationship exist in case of the health indicators like IMR and Death rate and also the lagged value of the health indicators which imply that the indicators are dependent on the past history. But insignificant relationship exist in case of Birth rate this could be because Birth rate is dependent on many other factors such as education and employment opportunities of women, social customs, religious beliefs, average age at marriage and use of contraceptives etc. rather than only depending on expenditures made on healthcare. Further, the R<sup>2</sup> values of all the estimated models are reasonably high. High R<sup>2</sup> value implies models are statistically significant with reasonably high explanatory power.

## 6. Conclusion

The aim of this paper is to find the health scenario of North east India and to check whether health care expenditure has any effect on the health indicators. Investing properly on health is very important because increasing expenditure on health has a very close relation with the improvement of the health status of its people. From the study it is found that there has been increase in the expenditure on health for all the states of north east which could be considered a positive sign of development. States like Assam, Tripura has high expenditure compared to states like Sikkim even though all the states exhibited increase in public health expenditure. On studying the ratio of health expenditure to NSDP it is found that Assam is making much

less expenditure with regards to its huge population whereas Sikkim has very high expenditure but could not show better performance in health.

A negative relation is found to exist between health expenditures and health indicators for the north eastern states. Whenever there is increase in health expenditures it leads to significant decrease in IMR, death rate and birth rate. In other words, health expenditures and health status has positive relation, status of health increases with increase in expenditure. Dynamic panel includes history to the model and it was found that history has significant relation with the present. Hence from the entire study we can conclude that even if public expenditure on health is increasing over the years but expenditure as a percentage of GDP is very low compared to many other countries. It has become very important that we give priority to the health sector as it has been found that expenditure on health has a positive impact on the health status of the people which ultimately will lead to development of the nation. Whereas it is also true that only investment of funds without proper allocation and wise use will create disparity, where comes the need for a proper monitoring mechanism.

## 7. Policy Recommendations

Health expenditure as a percentage of GDP is found to be low. Therefore allocation for health sector in the budget needed to be increased in an adequate manner which means we need to prioritize the health sector with more allocation of funds so as to achieve the target of "Health for all". Accessibility of public health care facilities by the people should be taken care as lack of awareness, disparity etc. leads to underutilization of these services. Lastly, Government of India should take appropriate measures with regards to capital account of health expenditure as expenditure made on capital account is negligible as compared to revenue account.

## Declarations

- **Availability of data and materials**

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

- **Competing interests**

Not applicable

- **Funding**

Not applicable

## Authors' contributions

BS has collected the data on Health Expenditure and Health Status of the Northeastern states of India from authentic sources. The data was then analyzed using Dynamic Panel data analysis techniques and results

were interpreted. NG has supervised in selecting the data and in writing the overall manuscript and also in interpreting the results. All authors read and approved the final manuscript."

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Not applicable

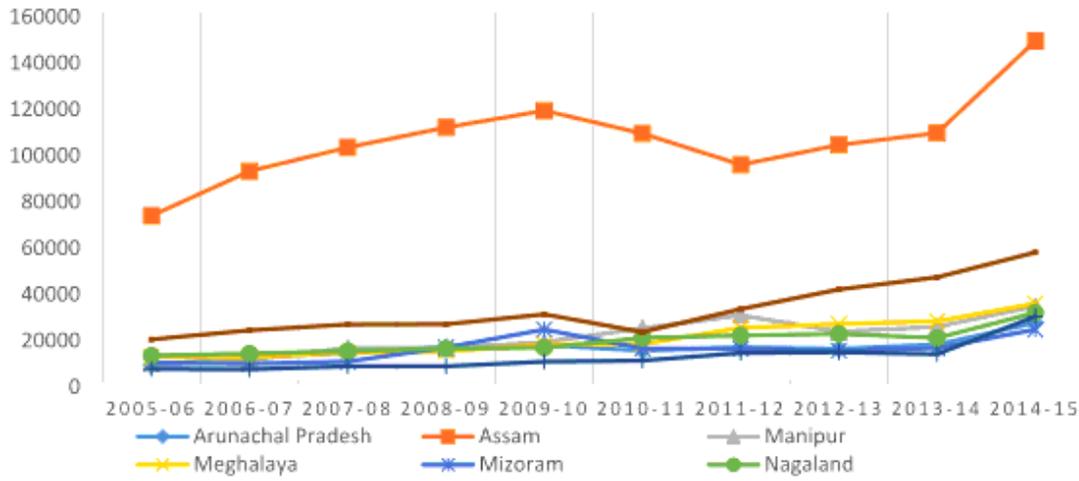
## References

1. Ahmed, M.A., Honakeri, P.M. (2012). Public Expenditure on Health Sector in India – Recent Trends, [https://www.researchgate.net/publication/255968818\\_Public\\_Expenditure\\_on\\_Health\\_Sector\\_in\\_India\\_-\\_Recent\\_Trends](https://www.researchgate.net/publication/255968818_Public_Expenditure_on_Health_Sector_in_India_-_Recent_Trends)
2. Arrow, K.J. (1963) 'Uncertainty and the Welfare Economics of Medical Care'. *The American Economic Review*, Vol. 53, No. 5, pp. 941–973.
3. Berman, P., Ahuja, R. (2008). Government Health Spending in India, *Economic and Political Weekly*, Vol. 43, No. 26/27 (Jun. 28 - Jul. 11, 2008), pp. 209–216.
4. Bhat, R., Jain, N. (2004) 'Analysis of public expenditure on health using state level data' Indian Institute of Management, Ahmedabad
5. Bhatia, S. (2013) 'Public health expenditure and health status in India: an inter-state analysis' <http://hdl.handle.net/10603/10223>
6. Census of India (2001 & 2011), Registrar General of India, Government of India, New Delhi.
7. Choudhury, M., Amar Nath, H. K. (2012) 'An Estimate of Public Expenditure on Health in India' *National Institute of Public Finance and Policy (NIPFP)*
8. Choudhury, S. (2018) 'Health Scenario of Assam: A Study of Two Districts' PhD thesis, Gauhati University, Assam.
9. 'Constitution of the World Health Organization' (1948), Retrieved 20 September 2017, from <https://www.who.int/about/governance/constitution>
10. Directorate General of Health Services (2012), Indian Public Health Standards (IPHS) Guidelines for Primary Health Centres, Ministry of Health and Family Welfare, Government of India.
11. Ghosh, S. "Sluggish health spending can be reversed with a substantial increase in the allocation for health in the union budget" *The Hindu*, 24th January 2019.
12. Kaul, I. and Faust, M. (2001). Global public goods and health: taking the agenda forward, *Bulletin of the World Health Organization*, 79: 869–874.
13. Labra, R. and Torrecillas, C. (2018). Estimating dynamic Panel data. A practical approach to perform long panels, *Revista Colombiana de Estadística*, Volume 41, Issue 1, pp. 31 to 52. DOI: <http://dx.doi.org/10.15446/rce.v41n1.61885>
14. Menon, N. (2017). Health policy and economic growth in India: lessons from international Growth center projects, Brandeis University.

15. Ministry of Health and Family Welfare (2014), *Bulletin on Rural Health Statistics (March 31, 2012)*, New Delhi, Government of India.
16. 'National Health Accounts, India' Ministry of Health and Family Welfare (MoHFW) Government of India.
17. National Family Health Survey. Website- <https://www.nfhs.org/>
18. National Health Mission. Website- <http://www.nhm.gov.in/>
19. Novignon, J., Olakojo, S. A., and Nonvignon, J. (2012). The effects of public and private health care expenditure on health status in sub-Saharan Africa: new evidence from panel data analysis, *Health Economic Review Springer open journal* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3533939/>.
20. Menon, N. (2017) 'Health policy and economic growth in India: lessons from international Growth center projects' Brandeis University.
21. Piper, A. T. (2014). The Benefits, Challenges and Insights of a Dynamic Panel assessment of Life Satisfaction, Munich Personal RePEc Archive (MPRA) Paper No. 59556, University Library of Munich, Germany. <http://mpra.ub.uni-muenchen.de/59556/>
22. Poullier, J. P., Hernandez, P., Kawabata, K., Savedoff, D.W. (2002). Patterns of global health expenditures: results for 191 countries, WHO Discussion Paper No 51. <http://www.who.int/healthinfo/paper51.pdf>
23. 'Public Health Expenditure in India' (2016) Press Information Bureau, Government of India, Ministry of Health and Family Welfare
24. Rao, M. G. and Choudhury, M. (2012). Health Care Financing Reforms in India, Working Paper No: 2012 - 100, National Institute of Public Finance and Policy.
25. 'Rural Health Statistics' 2014-15, Ministry of Health and Family Welfare, Statistics Division, Government of India.
26. Roberts, J. L. (1998). 'Terminology - A glossary of technical terms on the economics and finance of health services', World Health Organisation.
27. Saikia, D., Das, K. K. (2014). Access To Public Health-Care In The Rural Northeast India, The *NEHU Journal*, Vol XII, No. 2, July - December 2014, pp. 77- 100, ISSN- 0972-8406.
28. Sen, A. (1999). Health in development, *Bulletin of the World Health Organization*, 77(8)
29. Sinha, P. K., Sahay, A., Koul, S. (2016). Development of a Health Index of Indian States, Indian Institute of Management Ahmedabad (IIMA)
30. Smith, R. D. and MacKellar, L. (2007). Global public goods and the global health agenda: problems, priorities and potential, *Global Health* 3, 9. <https://doi.org/10.1186/1744-8603-3-9>
31. State Finances (2005-2015), A Study of Budgets of 2005-15, Reserve Bank of India, Govt. of India.
32. Sustainable Development Goals, United Nations Development Programme <http://www.undp.org/content/undp/en/home/sustainable-development-goals.html>
33. Younsi, M., Chakroun, M. and Nafla, A. (2016). Robust analysis of the determinants of healthcare expenditure growth: evidence from panel data for low-, middle- and high-income countries, *The International Journal of Health Planning and Management* 31: 580-601

# Figures

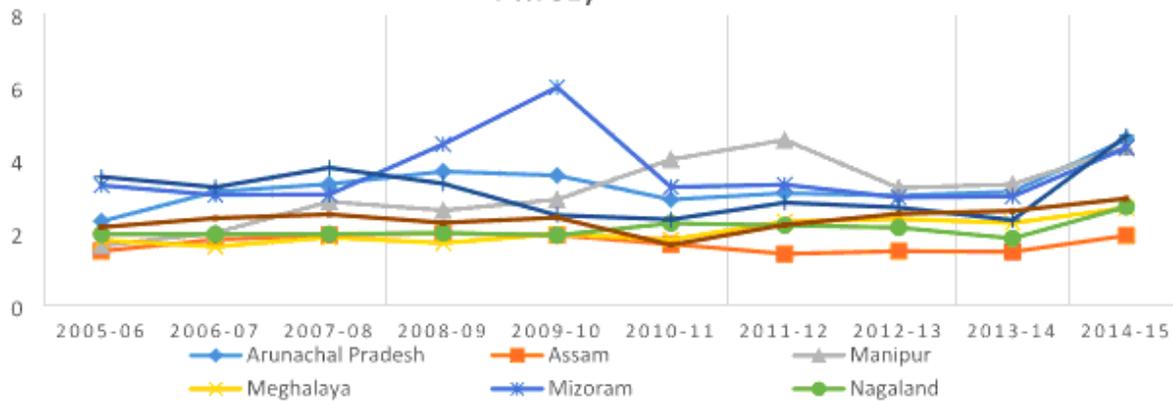
**HEALTH EXPENDITURE AT CONSTANT PRICES (IN LAKHS)**



**Figure 1**

**Health Expenditure of North East states at Constant Prices (in lakhs)**

**RATIO OF HEALTH EXPENDITURE TO NSDP (CONSTANT PRICE)**



**Figure 2**

**Ratio of Health Expenditure to NSDP at Constant price**