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THE RELATIONSHIP BETWEEN HEALTH STATUS AND HEALTH CARE EXPENDITURE IN A DEVELOPING HILL ECONOMY: AN ECONOMETRIC APPROACH

Dr. Satyabrata Mishra
Associate Prof. and HOD P.G. Department of Environmental Economics, M.P.C. (A) College,Takhatpur, Baripada Mayurbhanj, Odisha

Abstract
This study examines the relationship between health status, expenditure on health and education and per capita income, using data for the period 1971-2001 for Himachal Pradesh. The results suggest the lack of a long –run relationship between the variables. Health expenditure is an important determinant of better health status, and is therefore a key tool available to policy makers. Further research is required to determine the exact nature of this relationship by adding more variables such as diet, life-style and environment.

I. Introduction

The Link between health status and health care expenditure has attracted considerable interest on the part of economic researchers both in the theoretical and empirical levels. The health of human capital generates both higher income and individual well being. Improved health generates economic growth and poverty reduction in the long run. Two keys elements of human capital are the extent to which the labour force is educated, and the level of its health. The role of health in influencing economic outcomes has been acknowledged at the micro level (Strauss and Thomas), 1998: Shultz, 1999.

In this field enquiry two distinctive approaches have been followed by the researchers. The first approach is based on the work of grossman's (1972) human capital theory at the micro level, which regards health as a commodity that the individual will wish to consume and maximize, subjects to his or her budgets constraints, along with a number of endogenous and exogenous variables that have an impact on health. The second approaches, consider health as a production function that is addressed using macro level data and health is seen as an output of a health care system, determined by the input's to that system.

Over the last three decades, a number of studies using a demand function approach found a strong and positive relationship between national income and health care expenditure (see, for example, Kleiman 1974: Newhouse, 1977, 1987; Filmer and Pritchett, 1999). The distributional aspects of income and health relationship has also been exami9ned by preston (1975) using cross- country evidence, who found that improvements in income distribution have relatively large impacts on poor countries.

While many empirical studies have investigated the determinants of real per capita health expenditure, most were not based on theoretical foundations (Gerdtham and Jonsson, 2000). Though there has been some use of theoretical models of health care at the micro level (e.g. Grossman, 1972). Empirical models of per capita health care spending at the macro level have not been plentiful. A number of studies of this kind, based on international cross-section data, including Hitiris and Posnett (1992) and Gerdtham et al. (1992) found the income elasticity of per capita health expenditure was greater than one, implying that health care is a luxury good rather than a necessity.

While few researchers would argue against such a positive relatio9nship between income and health expenditure both within and across countries (see Alder et al., van Doorsaler et al., 1997), the main direction of causality between them is open to more debate. Moreover, recent studies using panel data to estimate the dynamics of the relationships between income and health expenditure have reached different conclusions (Hansen and King, 1996; Blomqvist and Carter, 1997; Mc Coskey and Seldon, 1998; Gerdtham and Lolggren 2000, 2002; Okunade and Karakus, 2001; Contoyannis et al., 2004; Frijters et al., 2005). One possible explanation for the different results is due to the variety of methods used to test the null-hypothesis of "no- cointegration" based on either static or dynamic models.

The forgoing studies were inspired by the counter- intuitive findings of the earlier studies that health care was a luxury good and not a necessity which led to a search for possible explanations. Hansen's and king's (1996) findings suggest that panel estimates of the health care expenditure and gross domestic product relationship could be spurious, due to the unrealistic assumption that all countries/regions share almost the same type of institutional characteristics. However, all other studies except by Hitris and Posnett (1992) have excluded health outcomes from their model specifications. Research based on micro-level data has found reverse causality running from income to health (Strauss and Thomas, 1998). There has been some recent work at the macro-level using cross-national panel data, which accounts for reverse causality and interdependence among health, income and economic growth.

Several studies in India also investigated the relationship between changes in morbidity and health expenditure using the National sample Survey (NSS, 1986-87) and the health survey data (Visaria and Gumber, 1994; Krishanan, 1995; Duraisamy, 1998; and Gumber, 1997). The relationship among income, health and productivity has been analyzed at the household level based on a micro econometric frame work. At the macro level the relationship between income/economic growth and health is relatively a less researched area (World Bank, 2004).

The relationship among health, poverty and economic growth in India for the year 1973-4, 1977-8, 1983-4, 1987-8, 1993-4 and 1999-20000 based on data for 15 Indian states along with time series analysis in each of the states has been examined by Gupta and Mitra (2004). Though their findings suggest that per capita public health expenditure positively influences health status, these findings also have certain limitations (Duraisamy and Mahal, 2005). The identification restrictions in their model specification are not based on economic theory and thus appear to be arbitrary. NSDP and (not NSDP per capita) have been taken as the dependent variable in the base year, a procedure rarely followed in the literature, and for which no justification has been put forth.

Duraisamy's and Mahal's (2005) study also examined the determinants of economic growth and health using panel data of 14 major Indian states for the period 1970/71-2000/01 and found two-way causation between economic growth and health status. Both per capita income and per capita expenditure on health exerted a positive effect on the life expectancy at birth (LEB). In a World Bank (2004) study, infant mortality rate was found to be negatively associated with both health expenditure and income.

Health expenditure is an important determinant of both higher economic growth and better health status and is therefore a key tool available to policy makers. As regards health, the combined expenditures by both federal and state governments in India on health (as a percentage of gross domestic products (GDP) have stagnated at around 1 percent over the last one and a half decades. The federal government provides direct and partial (matching grants) support to states for meeting recurring and non-recurring expenditures of programs under this policy initiative. States account for 51 percent of general government spending and exhibit significant variations in per capita health care spending. The ratio of public expenditure on health to total public expenditure has remained static throughout the 1990s (Bhat and Jain, 2006).

Most of the empirical evidence on impact of public spending on health status has been based on cross sectional surveys. It therefore carries little practical importance in framing policies to narrow down health inequalities and is unable to throw much light on casual effects. Moreover, it has been argued that only when it can be strongly demonstrated that income has a causal effect on health, does it become important to study the real mechanism underlying such an association (Ettner, 1996).

With this background, the present study attempts to explain the long run relationships among health spending, health status, education and per capita income in one of the hill states of India (Himachal Pradesh), utilizing time series econometrics for the period 1971-2001. The rest of the paper is organized as: Section II provides a brief background of the state. Data and methodology are outlined in Section III. Results are analyzed in Section IV and conclusions and policy implications are presented in the final section.

II. Background

The population of Himachal Pradesh (H. P.), a constituent state of the Union of India, is six million seven hundred seventy seven thousand (0.59 percent of the total population of the country) and accounts for 1.69 percent of the land area of the country. The state has a density of 109 persons per sq.km. Which is significantly lower than the Indian average of 299 persons per sq. km. Himachal Pradesh has recorded impressive achievements in both social and economic developments during the last three decades? One of the smaller states in Indian Union, H.P. has been doing fairly well in terms of basic social indicators (Dreze and sen, 2002).

Evidence confirms steady trends in Himachal Pradesh for improved health outcomes and increasing health expenditures. Between 1971 and 2001, for example, the average infant mortality rate fell from 113 to 63 deaths per thousand live births; average life expectancy at birth rose from 55 to 63 years; while over the same period total public expenditure on health has increased considerably from Rs. 74.21 million to Rs.519.10 million at constant prices. During 2000-01, 7.63 percent of Himachal's Population was estimated to lie below the poverty line compared to 25.02 percent of Maharashtra, while its per capita state domestic product was less than that of Maharashtra's. Himachal Pradesh enjoys pre-eminent position among the states of the Indian Union in the field of health and literacy (Kaushik and Karol, 2004).

Health is an important dimension of well being. Improvement in health is important for the attainment of the twin development goals of poverty reduction and economic growth. The state has almost exclusive responsibility for providing

public goods that create, there seems to be unanimity of view that universal access and equity are dependent on the state's financial support of basic health care. The access to health services has to be need and state specific, depending on the socio-economic conditions, health outcomes and administration capacity.

Government expenditures on health care are recorded under three broad headings: medical, family welfare and public health. Public health spending (real per capita) has registered a four times increase during the last three decades. Between 1971 and 1991, public health spending grew rapidly but between 1991 and 1994 it registered a decline. This reduction coincides with the period of implementation of structural adjustment programmers (SAP) and the total payments under this program were reduced (Tondon, 2004).

Nevertheless, rising public expenditure on health care is a major policy concern in India and recent public sector fiscal problems have placed additional stress on the public spending of healthcare. The role of the federal allocations on health spending varies across the states. In 1998-99, the federal share of total health expenditure varied between 8.75 percent of total health expenditure in Maharashtra to only 2 percent in Orissa (Selvaraju and Anningeri, 2001). An important policy question for policy purposes is what factors have determined growth in state government health care funding.

While there has been much debate on the increase in health expenditure in Himachal Pradesh, there has hardly been any analysis of the relationship between spending on health and health outcomes. To date, it appears that only one study has analyzed the trend and pattern of public expenditure and determinants of health status in Himachal Pradesh (Tondon, 2004). Studies by Gupta and Mitra, (2004) and Duraisamy and Mahal, (2005) deal with only selected major states of India, and Himachal Pradesh, despite its having attained second rank among the 29 Indian states, in terms of social indicators was not included in their analysis. Our study is one of the first of its kind in Himachal Pradesh based on the use of a multivariate framework to analyze the dynamic relationships among the macro variables: real per capita income spending on education and infant mortality rate (IMR), an indicator of health outcomes, using time series data for the period 1971-72 to 2000-01. Unit root and cointegration tests are used to help identify the appropriate dynamic model.

The choice of the time series approach is due to the fact it deals with the dynamic patterns and the evolution of variables in actually determining the health status. In this respect it is argued that policy analysis needs to take into account the explanatory power of certain determinants over time rather than conclude to policy options via cross-section analysis that offers static results that, furthermore, are subject to change at a later point in time. The exclusion of some indicators of health outcomes from studies of the long run relationship between per capita health spending and per-capita gross state domestic product is surprising given that several studies of the determinants of health outcomes have pointed source of bias (Filmer and Pritchett, 1999).

In addition, from the point of view of policy makers, it would be desirable to know more about short-run dynamics of the relationships among health outcomes, health spending, education expenditure and gross state domestic product per capita as well as long-run relationships between the variables. For example, the policy makers might be interested in knowing how a permanent increase in per capita health spending is likely to affect the health status in the short-run as well as in the long-run.

Iii. Data and Estimation Procedure

For the purpose of this study, data on four variables; a measure of the population's health status (IMR), real per capita expenditure on medical and public health (RPCHE), real per capita expenditure on education (RPCE) a real per capita income (RPCI) has been retrieved from various issues of Statistical Outlines of Himachal Pradesh(H.P); Economic Survey of H.P.; Annual Financial Statement (Budget); and finance Accounts, Government of H.P. for the period 1971-72 to 2000-01. In this analysis, health care expenditure refers to the states' expenditure and does not include the federal government's allocation for family welfare programmes. The expenditure on health also does not include budgetary allocations to water supply and sanitation.

As there is no consensus on what should be best measure of the overall health of the population, many studies use either infant mortality rate or life expectancy at birth. The life expectancy and the infant mortality rates are better indicators of health status of the population and are influenced by changes in health policy, broadly defined to include investments in health and health services. We chose to use infant mortality rate (IMR) as one of the determinants of health status as the latter is more attributable to factors not related to the health care system, whereas the risks associated with childbirth and life in the first year of an infant are reduced by better health care facilities and procedures. Sen (1998) has argued strongly that mortality is one of the most important indicators to measure the quality of life and a central goal of development.

It is also a key indicator of progress towards Millennium's Development Goal. The number of deaths occurring before the age of 1 year for a group of children born during a specific time period produces a simple and straightforward measure of mortality, and that enables us to compare the mortality of regions today and in the past, and to trace development overtime. In addition to income and public spending, health outcomes are likely to be affected by a state's level of knowledge and social capabilities, which we allow for in the model by including another variable, i.e., per capita expenditures on education. Empirical evidence has shown that higher levels of female education are associated with better health outcomes (Hill and King. 1992; Subbarao and Raney, 1995).

1. The model and Econometric Techniques

We explore the dynamic relationship among four variables: health status, real per capita income, real per capita expenditure on medical and public health and real per capita expenditure on education, using time series data for Himachal Pradesh. All data are in real terms and the gross state domestic product deflator has been used. The data are presented in natural logarithms. The transformation of the variables to logs achieves two things. First, non-linear relationship between variables is adequately captured by a log transformation. Second, this convenient transformation allows comparisons with earlier results as the coefficients are elasticities.

Johansen's (1991, 1994) vector auto-regression (VAR) model has been used to examine the cointegration relationship between integrated time series. We favored Johansen's approach because it uses maximum-likelihood estimates to test for the existence and number of cointegrating relations in a system. It is essentially a multivariate extension of the Augmented Dickey Fuller (ADF) test that applies to any number of cointegrating vectors. In contrast, the Engle and Granger approach estimates the parameter of a unique cointegrating vector and then performs an ADF test of the residuals. Monte Carlo experiments have shown that the least- squares (LS) estimates of cointegrating parameters can have substantial biases in samples as large as two hundred (see Banerjee et al., 1993). In addition, results from the ADE test are not invariant to choice of normalization, so the arbitrary choice of dependent variable in the LS regression can influence outcomes. If the cointegrating vector is unique, the methodologies are asymptotically equivalent.

In application of Johansen's (1991, 1994) vector error correction model (VECM) for testing for cointegration between) for testing for cointegration between integrating time series, we first consider whether each series is integrated of the same order, to do this we consider the standard Augmented Dickey-Fuller (ADF) and Phillips-perron (PP)tests. Assuming that each series contains a single unit root, and thus integrated of the same order, the potential for co-movement between series exists, this means that a linear combination of them is stationary, suggesting the presence of a long-run relationship amongst these variables. Thus, we can test for cointegration, i.e., the existence of at least one long run linear stationary relationship between these series, using the method of Johansen (1991, 1994), which involves investigation of the p- dimensional vector autoregressive process of kth order:

Where ∇ is the first difference lag operator Y_t, is a (p x 1) random vector of time series variables with order of integration less than or equal to one, I (1), μ is a (p x 1) vector of constants, I_i are a (p x p) matrices of a parameters, $\varepsilon_i$is a sequence of zero mean p-dimensional white noise vectors and π is a matrix of (p x p) matrix of parameters the rank of which contains information about long-run relationship among the variables. As is well known , the VECM expressed in equation (1) reduces to an orthodox vector autoregressive(VAR) model in first differences in the rank(R) of π is zero, bwhile if π has a full rank r = p, all elements in $y_i$are stationary. More interestingly, suggests the existence of r cointegrating vectors, such that there exists(p x r) matrices each of rank r such that $\pi = \alpha\beta$, where the columns of α are adjustment (or loading) factors and the rows of the matrix β are the cointegrating vectors, with the property that $\beta' y_t$is stationary even though y_1 may comprise of individually I (1) processes. tests of the hypothesis that the number of cointegrating vectors is at most r (r =1,…., p) are conducted using both the maximum Eigen value and trace test statistic for reduced rank in the context of the restriction imposed by cointegration on the unrestricted VAR involving the series comprising Y_{t*}

Iv. Empirical Results

Table 1 presents the unit root tests for our data. Three different models with varying deter ministic components having considered while performing the tests. The first is model with the intercept restricted to the cointegration space to account for the units of measurement of the variables this model assumes that there are no linear trends in the levels of the data, such that the first differenced series have a zero mean. For ease of understanding it will be called the model with a constant. The second is a model with a linear trend included in the cointegration a vector, i.e., the cointegration space includes time as a trend-stationary variable to take accounts of unknown exogenous growth. This model is labeled as the model with a constant and a trend. The third is a model that includes neither a constant nor a trend in the long-run cointegration space and this

model is usually used when linear trends in the levels of the data are observed. By assuming the trend to be zero, the model allows the non-stationary

Table 1
Unit Root Tests

Trend/Constant	*LNIMR*	*LNRPCE*	*LNRPCHE*	*LNRPCI*
		Augmented Dickey-Fuller tests in levels		
T/C	-3.38	-2.59	-4.17	-1.35
C	-0.72	0.71	-1.21	2.18
		Augmented Dickey-fuller tests in differences		
C	-5.25*	-4.68*	-3.34*	-6.60*
N	-5.00*	-3.53*	-2.39*	-5.46*
		Philips-Perron tests in levels		
T/C	-3.46	-2.41	-3.48	0.96
C	-0.75	-0.71	0.04	0.7
		Philips-perron tests in differences		
C	-5.25*	-4.65*	-7.71*	-6.61*
N	-5.01*	-3.67*	-6.58*	-5.45*

Notes: the letters LN preceding a variable name indicates that the natural logarithm has been taken. For test assumptions T refers to trend, C refers to constant, N refers to none. *Denotes statistical significance in rejecting the null of non stationary at 5 per cent level. Relationship to drift. For the purpose of this study, this model is referred to as the model with no constant and no trend.

Lag lengths for the ADF tests are determined by the Alkaike information Criteria (AIC) and Schwartz Information Criterion (SIC). For the Phillips parron (pp) tests, the truncation lag is determined by the method of Newey-West. These results suggest that all series contain a single unit root, which would require first differencing to achieve stationary. Since all series are integrated of the same order, we consider whether they are determined by some common set of fundamentals that is whether a stationary linear combination exists among these variables.

The lag lengths in the VAR are again determined by the AIC and SIC and are decided at

Table 2,**Cointegrating Relationships**

Hypothesized rank(r)	Eigen value	Likelihood ratio	5% critical value	Prob.
		Trace statistic for cointegrating rank		
r = 0	0.4962	47.3279	63.87	0.53
r ≤ 2	0.3939	28.8163	42.91	0.57
r ≤ 3	0.3187	15.2929	25.87	0.55
r ≤ 4	0.1669	4.9308	12.51	0.60
		Maximum Eigen value statistic for co-integrating rank		

two lags, these lag lengths also ensure that the errors are uncorrelated, while test statistics are calculated allowing for an intercept in both the cointegrating equation and VAR. The cointegration results presented in Table 2 suggest that there is no

cointegration between the variables. Our results corroborate the findings by Bhat and Jain (2006) based on the Engle and Granger method and Johansen test suggesting lack of long run association between health status, public health expenditure and per capita income.

1. Var Analysis

Based on the results given in the Table 3, many different four variable VAR models consisting of infant mortality rate, real per capita GSDP, real per capita expenditure on medical and public health and real per capita expenditure on education could be constructed; twelve possible combinations of the four variables are possible. With respect to the relationship between infant mortality rate and per capita expenditure on medical and public health, the results show evidence in favor of causality running from per capita expenditure on medical and public health to health status is stronger than the evidence in favor of causality running in the reverse direction; for three of the six **VAR** models the results imply that real per capita health expenditure has a significant impact on health status.

The results suggest that causality between, **LNRPCHE to LNIMR** is unidirectional. There appears to be no casual relationship between health spending and per capita income. Over all, the results of the causality tests confirm that the variables of the model are related, although not all the relationships predicted by economic theory are validated. Per capita health expenditure and per capita expenditure on education have significant impact on health status. There is also some evidence of a relationship between per capita income and health status, although in terms some evidence of statistical significance, the impact of per capita income on health status appears to be more important than the reverse relationship. Although the causality tests provide some insight into the causation of the variables they do not confirm any long run relationship/cointegration between the variables.

In cases where cointegration does not exist, a vector error correction model (VECM) cannot be built that incorporates the cointegration restrictions. A VECM restricts the long-run behavior of the endogenous variables in a VAR model to converge to their cointegration relationships while allowing for a wide range of short-run dynamics. In contrast to an unrestricted VAR model,

Table-3, Pair Wise Granger Causality Tests (Sample:1 29)

Direction of causality	*Number of lags*	*F value*	*Decision*
LNIMR → LNRPCHE	*2*	*0.69*	*Do not reject*
LNRPCHE → LNIMR	*2*	*6.12**	*Reject*
LNRPCE → LNRPCHE	*2*	*6.08**	*Reject*
LNRPCHE → LNRPCE	*2*	*1.73*	*Do not reject*
LNRPCI → LNRPCHE	*2*	*0.47*	*Do not reject*
LNRPCHE → LNRPCI	*2*	*0.55*	*Do not reject*
LNRPCE → LNIMR	*2*	*4.29**	*Reject*
LNIMR → LNRPCE	*2*	*1.37*	*Do not reject*
LNRPCI → LNIMR	*2*	*2.39**	*Reject*
LNIMR → LNRPCI	*2*	*0.04*	*Do not reject*
LNRPCI → LNRPCE	*2*	*0.87*	*Do not reject*
LNRPCE → LNRPCI	*2*	*0.42*	*Reject*

**Denotes statistical significance in rejecting the null of non-causality at 5% level.*

in a VECM, a temporary shock can have a permanent effect on the variables of the system.

2. Computing Elasticity

An attempt has also been made to compute the income elasticity of health care expenditure. From the literature, per capita expenditure on medical and public health by state government is assumed to be a function of real per capita income. The model is specified in log-log form so that the coefficient estimates and elasticities and therefore enables us to interpret the relationship of health care expenditures and income. We use the following model to estimate this relationship.

$$\text{In RPCHE} = \alpha + \beta * 1n\ \text{RPCL} + \varepsilon \qquad (2)$$

Where β will give the elasticity of RPCHE with RPCI and e is the residual.

Table-4, Computation of Income Elasticity of Public Expenditure on Health

	Coefficient	*t-value*
Constant	-8.87	-7.50
Elasticity Coefficient	1.64	10.60
Adjusted R2	0.79	_
F- statistic	112.48	_

Note : Standard errors and t- statistic are based on Newey- West HAC standard Errors and Covariance (lag truncation=3)

The study suggests that real per capita expenditure on medical and public health has grown substantially faster than real per capita incomes. The analysis also suggests that for every 1 percent increase in state's real per capita income expenditure on medical and public health per capita increases by (1.64 percent) points. The elasticity calculated by (Bhat and Jain, 2006) is higher (1.95 percent) and the difference could be due to methodological divergence as their results are based on panel data analysis.

In Himachal Pradesh for the period 1972-01, the estimates elasticities of health expenditure, education expenditure, and income are -0.44 percent, 0.19 percent and –0.20 percent respectively. In other words, over the period of this study, holding the real per capita income and real per capita income expenditure on education constant, a 1 percent increase in health expenditure led to an average 0.44 percent point decline in infant mortality rate. Real per capita health expenditure along with real per capita income and education expenditure accounted for 74 percent of the variations in infant mortality rate (Tondon, 2004). These results are contradictory to the findings of (Filmer and Pritchett, 1999) who estimated elasticity's from cross-national data to be between -0.4 and -0.8, that is a 1 percent difference in income was associated with a fall of mortality between 0.4 percent and –0.8 that is a 1 percent difference in income was associated with a fall of mortality between 0.4 percent and 0.8 percent.

Understanding why public spending on health has not had a strong effect on reducing mortality is crucial to designing public policy to reduce excess mortality and morbidity in developing economies. This does not mean that medical services are less influenced but the impact of public spending on health is much more intricate than the effectiveness of the services purchased. There are three possibilities as to why attempts to further lower infant mortality rate have not happened. For Public spending to improve health inexpensively, first, public spending must create effective health services, second the existence of those new public services has to change the total amount of effective health services consumed by the population, and third, the additional services consumed have to be cost effective in improving health.

The Way health care expenditures are financed has important implications for the health care delivery system. For example, insurance coverage for health care expenditures is very limited in India in general and Himachal Pradesh in praticular. About 4 percent to 5 percent of total health expenditure is reimbursable under existing insurance or reimbursement mechanisms, people borrow substantially to finance healthcare. In some cases, burrowing has been as high as their annual incomes.

3. Target Health Expenditures

The analysis presented in the previous section suggests that for every 1 percent increase in the state's per capita income, expenditure on medical and public health per capita has increased by 1.64 percent. This study also attempts to analyze the target health expenditure to determine how the ratio in Himachal Pradesh compares to the ratio calculated by (Bhat and Jain 2006). To estimate the target real per capita health expenditure/ real per capita income ratio, states follow an adaptive expectation model. Expectations are important in economic models of dynamic processes, particularly in macroeconomic models, and finding ways to model them is often a difficult task while using time series data. The adaptive expectation model has been one of the earliest approaches developed for this purpose.

Suppose one postulates that target public health expenditure (RPCHE*) at time t is related to real per capital income (RPCI) as follows:

$$RPCHE=\lambda_{0+}\lambda_1 RPCL + \mu_1 \quad (3)$$

Where λ_1 is the target ratio of health spending as percent of GSDP. One assumes that states are not spending exactly this ratio. It aims to achieve this target over a period of time with some speed of adjustment. This can be modeled as follows:

$$(RPCHE_1 – RPCHE_{t-1)=}\delta(RPCHE_1^{*}\text{-}RPCHE_{t-1}) \quad (4)$$

Simplifying this equation and substituting the value of RPCHE* in the above equation give us the following equation:

$$RPCHE_1=\delta RPCHE_1^{*}+(1–\delta)RPCHE_{t-1} \quad (5)$$

$$RPCHE_1=\delta\lambda_0+\delta RPCI_1^{*}+(1\text{-}\delta)RPCHE_{t-1}+\delta\mu_t \quad (6)$$

$$RPCHE_t=\alpha_{0+}\alpha_1 RPCI_1^{*}+\alpha_2\ RPCHE_{t-1} + \alpha_2\ RPCHE\ _{t-1} + \varepsilon_1 \quad (7)$$

V. Conclusion and Policy Implications

The principal finding of this study is that the variables in a 'standard' model of health status and health expenditure in Himachal Pradesh were not stationary in levels. Thus, one of the key OLS assumptions is violated, rendering the usual statistical tests of significance problematical. This finding does not, in a way, disprove the importance of income, education and health expenditure in determining the health status. Rather it suggests that the conventional methods of testing for such relationships have tended to oversimplify the issue.

The results consistently suggest that the health expenditure- health status relationship is very different from the health status-income relationship. The most consistent finding was that expenditure on medical and public health per capita does influence health status but it does not have a strong effect on reducing infant mortality, which is crucial in designing public policy to reduce excess mortality in developing economies. This study shows that income significantly affects health expenditure (a 1 percent difference in income is associated with a rise of 1.64ent in spending on health). There is also some evidence that education expenditure also effects health status positively.

Our results are broadly in line with those of other studies, but caution needs to be taken when interpreting the results of this and other studies. Increasing public expenditure on health is a necessary policy intervention for accelerating the economy's health status. Growth oriented policies may results in bringing about improvements in the health status of the population. Our results find no evidence of a long run relationship between health status, per capita health expenditure, per capita education expenditure and per capita income.One possible explanation for this apparent lack of relationship may be threshold effects. Alternatively, the observed lack of convergence and inconsistent results in the VAR models may be an indication of model misspecification. To verify this, it would be worthwhile to develop a more complete structural model; of the interactions among per capita health spending, per capita expenditure on education, per capita real income, health outcomes, i.e., a model that includes more variables. Relatively few studies have been successful in finding a link between health care expenditure and health outcomes as other factors affecting health outcomes such as diet, life- style and environment are often taken to be the main influencing health status and especially life expectancy (Nixon and Ulmann, 2006) .However, the sample period available for the estimation of such a model would necessarily be more restricted than employed here.

It would also be worthwhile to further investigate the nature of the structural breaks identified by the unit root tests and their impacts on health status and health spending through which policy may have influenced health status and health spending through income per capita in Himachal Pradesh. Certainly, the relationship among these variables is not simple and straightforward. Therefore, further research is required to determine the exact nature of this relationship.

References

1. Alder, N., et al. (1994), "Socio-economic status and health, the challenges of the gradient." American Psychologist 49, 15-24.
2. Banerjee, A., Dolado, J., Galbraith, J.W., D.F. Hendry, D.F. (1993), Cointegration and Error Correction, and the Econometric Analysis of Non-Stationary Data. Oxford, England: Oxford University Press. Pp.214-220.
3. Bhat, R., Jain, N., (2006), Analysis of Public and Private HGealth Care Expenditures.
4. Economic and Political Weekly 16,pp. 57-68.