

# **Determinants of Human Development Disparities: A Cross District Analysis of Punjab, Pakistan**

Muhammad Qasim and Amatul Razzaq Chaudhary\*

National College of Business Administration & Economics (NCBA&E), Lahore, Pakistan.

## **Abstract:**

It is important to study development disparities among regions because it may create a severe type of rivalry and distrust among the different regions. People are the means and also the end of all development activities. It is observed that human development disparities exist across the regions of Punjab. Present study investigates some important socio-economic determinants of human development disparities across the districts of Punjab. For this purpose thirty-five districts of Punjab are considered, one district, Chiniot is excluded because of some data limitations. We have used Human Development Index (HDI) and Non-Income Human Development Index (NIHDI) as dependent variables. Social infrastructure, remittances, industrialization and population density have been taken as determinants of HDI and NIHDI. The results of our study indicate that all four variables show a positive and significant relationship with HDI. Out of four variables, three variables excluding population density show positive and significant relationship with NIHDI. Population density has insignificant association with NIHDI. So, the districts with poor human development especially the districts in Western and Southern regions of Punjab are identified as target for special policy interventions to improve human development.

**Keywords:** Human Development, Social Infrastructure, Remittances, Industrialization, Population Density

**JEL Classification Numbers:** O15, H41, J61, L6, J11.

## **1. Introduction:**

Human development is the primary objective of all developing economies of the world. It has great importance in social planning. Every individual, society and nation wants a prosperous life.

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*\*Address of Correspondence:* Muhammad Qasim < email: [mqasim\\_attari@yahoo.com](mailto:mqasim_attari@yahoo.com) > is Ph.D. student in applied economics at NCBA&E Lahore, Pakistan. Amatul Razzaq Chaudhary < email : > is Professor/Dean of School Social Sciences at NCBA&E Lahore, Pakistan.

Different instruments are used, investments are undertaken and different policy frameworks are designed to achieve this target. Human development is a process to enlarge the choices of people. So, the definition of human development is very broad, but people have three basic and essential choices which are acceptable at every level of development. First, people always have desire to live a long and healthy life. Second, they have desire to expand their knowledge. Third, people have desire to access the resources needed for a decent standard of living (UNDP, 1990).

United Nations Development Programs (UNDP) introduced Human Development Index (HDI) in 1990 covers three dimensions. It evaluates the average improvement in a nation or region in basic three aspects of human development, a long and healthy life, access to knowledge and decent standard of living. The HDI is the geometric mean of normalized indices measuring the improvements in each aspect (UNDP, 2011).

It is observed that human development disparities exist across the countries and regions of the world. Different countries have different HDI values like Australia 0.929, Germany 0.905, Singapore 0.866, United States 0.910, China 0.687, Saudi Arabia 0.770, India 0.547, Sudan 0.408 and Afghanistan 0.398. These disparities exist even among those countries which fall in the same range of GDP per capita. For example Sri-Lanka and Egypt fall in the same range of GDP per capita but both have different human development status, HDI value of Sri Lanka is 0.691 whereas HDI value of Egypt is 0.644. Similarly Pakistan and Viet Nam fall in the same range of GDP per capita but both have different human development status, HDI value of Viet Nam is 0.593 whereas HDI value of Pakistan is 0.5042 (UNDP, 2011).

There may be various factors which may be held responsible for human development disparities. Differences of institutional quality have been identified as one of the most important of these factors. North (1990) describes that development disparities across the countries are due to difference in quality of institutions. According to him countries differ in human development due to different institutional arrangements. However differences in human development can also be observed across the regions of the same country even with same institutional arrangements. Pakistan may be an interesting case study in this regard, where regional disparities exist among the provinces as well as within provinces.

UNDP (2003) calculated human development indices at districts level in Pakistan. Their results show that there are big human development gaps among the districts of Pakistan; for example HDI value of Jhelum is 0.703 and HDI value of Dera Bhugti is 0.285. Jamal and Khan (2007) and Siddique (2008) have also pointed out big human development imbalances among the districts of Pakistan. Inequality in public provision of social services like clean drinking water, education, and health relate facilities in Pakistan has been also investigated by Chaudhary and Chaudhary (1998). Easterly (2001) called this type of economic growth as “growth without development”.

Punjab is the most populated and developed province of Pakistan. More than half of the population of Pakistan resides in Punjab. The developmental gaps across the districts of Punjab are also clearly observable. The existing literature shows that there are massive human development disparities across the districts of Punjab. The HDI value of Sheikhpura is 0.62,

Lahore 0.558, Muzaffar Garh 0.459, Dera Ghazi Khan 0.471 and Multan is 0.494 (UNDP, 2003). According to Jamal and Khan (2007) HDI value of Jhelum is 0.7698, Kasur 0.7132, Bhakkar 0.7058 Rajanpur 0.631, D.G Khan 0.6307, Muzaffar Garh 0.6201, Bahawalpur 0.6182 and Lodhran is 0.614. Human development disparities among the districts of Punjab have also been pointed out by Qasim and Chaudhary (2014). According to them HDI value of Rawalpindi is 0.6731, Lahore 0.6667, Sheikhpura 0.6487, Faisalabad 0.6267, Sialkot 0.6191, Kasur 0.6178, Nankana Sahib 0.5505, Narowal 0.5452, Rahim Yar Khan 0.5302, Dera Gazi Khan 0.4992, Pakpattan 0.4787, Bahawalnager 0.4769, Lodhran 0.4753, Bahawalpur 0.4521 and Rajanpur is 0.4515.

It is important to study development disparities among regions because it may create a severe type of rivalry and distrust among the different regions which can be dangerous for social cohesion (Pervaiz and Chaudhary, 2010). This distrust and rivalry can hamper the development and wellbeing of the people in different ways. Azfar (1973) points out that inter-regional disparity has created rivalry among the different regions of Pakistan. It implies that inter-regional disparities should be taken care of. The present study tries to investigate some socio-economic factors responsible for these human development disparities among the districts of Punjab. Impact of Social infrastructure, remittances, industrialization, population density on Human Development Index (HDI) and Non Income Human Development Index (NIHDI) has been investigated.

This study is organized in following sections. We have discussed, introduction in section one. Section two consists of brief review of literature. Section three consists of theoretical framework and methodology. Section four is about empirical results and discussion and section five consists of conclusion and policy implication.

## **2. Literature Review:**

There may be various factors which may be held responsible for human development disparities. Many economists such as Marshall (1890), Henderson and Clark (1990), Krugman (1991), Kim (1995), Becker et al., (1999), Chelliah and Shanmugam (2000), Edwards and Ureta (2003), Hanson and Woodruff (2003), Córdova (2005), UNDP (2005), Lopez et al (2007), Hawash (2007), Fayissa and Nsiah (2010) and Tripathi and Pandey (2012) have identified that social infrastructure, remittances, industrialization and population density may determine human development from different aspects across the countries and across the regions of a country.

Different studies indicated that population density, social infrastructure, remittances and industrialization had significant relationship with development from different perspectives. Malthus (1798) studied the universal tendency of population growth and economic development. According to him, if there were no checks on population growth, then population would increase at geometric rate but at the same time due to diminishing returns, food supplies can increase only at arithmetic rate. Because, each member of population would have less land to work and its marginal production would start to decline. But this prediction missed empirical support. The theory ignored the impact of technological progress on growth rate. The modern economic growth is associated with rapid technological progress in the form of scientific, technological and social innovations. All countries therefore have the potential to increase their economic growth

as compared to their population growth. Marshall (1890) described that agglomeration of population increased specialization. Miyashita (1986) pointed out that population density increased agriculture productivity and specialization. Hirschman and Lindblom (1962) described that inter-sectoral backward and forward linkages to economic development in manufacturing were perceived to be much stronger as compare to mining or agriculture which were typically characterised by weak linkages. Papanek (1967) described that industrialization had significant positive impact on economic growth of Pakistan.

Many studies indicated that the social infrastructure had significant relationship with economic development. Mera (1973), Hardy (1980), Antle (1983), Eberts (1986), revealed that social infrastructure had positive relationship with economic development. Romer (1986) indicated investment on human capital as a main source for fast economic growth. Henderson and Clark (1990) described that there was positive impact of population density on productivity. Krugman (1991) pointed out that agglomeration of population expanded economic activity, increased specialization and division of workers. Ravallion (1991) investigated the impact of public expenditures towards provision of social services like infrastructure, education and health facilities on human development. The study examined the relationship of public provision of social services with human development of developing countries by using different indicators of education and health as proxy for human development. The results showed that public expenditures related to public provision of social services especially towards education and health facilities had positive relationship with human development. Anand and Ravallion (1993) worked on the role of private income and public provision of social services in human development of developing economies. The study concluded that private income and public expenditures on health and education facilities had positive impact on human development. It suggested developing economies could improve their human development through increasing public expenditures on education and health.

Lucas (1993) described that due to industrialization, Korea achieved high level of economic development. Kim (1995) examined the impact of industrialization on human capital accumulation. The study concluded that industrialization had positive relationship with human capital accumulation in Korea. He mentioned that the government policies regarding industrialization and human capital accumulation played vital role to improve human development. Tiffen (1995) investigated the relationship between population growth, population density and economic growth in Kenya. The study covered the time period from 1932 to 1990. The results showed that population growth and population density both had strong positive relationship with economic growth in Kenya. Becker et al., (1999) highlighted three important conclusions about the relationship between population density and economic development. First population density had positive impact on productivity. Second high population density enhanced technical innovation and third, population density increased investment in human capital because the productivity of human capital was higher in those regions where population density was high.

Prabhu (1999) investigated the relationship between economic growth, human development and public provision of social services in Maharashtra state of India. The study examined the role of social infrastructure in human development at state level and also at regional level in Maharashtra over the period of 1960 to 1995. The results showed that social

infrastructure had positive relationship with human development and government expenditures on social infrastructure promoted human development across the regions. Chelliah and Shanmugam (2000) discussed some factors which were responsible for human development disparities across the districts of Tamil Nadu. They argued that industrialization and agricultural productivity had important role in the human development. The districts with high degree of industrialization and high agricultural productivity had high levels of human development. Jamal and Khan (2002) investigated the relationship of social development and human development with economic growth in Pakistan. The study constructed Social Development Index (SDI) for social development, growth rate of GDP per capita used for economic growth and HDI for human development. They also examined the causality of economic growth, human development and social development. The results showed that social development and human development had positive relationship with economic growth and all three variables had causal relationships in Pakistan. Chin and Chou (2004) studied the relationship between social infrastructure and economic development among the developing countries of the world. The study concluded that social infrastructure had strong positive relationship with economic development. Those countries which were more efficient in social infrastructure had better economic development as compare to other countries. Public expenditures on social infrastructure had positive impact on human development (Adeyemi et al., 2006) and (Akram, 2007).

Iqbal and Sattar (2005) investigated the impact of remittances on the economic development of Pakistan. The results showed that remittances had positive effect on economic development of Pakistan. The study argued, after empirical analyses from 1972 to 2003, that remittances were an important source to increase economic development of Pakistan. Adams (2006) concluded from an empirical study that remittances generally reduced poverty and could redistribute income. UNDP (2005) examined the impact of industrialization on human development in Kenya. The report studied the relationship of industrialization with different human development indicators like income, education, employment, agricultural productivity, skill formation and entrepreneurship. The overall results showed that there was strong, significant and positive impact of industrialization on human development in Kenya. This report also mentioned some challenges of industrialization to human development in Kenya like rapid urbanization, uneven development and limited skills over specialization, poor worker health, environmental degradation and over-crowded services. The report suggested that industry could be supportive for human development with tackling poverty through industrialization, improving opportunities to work, clean and healthy environment, job security and quality of infrastructure, protection of children, training and education, addressing gender disparity, information and awareness. Hawash (2007) described that industrialization played a vital role to promote economic development in Egypt. Castaldo and Reilly (2007) examined the pattern of household's expenditures after receiving the remittances in Albania. The results showed that Albanian migrants consumed more shares of remittances on human capital (education and health) as compare to other consuming goods. The remittances had positive impact on human development in Albania. Knudsen et al (2008) concluded that the population density had positive correlation with creativity, innovation and human capital.

Siddique (2008) found households income per capita, poverty and public provision of social services as determinants of capability development across the districts of Pakistan. She constructed public provision of social services index with education, health, water and sanitation

facilities. The results of regression indicated that income, public provision of social services had positive impact on capability development and poverty had negative relationship with capability development. Pillai (2008) examined the relationship between human development, economic growth and social infrastructure in Kerala State of India. The study argued that due to strong social infrastructure, Kerala had top ranked position in human development among the Indian states. The empirical results showed that social infrastructure had positive and significant relationship with human development in Kerala State. The human development and economic growth both had causal relationship in Kerala. Keskinen (2008) studied the relationship of population density and economic development in two areas Tonle Sap and Mekong Delta. These two areas were unique in characteristics, Tonle Sap was the area of Cambodia and Mekong Delta was the area of Vietnam. The Mekong had high population density and more developed area as compared to Tonle Sap. The results of empirical analysis showed that population density had positive impact on economic development in both areas. Barseghyan (2008) concluded that population density was positively correlated with productivity through economies of scale.

Szirmai (2009) described that virtually all cases of high, rapid, and sustained economic growth in modern economic development associated with industrialization, particularly growth in manufacturing production. The manufacturing sector offered special opportunities for economies of scale. Szirmai found significant positive correlation of 0.79 between the income per capita and the industrialization. Fayissa and Nsiah (2010) investigated the relationship between aggregate remittances and economic growth with unbalanced panel data from 1980 to 2004 in thirty-seven African countries. The results indicated positive relationship between remittances and economic growth in African countries. Adenutsi (2010) analyzed the long run impact of remittances on human development in low income countries. He selected eighteen Sub-Saharan countries and used panel data from 1987 to 2007 for the study. He concluded that remittances had strong positive and significant impact on the human development in Sub Saharan countries. Yang (2011) studied the relationship between remittances and human development. The results showed that there was positive relationship between remittances and human development aspects (education, health and earning), which could help to reduce poverty. Kibikyo and Omar (2012), Hassan, Mehmood and Hassan (2013) described that remittances had strong positive relationship with different human development indicators. The interactions between HDI and socio-economic variables have not been determined, and the causes of human development variations across the districts of Pakistan have not been discovered.

### **3. Theoretical Framework and Methodology:**

An overview of existing literature shows that there are various factors which may be held responsible for human development disparities across the countries and among the regions of a country. Present study investigates some important socio-economic determinants of human development disparities among the districts of Punjab, Pakistan. Normally, income per capita is used to examine the well-being of a region or country. However income per capita hides so many aspects of the socio-economic conditions of a society. Dasgupta and Weale (1992) describes that per capita income is not an appropriate measure to examine the well-being of a society because it does not necessarily tell about social condition of the society. Therefore this study uses HDI and NIHDI to measure human development disparities. Social infrastructure, remittances, industrialization and population density are considered as the determinants of HDI and NIHDI.

Public expenditures on social infrastructure may increase human development (Adeyemi et al., 2006; Akram, 2007 and Siddique, 2008). Remittances may contribute to human development by affecting education and health outcomes (Kibikyo and Omar, 2012; Hassan, Mehmood and Hassan, 2013). Industrialization can enhance income of the people through the creation of job opportunities. It also promotes innovations, labour skills and technical education by improving returns to human capital formation (Hawash, 2007). Productivity of human capital is higher in those regions where population density is high. So, population density increases investment in human capital and promotes human development (Becker et al., 1999). This shows that social infrastructure, remittances, degree of industrialization and population density may lead to differences in human development.

This study uses HDI and NIHDI for thirty-five districts of Punjab for the year 2011. It also investigates the impact of social infrastructure, remittances, degree of industrialization and population density on HDI and NIHDI. The study uses two regression models, the first model finds out the determinants of HDI and the second model discovers the determinants of NIHDI across the districts. Both regression models are estimated using Ordinary Least Square (OLS) method. The models used for the present study are given below:

$$HDI_i = f(SI_i, REM_i, IND_i, PD_i) \quad (3.1)$$

$$NIHDI_i = f(SI_i, REM_i, IND_i, PD_i) \quad (3.2)$$

The stochastic form of the above models is given below:

$$HDI_i = \alpha_1 + \beta_1 SI_i + \beta_2 REM_i + \beta_3 IND_i + \beta_4 PD_i + e_i \quad (3.3)$$

$$NIHDI_i = \alpha_2 + \gamma_1 SI_i + \gamma_2 REM_i + \gamma_3 IND_i + \gamma_4 PD_i + \mu_i \quad (3.4)$$

$HDI_i$  = Human Development Index of  $i^{th}$  district

$NIHDI_i$  = Non Income Human Development Index of  $i^{th}$  district

$SI_i$  = Social Infrastructure of  $i^{th}$  district

$REM_i$  = Remittances of  $i^{th}$  district

$IND_i$  = Industrialization of  $i^{th}$  district

$PD_i$  = Population Density of  $i^{th}$  district

$i$  = 1, 2, 3, ....., 35.

### **3.1 Specification of the variables chosen for present study:**

HDI and NIHDI are used as dependent variables whereas social infrastructure, remittances, industrialization and population density are used as independent variables. The data of HDI and NIHDI for thirty-five districts of Punjab is collected from Qasim and Chaudhary (2014) and data for independent variables is taken from various statistical surveys. The details of construction, brief description and data sources of the variables are given in the following:

#### **3.1.1 Human Development Index**

Human development index (HDI) used in this study covers three dimensions. These dimensions include average achievements by the districts in health, education and income. The average achievements are measured through three indices i.e. health index, education index and income index. HDI is a composite index which combines these three indices with equal weightage. UNDP has been reporting HDI for a large numbers of countries since 1990 at annual basis.

$$HDI = (1/3 Health + 1/3 Education + 1/3 Income) \quad (3.5)$$

#### **3.1.2 Non Income Human Development Index**

In its human development report published in 2010 UNDP has introduced some new indices to measure human development. Non Income Human Development Index (NIHDI) is one of such measures. It is constructed by using the indicators related with health and education. Unlike HDI, it does not use Gross National Product (GNP) in its construction. HDI measures the improvements in three aspects which are a long and healthy life, access to knowledge and decent standard of living. But NIHDI takes into account only two aspects which include a long and healthy life and access to knowledge. Thus NIHDI focuses only on non-income dimensions of human development. The construction of NIHDI is given below:

$$NIHDI = (1/2 Health + 1/2 Education) \quad (3.6)$$

#### **3.1.3 Social Infrastructure**

It is very hard to find a generally agreed definition of social infrastructure but commonly it is related to schools, libraries, universities, clinics, hospitals, courts, museums, theatres, playgrounds, parks, fountains and statues etc. It is defined as the infrastructure that promotes the health, education and cultural standards of the population (Snieska and Simkunaite, 2009). We have used educational institutions (primary, secondary and tertiary) per person of the age cohort 5 to 25 year and health institutions (hospitals, dispensaries, rural health centers, basic health units, sub-health centers) per person as proxies for social infrastructure at districts level. We have constructed social infrastructure index with the help of Principal Component Analysis (PCA). In

education institutions we have included government mosque schools, government primary schools, government middle schools, government high schools, higher secondary schools by government and others, intermediate and degree colleges by government and others.

### **3.1.4 Remittances**

Remittances relates to those transfers which are received by the household in the home place. In present study we have taken domestic remittances and foreign remittances in millions. Domestic remittances include those remittances which are received by the district from other districts of the same country. Foreign remittances include the remittances which are received by the district from foreign countries. So we have used total remittances (domestic plus abroad).

### **3.1.5 Industrialization**

Generally Industry refers to that sector of economy which is related with manufacturing and production of different products. In literature different proxies have been used for industrialization to examine its relationship with economic development. We used degree of industrialization which we estimated by dividing the total number of factories of a district to its population as proxy for industrialization and examined the effect of industrialization on the human development of thirty five districts.

### **3.1.6 Population Density**

Population density is mid-year population divided by land area in square kilometers. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship, except for refugees not permanently settled in the country of asylum, which are generally considered as part of the population of their country of origin. Land area is a country's total area, excluding area under inland water bodies, national claims to continental shelf, and exclusive economic zones. We have used population density (thousand people per square km) for the districts of Punjab.

## **3.2 Data Sources**

We have used cross sectional data for thirty-five districts of Punjab for the year of 2010-11 for present study. The data for HDI and NIHDI is collected from Qasim and Chaudhary (2014) and data for determinants of human development disparities have collected from different kind of sources. The data of social infrastructure, degree of industrialization and population density is collected from Punjab Development Statistics (2012), whereas data of total remittances (within country plus abroad) is collected from (MICS, 2011) which is conducted by Punjab Bureau of Statistics with the collaboration of UNDP and United Nations International Children's Emergency Fund (UNCIEF).

## **4. Empirical Results and Discussion**

The results of estimated models are following:

#### 4.1 The Determinants of HDI

**Table 4.1**  
**Determinants of HDI across the Districts of Punjab**

<b>Dependent variable = HDI</b>			
<b>Variable</b>	<b>Coefficient</b>	<b>T-Statistic</b>	<b>Prob-Value</b>
Constant	0.416229	14.22767	0.0000
IND	0.244561	2.895155	0.0070
PD	0.073369	1.872807	0.0709
REM	0.210867	1.951867	0.0603
SI	0.153773	2.574078	0.0152
F-Statistic = 6.837336			
Prob(F-Statistic) = 0.000490			
R-Squared = 0.476890			
Adj-R- Squared = 0.407142			
Durbin-Watson Stat = 2.296086			

Source: Author's Calculation

The results of Table 4.1 reveal that all four variables Social Infrastructure (SI), Remittances (REM), Industrialization (IND) and Population Density (PD) have positive and statistically significant impact on HDI across the districts of Punjab. The results show that the coefficient of industrialization is significant at 1 percent level of significance and the coefficient of social infrastructure is significant at 5 percent. But the coefficients of population density and remittances are significant at 10 percent level. The estimates indicate that 1 unit increase in industrialization increase human development by 0.2445 units. The results show that one unit positive change in population density improves human development by 0.0733 units. Similarly, human development responds 0.2108 units to one unit change in remittances while one unit increase in infrastructure leads to 0.1537 units improvement in human development. The explanatory power of the model is 0.4768 which explains that these four variables determine the 48 percent human development across the districts. The districts having better social infrastructure, more inflows of remittances, higher degree of industrialization and dense population may have higher HDI ranking.

### (A) Diagnostic Tests

Diagnostic tests for normality, serial correlation, heteroskedasticity and model specification are applied. The results of these tests are shown in Table 4.2.

**Table 4.2**

**Diagnostic Tests**

<i>Normality Test</i> (Jarque-Bera Statistic)	Jarque-Bera Statistic = 0.3018	Probability = 0.8599
<i>Serial Correlation</i> (Breush-Godfrey Serial Correlation LM Test)	F-statistics = 0.7579	Probability = 0.3911
<i>Heteroskedasticity Test</i> (White Heteroskedasticity Test)	F-statistics = 0.2879	Probability = 0.9639

Source: Author's Calculation

The results of these tests indicate that the residual is normally distributed and there is also no problem of serial correlation and autoregressive conditional heteroskedasticity.

To analyze the stability of the coefficients together the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMsq) are applied. The graphical representation of (CUSUM) and (CUSUMsq) are shown in Figure 4.1 and 4.2. If the plot of these statistics remains within critical boundaries of the five percent significance level, the null hypothesis stating that the regression equation is correctly specified cannot be rejected. The results of the Figure 4.1 and 4.2 indicate that the plots of both statistics (CUSUM) and (CUSUMsq) are within the boundaries see in the appendix A-3, so it is clear that our model is correctly specified.

### 4.2 The Determinants of NIHDI

**Table 4.3**

**Determinants of NIHDI across the Districts of Punjab**

<b>Dependent variable = NIHDI</b>			
<b>Variable</b>	<b>Coefficient</b>	<b>T-Statistic</b>	<b>Prob-Value</b>
Constant	0.487937	15.00677	0.0000
IND	0.157677	1.670333	0.0953
PD	0.046731	0.936437	0.3565

REM	0.440375	3.898905	0.0005
SI	0.284635	3.446218	0.0017
R-Squared = 0.574924			
Adj-R-Squared = 0.518247			
F-Statistic = 10.14390			
Prob(F-Statistic) = 0.000026			
Durbin-Watson Stat = 2.228256			

Source: Author's Calculation

The results of Table 4.3 show that Social Infrastructure (SI), Remittances (REM) and Industrialization (IND) have positive and statistically significant impact on NIHDI. But the relationship between population density and NIHDI is insignificant. The results show that the coefficients of Industrialization, social infrastructure and remittances are respectively significant at 10, 1 and 5 percent level of significance. The estimates indicate that 1 unit increase in industrialization increase human development by 0.1576 units. The results show that one unit positive change in remittances improves human development by 0.4403 units. Similarly, human development responds 0.2846 units to one unit change in social infrastructure.

#### (B) Diagnostic Tests

Diagnostic tests for normality, serial correlation, heteroskedasticity and model specification are applied. The results of these tests are shown in Table 4.4.

**Table 4.4**

#### **Diagnostic Tests**

<i>Normality Test</i> (Jarque-Bera Statistic)	Jarque-Bera Statistic = 0.0437	Probability = 0.9783
<i>Serial Correlation</i> (Breush-Godfrey Serial Correlation LM Test)	F-statistics = 0.4810	Probability = 0.4934
<i>Heteroskedasticity Test</i> (White heteroskedasticity Test)	F-statistics = 0.8431	Probability = 0.5741

Source: Author's Calculation

The results of these tests indicate that the residual is normally distributed and there is also no problem of serial correlation and autoregressive conditional heteroskedasticity.

To analyze the stability of the coefficients together the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMsq) are applied. The graphical representation of (CUSUM) and (CUSUMsq) are shown in figure 4.3 and 4.4. If the plot of these statistics remains within critical boundaries of the five percent significance level, the null hypothesis stating that the regression equation is correctly specified cannot be rejected. The results of the figure 4.3 and 4.4 indicate that the plots of both statistics (CUSUM) and (CUSUMsq) are within the boundaries see appendix A-3, so it is clear that our model is correctly specified.

## **5. Conclusion and Policy Implication**

The study investigated some socio-economic determinants of HDI and NIHDI across the districts of Punjab. Among the vast range of determinants of HDI and NIHDI, the study focused on some socio-economic determinants of differences in HDI and NIHDI. Thirty-five districts were considered for this purpose and cross section data was used.

The results of both models indicated that social infrastructure, industrialization, remittances positively affected the HDI and NIHDI while population density positively affected the HDI but had insignificant association with NIHDI. The government of Punjab can provide optimally (according to the need of the region) human empowerment and opportunities through education, health, water and sanitation facilities that widen the people's horizon and capabilities to participate, negotiate and influence accountable institutions which are responsible for the provision of social services and economic incentives for the development. To improve human development and to reduce human development disparities government of Punjab and non-government organizations can expand social infrastructure among the districts because it has positive and significant impact on the HDI and NIHDI. More focus should be on those districts which have low social infrastructure (education institutions and health institutions) like Layyah, Vehari, Muzaffar Garh, D.G Khan, Pakpatten, Bahawalnager, Lodhran, Bahawalpur and Rajanpur) as compare to other districts. The development at sectoral level (agriculture, industrial and services) plays an important role to increase human development. To improve sectoral development government can make policies which are not only pro-people development, but create the income and welfare enhancing opportunities needed to promote human development at district level. The results show that industrialization has positive impact on HDI and NIHDI across the districts of Punjab, so government should give incentives and provide basic facilities like infrastructure to investors to increase industrialization especially in those districts which have low degree of industrialization like Layyah, Vehari, Muzaffar Garh, D.G Khan, Pakpatten, Bahawalnager, Lodhran, Bahawalpur, Rajanpur, Sahiwal, Narowal, Okara, Chakwal, Bhakhar, Hafizabad, Jhang, Mianwali, Mandi Bahuddin and Khanewal.

The results indicate that remittances (abroad plus domestic) also have positive impact on HDI and NIHDI across the districts of Punjab. The government can build labor skills development and technical training institutes according to the international demand for labor. The government and private organizations can also create job opportunities in education, health,

agriculture, industrial and other sectors at regional level especially in south region of Punjab because the people of one district can easily move to nearer district for earning. The literature on remittances provides some examples of governments that have implementing business counseling, information and training programs to assist return migrants and remitters to get the required information and knowledge for investment. Although in Pakistan the Overseas Pakistanis Foundation (OPF) is offering investment advisory services to return migrants but there is needed to expand its benefits among those districts which have low remittances. The foundation can help to increase investment projects in low HDI districts, especially among south region districts. The government of Korea launched an experimental training program in 1986 for retraining return migrants in new skills so that they can move to other industries or establish their own business. By mid-1986, some 4,000 workers were participating in the scheme (Athukorala, 1992). To promote remittances, government can also follow the policies of Bangladesh and the Philippines where the share of informal remittances has gone down because their banking systems have focused on speed, transfer cost reduction, and income tax relief for remitters (Amjad et al., 2013). After concluding positive relationship of population density with HDI we can say that dense population can promote human development among the districts of Punjab because it has different indirect impacts on human development. First, population density increases productivity. Second, high population density promotes technical innovation. Third, when population density increases, there is a higher incentive for investment in human capital, because the productivity of human capital is higher in those regions where population density is high (Becker et al., 1999). The government of Punjab can enhance the empowerment of the people among the districts with the improvement in income, education, health and other social services. There are different criterions for the allocation of development budget among the regions. Underdevelopment may also be considered as criteria for the allocation of development budget among the different regions. The government of Punjab may increase the development budget of those districts which have low level of human development like Layyah, Vehari, Muzaffar Garh, Sargodha, D.G Khan, Pakpatten, Bahawalnager, Lodhran, Bahawalpur and Rajanpur.

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**APPENDIX**  
**Table A-1: Data**

**Ranking of the Districts based on HDI**

Districts	HDI		Districts	HDI	
	Value	Rank		Value	Rank

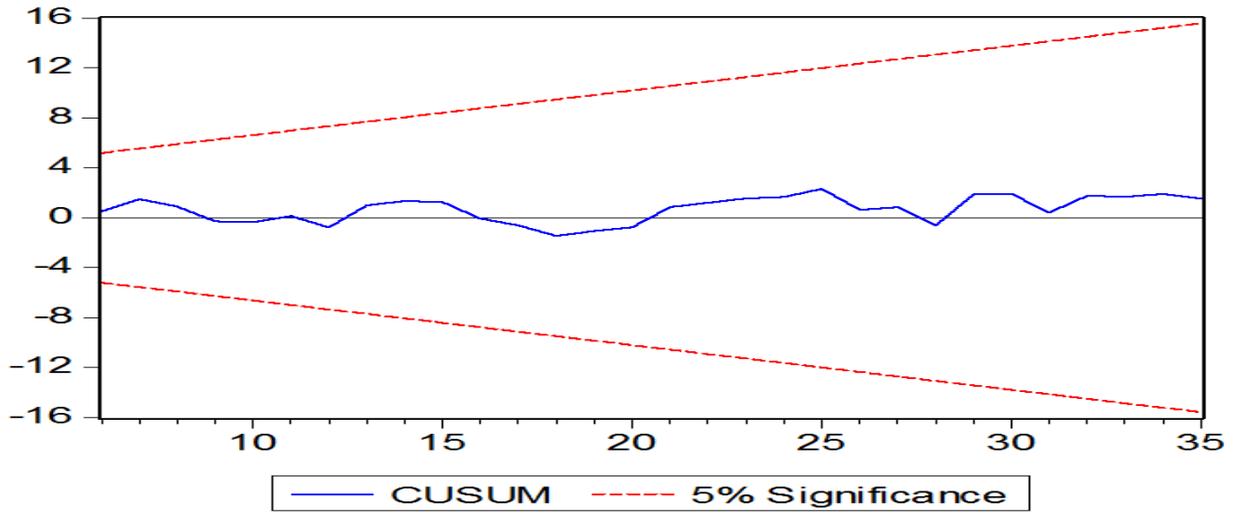
Rawalpindi	0.6731	1	Nankana Sahib	0.5505	19
Lahore	0.6667	2	Mandi Bahuddin	0.5470	20
Sheikhupura	0.6487	3	Narowal	0.5452	21
Faisalabad	0.6267	4	Toba Take Singh	0.5411	22
Sialkot	0.6198	5	Okara	0.5408	23
Kasur	0.6171	6	Hafizabad	0.5359	24
Multan	0.6071	7	Rahim Yar Khan	0.5302	25
Jhelum	0.5985	8	Layyah	0.5299	26
Chakwal	0.5983	9	Vehari	0.5064	27
Khushab	0.5776	10	Muzaffar Garh	0.5047	28
Jhang	0.5770	11	Sargodha	0.5006	29
Attock	0.5690	12	Dera Gazi Khan	0.4992	30
Mianwali	0.5665	13	Pakpatten	0.4787	31
Bhakhar	0.5643	14	Bahawalnager	0.4769	32
Gujrat	0.5642	15	Lodhran	0.4753	33
Gujranwala	0.5630	16	Bahawalpur	0.4521	34
Khanewal	0.5567	17	Rajanpur	0.4515	35
Sahiwal	0.5559	18	PUNJAB	0.5567	

**Table A-2: Data**

<b>Districts</b>	<b>Social Infrastructure (Index)</b>	<b>Remittances in millions</b>	<b>Degree of Industrialization</b>	<b>Population Density</b>
Attock	0.00341	0.2180	0.03095	0.238
Bahawalnager	0.00341	0.1480	0.07913	0.305

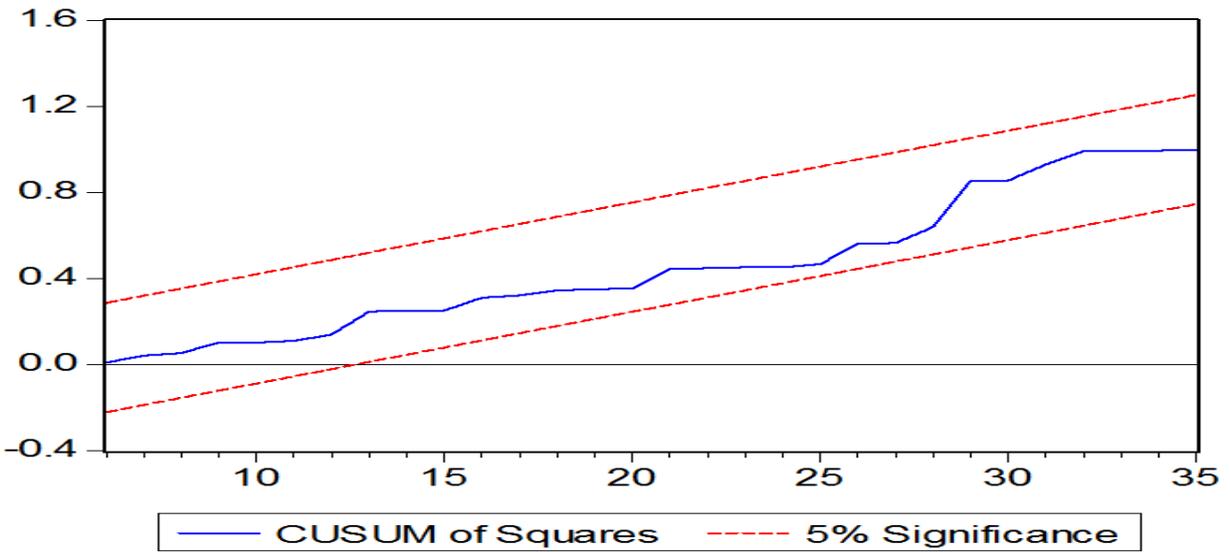
Bahawalpur	0.00230	0.1400	0.10497	0.138
Bhakhar	0.00348	0.1769	0.01827	0.181
Chakwal	0.00416	0.1920	0.10502	0.206
Dera Gazi Khan	0.00274	0.1400	0.04330	0.197
Faisalabad	0.00201	0.2000	0.23570	1.235
Gujranwala	0.00201	0.2176	0.23576	1.331
Gujrat	0.00292	0.2900	0.21439	0.840
Hafizabad	0.00264	0.2082	0.06165	0.467
Jhelum	0.00182	0.3240	0.07444	0.420
Jhang	0.00567	0.1693	0.08101	0.331
Kasur	0.00210	0.1680	0.18864	0.798
Khanewal	0.00274	0.1680	0.06252	0.605
Khushab	0.00334	0.2840	0.09954	0.182
Lahore	0.00134	0.3600	0.22491	4.889
Layyah	0.00342	0.2600	0.08586	0.251
Lodhran	0.00219	0.1580	0.08240	0.589
Mandi Bahuddin	0.00270	0.2629	0.06178	0.548
Mianwali	0.00337	0.3120	0.05120	0.237
Multan	0.00199	0.1680	0.10566	1.121
Muzaffar Garh	0.00187	0.1480	0.03559	0.457
Nankana Sahib	0.00298	0.1800	0.12928	0.596
Narowal	0.00382	0.2400	0.01567	0.702
Okara	0.00224	0.1384	0.02833	0.680
Pakpatten	0.00217	0.2437	0.10786	0.633
Rahim Yar Khan	0.00255	0.1400	0.04697	0.371
Rajanpur	0.00237	0.1680	0.04755	0.128
Rawalpindi	0.00261	0.2760	0.07032	0.822
Sahiwal	0.00275	0.2100	0.09643	0.708
Sargodha	0.00308	0.2520	0.10845	0.597
Sheikhupura	0.00202	0.1879	0.31691	0.897
Sialkot	0.00271	0.2760	0.22347	1.207
Toba Tek Singh	0.00330	0.1883	0.06773	0.651
Vehari	0.00227	0.2013	0.06556	0.647

**A-3: Figures (CUSUM) and (CUSUMsq)**



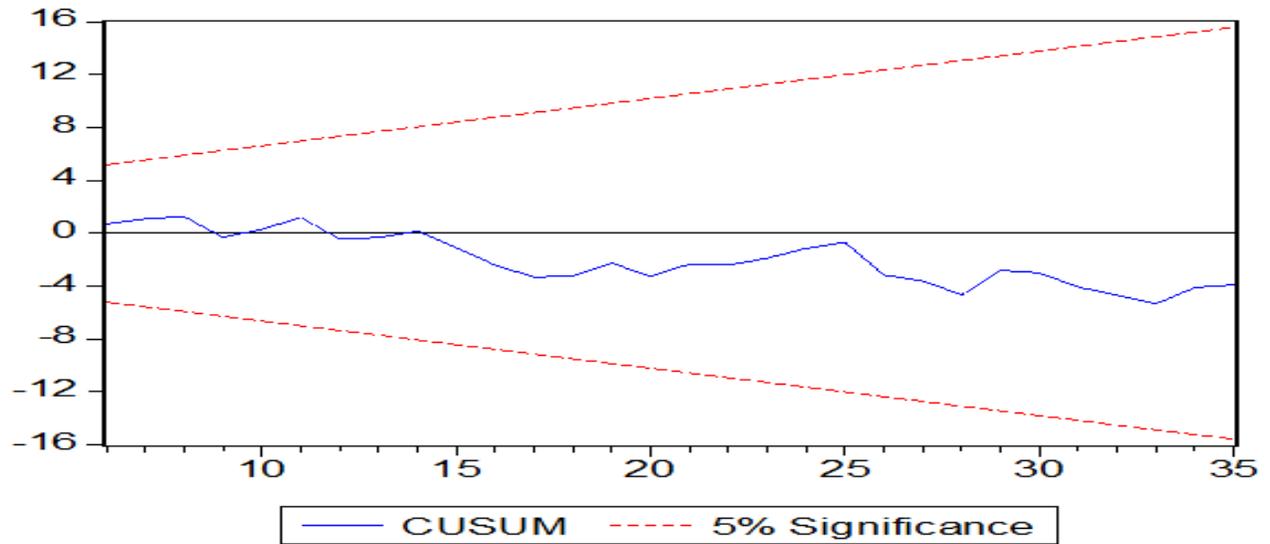
The straight lines represent critical bounds at 5% Significance level.

**Figure 4.1: Plot of Cumulative Sum of Recursive Residuals**



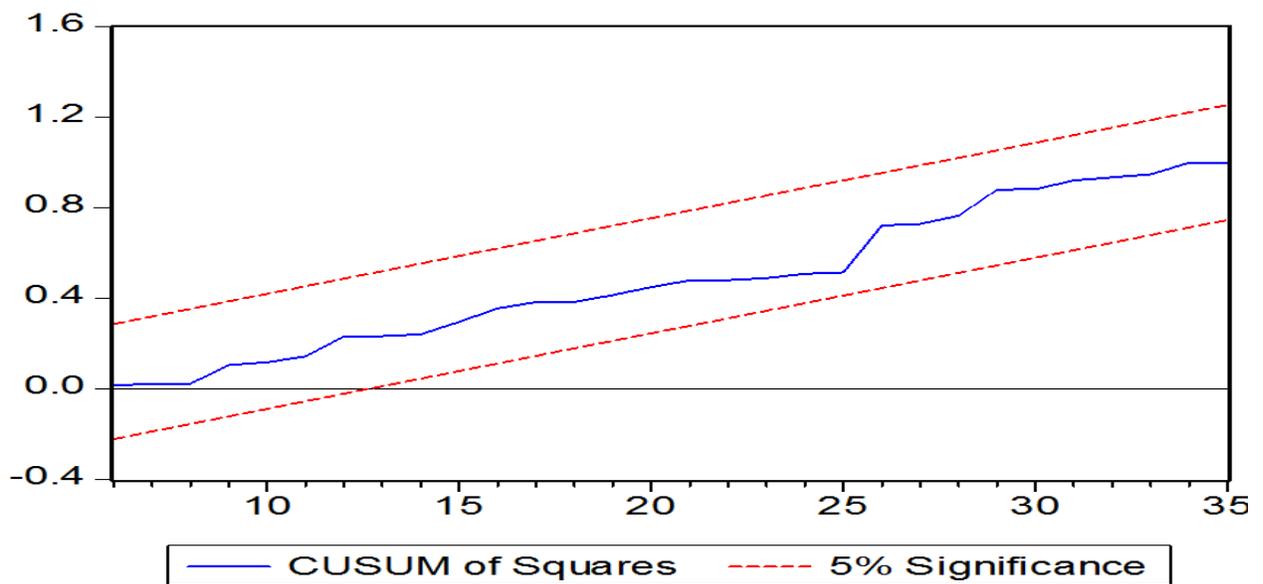
The straight lines represent critical bounds at 5% Significance level.

**Figure 4.2: Plot of Cumulative Sum of Squares of Recursive Residuals**



The straight lines represent critical bounds at 5% Significance level.

**Figure 4.3: Plot of Cumulative Sum of Recursive Residuals**



The straight lines represent critical bounds at 5% Significance level.

**Figure 4.4: Plot of Cumulative Sum of Squares of Recursive Residuals**