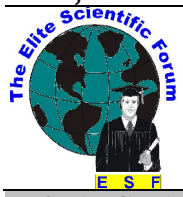
Pak. j. life soc. Sci. (2012), 10(2): 139-144 E-ISSN: 2221-7630;P-ISSN: 1727-4915



Pakistan Journal of Life and Social Sciences
www.pjlss.edu.pk

RESEARCH ARTICLE

Health Status, Income Inequality and Institutions: Evidence from Pakistan Economy

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ARTICLE INFO

Received:	May 26, 2012
Accepted:	Oct 21, 2012
Online:	Nov 26, 2012

Keywords
Co-integration
ECM
Health status
Income distribution
Institution
Pakistan

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ABSTRACT

The aim of this study was to examine the effect of income distribution on health status and also to investigate whether this effect depends on institutional structure in Pakistan. The result of co-integration and Error Correction Model (ECM) applied on annual data over the period of 1973-2010; revealed that unequal income distribution worsens health indicators in Pakistan. However, this negative effect may be reduced by introducing an efficient and equity based distribution system for all resources. The results also showed that per capita public health expenditure, literacy rate and number of doctors positively affect people's health in Pakistan.

INTRODUCTION

In normative economics, an individual's well-being is measured through total income and consumption spending. Unlikely to this health is considered the most important indicator of quality and well-being of life as the goods and services do not provide much satisfaction. Health is a momentous catalyst in increasing the earning potential and self respect of individuals. Not only income rather egalitarian distribution of income is necessary for attaining health. Inequality in income distribution affects the health status of people living both in developing and developed countries (Rodgers, 1979; Wilkinson, 1992). Policy makers, welfare economists and researchers showed a great deal of interest in finding the reasons why all individuals do not enjoy equal health status within a country. As a result, a wide range of knowledge was produced on the equality of health status (Adjaye, 2004; Deaton and Lubotsky, 2001; Deaton, 1999). Most of the literature like Murthy (2007), Li and Zhu (2006), Lynch et al. (2001) and Wilkinson (1992) shows an inverse relationship between income inequality and health status but Mellor and Milyo (2001) and Herzer and Nunnenkamp (2011) observed the results contradictory to the former. Infant mortality rate was lower in countries with unequal income distribution (Mellor and Milyo (2001) and higher in countries with better income distribution (Leigh and Christopherm, 2006). No significant relationship was observed between income inequality and health status in UK and USA (Deaton and Christina, 2004). Musgrove (1996) and Filmer et al. (1998) observed insignificant association between health spending and health status. In contrary, Gyimah-Brempong and Wilson (2004), Deussing (2003), Berger and Messer (2002) found a positive association between health expenditures and health status.

The number of Doctors in a community has always remained an important determinant of health status in the form of human capital (Murthy, 2007; Nixon and Ulmann, 2006; Robst, 2001 and Robst and Graham, 1997). Likewise, the literacy rate is also considered to be the main contributor in health status. Anyanwu and Erhuakpor, (2009), Murthy (2007), Ramesh and Mirmirani (2007) found significant effects of the literacy rate on infant mortality and under five mortality rate. Above all of this bad political and institutional

setup affects every sphere of life. In the presence of poor institutional structure, income inequality adversely affected education and health status of people (Alesina and Perotti, 1996). Corrupt institutional structure always supported dictators and a small group of wealthy people to influence country's policies; in favor of their own class and provided no incentives to large proportion of poor people (Meltzer and Richard, 1981). According to Jones, Knowles and Owen (2007) and Knowles and Owen (2008) improvement in the quality of formal institutions had a statistically significant positive effect on life expectancy in the countries like Pakistan, India and Bangladesh. An increase in Pakistan's quality rating for formal institutions, by 20 points might increase the life expectancy by nearly 10 years.

Pakistan is among those countries whose income distribution is highly skewed. This unequal income spread gives rise to higher rate of poverty and reduces the per capita consumption of the poor (Ali et al., 2010). As a result, the number of hungry and malnourished people has increased in the country. Government expenditure on public health services remained never promising. The development in health sector is also very slow as compared to other countries in this region (Hussain et al., 2009). Income inequality further adversly affects population health partly because it constitutes a potential factor of dissatisfactions and and disappointment, revolution and more generally a climate of uncertainty in the developing countries. This socio-political unrest is costly in terms of human capital, namely education, malnutrition, health, etc. Even during the democratic regime resources are grabbed on the principle of might is right. Most job opportunities are distributed on the basis of nepotism and bribery. In the backdrop of all these current study was planned to investigate the effect of income distribution on health status in the presence of institutional quality.

MATERIALS AND METHODS

The objectives of this study were achieved through the following model:

$$HStatus_t = \beta_0 + \beta_1 GI_t + \beta_2 PCHE_t + \beta_3 LR + \beta_4 PDR_t + \beta_5 PI_t + \beta_6 (GI * PI)_t + \varepsilon_t \ldots\ldots (1)$$

Variables	Description
IM =	Infant mortality
LE =	Life expectancy
GI =	Gini Coefficient, (equality 0 to 1 inequality)
PCHE =	Per capita health expenditure
LR =	Literacy rate
PDR =	Population per doctor
PI =	Institutional set up (un stable-10 to +10 stable)

Whereas; β_1, β_2, β_3, β_4 and β_5 are the coefficints of income inequality , per capita health expenditure, literacy rate, population per doctor and institutional setup affecting infant mortality and life expectancy as a measure of health status respectively. While; β_6 expresses the coefficient of interaction term between income inequality and political setup.

Substituting infant mortality (IM) and life expectancy (LE) separately as a measure of health status in the model (1), the following models were obtained;

$$IM_t = \beta_0 + \beta_1 GI_t + \beta_2 PCHE_t + \beta_3 LR + \beta_4 PDR_t + \beta_5 PI_t + \beta_6 (GI * PI)_t + \varepsilon_t \ldots\ldots (2)$$

$$LE_t = \beta_0 + \beta_1 GI_t + \beta_2 PCHE_t + \beta_3 LR + \beta_4 PDR_t + \beta_5 PI_t + \beta_6 (GI * PI)_t + \varepsilon_t \ldots\ldots (3)$$

To estimate the above models, time-series data for the period 1973-2010 was taken from various issues of Economic Survey of Pakistan, World Development Indicators (2012) and International Country Risk Guide.

Econometric Methodology

The first step in our analysis was to check the stationarity of the selected variables. If all variables were stationary at the same order of integration then Johansen and Juselius (J-J, 1990) co-integration technique; based on following VAR model could be applied to examine the long-run relationship between variables.

$$\Delta Z_t = \tau + \Pi Z_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta Z_{t-i} + m_t \ldots\ldots (4)$$

Where Z_t = [Hstatus, IncIneq, PCHE , LR, PDR, Inst, IncIneq*Inst] is a column vector Π and Γ_i are the coefficient matrices, k-1 denote the number of lags and m_t is a 6 X 1 vector of white noise error terms. The rank of the matrix Π provided information regarding the long-run relationship.

After the existence of the long - run relationship among variables, short run dynamics were captured by estimating the following Error Correction Model (ECM).

$$\Delta IM = \alpha_0 + \sum_{i=1} \gamma_i \Delta IM_{t-i} + \sum_{i=1} \lambda_i \Delta GI_{t-i} + \sum_{i=1} \delta_i \Delta PCHE_{t-i} + \sum_{i=1} \eta_i \Delta LR_{t-i} + \sum_{i=1} \phi_i \Delta PDR_{t-i} + \sum_{i=1} \varphi_i \Delta PI_{t-i} + \sum_{i=1} \omega_i \Delta GI * PI_{t-i} + \zeta EC_{t-1} + \mu_t \ldots\ldots (5)$$

$$\Delta LE = \alpha_0 + \sum_{i=1} \gamma_i \Delta LE_{t-i} + \sum_{i=1} \lambda_i \Delta GI_{t-i} + \sum_{i=1} \delta_i \Delta PCHE_{t-i} + \sum_{i=1} \eta_i \Delta LR_{t-i} + \sum_{i=1} \phi_i \Delta PDR_{t-i} + \sum_{i=1} \varphi_i \Delta PI_{t-i} + \sum_{i=1} \omega_i \Delta GI * Inst_{t-i} + \zeta EC_{t-1} + \mu_t \ldots\ldots (6)$$

The error correction term indicates the speed of adjustment back to long run disequilibria after a short run shocks. Further, causality is tested by applying Granger Causality/block exogenity Wald test. Finally, diagnostic tests like Breusch-Godfrey LM test for serial correlation, White test for Heteroskedasticity and Jarque-Bera test for Normality were applied to confirm that the lag length selected by appropriate criteria best fits the VAR model.

RESULTS AND DISCUSSION

Augmented Dickey Fuller (ADF, 1986) unit root test was employed to check stationarity of the variables in the study. Results (Table 1) show that all the selected variables were non-stationary in their level form but hypothesis of non-stationary was rejected at first difference form. Thus, indicating that all the variables were first difference stationary or integrated of order one.

The next step was to determine the long-run linear relationship among variables by applying J-J Co-integration technique. According to Shwartz Information Criterion (SIC) the optimal lag length of 2 was selected for eq-5 and 1 for eq-6. According to J-J Co-integration results (Table 2), Trace statistic and Maximum Eigen statistics rejected the null hypothesis of no co- integration relationship at one percent significance level, thus indicating the existence of a long run relationship in both models of health status.

Results of normalized co-integration equation for infant mortality (Table 3) show that income inequality had a significant effect in increasing the infant mortality rate as a 1 percentage point increase in gini-coefficient raised the infant mortality by 7.03 percentage points. The coefficient of institutional quality also had a significant effect in increasing the infant mortality rate in Pakistan. It explained that, in democratic regimes in Pakistan, unequal distribution of resources was witnessed and people got less relief. The infant mortality can be reduced in the country by increasing per capita public health expenditure, the Number of doctors per population and the literacy rate. Furthermore, a quality institutional system characterized with political stability reduced the adverse effects of income inequality on infant mortality. Otherwise income inequality coupled with tyrannical and despotic institutional and political system might aggravate the health situation shown by the upsurge in infant mortality rate.

According to the results of the normalized co-integration equation for life expectancy (Table 3) income inequality negatively adversely affected the life expectancy while per capita health expenditures, Number of doctors per population and literacy rate had positively impact on the span of people's life in Pakistan. Average expected Life of adults in Pakistan

Table 1: ADF Test Results

Variables	at Level				at 1st Difference			
	Constant & no trend		Constant & trend		Constant & no trend		Constant & trend	
	Test stat.	P-Value	Test stat.	P-Value	Test stat.	P-value	Test stat.	P-value
IM	-1.29	0.62	-1.10	0.91	-3.48	0.015	-3.75	0.05
LE	-2.43	0.14	-2.85	0.19	-4.87	0.0004	-5.35	0.0006
GI	-2.44	0.14	0.71	0.99	-2.95	0.049	-4.98	0.005
PI	-2.16	0.22	-2.15	0.49	-3.96	0.004	-4.07	0.013
LR	1.19	0.99	-2.09	0.53	-2.81	0.07	-3.30	0.084
PCHE	2.67	1.00	1.93	1.00	-2.65	0.08	-3.32	0.075
PDR	-2.06	0.26	-2.35	0.39	-4.76	0.0007	-3.34	0.070
GI*PI	-2.08	0.25	-2.06	0.55	-3.96	0.004	-4.06	0.016

Table 2: Johansen Co integration Test Results

(Variables: IM, GI, PI, LR, PDR, GI*PI)					
Hypotheses	Trace Statistic	P-Value	Hypotheses	Max-Eigen Stat.	P-Value
R=0	280.98	0.00	R=0	91.34	0.00
R≤1	189.64	0.00	R=1	73.89	0.00
R≤2	115.74	0.00	R=2	47.24	0.0002
R≤3	68.49	0.00	R=3	29.34	0.009
R≤4	39.16	0.0003	R=4	24.95	0.0036
R≤5	14.20	0.02	R=5	13.49	0.019
R≤6	0.71	0.45	R=6	0.709	0.458
(Variables: LE, GI, PI, LR, PDR, GI*PI)					
R=0	235.44	0.00	R=0	76.39	0.0000
R≤1	159.05	0.00	R=1	58.33	0.0002
R≤2	100.72	0.0003	R=2	29.61	0.1831
R≤3	71.11	0.0008	R=3	25.79	0.1091
R≤4	45.32	0.003	R=4	23.50	0.0338
R≤5	21.81	0.03	R=5	16.54	0.0396
R≤6	5.27	0.25	R=6	5.273	0.2548

Table 3: Normalized Co-integrating Equation

Variables	(Dependent Variable: IM)		(Dependent Variable: LE)	
	Coefficient	Test-stat	Coefficient	Test-stat
GI	7.036	45.68	-0.65	-3.9
PCHE	- 0.22	-7.4	0.006	3.91
PI	4.45	7.24	-0.69	10.83
LR	-2.23	-8.27	0.41	8.48
PDR	-0.004	-24.75	0.0004	7.28
GI*PI	-0.134	-8.23	0.02	11.13

Table 4: ECM Test Results

Variables	Dependent Variable: ΔIM		Dependent Variable: ΔLE	
	Coefficient	T-Ratio	Coefficient	T-Ratio
Constant	-1.95	-2.37	0.098	0.73
ΔGI	3.038	2.20	-0.49	-1.016
ΔLR	-0.27	0.59	0.002	0.015
ΔPCHE	0.016	1.77	0.0004	0.13
ΔPDR	-0.001	-2.51	0.00007	0.36
ΔPI	0.49	1.89	-0.42	-3.22
ΔGI*PI	-0.013	-1.35	0.01	3.08
EC(-1)	-0.28	-1.98	-0.74	-6.45
R^2	0.668		0.645	
Adj- R^2	0.613		0.560	
F-test	4.399		7.556	

reduced in the wake of political instability due to prevalence of nepotism, chaos, disturbance, allocation of resources to non productive sectors of economy and inconsistency of policies very particular with an unstable political system of South Asian countries. The coefficient of the interaction term indicates that better income distribution in the presence of efficient and sovereign institutions significantly increased the expected life span of the masses living in the country.

In the above both models the long run relationship existed therefore it was possible to estimate the short run dynamics also. In the ECM model for the infant mortality (Table 4), lagged error-correction term revealed that if any shock caused instabilities in the system, about 28 percent of disequilibria of previous period might be corrected in the next period. The result also showed that income inequality, per capita government health expenditure, Number of doctors, literacy rate and political stability contributed significantly in reducing infant mortality rate even in smaller duration. Similarly, in life expectancy model, 74% of the imbalance in previous period could be be corrected in the current period. Moreover, F-statistics value being greater than critical value i.e. 3.64, showed the overall significance of the both fitted models.

Granger Causality through block Exogeneity Wald test results reported in Table 5 showed that there existed unidirectional causality running from gini- coefficient to infant mortality on the one hand and from infant mortality to per capita public health expenditure and Number of doctors per population on the other hand. Bi-directional causality existed between infant mortality and literacy rate. However, no causality was observed between political instability and infant mortality rate in our selected sample period.

In life expectancy model, results of Granger causality (Table 5) indicated bi-directional causality between Gini-coefficient and life expectancy and between life expectancy and Number of doctors per population. Uni-directional causality was observed running from per capita public health expenditure to life expectancy and also from literacy rate to life expectancy rate. This result particulary emphasized the importance of infrastructure building in education and health. Finally, the application of diagnostic tests confirmed that both the models were free from the problem of serial correlation,,heteroskedasticity and were normally distributed (Table 6).

Table 5: Granger Causality / Block Exogeneity Wald Tests Results

(Dependent Variable: IM)					(Dependent Variable: LE)				
Direction of Causality			χ^2 Test	P-Value	Direction of Causality			χ^2 Test	P-Value
GI	→	IM	7.38	0.054	GI	→	LE	13.90	0.003
IM	NO	GI	3.78	0.28	LE	→	GI	7.16	0.067
PCHE	NO	IM	3.43	0.33	PCHE	→	LE	6.77	0.067
IM	→	PCHE	18.46	0.0004	LE	NO	PCHE	1.51	0.72
LR	→	IM	9.044	0.028	LR	→	LE	7.08	0.05
IM	→	LR	6.72	0.082	LE	NO	LR	3.34	0.38
PDR	NO	IM	2.70	0.44	PDR	→	LE	9.94	0.02
IM	→	PDR	6.62	0.085	LE	→	PDR	4.07	0.25
PI	NO	IM	4.43	0.218	PI	NO	LE	2.71	0.44
IM	NO	PI	2.001	0.57	LE	→	PI	6.77	0.08

Table 6: Diagnostic Test Results

	Dependent Variable: IM		Dependent Variable: LE	
Diagnostic Test	Test Statistics	P-value	Test Statistics	P-value
Serial Correlation LM Test	0.99	0.73	0.37	0.55
White Heteroskedasticity Test	1.57	0.21	0.68	0.74
Jarque-Bera Normality Test	0.35	0.84	1.17	0.55

Conclusion

The main objectives of this study were to examine the impact of income inequality on people's health and evaluate whether this effect depends on institutional structure prevailing in the country; using annual data for the period over 1973-2010 in Pakistan. The result of co-integration and error-correction model revealed that unequal income distribution worsened people's health by increasing infant mortality rate and reducing the life expectancy rate. However, this negative effect might be reduced by introducing efficient institutional structure in Pakistan. The result also showed all control variables, per capita public health expenditure, literacy rate and the Number of doctors positively affected people's health both in long-run and in short-run. The study also found causal relationship between income inequality and health status indicators. An important policy implication came that in order to avoid the adverse impacts of income inequality on health Pakistan should adopt distributive policy and improve its institutional structure.

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