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Research Article

Impact Of Public Expenditure on Health Outcomes in Tamil Nadu

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ARTICLE INFO **ABSTRACT**

The level of public spending has emerged as one of the most significant measures of development for the priorities of the elected government. Public expenditure is essential to achieving the government's development objectives. Government of India committed to spend minimum 3 percent of GDP for public health. However, until now the goal has not been realized which forces the sizable number of poor people to spend from their pockets. Both union and state governments together spend just about 1 percent of GDP for health. Analyzing the impact of public spending on health outcomes in Tamil Nadu is the study's main objective. Nonetheless, the concerning disparity in our health care is evident from health indices such as the rate of malnourishment, life expectancy at birth, sex ratio, maternal mortality rate, and infant mortality rate. Health spending by the Government in India accounts for less than 1 percent of GDP and this also brought down the basic health indicators and poor health infrastructure such as reductions in dispensaries, number of beds, doctors per patient and number of primary health centres followed by sub-centres. The study examined the impacts of public spending on health outcomes and its results in Tamil Nadu with relevant indicators using the Vector Error Correction model. The result revealed that public expenditure has positive association with dispensaries, number of doctors and number of nurses, meaning that increase in public expenditure. The study concludes that the most of the health indicators respond positively for improved public spending on health infrastructure like primary health centres, preventive health, maternity care, nutrition and so on. Hence, both efficiency level of public spending as well as inadequacy of public spending have empirically analysed. Additionally, it is noted that a number of health indicators are positively impacted by public spending on health.

Keywords: Public expenditure, health, GDP, VECM.

Introduction

Ever since the emergence of capability approach to measure human development as an end of all our development policies and programmes replacing the earlier growth centered measure of development, social sector like health, education and poverty eradication have become the focus of the development policies. Among them, providing basic health occupies a special significance as it is the means as well as an end of our development efforts. The goal of adequate human development cannot be achieved when most of the people are suffering at different levels due to lack of minimum health care. Hence, providing basic health care plays a critical role in ensuring our ultimate objective of human wellbeing that too on a sustainable basis. Public expenditure plays a vital role in realizing such development objective and the amount of public spending as such has emerged as one of the most important indicators of development as it indicates the priority of the elected government. Barro (1990), Devarajan (1996) have explored the connection between public expenditure and economic growth in developing nations such as India. Many research studies like Seetha Prabhu (1999), Mahendra Dev (2002), Seema Joshi (2006) and Anirban Nag (2018) have demonstrated that the union and state fiscal consolidation programs have had a significantly negative on social sector spending. The government continued to spend less money on health and education.

Health as a Common Good

As far as the provision of adequate health infrastructures are concerned, market has been deemed to be a failure both in the developed as well as developing countries like India. Given such widespread market failure, government intervention is justified on two grounds. First, some of the basic public health facilities are public goods and hence to be provided by the government. Second, treatment for many communicable diseases needs to be provided by government on externality ground. That is the treatments for communicable diseases may be a private good but as they have the risk of spreading the diseases to other member of the society, government intervention is needed to improve the collective wellbeing. Besides, there are also other areas which justify the rational of public health on 'externalities' and 'public goods' basis. For instance, information asymmetries between the patients and the health service provider results in extensive exploitation of patients in countries like India. To prevent such information asymmetries between the patients and the health service provider government should intervene and correct the inefficacies. Similar situation can also be found in insurance and capital market where government intervention through regulation will make a big change in efficiency.

Based on the background, the study is attempted to find out the growth of health care spending in Tamil Nadu following the period of reform and assess its impact on the primary indicators of health. By doing so, the study will also try to estimate the gap between the actual level of expenditure and the normatively determined required level of health care expenditure in Tamil Nadu.

Objective and Methodology

The purpose is to examine how public spending improves Tamil Nadu's health outcomes and arrived at relevant policy implications with the relevant health indicators.

The methodology of the study is focusing on empirical in nature and exclusively depends on secondary data about the state of health spending in Tamil Nadu and its results. The study has used statistical tools like simple average, ratio, percentage and econometric methods with various tools namely the Unit Root Test, which evaluates health expenditure data using a variety of tests, such as the Granger Causality Test, the Vector Error Correction Model, the Johansen Co-integration Test, and the Augmented Dickey Fuller and Jarque-Bera tests.

Public Expenditure on Health in Tamil Nadu

Tamil Nadu is one of the best states in socially and economically a well performing in the country. From the time of independence, the state has been dedicated in the provision of quality in the health sector. Almost all the political parties who ruled the state known for their rationality. The health sector expenditure has been on increasing trend and shows how far the government was interested towards providing health benefits to its masses. During the five-year plan period Government of Tamil Nadu has introduced number of schemes and policy measures towards the health sector. This was possible with the support of Union Government centre, economic aid from other countries and assistance from World Bank.

Impact of Health Outcomes in Tamil Nadu

The analysis and interpretation of Tamil Nadu's public health spending are examined in this study. It examines the results of public health spending in Tamil Nadu. There are two sections to this study. The first section examines a few key health indicators, including the birth and death rates, the rates of infant and child mortality, and the analytical discussion of life expectancy at birth. The impact of public health spending on the health infrastructure which includes pharmacies, hospitals, doctors, nurses, and primary health centers is addressed in the second section.

Linkage between Public Expenditure and Health Indicators

This study analyses the association between public spending and health indicators empirically. The linkage between public expenditure and health indicators depends upon many socio-economic factors but public expenditure is a dominant factor in a state like Tamil Nadu. For instance, with the improved health and infrastructure spending, public expenditure may lower the BR, DR, IMR, and CMR, as well as LE rates. The only state, though, where public spending has a positive effect on health indicators is Tamil Nadu. Thus, the study improves its scope in order to examine the link between public spending as well as specific health indicators. Increases in public spending on health indicators can be achieved in several ways. Public spending on health infrastructure, such as pharmacies, doctors, hospitals, nurses, and primary health centers, can be encouraged. The present study discusses the positive impact of public expenditure and health indicators. Tamil Nadu is a much better state to create health infrastructure to reduce these indicators in terms of the improved health performance. One of the best states for implementing into place effective health insurance plans and programs is Tamil Nadu.

Tamil Nadu is a model for all Indian states to reduce IMR and CMR. Therefore, reducing the birth and death rates, monitoring the IMR and MMR, eliminating diseases, maintaining immunization coverage, and expanding basic health amenities to all hospitals in Tamil Nadu have been given top priority. Tamil Nadu has taken serious measures to this sector for improvement and regulating health expenditure and related infrastructure expenditure to strengthen rural health services (Planning Commission Report, 1992, Government of Tamil Nadu).

Results and Discussions

This study explains the data used, discusses the construction of the variables and provides an overview of the econometric methodology have been used. There are two sections to the study. The study's data and sources are described in the first section. Section two, elucidates on the construction of the variables used, whereas section three describes various econometric test to analyse the data and gives an overview of the econometric methodology used in this study. This study has used two different econometric models. These two models analyze empirical data to arrive at how public spending impacts on Tamil Nadu's health sector. The two separate sets of variables mentioned above are divided into the following models specifications, each of which is included in a different Vector Error Correction model that were used in the study.

Model specification

Model 1: Health Indicators

$BR_t = \beta_0 + \beta_1 PHEX + U_{t1}$........................ (1)
$DR_t = \beta_0 + \beta_2 PHEX + U_{t2}$........................ .(2)
$IMR_t = \beta_0 + \beta_3 PHEX + U_{t3}$........................ (3)
$LE_t = \beta_0 + \beta_4 PHEX + U_{t4}$........................ ..(4)
$CMR_t = \beta_0 + \beta_5 PHEX + U_{t5}$........................ (5)
Where,

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = Regression parameters
t = Years
BR = Birth rate
DR = Death rate
MR = Infant mortality rate
LE = Life expectancy at birth
CMR = Child mortality rate
PHEX = Public health expenditure
U = Error term

The second model is also segregated, like the above model which includes the health infrastructure variables such as number of hospitals, dispensaries, number of doctors, number of nurses and primary health centres.

Model 2: Health Infrastructure

$HOS_t = \beta_0 + \beta_1 PHEX + U_{t1}$........................ (6)
$DIS_t = \beta_0 + \beta_2 PHEX + U_{t2}$........................ (7)
$PHC_t = \beta_0 + \beta_3 PHEX + U_{t3}$........................ (8)
$DOC_t = \beta_0 + \beta_4 PHEX + U_{t4}$........................ (9)
$NUR_t = \beta_0 + \beta_5 PHEX + U_{t5}$........................ (10)
Where,

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = Regression parameters
t = Years
HOS = Number of hospital
DIS = Number of dispensaries
PHC = Primary health centres
DOC = Number doctors
NUR = Number of nurses
PHEX =Public health expenditure
U =Error term

The two models mentioned above to examine the effects of public spending on health in Tamil Nadu using relevant health infrastructure variables. In both models PHEX is independent variable and all others are dependent variables.

Model 1: Health Indicators

Table No. 1 Descriptive Statistics

	BR	CMR	DR	IMR	LE	PHEX
Mean	17.61	8.09	7.69	40.74	67.61	241027.0
Median	17.10	9.00	7.60	43.00	67.90	126886.5
Maximum	20.80	10.60	8.80	59.00	72.61	833106.7
Minimum	15.40	1.70	7.00	18.60	62.95	43857.74
Sta. Deviation	1.78	2.56	0.43	14.07	3.09	227309.3
Skewness	0.22	-1.15	0.76	-0.28	-0.05	1.353583
Kurtosis	1.58	3.17	3.20	1.59	1.81	3.640757
Jarque-Bera	2.28	5.61	2.50	2.41	1.48	8.061793
Probability	0.31	0.06	0.28	0.29	0.47	0.017758
Sum	440.40	202.30	192.35	1018.60	1690.46	6025674.
Sum Sq. Devia.	76.11	157.29	4.57	4752.12	230.11	1.24E+12
Obvt.	25	25	25	25	25	25

Source: Computed by the researcher

Table 1 presents the descriptive statistics for BR, CMR, DR, IMR, LE, and PHEX. For the BR series, its mean value is 17.6 and its medium value is 17.1. The maximum and minimum values for the series is 20.8 and 15.4 respectively. The standard deviation for this series stood at 1.7.

The mean value for CMR, DR, IMR LE, and PHEX is 9.0. 7.69, 40.74, 67.61, and 241027 lakhs respectively. The medium value for CMR series is 9.0, DR is 7.6, and IMR has 43.0. Similarly, the medium values for LE is 67.61 while the PHEX which is the government expenditure has medium of 126886.5 lakhs of expenditure within the sample period. In terms of skewness, DR, BR and PHEX are all positively skewed while the remaining variables are negatively skewed. In the same vein, CMR, DR and PHEX appeared to be leptokurtic while the remaining series are platykutic. Comparably, the Jarque-Bera test reveals that, with the exception of PHEX, all variables are normally distributed.

Table No. 2 Unit Root Test

	ADF Test		
Variables	Level	1st Difference	Decision
BR	-1.986	-4.924	I (I)
CMR	-0.421	-4.585	I (I)
DR	-3.728	-	I (0)
IMR	-2.267	-4.787	I (1)
LE	-3.807	-	I (0)
PHE	1.854	-3.667	I (1)

Source: Computed by the researcher

In Table No. 2, a unit root test is revealed and the purpose of this test or stationarity test is to determine the stochastic properties of each series. That is, the mean, variance and co-variances. This will ensure the presence of long run information or otherwise. To accomplish this task we, applied ADF test. We can see the table 2, some of the variables DR, LE, and I(0) are stationary at this level, whereas the remaining variables BR, CMR, IMR, and PHEX are all stationary at first difference. This indicates that our series are a combination of I (0) and I (1), necessitating additional investigation to determine whether co-integration is present.

Table No. 3 Johansen Co-integration Test (Pantula Principle for choosing Co-Integration)

Assumption	Trace Statistics	Max Equ.	Decision
No intercept- trend in CE of test VAR	1	1	Co-Integration
Intercept- no trend- in CE-no intercept in VAR	3	0	Co-Integration
Intercept- no trend- in CE and test VAR	1	0	No Co-Integration
Intercept & trend in CE- no intercept in VAR	0	0	Co-Integration
Intercept & trend in CE-intercept in VAR	0	0	Co-Integration

Source: Computed by the researcher

Table no.3 presents a Pantula method for choosing co-integration conducted through a Johansen procedure. Our series' unit root test indicates that while DR and LE are level stationary series, BR, IMR, CMR, and PHEX are stationary at first difference. We removed the two series that is DR, LE which are stationary at level as we cannot run Johansen with a level series. After removing the two series we are left with the first difference stationary series, and these series are qualified for Johansen procedure.

Coming back to the result, the granger test is short run phenomena. Here, we would like to examine the causal relationships between public health spending and LE, BR, DR, and CMR. The findings indicate that there is no correlation between public health spending and the birth rate. On the other hand, there is a direct causal link between public spending and the rate of child mortality. For the most part, there is no causal connection found in the short term between public spending and the rates of death, infant mortality, or life expectancy.

Table No. 4 Granger Causality Test

Null Hypothesis:	Obs.	F-Statistic	Probability
D(CMR) doesn't Cause D(BR)	22	0.97220	0.3983
D(BR) doesn't Cause D(CMR)		0.09017	0.9142
D(DR) doesn't Cause D(BR)	22	0.16427	0.8498
D(BR) doesn't Cause D(DR)		0.07248	0.9304
D(IMR) doesn't Cause D(BR)	22	2.42969	0.1180
D(BR) doesn't Cause D(IMR)		2.44168	0.1169
D(LFE) doesn't Cause D(BR)	22	0.96546	0.4007
D(BR) doesn't Cause D(LFE)		5.22161	0.0171
D(PHEX) doesn't Cause D(BR)	22	0.60001	0.5600
D(BR) doesn't Cause D(PHEX)		0.87542	0.4346
D(DR) doesn't Cause D(CMR)	22	0.72930	0.4967
D(CMR) doesn't Cause D(DR)		0.64327	0.5379
D(IMR) doesn't Cause D(CMR)	22	2.03388	0.1615
D(CMR) doesn't Cause D(IMR)		0.80914	0.4617
D(LFE) doesn't Cause D(CMR)	22	2.16405	0.1455
D(CMR) doesn't Cause D(LFE)		0.05815	0.9437
D(PHEX) doesn't Cause D(CMR)	22	5.45183	0.0148
D(CMR) doesn't Cause D(PHEX)		0.00264	0.9974
D(IMR) doesn't Cause D(DR)	22	1.76806	0.2006
D(DR) doesn't Cause D(IMR)		0.10991	0.8965
D(LFE) doesn't Cause D(DR)	22	1.29112	0.3006
D(DR) doesn't Cause D(LFE)		0.10467	0.9012
D(PHEX) doesn't Cause D(DR)	22	0.73054	0.4962
D(DR) doesn't Cause D(PHEX)		0.15017	0.8617
D(LFE) doesn't Cause D(IMR)	22	0.34841	0.7107
D(IMR) doesn't Cause D(LFE)		0.66229	0.5285
D(PHEX) doesn't Cause D(IMR)	22	0.04832	0.9530
D(IMR) doesn't Cause D(PHEX)		0.16725	0.8474
D(PHEX) doesn't Cause D(LFE)	22	0.32307	0.7283
D(LFE) doesn't Cause D(PHEX)		0.29822	0.7459

Source: Computed by the researcher

Vector Error Correction Model (VECM)

This model is an equation system that explains the relationships between the variables. If the variables are 1st differnce, then we have an error correction model. This model is essentially a special case of the VAR for variables with stationary differences (i.e. I (1)).

Table No. 5 Vector Error Correction Model (VECM)

Error Correction	Δ (BR)	Δ (CMR)	Δ (DR)	Δ (IMR)	Δ (LE)	Δ (PHEX)
Δ (BR(-1))	-0.416734	-0.308660	0.009406	-2.390986	1.072977	52705.17
Δ (CMR(-1))	-0.587255	-0.059900	-0.082542	-0.485641	0.254632	18232.38
Δ (DR(-1))	0.866151	0.098979	-0.129775	-1.285188	0.271753	9783.265
Δ (IMR(-1))	0.144175	-0.104903	-0.033876	0.184153	-0.067901	-2756.777
Δ (LE(-1))	0.283927	-0.020916	0.036425	1.052898	-0.380100	-20525.49
Δ (PHEX(-1))	-2.06E-06	-6.70E-06	-9.62E-07	5.17E-06	-4.71E-06	0.603289

Source: Computed by the researcher.

The output of VEC model is shown in Table No. 5. As stated above, since we find an evidence of co-integration from the Johansen model, the right model to apply is Vector Error Correction model. The table contains the structural parameters which shows the responses among the variables. Here, our objective is to determine how public health spending affects health-related variables like LE, BR, DR, and IMR. The objective statuses that the public expenditure is an exogenous variable and the health variables are endogenous.

The result reveals that birth rate and public health expenditure have a negative relationship. Meaning that increase in public expenditure on health will increase birth rate. This comes as expected given the fact that Indian government earmarked some fund for controlling birth as part of its periodical economic and growth plans. Our study indicates a negative correlation between child mortality rates and public spending, i.e., an increase in public spending results in a higher child mortality rate.

Through the provision of comprehensive emergency obstetric care for mothers and neonatal care, efforts have been made to enhance the quality of healthcare available to new born. Both public and private health care sectors have been played a vital role for better health care delivery. As an outcome of the result, the improvement of new born health care system can knock down the infant mortality rate.

Model 2: Health Infrastructure

Table No. 6 Descriptive Statistics

	DIS.	HOS.	DOC.	NUR.	PHC	PHEX
Mean	198.56	322.77	10800.28	22737.52	1495.92	241027.0
Median	200.00	323.00	9464.00	19762.00	1417.00	126886.5
Maximum	234.00	351.00	18452.00	37415.00	1751.00	833106.7
Minimum	164.00	296.00	8463.00	12845.00	1408.00	43857.74
Std. Dev.	20.61	16.31	2856.28	6744.40	128.81	227309.3
Skewness	-0.15	0.03	1.29	0.71	1.07	1.353583
Kurtosis	1.76	1.91	3.82	2.63	2.46	3.640757
Jarque-Bera	1.68	1.23	7.65	2.25	5.13	8.061793
Probability	0.43	0.53	0.02	0.32	0.07	0.017758
Sum	4964.00	8069.30	270007.0	568438.0	37398.00	6025674.
SumSq. Dev.	10202.16	6384.79	1.96	1.9	398235.8	1.24E+12
Observations	25	25	25	25	25	25

Source: Computed by the researcher.

Table no. 6 present a descriptive statistics of DIS, HOS, DOC, NUR, PHC, and PHEX. As reported in the table the mean and medium values for the variables above are 198.6, 322.7, 10,800.2, 22737.2, 1495.9, 24,1027, and 200.0, 323, 9464, 19762, 1417, 126886 billion respectively. Similarly, the maximum and minimum values for DIS. is 243 and 164, for HOS. is 351 and 296, for DOC, is 18452 and 8463. Similarly, the maximum and minimum values for NUR, PHC and PHEX are 37415 and 12845, 1751, and 1408, 833106.7 and 43857.7 respectively. All series are positively skewed except DIS. and HOS. More so, all the series are platykurtic except DOC. and PHEX which appeared to be leptokurtic. In terms of the Jarque-Bera test, DISP, HOS. and NUR. are normally distributed as their probability values are all more than 10. While DOC, PHC, and PHEX are not normally distributed.

Table No. 7 Unit Root Test

	ADF Test		
Variables	Level	1st Difference	Decision
Dispensaries	-2.206	-3.458	I (I)
Hospitals	-2.379	-5.328	I (1)
No. of Doctors	0.578	-3.542	I (1)
No. of Nurses	-1.724	-5.713	I (1)
Primary Health Centre	-1.455	-5.122	I (1)
PHEX	1.854	-3.667	I (1)

Source: Computed by the researcher.

The analysis of each series' stochastic properties is shown in Table No. 7. Before doing any additional analysis, it is necessary to determine the series' integration order. This will help us in knowing the stability or otherwise of each variable. To find the out the stability status of the series we employed ADF test. Based on the outcomes of testing each variable separately, all the series are integrated of first order. Hence, the long run information of these series is missing, therefore the need now, to check for co-integration. In this regard we used Johansen multivariate co-integration procedure.

Table No. 8 Johansen Co-Integration Test

Assumption	Trace Statistics	Max Equ	Decision
No intercept- trend in CE of test VAR	1	0	Co-integration
Intercept- no trend in CE-no intercept in VAR	4	0	Co-integration
Intercept- no trend in CE and test VAR	0	0	No co-integration
Intercept & trend in CE- no intercept in VAR	1	1	Co-integration
Intercept & trend in CE-intercept in VAR	1	1	Co-integration

Source: Computed by the researcher.

A pantula principles which says to run all the data generating process assumptions (DGP) and select the assumption with highest co-integration is hereby followed. After running a separate analysis for each assumption, the assumption with the highest quantity of co-integrating vectors that is, the intercept no trend in CE none intercept in VAR has been chosen for additional examination. The long run co-integrating equation must then be extracted.

Table No. 9 Long Run Co-Integrating Equation

PHEX	HOS.	DOC.	NUR.	PHC	DIS.	Co-Int.
	-31083.20	-11.74082	0.026990	285.0593	19909.09	5652332.
1.000000	(1859.79)	(5.90091)	(1.97461)	(77.5928)	(1248.56)	(330978.)

Source: Computed by the researcher.

Table no. 9 present the long run co-integrating equation. When we normalise on PHEX, the result reveals that hospital and DOC. have a negative relationship with PHEX, while NUR, PHC, and DIS, all have a positive relationship with PHEX in the long run.

Granger Causality Test

Several macro time series data points demonstrate how the theory of non-stationarity time series analysis was developed.

Table No. 10 Granger Causality Test

Null Hypothesis:	Observations	F-Statistic	Probability
HOS. doesn't Cause DIS.	23	3.91508	0.0388
DIS. doesn't Cause HOS.		0.18881	0.8296
DOC. doesn't Cause DIS.	23	1.66706	0.2167
DIS. doesn't Cause DOC.		1.67481	0.2152
NUR. doesn't Cause DIS.	23	1.25793	0.3081
DIS. doesn't Cause NUR.		0.70845	0.5056
PHC doesn't Cause DIS.	23	0.43397	0.6545
DIS. doesn't Cause PHC.		1.81834	0.1909
PHEX doesn't Cause DIS.	23	1.24807	0.3107
DIS. doesn't Cause PHEX		1.83729	0.1879
DOC. doesn't Cause HOS.	23	0.58023	0.5699
HOS. doesn't Cause DOC.		0.83566	0.4497
NUR. doesn't Cause HOS.	23	0.71882	0.5008
HOS. doesn't Cause NUR.		1.21004	0.3213
PHC doesn't Cause HOS.	23	2.13911	0.1467
HOS. doesn't Cause PHC		2.88091	0.0821
PHEX doesn't Cause HOS.	23	1.55789	0.2377
HOS. doesn't Cause PHEX		0.27160	0.7652
NUR. doesn't Cause DOC.	23	0.66402	0.5269
DOC. doesn't Cause NUR.		1.69704	0.2113
PHC doesn't Cause NDOC	23	0.04839	0.9529
DOC. doesn't Cause PHC		3.81425	0.0416
PHEX doesn't Cause DOC.	23	1.33134	0.2889
DOC. doesn't Cause PHEX		2.46013	0.1136
PHC doesn't Cause NUR.	23	1.52687	0.2441
NUR. doesn't Cause PHC		3.36937	0.0572
PHEX doesn't Cause NUR.	23	1.91971	0.1755
NUR. doesn't Cause PHEX		0.47708	0.6282
PHEX doesn't Cause PHC	23	3.56018	0.0498
PHC doesn't Cause PHEX		22.5567	1.E-05

Source: Computed by the researcher.

Table no. 10 presents a pairwise granger causality test. We connect two variables and find out the causal relationship between the two. When one variable causes the second one it is evidence of unidirectional causality, while if both the variables cause each other then we have a case of bi-directional causality. There is a unidirectional causality that runs from the HOS to the DIS, as the result reports. In the same way, unidirectional causality exists between DOC and PHC. Lastly, there is bidirectional causality—that is, the two variables cause one another—between PHEX and PHC.

Vector Error Correction Model for second section

A constrained VAR co-integration model with built-in restrictions is called a Vector Error Correction model. It is known that non-stationary series that I have designed for use are co-integrated.

Table No. 11 VECM

Error Correction	Δ (DIS.)	Δ (HOS.)	Δ (DOC.)	Δ (NUR.)	Δ (PHC)	Δ (PHEX)
Δ (DIS.(-1))	0.215001	0.345765	-71.35288	-10.42610	7.093497	-4337.606
Δ (HOS.(-1))	0.766279	0.212058	76.97837	215.1248	-8.739622	5606.932
Δ (DOC.(-1))	0.000892	-0.000322	0.292712	-0.245001	0.009071	21.24647
Δ (NUR.(-1))	-0.000415	-0.000169	-0.021029	-0.248959	-0.007140	-1.065789
Δ (PHC(-1))	-0.008114	0.010599	-0.353272	7.301490	0.174219	399.7559
Δ (PHEX(-1))	3.63E-05	-2.30E-05	0.002279	0.003131	-0.000319	-0.527234

Source: Computed by the researcher.

Since our variables have long run relationship, that is co-integration exist, we must apply Vector Error Correction model as the right model. Table no. 11 contains the result of the impact model. Here, the main objective we want to achieve is to find out the impact public expenditure has on some health infrastructure. The findings indicate a positive relationship between public spending and DIS, DOC, and NUR, indicating that rising public spending will cause these variables to rise. While HOS, and PHC shows an inverse relationship between with PHEX, meaning that increase in public expenditure will make these variables to decrease.

Subsequently, the public health expenditure on hospital and primary health centres have shown in the negative relationship, as the result demonstrate that when government increase the spending on health sector the number of hospital and primary health centre has decline. The major reason is the public health expenditure on DIS, DOC, and NUR are high when compare to other variables. Here, the study analyses and recommend to facilitate more public health spending on the concern HOS and PHC in all over the state.

Conclusion

The above study leads to conclude that, while the life expectancy at birth has a negative relationship in the first model, the selected health variables have positive directions in BR, DR, IMR, and CMR. Similarly, in the second model analysed, the public expenditure on health infrastructure variables is in positive relationship between the health expenditure such as DIS, DOC and NUR, whereas the HOS and PHC have shown negative relationship meaning that increase the expenditure these variables decreased. Therefore, the government increase its expenditure towards on development expenditure that had made the economy to achieve higher level economic growth. Government should spend more money on social sectors to increase health and related expenditure in Tamil Nadu.

In order to address the disparities in health outcomes, Tamil Nadu should raise its spending to at least 2 percent of its GSDP in the upcoming years. Increases in investments on health sector to manage the efficiency to be achieved for better health outcomes. Increasing government involvement in healthcare delivery and the liberalization of the health sector should lead to better health outcomes at all levels. Hence, more funds should be complimented with institutional reforms to ensure greater transparency and accountability.

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