



Impact of Human Capital on Poverty Reduction in Pakistan

Rashid Naweed Rashid¹, Muhammad Kashif Saeed², Hashim Ali³

¹ Assistant Professor, Government Graduate College Toba Tek Singh, Pakistan. Email: rashidnaweed97@gmail.com

² Assistant Professor, Government Graduate College Toba Tek Singh, Pakistan. Email: mkssaeed_tts@yahoo.com

³ Assistant Professor, Government Graduate College Toba Tek Singh, Pakistan. Email: hashimgagrana@gmail.com

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ABSTRACT

This paper determines the impact of various health indicators on poverty reduction in Pakistan. Health indicators affect the Poverty through increasing Labor productivity and through improving Education. GNP per capita is a proxy variable for poverty reduction. Life Expectancy, infant mortality rate, total health Expenditures, and Population per doctor are explanatory variables in Model 1. The study has regressed these health indicators on Education in Model 2. To determine the Short-run and long run relationship among the variables the research applied the Co-integration (ARDL) and Error Correction Model. The study uses the Augmented- Dickey-Fuller test to check the unit root. The study has analyzed the time series data of Pakistan from 1985 to 2021. The research finds that health indicators like: Life expectancy and Infant mortality increase the GDP per Capita in the long run. The health indicators also have positive effects on education and as a result, Education increases the GDP per capita in the short- run and long run. The research concludes that improvement in human capital leads to decrease the poverty and to improve the health and education sectors of the society. The major policy implication of this study is that to decrease poverty and look for a healthy and educated society, then the government should urgently and seriously focus on the health sector of Pakistan.



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Corresponding Author's Email: rashidnaweed97@gmail.com

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1. Introduction

In the Existing literature, several studies have focused to analyze the effects of poverty on human development. It is a very well-known theory that decreasing poverty stimulates human development and vice versa. Nevertheless, very little literature exists which have discussed the human development effects on poverty. Investment in the health sector is not only desirable but also an essential priority for most societies. Human development has a significant role to improve the living conditions in every society (Sharafat Ali & Ahmad, 2013; De la Fuente & Doménech, 2006; Riley, 2012). A country, that wishes to improve the lives of its people, must provide equal rights and opportunities to the masses. A society cannot achieve the goals of a peaceful and healthy society without investing in human capital (Bassanini & Scarpetta, 2001).

Health, Education, and income are considered to be the most important factors for human development (Afzal, Farooq, Ahmad, Begum, & Quddus, 2010; Oforegbunam & Okorafor, 2010). Improvement in these factors enables the country to get rid of poverty and provide equal human Rights (Gyimah-Brempong & Wilson, 2004; Liao, Zhang, & Zhang, 2022). Although Physical fitness in the form of human capital contributes to economic development, most empirical studies identify physical fitness narrowly with education (Sunde & Vischer, 2015). Our fundamental argument is that this practice does not take into account the strong reasons for considering health to be a critical characteristic of poverty reduction. Therefore, health is a crucial ingredient of economic development and ultimately decreases poverty (Ahmad, Natochin, Artemyev, & O'Tousa, 2007; Ogundari & Awokuse, 2018). Healthier workers are mentally and physically more productive and robust. They are more fruitful and earn higher incomes. They are also less likely to be remaining absent from duties due to their illness or in their families (Yahaya, 2007).

Disability and Illness reduce the working hours and hourly wages significantly. This effect is particularly strong in developing economies like Pakistan where a considerable part of the labor force is engaged in manual labor than in developed countries (Bontis & Serenko, 2009; Dessler, 2000; Garavan, Morley, Gunnigle, & Collins, 2001). Health indicators in the form of infant mortality, life expectancy, health facilities, and health expenditures have appeared in many cross-country analyses and found that it has a significant effect on the reduction of poverty (Amin, 2012; Bloom & Canning, 2000).

2. Literature Review

Healthy persons remain more productive for society and their families (Schultz, 2005). Physical and mental fitness increases the performance of every individual and ultimately results in the form of higher wages (Bhargava, Jamison, Lau, & Murray, 2001). They have more job opportunities and can adjust to tough circumstances. Ill persons remain on leaves and also show laziness during working hours (García Gómez & López Nicolás, 2006). No one would like to oblige these types of persons and as result, they remained jobless (Dragano & Wahrendorf, 2014). However, the empirical studies Bloom and Canning (2000) analyze the effects of labor productivity on health on per capita income. Lorentzen et al. (2005) in research decreased the gap between the empirical and theoretical work in a cross-country analysis.

Good health has a significant positive and sizeable effect on the GDP in general and on personal income in particular (Bhargava et al., 2001; Ogundari & Awokuse, 2018). A healthy person has more and more opportunities to do the work. He or she can perform his/her duties more productively which leads to more contribution to the production and as a result, will earn more money (Well, 2007). It is generally accepted that High life expectancy is linked with lower morbidity and better health conditions (Murray & Lopez, 1997). There exists a positive relationship between Poverty reduction and health conditions (Pollack 2013). It is a well-known phenomenon that health issues have a deep concerned with the level of personal income, particularly in developing countries (Mehrra & Musai, 2013).

Middle-class persons enjoy good health than the poorest. But, on the other hand, the middle class is less healthy than the upper class. Even wealth and income have different effects on health. Persons who have more wealth are less healthy than those with higher incomes (National Center for Health Statistics, 2012). The old proverb, Health before wealth, can be voluntarily understood in developing countries by assessing the correlation between poverty and poor health conditions (Khan, Amjad, & Din, 2005). Excellent health conditions enhance labor productivity, income, and educational attainments which as a result reduce the poverty (Awan & Khan, 2015). When poor families realize that their Childs likely to be healthier, they like to reduce the family size and as a result per capita income will increase. As a result, world projects that aim to improve the health conditions in developing countries could lead to help in fighting against worldwide poverty (WHO, 2001).

The health of the head of the household is even more important than the rest of the family members. When the head of household is injured or becomes ill, the whole family can become suffered in a twist of a sudden decline in income and unexpected health care expenditures (Jamison, Lau, & Wang, 2005). The world community has focused on three Millennium Development Goals that emphasize health improvements like high rate of life expectancy, reducing infant mortality, decreasing maternal death, and controlling the different chronic diseases like Tuberculosis, HIV/AIDS, and Malaria. Other achievements of MDGs—especially are: eliminating starvation and poverty, attaining female empowerment 100% literacy rate – significantly depending on better health (Mayer, 2001; Nasir & Iqbal, 2009). The previous research shows a strong association between health conditions and poverty reduction through economic development in all economies particularly in developing countries (Ahmad et al., 2007; Amin, 2012; Pelinescu, 2015).

3. Theoretical Framework

3.1 Data

The research has used the Time series secondary data from 1985 to 2021. The data was collected from different sources: Pakistan Economic Surveys, Pakistan Bureau of Statistics, World Development Indicators, Pakistan statistics yearly books, and publications of the State Bank of Pakistan.

3.2 Model Specification

Model 1

$$GDP = \Omega_0 + \Omega_1 LE + \Omega_2 IM + \Omega_3 HE + \Omega_4 POPD + \varepsilon_t \quad (1)$$

Model 2

$$LR = \phi_0 + \phi_1 LE + \phi_2 IM + \phi_3 HE + \phi_4 POP + \varepsilon_t \quad (2)$$

GDP per capita is a dependent variable that has been used proxy for Poverty measures. Health indicators: Life expectancy, infant mortality rate, health expenditures, and Population per Doctor are the independent variables in the first model Literacy rate is a dependent variable in Model 2.

3.3 Methodology

In the existing literature, many econometrics techniques like Engle and Granger (1987), maximum likelihood (1988), Hansen's (1990), Johansen and Juselius (1990) have been used to find the relationship among the variables. Many researchers have used the Johanson cointegration and vector error correction model for the determination of long-run and short-run relationships among the time series variables. However, these approaches have some serious methodological flaws (Pesaran, Shin, & Smith, 2001).

Pesaran and Shin (1999) and Pesaran, Shin, and Smith (1996) introduced the autoregressive distributive lag (ARDL) approach and further scrutinized by Pesaran et al. (2001). This is the most appropriate technique to establish the long-run and short-run relationships among the variables. We have specified the following models for estimations:

Model 1: The null hypothesis is defined as:

$$H_0: \Omega_1 = \Omega_2 = \Omega_3 = \Omega_4 = \Omega_5 = 0 \quad (3)$$

The alternative hypothesis is defined as:

$$H_1: \Omega_1 \neq \Omega_2 \neq \Omega_3 \neq \Omega_4 \neq \Omega_5 \neq 0 \quad (4)$$

To analyze the joint significance of, $\Omega_1, \Omega_2, \Omega_3, \Omega_4,$ and Ω_5 , the F-Statistics is computed. The following equation has been used:

$$\Delta GDP_t = \delta_0 + \delta_1 \Delta GDP_{t-1} + \delta_2 \Delta LE_{t-1} + \delta_3 \Delta IM_{t-1} + \delta_4 \Delta HE_{t-1} + \delta_5 \Delta POPD_{t-1} + \varepsilon_t \quad (5)$$

A variable addition test is conducted by using the following equation:

$$\Omega_1 GDP_{t-1}, \Omega_2 LE_{t-1}, \Omega_3 IM_{t-1}, \Omega_4 HE_{t-1}, \Omega_5 POPD_{t-1} \quad (6)$$

Where GDP is the gross domestic production per capita, representing the poverty situation in the country, LE is the life expectancy in the years, IM is the infant mortality rate per thousand, HE is the total health expenditures in billions, POPD is the population per doctor.

Model 2:

Null hypothesis

$$H_0: \phi_1 = \phi_2 = \phi_3 = \phi_4 = \phi_5 = 0 \quad (7)$$

The alternative hypothesis is defined as:

$$H_1: \phi_1 \neq 0, \phi_2 \neq 0, \phi_3 \neq 0, \phi_4 \neq 0, \phi_5 \neq 0 \quad (8)$$

To analyze the joint significance of $\phi_1, \phi_2, \phi_3, \phi_4,$ and ϕ_5 . The F-Statistics is computed. By the following equation.

$$\Delta LR_t = \varrho_0 + \varrho_1 LR_{t-1} + \varrho_2 \Delta LE_{t-1} + \varrho_3 \Delta IM_{t-1} + \varrho_4 \Delta HE_{t-1} + \varrho_5 \Delta POPD_{t-1} + \varepsilon_t \quad (9)$$

The variable addition test is conducted by using the following equation:

$$\phi_1 LR_{t-1}, \phi_2 LE_{t-1}, \phi_3 IM_{t-1}, \phi_4 HE_{t-1}, \phi_5 POPD_{t-1} \quad (10)$$

Where LR represents Literacy rate of Pakistan the other variables are already defined in the previous model.

3.4 Co-integration and Error Correction Mechanism

Model 1: ARDL (p, q1, q2, q3, q4) for Health indicators effects on GDP per capita

The following equation has been specified to find the long run coefficients:

$$\Delta GDP = \delta_0 + \sum_{i=1}^p \delta_i \Delta GDP_{t-i} + \sum_{i=1}^{q_1} \delta_i \Delta LE_{t-i} + \sum_{i=1}^{q_2} \delta_i \Delta IM_{t-i} + \sum_{i=1}^{q_3} \delta_i \Delta HE_{t-i} + \sum_{i=1}^{q_4} \delta_i \Delta POP_{t-i} + \varepsilon_t \quad (11)$$

The order of ARDL (p, q1, q2, q3, q4) has been specified by using the Schwartz Bayesian Criterion (SBC). In accordance with above long run estimates, the short run dynamics parameters of ARDL model have been estimated by the following error correction model:

$$\Delta GDP = \delta_0 + \sum_{i=1}^p \delta_i \Delta GDP_{t-i} + \sum_{j=1}^q \delta_j \Delta LE_{t-j} + \sum_{k=1}^q \delta_k \Delta IM_{t-k} + \sum_{l=1}^q \delta_l \Delta HE_{t-l} + \sum_{m=1}^q \delta_m \Delta POP_{t-m} + \vartheta \varepsilon_{t-1} + \varepsilon_t \quad (12)$$

Where ϑ is the speed of adjustment of concerned model towards equilibrium and $\delta_0, \delta_i, \delta_j, \delta_k, \delta_l$ and δ_m are short run coefficients.

Model 2: To find the long coefficients, the following ARDL (p, q1, q2, q3, q4,) model has been specified:

$$\Delta LR = \varrho_0 + \sum_{i=1}^p \varrho_i \Delta GDP_{t-i} + \sum_{i=1}^{q1} \varrho_i \Delta LE_{t-i} + \sum_{i=1}^{q2} \varrho_i \Delta IM_{t-i} + \sum_{i=1}^{q3} \varrho_i \Delta HE_{t-i} + \sum_{i=1}^{q4} \varrho_i POP_{t-i} + \varepsilon_t \quad (13)$$

The order of ARDL (p, q1, q2, q3, q4) has been specified by using the Schwartz Bayesian Criterion (SBC). In accordance with above long run estimates, the short run dynamics parameters of ARDL model have been estimated by the following error correction model:

$$\Delta LR = \varrho_0 + \sum_{i=1}^p \varrho_i \Delta GDP_{t-i} + \sum_{j=1}^q \varrho_j \Delta LE_{t-j} + \sum_{k=1}^q \varrho_k \Delta IM_{t-k} + \sum_{l=1}^q \varrho_l \Delta HE_{t-l} + \sum_{m=1}^q \varrho_m POP_{t-m} + \theta \varepsilon_{t-1} + \varepsilon_t \quad (14)$$

Where $\varrho_0, \varrho_i, \varrho_j, \varrho_k, \varrho_l$ and ϱ_m are short run coefficients while θ is the speed of adjustment toward the equilibrium.

4. Results and Discussions

4.1 Unit root test and Bound Test

The Augmented Dickey Fuller test is used to check the stationary of the data. None of the variable is integrated order I (2) which is the preliminary condition to apply the Bounds test Methodology.

4.2 Bounds Test

The bounds test procedure is the necessary condition for ARDL approach. By the OLS method, F-Test is conducted to find the long run relationship between the variables. Since the study is using annual time series data 1 lag is selected for the order of lags. The Computed F-statistics for Model 1, has the 99% level of significance. The computed F-statistics for Model 2 shows the Cointegration relationship at 95% level of significance.

Table 1
Results of bound test for Co-integration

Equation	F-statistics	Upper bond value	Conclusion
Model 1 GDP/ LE, IM, HE, POPD, GR	4.31	95% (3.61)	Co-integration
Model 2 EDU/ LE, IM, HE, POPD	7.21	99% (4.43)	Co-integration

Source: Author’s calculations

Model 1:

The relationship between Life Expectancy and GDP per Capita is positive and statistically significant in both the short- run and long- run. It shows that with an increase in living years, the person earns more and more money due to the enlargement in the earning period. A healthy person can utilize the working age more effectively. This result is consistent with previous research (Sajid Ali, Sharif Chaudhry, & Farooq, 2012; Liao et al., 2022). It proves that a person leading a healthy lifestyle has more chances to alleviate poverty (Amin, 2012). Infant mortality has negative effects on the GDP per capita both in the short run and long run (Pelinescu, 2015).

Health expenditures also have a positive relationship with the GDP per Capita (Awan, 2012). An increase in health expenditures means better health facilities and a healthy society. A healthy society ultimately has good living standards and a reduction in poverty is essential. Population per Doctor has not a significant relationship with GDP per capita in the long run but in the short term, it has a significant effect on the dependent variable.

Model 2:

The result of this study shows that life expectancy has a positive and significant effect on the literacy rate in Pakistan. An increase in the living years will lead to an increase in the literacy rate (Moonie, Sterling, Figgs, & Castro, 2008). However, its process of effectiveness is a little bit technical. Infant mortality has a very minor effect on the literacy rate. Health expenditures have no significant relationship with the Literacy rate. Population per doctor variable has a negative and significant relationship with the literacy rate. It shows that as the availability of doctors increases, they can cure diseases timely and effective. The previous researches also show that a Healthy society has a good literacy rate (Glewwe, 2005; Taras & Potts-Datema, 2005; Trudeau & Shephard, 2008). In the short-run analysis, all the variables have the same effects on the dependent variable. However, health expenditures that have no effect on education in long-run it is also significant in the short-run.

4.3 Error-correction Mechanism

The coefficients of the error term show the speed at which the GDP per capita adjusts to its steady level. The first model suggests the adjustment speed of -0.72, it describes that 72 percent of the adjustment in the actual GDP per capita towards its long-run level happens within a year in Pakistan. In the second model, the speed of adjustment is -0.46 which shows that 47 percent of the adjustment in educational indicators towards its long-run equilibrium takes place in a year.

Table 2

Long run Effects of Health indicators on GDP per capita (Model 1)

Dependent variable: GDP per capita		
Period: 1985 to 2021 ARDL (0,1,1,0,1) (Schwarz Information criterion)		
Regressors	(Coefficients)	(t-ratios)
Constant	4.3521	8.653
Life Expectancy	3.542*	7.613
Infant Mortality	-0.2753***	-1.721
Health Expenditures	0.883*	5.653
Population per Doctor	-0.251	-0.143

Source: Author's Calculations, Level of Significance: *1% **5% ***10%

Table 3

Short run Effects of Health Indicators on GDP per Capita (Model 1)

Dependent variable: GDP per capita		
Period: 1985 to 2021 ARDL (0,1,1,0,1) Selected on (Schwarz Information criterion)		
Regressors	(Coefficients)	(t-ratios)
Δ Constants	8.826	3.412
Δ Lagged Dependent Variable	0.876*	4.176
Δ Life Expectancy	1.276**	2.149
Δ Infant mortality	-0.183***	-1.935
Δ Health Expenditures	0.242*	2.741
Δ Population per Doctor	-0.220*	-2.767
Error term(-1)	-0.727*	-6.658

R-Square = 0.7696

R-Bar-Square=0.689

D.W Statistics= 1.941

F-Statistics = 9.335 (0.000)

Source: Author's calculations, Level of Significance: *1% **5% ***10%

Table 4
Long run Effects of Health Indicators on Education (Model 2)

Dependent variable: Literacy Rate		
Period: 1985 to 2021 ARDL (0,1,1,1,1) Selected on (Schwarz Information criterion)		
Regressors	(Coefficients)	t -ratio
constant	1.431***	1.851
Lagged Dependent Variable	0.643**	2.290
Life Expectancy	3.375*	3.621
Infant Mortality rate	-1.511**	-2.320
Health Expenditures	0.642	0.661
Population per Doctor	-0.621*	-2.738

Source: Author's calculations, Level of Significance:*1% **5% ***10%

Table 5
Short run Effects of Health Indicators on Education (Model 2)

Dependent variable: Literacy Rate		
Period: 1985 to 2021 ARDL (0,1,1,1,1) Selected on Schwarz Information criterion)		
Explanatory Variable	(Coefficients)	(t -ratios)
Δ Constant	12.522**	1.689
Δ Lagged Dependent Variable	1.352***	0.765
Δ Life Expectancy	1.530*	3.022
Δ Infant Mortality Rate	- 0.299*	- 2.731
Health Expenditures	0.306*	3.761
Population per Doctor	-0.256**	-1.652
Error term(-1)	-0.47*	-3.587

D.W Statistics=1.977 F-Values = 9.951 (0.000) Value of R-Square= 0.811

R-Bar-Square= 0.721

Source: Author's calculations, Level of Significance:*1% **5% ***10%

5. Conclusions and Policy Implications

The main objective of this study is to describe the short-run as well as long-run relationship between development in human capital and poverty reduction. The Time series data from 1985 to 2021 has been used. GDP per capita has been used as a proxy for poverty reduction, although it is a weak representative of poverty. Co-integration ARDL approach coupled with Error correction model test has been used to analyze the short-run and long-run relationship among the concerned variables. The results show that health indicators have the strong impact on the reduction of poverty through the increase in the GDP per capita. It has been further proved that improvement in the health sector positively influences the education sector in the country. The findings clearly have shown that Health and educational attainments have positive impacts on poverty reduction. The most important thing is the hopeful chances of escaping poverty of a country, which increase the health facilities and educational levels. Therefore, the health and education are the most important factors regarding poverty. The positive health indicators and educational attainments enhance the earning potential of the individuals and consequently, the high income will certainly help them to break the vicious circle of poverty.

The research concludes that human development is the important determinant of poverty reduction. By investing in the health and educational sectors will not only improve the living standards of the individuals but it will also make it convenient to reduce the poverty in Pakistan. Moreover, the health has dual effects on poverty. It directly affects the GDP per Capita through health improvements and it indirectly affects the poverty through improvement in education.

We conclude that the good health decreases the poverty and reduction in poverty increases the health facilities. So, health has the multiplier effects on the poverty reduction. The research suggests the followings policy implications:

1. Investment in human capital is essential for economic development. Therefore, Government and private sectors should focus on the human capital.
2. Health is the very basic determinant of human development. To reduce the poverty the health indicators must be positive. Govt. should start the basic health programmes to aware the people about the diseases and educate how they can eradicate these diseases.
3. People should have easy access to health facilities.
4. Literacy rate also plays an important role in the poverty reduction. Therefore, the Government should increase the health and education budget to provide the better health and educational facilities. The focus on the health is more important than on the other sectors.
5. Further research can be undertaken by using the alternative models and economic techniques to better research results and policy research formation for reduction of poverty.

Authors Contribution

Rashid Naweed Rashid: design of the work, critical revision, incorporation of intellectual content
Muhammad Kashif Saeed: introduction, data analysis and interpretation, drafting the article
Hashim Ali: data collection, literature search, drafting the article

Conflict of Interests/Disclosures

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