Zentrum für Entwicklungsforschung
Center for Development Research
University of Bonn

ZEF-Discussion Papers on Development Policy No. 158

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Determinants of Public Health expenditures in Pakistan

Bonn, November 2011

Faisal Abbas and Ulrich Hiemenz, Determinants of Public Health expenditures in Pakistan, ZEF- Discussion Papers on Development Policy No. 158, Center for Development Research, Bonn, November 2011, pp. 30.

ISSN: 1436-9931

Published by:
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Acknowledgements

We thank Arnab Basu, Joachim Von Braun, Seid Nuru Ali, Iram Khan and Holger Seebens for their valuable comments and suggestion on various drafts of this paper. Also, we extend our thanks to Abay Asfaw for commenting and reviewing the paper. Thanks are also due to Erick Baur for his editorial assistance. For errors remaining usual disclaimer applies.

Abstract

This study describes the macroeconomic determinants of health care spending in a broad context using time series data from Pakistan on economic, demographic, social, and political variables. The data spans a period from 1972- 2006 and was analyzed using cointegration and error correction approaches. All variables were found to be first difference stationary and the results confirm the presence of one cointegrating vector. This proves the existence of a long-run relationship between public health care expenditures and the other variables used in the model. The income elasticity of public health care expenditures is estimated at 0.23. As this value is less than unity it suggests that, contrary to most of the Organization for Economic Co-operation and Development (OECD) countries health care qualifies as a necessity in Pakistan. Urbanization and unemployment are variables that have a negative effect on health care expenditures, with elasticity values of -1.29 and –0.32 respectively, implying that it is costly to provide health care to residents of remote rural areas of Pakistan.

Keywords: Public Health Expenditures; Unemployment; Urbanization; Cointegration; time series; Pakistan.

1 Problem Setting

Poverty, inequality, market failures and other existing negative externalities create the need for government involvement in major public service provisions such as health care, particularly in developing countries (World Bank, 1993). The health sector must be considered in conjunction with social, economic, and demographic characteristics of the economy. Hence, not only biological and environmental, but also economic, social, and demographic changes affect health and health care expenditure decisions at the national level.

Since the pioneering work of Joseph Newhouse (1977) on relationships between health spending and national income, this area of economic inquiry has received much attention. Newhouse (1977) explained that more than 90 percent of the variation in health care expenditures results from changes in income alone and concluded that simply examining this variable is sufficient to explain variation in health care expenditures.

This approach was criticized by Hitiris and Posnett (1992), Hansen and King (1996), and Okunade and Karakus (2001).[1] Hitiris and Posnett (1992) reexamined the relationship between health care and income explored by Newhouse (1977) adding non income variables such as the proportion of the population above 65 years of age, mortality rate, and public finance share of health care spending. Although the effect of these additional variables appears to be relatively small, the model suggests that non income variables have significant influence on health care expenditures. According to Parkin (1987) institutional factors play an important role in explaining variation in health care expenditures. The estimates for OECD countries revealed that the income elasticity of health care expenditures is less than unity, in contrast to Newhouse's (1977) hypothesis that it is above unity, suggesting that macroeconomic data may be appropriate for this analysis. Newhouse (1977) used microeconomic interpretation and included only explanatory variable, which may be an under-specified model.

[1]Contrary to Newhouse (1977) some micro studies that of Grossman (1972), Murinnen (1982) and Wagstaff (1986) observes slight correlation between income and health care utilization. While explaining that the individuals are mostly subsidized or they don't have to pay the full price of using health care resources but this is not true for a whole country.

Using an Engle-Granger (EG) cointegration test, Hansen and King (1996) found no cointegration for 17 out of 20 OECD countries, while for the remaining countries the hypothesis of no cointegration could not be rejected at a 5 percent significance level. This may be due to the inclusion of irrelevant explanatory variables in the cointegration equations, which could have increased the magnitude of the critical test values (Engle and Granger, 1991). The findings suggest that for most OECD countries, no long-term relationship exists between health care expenditures (HCE) and gross domestic product (GDP), or with other non-income variables in contrast to the results of Culyer (1990) and Hitiris and Posnett (1992). The principal finding of Hitiris and Posnett (1992) study was the non-stationarity of variables collectively which did not disprove the importance of income and non-income variables in determining the level of health care spending. Okunade and Karakus (2001) applied Augmented Dickey Fuller (ADF), Phillip Perron, and heterogeneous panel unit root tests, as well as EG and Johansson multivariate methods to model OECD health care expenditures. The cointegration test results for health care spending and GDP per capita indicated cointegration for some of the OECD countries, whereas others lacked cointegration or exhibited dynamic instability. By applying the cointegration technique, Blomqvist and Carter (1997) reexamined whether health care is a luxury or a necessity. The authors used data on health care spending collected for 24 OECD countries from 1960 to 1991 and GDP per capita at purchasing power parity (PPP) terms, the proportion of the population aged 65 years or older, time trends and the implicit price deflator since base year 1985. Their study estimated elasticity below one and concluded that the elasticity of health care above unity is doubtful; possibly because advancement in technology lowers health care costs.

Time series studies, as opposed to cross section estimates, use the stationarity approach however, if the stationarity condition is not met this produces spurious results. To avoid this problem some studies, such as Okunade and Karakus (2001) utilized the well established ADF and Phillip Perron (PP) unit root analyses to test whether series data are first difference and/or trend stationary. The unit root tests are sensitive to data length (i.e., increasing the length of the data period changes the order of integration), and it is not clear whether the order is increasing or decreasing.

Sample size is a relevant issue with cross sectional studies (Hansen and King, 1996). Although per capita estimates are a conventional approach, they are not distribution sensitive. It is concluded by Parkin et al. (1989) and Hitiris and Posnett (1992) that not only income per capita, but also other factors like the relative cost of health care and the real income in cross-country settings are also important. Parkin et al. (1987) criticized the use of aggregate data in the cross-country context to estimate elasticity. Their model examined pooling restrictions after allowing for different intercepts for each country and their findings have implications for the use of international cross sectional data for determining the influence of external factors on health care expenditures. Their paper criticizes the prevailing wisdom on the relationship between health care spending and income, suggesting some ground breaking steps to avoid spurious results; however, they fail to provide specific inferences regarding the use of non-income variables and functional form.

Country level time series studies from developing economies that estimate health care demand function are limited (virtually none). Most have tried to estimate the income elasticity of health expenditures using data from OECD/industrialized countries. A number of studies have suggested that there is a possibility of misspecification; hence caution must be taken when interpreting income elasticity of health expenditures as either a luxury or a necessity (see Culyer, 1990). A few studies tried using time series data to account for stationarity and cointegration, although no agreement was found on whether long run relationship between health care expenditures and income exists (Clemente et al., 2004; Hansen and King, 1996; Murthy and Ukpolo, 1994). For example, one cross sectional model estimated the income elasticity of health spending close to 1, indicating health care to be necessity (see Gerdtham and Jönsson, 2000); whereas some time series studies (see Hitiris and Posnett, 1992; McGuire et al., 1993; Cutler, 1995) estimated health care elasticity to be more than unity, indicating that healthcare is a luxury. Therefore, whether or not income elasticity of health care expenditures is above or below unity is an important but an unsettled question. Elasticity is essential to know because it has strong implications for universal health care provision, especially in developing countries like Pakistan which is already facing a dilemma due to low public health care expenditures.

Pakistan has an above average record of GDP growth (5 percent on average) over the last 5 decades, and spends a little above 3 percent of the total annual budget for economic, social, and community services (GOP, 2005). Public health care expenditures remained below 1 percent of GDP, which is lower than 1.2 percent spent in Bangladesh and 14 percent spent in Sri Lanka (ADB, 2005; Zaidi, 1999).

This paper estimated income elasticity of health care expenditures for Pakistan because the central government is resource constrained and has to make decisions based on cost effectiveness. In another attempt, the role of unemployment and urbanization is empirically examined in modeling public health care expenditures in Pakistan. Unemployment reduces national income by employing only a portion of the potential work force and by increasing dependency burden. Our assumption is that increased employment will increase income and hence, the government will be in a better position to invest in the social sector (e.g., health care). Unemployment reflects the economic policies followed by a government in the medium to long run for reducing inequality and investing in standard of living. [2]

The urban population is growing relatively faster than the rural population in Pakistan. Currently almost 36 percent of the population is living in urban centers (GOP, 2010). Thus, it is interesting to empirically examine the phenomenon of unemployment and urbanization in determining public health care expenditures in Pakistan. Specifically, this paper examines the social, economic, and demographic factors that determine the public health expenditures in Pakistan. Using Johansen (1988) and Johansen and Juselius (1990) cointegration methods, this paper empirically estimates the possible long run relationship. By applying the general-to-specific modeling approach of Hendry (1980; 1984), short- run dynamics are estimated using a vector error correction model (VECM).

This paper deviates from other traditional studies in two ways; first it empirically examines the short run dynamic relationships of the factors determining health care expenditures, which has not been explored by similar efforts, and second, it uses the

[2] The impact of unemployment on health status is explored among others by Brenner (1973, 1987); Gravelle, (1984); Joyce and Mocan (1991) and Lindegaard (2010) with contrary results.

application of a weak exogeneity test. The estimation of a health care demand function lacks theoretical basis, hence the weak exogeneity test distinguishes between exogenous and endogenous variables by imposing zero restrictions on alpha and beta coefficients of the model (see Sims, 1980). This improves modeling of independent and dependant variables and helps obtain robust results for policy inferences. Short run VECM improves understanding of the dynamic relationships among the variables of the system.

The remainder of the paper is organized as follows; Section 2 discusses the model, the data sources and the variables used for analysis. The empirical methodology used for this study is elaborated in section 3, while section 4 presents the result of the analysis. The last section summarizes and concludes the paper.

2 Model and Data

2.1 Model

McGuire et al. (1993) described the analysis of health care as "notorious" because it lacks a theoretical basis. [3] They argued that without any theoretical basis, an additive functional form is estimated by virtually all studies (e.g., Hitiris and Posnett, 1992; Newhouse, 1977; Wolfe, 1986), which may be linear or nonlinear, but is not yet known. Linear models imply that inputs of the models are independent and give constant marginal products for each additional unit of an input, whereas log form models show declining marginal products (McGuire et al., 1993). Grossman (1972) tried to provide a theoretical model, but due to imperfect health care markets, it still needs to be adopted for better specifications of health care models.[4] Most of the studies on the determinants of health care expenditures have used a demand function approach, specifically; real health care expenditures (HCE) are hypothesized to be a function of real income (GDP) and a selection of non-income variables.

Changes in income affect demand for health care, and based on the size and magnitude, health care can be described as an inferior, normal, or superior good (McGuire et al., 1993). There is also concern about the status of income elasticity, which in most cases is above unity for industrialized countries (e.g., Parkin et al., 1987). Not only income, but also non-income indicators like demographic, social, and environmental factors also have an impact on health care expenditures.

Due to the lack of a health care price index or any other measure that may capture the price of health care in Pakistan, it is difficult to measure the price effect directly. Most previous studies used cross-country data therefore it is necessary in this type of analysis to treat price variation using a separate variable. This study however, is limited to a single country where it can be assumed that change in prices affect the entire population (with few exceptions).

[3] As, most of the modelling in health economics is adhoc therefore, studies that followed empirical approach to find evidence of the factors affecting health expenditures have no reliance on theory.
[4] For detail discussion of health care markets and their imperfect behavior see among others; Jack, 1999, Schultz, 2004.

Based on previous studies (i.e.,Hitiris and Posnet, 1992; Hansen and King, 1996; Okunade and Karakus, 2001), a stochastic model was used in this study, based on the hypothesis that annual health spending per capita is determined by a host of macroeconomic, social and demographic factors. The functional form of model is given as follows:

Health expenditures/capita = f (Economic, Social, Health services, Personnel, and Demographic factors) (1)

Transforming the descriptive form into a mathematical model gives the following:

$$pche_t = \alpha . pci_t^{\beta_1} \times pophosp_t^{\beta_2} \times unemply_t^{\beta_3} \times dhegdp_t^{\beta_4} \times pop14_t^{\beta_5} \times urban_t^{\beta_6} \times \varepsilon_t \quad (2)$$

Taking the log transformation of this multiplicative form yields:

$$\log pche_t = \begin{pmatrix} \alpha + \beta_1 \log pci_t + \beta_2 \log pophosp_t + \beta_3 \log unemply_t + \\ \beta_4 \log dhegdp_t + \beta_5 \log pop14_t + \beta_6 \log urban_t + \varepsilon_t \end{pmatrix} \quad (3)$$

Where subscript t is the time period from *1972, 1973,………, 2006*, $pche_t$ and pci_t are the real annual public health care expenditures and real income in per capita terms, $pophosp_t$ is the ratio of population per hospital as a proxy for health care service quality and access. A greater number of hospitals will increase access to health care services and reduce the burden on individual hospital's resources, thus enhancing efficiency and service quality. The variable $unemply_t$ is a measure of unemployment based on the percentage of the total labor force in the economy (a measure of social exclusion), and $d\,hegdp_t$ is the development health care expenditure as percentage of gross domestic product (GDP). This variable shows government attitude in allocating scarce public resources. The variable $pop14_t$ represents the percentage of the total population 14 years of age and younger, $urban_t$ represents the percentage of the total population living in urban areas, and ε_t is a white noise error term. The β terms are coefficients representing elasticity of the respective variables. The signs β_1, β_2, β_4, and β_5 are expected to positively influence health care spending, while β_3 is hypothesized to negatively influence health care expenditures. The significance of β_6 is open for discussion.

Overcrowded cities with large influxes of immigrants experience growing pressure on fragile urban infrastructure like sanitation facilities and water supply. Parallel increases in industrialization and urbanization can cause pollution problems (Gugler and Flanagan, 1978; Adegbola, 1987; Gbesemete and Gerdtham, 1992). Relative to rural populations urbanites generally have better access to medical care facilities (Siddiqui, et al., 1995), strong social networking, and better transportation facilities. Therefore urbanization can have both positive and negative effects on health care expenditures.

Income per capita is a leading development and living condition indicator, and is frequently used in models for policy purposes. Income levels determine resource availability for various applications, hence it is assumed to have a positive relationship with health care expenditures (see Newhouse, 1977; Murthy and Okunade, 2000). This is because unemployment is expected to undermine economic and social stability in society. Economies that fail to provide productive and secure employment opportunities invite political instability, social unrest due to poverty, and inequality, and therefore economic insecurity that ultimately leads to social exclusion. Unemployment also reduces contributions to national income, reducing available resources to allocate to the social sector, therefore having a negative impact on public health care expenditures.

Health care service infrastructure determines access to health care and service quality. We used the hospital population ratio instead of the population per hospital bed because the majority of the disease burden in Pakistan is communicable and hence requires outpatient services rather than hospital care. Age structure of the population may be of prime importance in determining the level of health care expenditures because health needs are age dependant. Demand for health care fluctuates with age, children less than 15 years of age (dependant age group) are more likely to use medical care (Gbesemete and Jonsson, 1993). Contrary to studies like that of Hitiris and Posnett (1992) and Barros (1998), [5] this study used a variable to represent the population under15 years of age in Pakistan. Due to high rates of infant and child mortality and the fact that more than two-fifths of the population falls within this age category in Pakistan, demand for medical care by this demographic is growing.

In this study we used a double log model guided by existing literature. This approach is preferred because it is easy to apply to single country settings, and it also provides the coefficients as elasticity estimates which are relatively straightforward to interpret. This also follows precedent, as most of the previous studies that estimated the determinants of health care expenditures preferred this approach (e.g., Murthy and Ukpolo, 1994; Gbesemete and Gerdtham, 1992; Toor and Butt, 2005).

2.2 Data

Annual time series data spanning from 1972 to 2006 for real per capita health care expenditures (RPCHE) [6] and other social, economic, health personnel and services, and demographic variables are used in this analysis. All financial variables are in local currency and deflated with GDP deflator for 2000-01 as the base year. Data sources for the variables include the Economic Survey of Pakistan for various years and the Handbook of Statistics on Pakistan Economy by the State Bank of Pakistan. Population and urbanization data series were taken from World Development Indicators (WDI) CD-ROM 2007. Health care expenditures are continuously increasing over time, but increases were relatively lower during the decade from 1970 until mid 1980, and gained momentum in the 1990s increasing from Pak Rs. 75 to almost Rs.180 by the year 2006.

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[5] Studies that used OECD or other developed countries data mostly used population of age greater than 65 years as a demographic factor (see for example; Hitiris and Posnett, 1992; Hansen and King, 1996 and George and Karatzas, 2000)

[6] We make use of only public health expenditures as such, a long annual time series for private health expenditures for Pakistan is not available.

Table 1: Summary Statistics of Variables[7]

Variables	Mean	Maximum	Minimum	Standard deviation
pche	131.83	205.37	40.53	44.54
pci	8662.2	27249.43	1957.53	7265.01
pop14	43.223	45.96	40.10	1.49
pophosp	147667.4	175549.6	127930.7	10374
dhegdp	0.755	1.19	0.44	0.162
unemply	4.625	43.92	37.69	1.6065
urban	3.617	4.43	3.17	0.43

pche= real per capita public health expenditures; *pci*= real per capita national income; *pop14*= population of age less than 14 years as percent of total population; *pophosp*=population hospital ratio; *dhegdp*=development public health expenditures as percentage of GDP; *unemply*; unemployment rate and *urban*= urbanization rate.

Development health care spending as percentage of GDP remained lower relative to non development expenditures. After 2002 development health care spending increased, and presently the government is allocating more on social sector especially on health and education through increased spending on the Public Sector Development Program (PSDP).

Income per capita increased over 2.3 percent in real terms and the economy's overall growth remained around 4.8 percent per annum during the entire period (Hussain, 1999; Uddin and Swati, 2006). During the decade of the 1990s the economy remained slow-moving until the year 2000 when its performance increased above 2 percent. Unemployment followed a gradually increasing trend over the same period. At the start of new millennium the rising trend of unemployment increased from 7.82 percent in 2000 to around 7.92 percent in the year 2005-2006 (Kemal, 1994). The overall age structure of the population is heavily skewed towards the below 15 years age group, which constitute approximately 43 percent of the total population (GOP, 2006; UNFPA, 2003). Population growth, if it remains unchecked over the long term, has a pernicious effect on the quality of human capital formation and human development because of the increasing burden on scarce public resources and infrastructure. Pakistan is the one of the most urbanized nations in South Asia, with 3 percent of the countries geographic area and 36 percent of the total population

[7] For detail description of the variables see the page 7 of this paper.

classified as urban in 2008 (GOP, 2010). The phenomenon of urbanization exerts pressure on existing health care facilities and the national public health care budget.

3 Empirical Approach

3.1 Order of Integration

Most of the time series data are non-stationary in nature and hence simple ordinary least square (OLS) regression analysis of such data produce spurious results. Whether the underlying series is stationary or not has implications for t-values, Durban Watson (DW) statistics, and R^2 measures, making the use of usual test statistics invalid (Philips, 1986; Seddighi et al., 2000). There are a number of approaches but the Dickey-Fuller (DF) test (Dickey and Fuller, 1981) is most commonly used. This approach assumes only one unit root in the process (Dickey et al., 1986) and requires estimating the following model by OLS:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \alpha_2 Y_{t-1} + \beta_i \sum_{i=1}^{m} \Delta Y_{t-i} + \mu_t \qquad (4)$$

Equation (4) indicates that the series Y_t now has both stochastic and deterministic trends. The DF test assumes that error term μ_t to be white noise, which is unlikely in most cases and hence the problem of autocorrelation in the residuals occurs in estimating equation (4). To fix this problem we have employed the ADF. The key insight of the ADF test is that testing for non stationarity is equivalent to testing for the existence of the unit root data it contains. This is therefore a preferred and relatively more applicable approach. To make μ_t white noise, lagged values of the dependent variable are included on the right hand side of the DF equations.

Generally, we do not know how many lagged values of the dependent variable to include in the estimate. There are several approaches, in this case we used Lagrange multiplier (LM) test (Holden and Perman, 1994). The LM test is statistically more powerful with finite or small samples (Maddala, 1992) and is widely used because of its easy application, which made it suitable for this analysis. In testing for the presence of unit root data within individual time series using the ADF test (Dickey and Fuller, 1981; Said and Dickey, 1984), both with and without a deterministic trend, we follow the sequential procedure of Dickey and Pantula (1987): the largest plausible number of lags, assumed to be four, is tested and, if rejected, that of two is tested and so on.[8] The number of lags in the ADF equation is chosen to ensure that there is no serial correlation using the Breusch-Godfrey statistic (Greene, 2000).

3.2 Testing for Cointegration (long run relationship)

Johansen's Full Information Maximum Likelihood (FIML) approach (Johansen, 1988; Johansen and Juselius, 1990) was used in this study to test for cointegration. Cointegration requires two conditions to apply; first, the series for at least two of the individual variables are integrated of the same order; and second, a linear combination of the variables exist which is integrated at an order lower than that of the individual variables (Hansen and Juselius, 1995). The Johansen cointegration method has some advantage over the EG (1987) two-step procedure. It is not possible with the EG approach to predict the number of cointegrating vectors, while this is possible using the Johansen method. Knowledge of the number of cointegrating vectors is important as under or over estimation has potentially serious consequences for estimation and inferences. With the Johansen approach we can calculate the speed of adjustment coefficients (error correction term) which is not possible using the EG approach. The Johansen maximum likelihood approach based on the following multivariate vector autoregressive (VAR) model is described as:

$$Z_t = A_1 Z_{t-1} + ... + A_k Z_{t-k} + \mu_t \qquad \textit{Where } \mu_t \sim IID(0, \sigma^2) \qquad (5)$$

In equation (5) Z_t is a $(n \times 1)$ vector of *I (1)* variables, which contains both endogenous and exogenous variables $[pche, pci, pophosp, unemply, hegdp, pop14, urban]$ included in the VAR model. The term A_i is a $(n \times n)$ matrix of parameters and μ_t is $(n \times 1)$ a vector of white noise error term. The use of this type of modeling strategy is advocated among alternatives by Sims (1980) to estimate the dynamic relationships of the variables which are jointly endogenous. Equation (5) can be estimated in an efficient way by using OLS methods.

[8] The results of up to two lags are presented for all the variables used for analysis including constant, constant and trend and without constant and trend.

Two likelihood ratio (LR) tests were used to detect the presence of cointegrating vectors. The first is the trace test, which tests the null hypothesis of most *r* cointegrating vectors against the alternative that it is less than *r*. The second is the maximal Eigenvalue test, which tests the null hypothesis of *r* cointegrating vectors against the alternative of *r + 1*. The trace test is more robust to skewness than the maximal Eigenvalue test. We have presented the results of both tests.

Determining the number of vectors in a Johansson cointegration analysis is one step in establishing a long run relation, while a step further is to estimate whether the variables in the VAR model are endogenous or exogenous by restricting the coefficients (alpha and beta) of the cointegration equations equal to zero. This weak exogeneity test indicates better model options for the variables as either exogenous or endogenous and helps determine the relationship between variables (Hendry, 2004). The weak exogeneity test is carried out and the significance of alpha and beta is checked using a LR test with a chi square distribution. Previous studies of the factors affecting health care expenditures in time series or panel data setting have not applied the weak exogeneity estimation procedure. The failure to do so poses serious concerns about their ad hoc specification of models and selection of endogenous and exogenous variables.

Variables can deviate apart from their equilibrium path in the short- run; therefore, it is interesting to estimate the dynamic behavior of variables using the VECM. This model also includes an adjustment coefficient that explains short-run deviation from the mean equilibrium path. Therefore, the past value or lagged error term is used to capture the effect of past events on the present values.

If the series *pche*, *pci* and other variables of interests are *I(1)* and cointegrated, then the VECM is represented by the general form using the equation:

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \dots\dots\dots + \Gamma_{k-1} \Delta Z_{t-k+1} + \Pi Z_{t-k} + \upsilon_t \qquad (6)$$

Where Δ is the difference operator, υ_t is the white noise error term which is independently and identically distributed (IID) with zero mean and constant variance,

Γ_i and Π are $(n \times n)$ matrices of the parameters with Γ_i $= -(\mathrm{I} - \mathrm{A}_1 - \mathrm{A}_2 \ldots\ldots - \mathrm{A}_\mathrm{i})$, where $(i = 1, \ldots, k-1)$, and Π $=$ - $(\mathrm{I} - A_1 - A_2 \ \ldots \ - A_\mathrm{k})$. The estimated values of $\hat{\Gamma}_i$ and $\hat{\Pi}_i$ gives the short run and long run information of changes in Z_t. The term $\Pi = \alpha\beta'$, where α represents the speed of adjustment to disequilibrium and the matrix term β provides long coefficients in a way that the term $\beta' Z_{t-k}$ set in the above equation (6) represents up to $(n-1)$ cointegration relationships in the model, to make sure that the Z_t converge with their long run steady state solutions (Harris and Sollis, 2003). Here, the term Π is the error correction term and measures the speed of adjustment in Z_t and shows the extent to which any disequilibrium in the previous period effects adjustments in the present period. As this disequilibrium error term is a stationary variable *I (0)* by definition, it implies that there is some adjustment process that prevents errors in the long run becoming larger. While the optimal lag length of the variables included in the model are determined by using the general-to-specific modeling procedure of Hendry (1980; 1984), the Error Correction Model (ECM) is formulated in the first difference terms to eliminate trends from the variables involved and thus resolves the problem of spurious regression. One advantage of using ECM is that it reintroduces, in a statistically acceptable way, a lagged error correction term, which captures the long run information lost through differencing.

4 Results and discussion

4.1 Unit root test results (order of integration)

Univariate properties of the variables are estimated using the standard Dickey Fuller (DF) and Augmented Dickey–Fuller (ADF) unit root tests. The tests allow for the presence of a drift (constant term) and a drift with a deterministic trend. Both the DF and ADF tests fail to reject the null hypothesis of unit root for all variables. However, the null hypothesis is rejected overwhelmingly for all the series in first-difference. The results of the DF and ADF tests are presented in table 2 in both level and difference forms. The DF unit root test results show that the real per capita health expenditures *(pche),* are stationary at 5 and 1% significance levels with drift and with drift and trend terms.

Table 2: DF Unit Root test Results in level and differenced form

Variables	Dickey Fuller Test			Augmented Dickey Fuller Test			
	No Drift and Trend	Drift	Drift and Trend	No Drift and Trend		Drift	
				1	2	1	2
pche	1.93	-3.13*	-3.20*	-3.42*	-3.12*	-2.80	-2.91
pci	3.48	0.74	-2.22	-2.54	-2.22	0.51	0.73
pop14	-2.62	-1.34	-1.51	-2.38	-2.64	-1.44	-1.45
pophosp	2.52	0.19	-0.96	-0.86	-0.98	0.28	0.24
hegdp	-0.73	-1.52	-1.95	-2.18	-1.82	-2.02	-1.74
unemply	1.234	-1.55	-2.5	-2.73	-3.00*	-1.54	-1.51
urban	-2.29	-2.20	0.37	-0.77	-0.95	-1.93	-1.92
Δ *pche*	-4.65**	-4.81**	4.61**	-4.34**	-3.15*	-4.52**	-3.43*
Δ *pci*	-3.35**	-4.60**	4.57**	-4.11**	-2.88	-4.10**	-2.90
Δ *pop14*	-3.20**	-3.53*	-3.54*	-2.79	-2.45	-2.78	-2.60
Δ *pophosp*	-5.43**	6.30**	-6.5**	-4.03**	-2.54	-3.86	-2.40
Δ *hegdp*	-5.96**	-5.94**	-5.78**	-5.52**	-4.22**	-5.58**	-4.31**
Δ *unemply*	-5.02**	-5.51**	-5.56**	-4.12**	-3.74**	-4.05**	-3.69**
Δ *urban*	-3.54**	-3.81**	-4.39**	-3.28*	-2.99*	-2.69	-2.36

** shows the significance level at 5% and ** at 1% level.*

4.2 Cointegration results (Long run relationship)

After estimating the unit root hypothesis, the next step using Johansen methods is to estimate the cointegration relationship for all variables in the model. The results of cointegration equation estimated using the Trace test and Eigenvalue statistics are presented with the hypotheses tested in table 3. Trace test statistics strongly reject the null hypothesis that there is no cointegration vector present but do not reject the hypothesis that there is one cointegrating vector (i.e. *r=1*). The null hypothesis of no cointegration is rejected at the 1 percent significance level and this result is validated through the maximum Eigenvalue statistics. It can be concluded that one cointegrating vector exists, implying that the variables are bounded together by the long-run relationship.

Table 3: Eigen value and Trace statistics (Tests for no. of cointegrating vectors)

Rank	Eigenvalue	Log likelihood	H_0 : rank <=	Trace test	P-value
0		423.63	0	161.35	0.000**
1	0.872	458.55	1	91.498	0.093
2	0.622	475.11	2	58.389	0.290
3	0.507	487.14	3	34.335	0.488
4	0.417	496.32	4	15.972	0.720
5	0.248	501.18	5	6.255	0.669
6	0.122	503.40	6	1.805	0.179
7	0.052	504.31			
Diagnostic Tests Statistics					
Vector AR 1-2 test	F (98, 46) 1.2209 (0.2277)				
Vector Hetero test	χ^2 (392) 408.51 (0.2725)				
Vector Normality test	χ^2 (14) 44.45 (0.0001)**				
Residual(μ_t)[1]	-2.96** (0)[2] -2.99** (1) -2.84** (2)				

[1]Error term obtained after cointegration equation. [2] shows lag length used to determine stationarity.
** and * show significance at 1 and 5 percent level. Number of lags included in the analysis is one. Constant is unrestricted.

According to the definition of cointegration, error term obtained after cointegration must be lower in order than that of the model variables (Asteriou, 2006). The residual term (μ_t)[9] is analyzed using zero, one and two lags without trend and constant, and is concluded to be stationary (i.e., *I (0)*). Essential test results are also presented in table 4 under the diagnostic test statistics and all diagnostic tests provided evidence that there is no statistical problem in the data.

[9] The test of stationarity for residual term regress its lagged value on its own without intercept or trend because it is an error term.

After determining the number of possible cointegrating vectors, the next step in Johansen framework is to restrict alpha (α) and beta (β) coefficients by hypothesizing them as equal to zero. For the one cointegrating vector, the number of (α) rows and (β') columns are six as there are seven variables included in the model. The procedure of testing zero restrictions on alpha and beta coefficients is carried out by using likelihood ratio (LR) test statistics with chi square distribution. The results of alpha (α) restriction showed that zero restriction tests for *pche* and *pci* are rejected, but cannot be rejected for the other variables (see table 4 below).

Table 4: Test for Zero Restrictions on long run parameters (α coefficients)

1) Zero Restriction test for α coefficients							
Variables	*pche*	*pci*	*pophosp*	*unemply*	*dhegdp*	*pop14*	*urban*
α **- coefficient**	-0.734	-0.002	-0.4453	0.0315	-0.027	-0.6891	0.0477
LR test: χ^2 (≈ 1)	30.48	22.12	0.017	0.001	1.107	0.998	3.75
P-value	0.00**	0.00**	0.89	0.97	0.29	0.32	0.052
2) Zero Restriction test for β coefficients							
β **- coefficient**	1.0000	-0.237	-3.942	0.323	-0.930	-2.544	1.294
LR test: χ2 (≈ 1)	35.17	9.93	20.30	11.70	27.16	5.73	7.93
P-value	0.00**	0.00**	0.00**	0.00**	0.00**	0.02*	0.00**

** and * show rejection at 1 and 5 percent level of significance respectively.

It was therefore easy to normalize all the variables in the model using *pche.* The variable health spending per capita is significant at the 1 percent significance level and it explains 73 percent of the long run disturbance in the economy if a shock occurs. The alpha restriction tests show that the real income variable can also be modeled as an endogenous (dependant) variable. None of the variables appear to be significantly different from zero using alpha restrictions. This means that the other variables have to be treated as endogenous (independent) variables, and we can normalize them using per capita health expenditures *(pche)*. The results indicate that the variable *pche* is significant and can also be modeled as an independent variable, as our objective is to measure the impact of income on health care expenditures and not vice versa. Therefore, we rely on the result of alpha restriction tests and model *pche* as a dependant variable. This result also confirms the two-way causality between these variables as suggested in the literature, implying that the relation between income and health care expenditures is spiral (Hamoudi and Sachs, 1999). This means that both variables can be modeled interchangeably depending on the objective of the study.

The single equation model which gives long run elasticity of the parameters, also called Johansen normalized estimates, for the determinants of health care spending can be estimated by normalizing all health care expenditure variables and be written as follows:

$$pche = 0.237(pci) + 3.94(pophosp) - 0.32(unemploy) + 0.93(dhegdp) + 2.54(popu) - 1.29(urban) \quad (7)$$

The signs of all the variables in equation 7 are a priori. The negative sign for unemployment variable is expected because unemployment has negative effects on the productive potential of human resources by employing fewer people in productive jobs and thereby reducing national income as well as individual income. Thus, one may expect less income available for food and other expenditures than for health care. Secondly, in a developing country like Pakistan where health insurance is unavailable for most individuals (especially the poor), there is more emphasis on the use of national resources for basic necessities like food, housing, and clothing rather than spending on health care. Thirdly, governmental spending on programs that generate employment is emphasized rather than spending on health care for the majority of the population.

Urbanization is having negative effects on health care spending in Pakistan. This result is consistent with the findings of Cumper (1984), Siddiqui et al. (1995), and Toor and Butt (2005). Cumper (1984) argued that urbanization lead to greater availability of health services and hence may offset the demand for health care expenditures. In the case of Pakistan, one factor that may be responsible for this negative relationship is the availability of low-cost private doctors who are not legally registered, but are in demand due to their availability and below market price. Urban infrastructure is also well-developed relative to rural areas of the country (e.g., public transportation in urban areas), which reduces the cost of health care provision. A higher share of the population less than 14 years of age is contributing to health care spending. The sign and magnitude that the children demographic variable indicates this age group consumes more health resources. One percent increase in the population less than 14 years of age increases health care spending by 2.5 percent. This is because this age group is relatively more prone to communicable diseases which constitute 45-50 percent of the health care burden in Pakistan.

The coefficient of the population hospital ratio variable is relatively larger than that of the age group variable meaning that one percent increase in population hospital ratio increases the health spending by 3.94 percent. The positive sign of the income variable indicates the potential level of development of a country and its general affect on public health expenditures which is in agreement with other similar studies (e.g., Okunade and Karakus, 2001; Toor and Butt, 2005). However, an elasticity of less than one[10] indicates that the health care spending is a normal good (necessity) rather than an increased marginal preference or the capability to spend on health care as in the case of OECD and industrialized nations. This result is contrary to the findings of Newhouse (1977) and Leu (1986). This low income effect indicates inequitable income distribution[11] and the lack of government willingness to prioritize the health care sector. Income elasticity of health care is around 0.237 which signifies that a 1 percentage increase in national income will lead to 0.237 percent increase in health care spending. This might be because in Pakistan the public health care sector is not efficient and nearly fails to deliver health care to a large proportion of the population, creating the need for private health care facilities. On the contrary, costs of private health care services are beyond the reach of poor people in Pakistan because these are commercial, for-profit services. Rural areas require hospitals and essential medical services. Furthermore, the lack of transportation and infrastructure in rural areas threaten public health care services and their utilization due to the greater cost of access to them.

[10] We have only estimated income elasticity for public health care expenditures while other mentioned studies used both public and private health care expenditures. This might be one reason for the low income elasticity found for Pakistan. However, elasticity estimates from this study can be compared with other studies of OECD and industrialized countries with caution.

[11]Income distribution in Pakistan is increasingly skewed with high poverty levels unlike China where increased inequality has been accompanied by a reduction in poverty; hence pose a downward effect on income elasticity of public health care expenditures.

The sign and effect of health care spending as a percentage of GDP are positive and *a priori*. If the population is increasing at a slower rate than increases in GDP and health spending as percentage of GDP, it implies that the country has more resources available per person. The effect of health care services is positive as hypothesized and its elasticity appeared to be greater than unity, indicating that government has to invest more on developing infrastructure to better equip the health sector with facilities, especially basic health care services like basic health units (BHUs), and primary health care centers (PHCs).

4.3 Vector error correction results (short- run dynamic modeling)

Short-run dynamic modeling is carried out by using the general to specific modeling approach according to Hendry (1984) and Campos et al. (2005). The specific purpose of this exercise was to see which of the variables are important in the short- run as a potential policy measure. This can also help us to explain how some of the variables behave in the short and long-run. The results of the short-run dynamic model are presented in table 5.

Table 5: Short run Vector Error Correction Model (VECM) Results

Variables	Coefficient	t-statistics	Prob. value
pci	-0.583 [0.1238]	-4.71	0.000
pophosp	0.763 [0.3558]	2.14	0.042
Pop14	3.240 [1.177]	2.75	0.011
dhegdp	0.176 [0.064]	2.74	0.011
$hegdp_{t-1}$	0.298 [0.1244]	2.40	0.024
unemply	-0.086 [0.0508]	-1.68	0.10
constant	0.088 [0.01346]	6.54	0.000
ECT_{t-1}	-0.377 [0.175]	-2.16	0.041
Diagnostic Test Results			
AR 1-2 test	F (2, 22)	0.9156 (0.4150)	
Normality Test	χ^2 (2)	2.1640 (0.3389)	
Hetero Test	F (16, 7)	0.3882 (0.9445)	
ARCH 1-1 Test	F (1, 22)	0.2109 (0.6506)	
RESET Test	F (1, 23)	0.1112 (0.7418)	
R^2	0.9179		
F (8, 24)	33.55 (0.000)**		
DW	2.15		

* and ** show rejection at 5 and 1 percent level of significance. [ ] shows the Standard errors of the coefficients and ( ) shows probability level. ECT stands for error correction term.

The negative sign of the significant income coefficient in the short run is surprising. It is not the income *per se*, but the level of development of a country that affects health care spending and public health. As described by Judge et al. (1998), the level of economic development has a tremendous effect on health care spending because low-income families are less able to afford basic needs like (which contributes to public health problems) and much less likely to spend money on health care. Another possible explanation for income having a negative effect on health care spending is the inequality effect of income which in both the short and long run has important implications for public resource allocation. The low priority given to the health care sector in development planning and therefore, the underutilization of available resources in the health sector may cause a negative income effect in the short-run.

Finally, urban bias[12] in health care spending can also pose a threat in the immediate period because those who live in the rural areas remain without access to public facilities contributing to the inefficiency of public health care facilities. The short-term elasticity of the hospital population ratio variable is smaller relative to the long run elasticity estimate. This is because people are more cautious about access to health care services in the short-term and the quality criterion comes afterwards. Also, in Pakistan the burden of communicable diseases on the public health system is high and implies the need for outpatient care services rather than the need for in-patient hospital care. Due to epidemiological transition[13] in the long run, this variable is becoming more relevant to policy.

The urbanization variable is not significant in the short run in Pakistan because migration is a long run phenomenon. The sign of the unemployment coefficient is, according to *a priori*, both in the long- and short run but the unemployment variable was not significant in the short-run analysis. One obvious reason may be that the strong social bonding of Pakistani society makes unemployment in the short-run less significant in explaining health care expenditures. Health care spending as a ratio of GDP has a significant one year lagged effect and emphasizes the importance of prioritizing increased government health care spending. The error term is significant and the value shows that the previous period disturbance in the variables is almost 38 percent adjusted for this year which is quite logical and reasonable. Almost 92 percent of the variation in the model is explained by the income and non-income variables. Diagnostic test results show that statistical problems like autocorrelation, heteroskedascticity, functional form, and skewness did not exist in the model.

[12] Zaidi (1988) explained that around eighty percent of the public health expenditures go to urban areas.

[13] Epidemiological transition is used to be thought that—the shift from infectious and deficiency diseases to chronic non communicable diseases—was a unidirectional process, beginning when infectious diseases were predominant and ending when non communicable diseases dominated the causes of death.

5 Summary and conclusion

What determines health care expenditures at the national level is an important policy question. This paper sought to answer this question by empirically estimating the factors affecting public health expenditures at the national level in Pakistan based on annual data from 1972 to 2006. The results of unit root tests confirmed that all variables were first difference stationary thus I (1). Cointegration analysis and VECM were employed to detect possible long run and short run relationships between health care expenditures with both income and nonincome variables. Long-run relationships exist between health care expenditures and other model variables.

Urbanization inversely affects public health care expenditures; it is costly to provide health care services to remote areas. Therefore, it is necessary for long-term planning to take account of the urbanization process. In the short run, the urbanization variable was not significant, indicating that migration from rural to urban areas is not a short run phenomenon and that people need a fairly long period to settle into urban areas. A second reason might be that population growth rate in urban areas is relatively low due to greater availability of reproductive and basic public health care services that protects urban households from exposure to seasonal diseases. Also, level of awareness about bigger family size and its impact on household resource distribution is relatively more. Third, relatively well-developed infrastructure in urban areas reduces transportation costs, which may cause the negative relationship with government health expenditures.

Unemployment has a significantly negative impact in the long run on health care expenditures per capita. This is because human resources are under-utilized which reduces income at individual, local and national levels. It means that a relatively large share of working age population is unable to contribute to national income, further impeding investment in public health care. In case of Pakistan, social capital is very strong, providing a cushion for public health and welfare services in case of temporary unemployment.

Income is thought to be a strong predictor of health spending at national level (Newhouse, 1977). Income elasticity of health expenditures estimated for Pakistan in this paper is less than unity which contrasts with the results of most previous studies (Newhouse, 1977; Okunade and Murthy, 2002; Roberts, 1999). The reason for this might be that Pakistan is still a developing country and people use health care services in times of need due to poverty and lack of access to health care services. Secondly, the lack of government hospitals in rural areas creates a rural market for private doctors and health services. This implies that people in need utilize private health care services which increases out-of-pocket expenditures and that the government perceives less need for providing universal coverage.

It is also important to note that if health care is a necessity (Font et al., 2009) as in the case of Pakistan, then it is imperative that governments have a larger role in allocating and directing public resources to health care. This not only prevents costs associated with better human capital formation but also helps in contributing positively to economy as productivity is linked to public health. Government should prioritize establishing a task force to evaluate health care expenditures spent on developmental and non-developmental work and to determine the impact of scarce resources that can otherwise be utilized in a more effective and efficient way. Focus should be given to policies that promote greater access to health care facilities, especially for mothers and children. It is valid to establish more health facilities to improve access to the general population. Focal area should include rural and the urban slums.

References

Adegbola, O. (1987). The impact of urbanization and industrialization on health conditions: the case of Nigeria, World Health Statistics, Vol. 40, No. 1, pp.74-83.

ADB. (2005). Key indicators 2005, Asian Development Bank, Manila Philippine.

Asteriou, D. (2006). Applied Econometrics: a modern approach using E-views and Microfit, Palgrave McMillan, New York.

Barros, P. P. (1998). The black box of health care expenditure growth determinants, Health economics, 7: pp: 533-544.

Blomqvist, A. G. and Carter, R. A. L. (1997). Is health care really a luxury? Journal of Health Economics, Vol. 16, pp: 207-29.

Campos, J., Ericsson, N. R. and Hendry, D. F. (2005). General to specific modeling: an overview and selected bibliography, Board of governors of the Federal Reserve System International Finance discussion paper number 838. http://www.federalreserve.gov/pubs/ifdp/2005/838/ifdp838.pdf

Culyer, A.J. (1990). Cost Containment in Europe, in: OECD 1990, Health care systems in transition (OECD, Paris), pp: 29-40.

Cumper, G. E. (1984). Determinants of health level in developing countries, Research, studies press Ltd, Letch worth, UK.

Cutler, D. M. (1995). The cost of financing health care. The American Economic Review, 85, pp. 33- 4.

Dickey, D. A., and S. G. Pantula (1987). Determining the Order of Differencing in Autoregressive Processes. Journal of Business and Economic Statistics, 15: 455-461.

Dickey, D. A., and W. A. Fuller (1981) Likelihood Ratio Statistics for Autoregressive Time Series With a Unit Root. Econometrica, 49: pp 1057-1072.

Dickey, D.A., W.R. Bell and R.B. Miller. (1986). 'Unit root in time series models: Tests and implications', The American statistician, Vol. 40, pp 12-24.

Engle, R. F. and Granger, C. W. (1987). Co-integration and Error correction: presentation, estimation and testing, Econometrica, Vol.55, pp. 251-276.

Engle, R. F. and Granger, C. W. J. (1991). Long run economic relationship: readings in cointegration, Oxford University press, Oxford.

Font, C. J., Gemmill, M. and Rubert, G. (2009). Re-visiting the health care luxury good hypothesis: Aggregation, precision and publication biases? Health, Econometrics and Data Group (HEDG) working paper 09/02, The University of York, UK. http://www.york.ac.uk/res/herc/documents/wp/09_02.pdf

Gbesemete, K. P. and Gerdtham, U. G . (1992). Determinants of health care expenditures in Africa: a cross sectional study. World development 20, pp: 303-308.

Gerdtham, U. G. and Jönsson, B. (2000). International comparisons of health expenditure, in Handbook of Health Economics, eds. A. J. Culyer and J. P. Newhouse, North-Holland, The Netherlands, pp. 11- 53.

GOP. (2005). Economic Survey 2004-05, Finance Division, Economic Adviser's Wing, Islamabad, Pakistan.

GOP. (2006). Economic survey of Pakistan 2005-06, Economic Advisor's wing, Ministry of Finance Islamabad, Pakistan.

GOP. (2010). Economic Survey 2009-10, Finance Division, Economic Adviser's Wing, Islamabad, Pakistan.

Greene, W. H. (2000). Econometric Analysis (4th edition), New Jersey: Prentice-Hall, International Inc, London.

Grossman, M. (1972). The demand for health, National Bureau of Economic Research (NBER), New York, USA.

Gugler, J. and Flanagan, W. G. (1978). Urbanization and social change in West Africa, Cambridge University Press, Cambridge.

Hamoudi, A. A. and Sachs, J. D. (1999). Economic consequences of health status: a review of evidence. Centre for International Development (CID) working paper No. 30, Harvard University.

Hansen, H. and K. Juselius. (1995). Cats in rats: Cointegration analysis of time series. Estina, Evanston, Illinois.

Hansen, P. and King A. (1996). The determinants of health care expenditure: a co-integration approach, Journal of Health Economics, 15, pp.127-37.

Harris, R. and Sollis, R. (2003). Applied time series modeling and forecasting, John Wiley and Sons Ltd. West Sussex, England.

Hendry, D. F. (1980). Econometrics- alchemy or science? , Economica Vol. 47, pp: 387-406.

Hendry, D. F. (2004). Causality and exogeneity in non-stationary economic time series, Economics department Nuffield college, University of Oxford.

Hendry, D.F. (1984). Monte Carlo experimentation in econometrics, In: Griliches, Z. and M.D. Intriligator (Eds.), Handbook of Econometrics, Volume 2-3, Chapter 16. Amsterdam: North-Holland.

Hitiris, T. and Posnett, J. (1992). The determinants and effects of health expenditure in developed countries. Journal of Health Economics, 11, 173-81.

Holden, D. and R. Perman. (1994). Unit Roots and Cointegration for the Economist. Chapter 3, in B.B. Rao, (ed), Cointegration for the Applied Economist, New York: St. Martin’s Press.

Hussain, A. (1999). Employment generation, poverty alleviation and growth in Pakistan’s rural sector: policies for institutional change, report prepared for the International Labor Organization, country employment policy review, Pakistan, ILO/CEPR.

Jack, W. (1999). Principles of health economics in developing countries, World Bank Institute (WBI), Washington DC.: USA.

Johansen, S. (1988). ‘Statistical analysis of cointegrating vectors’, journal of economic dynamics and control, Vol. 12, pp 231-2544.

Johansen, S. and Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration –with application to the demand for money, ‘Oxford Bulletin of Economics and Statistics 52, pp: 169-210.

Judge, K., Mulligan, J. and Benzeval, M. (1998). Income inequality and population health. Social science and medicine 46 (4-5) pp: 567-579.

Karatsaz, G. (2000). On the determination of the US aggregate health care expenditure, Applied Economics, Vol. 32, pp. 1085-1099.

Kemal, A. R. (1994). Structural adjustment, employment, income distribution and poverty, in Pakistan Development Review (PDR), Vol.33 No. 4.

Leu, R. (1986). The public-private mix and international health care costs, in: A.J. Culyer and B. Jonsson, eds. Public and private health services (Basil Blackwell, Oxford).

Maddala, G. S. (1992). Introduction to econometrics, second edition, McMillan Publication, USA.

McGuire, A., Parkin, D., Hughes, D. and Gerard, K. (1993). Econometric analysis of national health expenditures: can positive economics help to answer normative questions? Health economics, 2, pp. 113-126.

Murinnen, J. M. (1982). Demand for health: a generalized Grossman model, Journal of Health economics Vol.1 No.1 pp. 5-28.

Murthy, N. R. V. and Okunade, A. A. (2000). Managed care, deficit financing and aggregate health care expenditure in the United States: a cointegration analysis. Health Care Management Science, 3, pp. 279-85.

Murthy, N. R. V. and Ukpolo, V. (1994). Aggregate health care expenditure in the United States: evidence from cointegration tests, Applied Economics, Vol. 26, Issue, 8. pp. 797-802.

Newhouse, J. (1977). Medical care expenditure: A cross-national survey, Journal of Human Resources 12, 115-125.

Okunade, A. A., and Karakus, C. M. (2001). Unit root and cointegration tests: time series versus panel estimates for international health expenditure models, Applied Economics 33 pp. 1131-1137.

Parkin, D. W., McGuire, A. J. and Yule, B. F. (1987). Aggregate health care expenditures and National incomes: Is health care a luxury good? Journal of Health Economics 6, pp. 109-127.

Parkin, D. W., McGuire, A. J. and Yule, B. F. (1989). What do international comparisons of health care expenditures really show? Community medicine Vol. 11, No. 2 pp. 116-123.

Philips, P.C.B. (1986). Understanding spurious regressions in econometrics. Journal of econometrics Vol. 33, Issue 3, pp: 311-340.

Said, S.E. and Dickey, D.A. (1984). Testing for Unit Roots in Autoregressive-Moving Average Models of Unknown Order, Biometrika, 71, pp: 599-607.

Schultz, T. P. (2004). Health economics and application in developing countries, Journal of Health Economics, Vol. 23, No. 4, pp. 637-641.

Seddighi, H., Lawler, K. A. and Katos, A. V. (2000). Econometrics: a practical approach, Routledge Publishing, 1st edition.

Siddiqui, R., Usman, A. and Rashida, H. (1995). Determinants of Expenditure on health in Pakistan, The Pakistan development review, Vol. 34 No. 4 pp: 959-970.

Sims, C.A. (1980). Macroeconomics and Reality, Econometrica, Vol. 48, No.1. pp: 1-48.

Toor, I. A., and Butt, M. S. (2005). Determinants of Health Expenditure in Pakistan, Pakistan Economic and Social Review, Vol. 943, No.1, pp. 133–150.

Uddin, F. and Swati, M.A. (2006). Pakistan's Economic Journey: need for new paradigm. Institute of Policy studies, Islamabad, Pakistan.

UNFPA. (2003). Pakistan population assessment report, Country Assessment report, United Nation population fund (UNFPA), Islamabad, Pakistan.

Wagstaff, A. (1986). The demand for health: some new evidence, Journal of health economics Vol.5. No.3 pp.195-233.

Wolfe, B. (1986). Health status and medical care expenditures: Is there a link? Social Science and Medicine, Vol. 22, No. 10, pp. 993-999.

World Bank (1993). World Development Report 1993, Investing in Health. Washington D.C: World Bank.

Zaidi, S. A. (1988). The political Economy of health care in Pakistan. Vanguard Books (Pvt.) Limited Lahore, Pakistan.

Zaidi, S. A. (1999). Issues in Pakistan's Economy, First Edition, published by Oxford University press, Karachi, Pakistan.