Regional Disparity and Decentralization in Pakistan: A Decomposition Analysis

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Abstract

The main objective of the study is to analyze the changing trends of social (education and health) inequalities before and after decentralization at the inter-regional and intra-regional level in Pakistan from 2005 to 2015. Coefficient of variation and decomposition of Theil inequality index are used to evaluate the spatial dimensions of inequality at the provincial and rural-urban level. Results of CV indicate high disparity in the education and health sectors at both inter-provincial and intra-regional level. Decomposition of education inequality indicates improvement at provincial level. Rural population has high education inequality than urban. Results of Theil index predict that health inequality has narrowed in the women health in the period of decentralization. Disparity level of child health shows the existence of inequality at both the provincial and rural-urban levels. This situation even persists in the decentralization period. Although the situation of Diarrhoea treatment has improved at the provincial level but there are stark differences in the inequality level of rural and urban population. Within and between group inequality at the provincial and rural-urban level indicates a stable and decline in education and health inequality. Decentralization has slightly improved the situation in both areas, however, such economic and social policies should be adapted which helps to eliminate the issue of regional inequality and develop the lagging areas.

Keywords: Regional Disparity, Social Inequality, Decentralization, Pakistan

1. Introduction

The historical perspective of the world economy shows that human race was confronted with many social and economic issues. On many economic forums, various eminent economists have presented their views and theories to elucidate those economic problems and accentuated the future economic crisis which can create serious economic issues in the process of development. Regional disparity is one such problem which remained a burning issue for all those countries who are struggling for the economic growth of their country. Regional disparity has remained a core issue for many developed nations and regions like America and Europe (Boldrin & Canova, 2001; Neckerman & Torche, 2007; Heidenreich & Wunder, 2008; Wu & Gopinath, 2008). But its roots are deeper in the third world and developing countries (Hall, 1984). China and India as the most populated nations of the world are also facing the repercussions of regional disparity (Bhattacharya & Sakthivel, 2004; Liu, 2006; Paul & Ghosh,2007; Fan et al., 2011).

Regional disparity has remained a subject of interest for many regional economist and geographers. Regional economist suggested multiple theories and economic models on regional development. These theories can be classified into two approaches. First, theory of convergence presented by Neo-classical economists which state that regional inequality is not a serious issue for an economy and can be removed through the proper working of market structure in the long run. This theory is further supported by the empirical evidence of inverted-U hypothesis of Kuznets (1955). Second is the disequilibrium model (divergence) which is supported by Myrdal (1957) who gave the concept of circular cumulative causation which states that in the presence of inequality the elements that accelerates the market structure start increasing the inequality in the region instead of decreasing it. Krugman (1991) presented the new economic geography theory and explains the importance and significance of geographical structure in the regional development.

Regional disparity and economic development of a country are inter-linked and can be classified into geographical, social and economic inequality (Yu & Wei, 2003). The interpretation of regional disparity is not only confined to population in general rather it relates to underdevelopment of geographically identified areas along with relative prosperity of such areas (Patel, 1991). It is not necessary that if an area or region is considered developed or prosperous than all people living in that region are rich or achieving basic standards of living (Jacka, Kipnis

& Sargeson, 2013). In order to get a balanced regional structure, resources should be distributed evenly in the regions (Hall, 1984). But if the distribution of these resources is not equitable then it creates disparity in the regions and a sense of deprivation among the population of lagging regions. Differences in the economic development structure and their effects on the level of inequality, impoverishment and on the social structure of a society are now considered a serious issue by many regional scientists. Literature on regional disparity indicates that regional inequality is mostly represented by the analysis of income inequality and inequalities linked with the social structure of a country are usually neglected. Few studies from the literature of regional development investigated the changing trends of social inequalities such as literacy, infant mortality rate and life expectancy (Sahn & Stifel, 2003; Jamal & Khan, 2003; Zhang & Kanbur, 2005; Fan et al, 2011; Akita & Pirmansah, 2011; Akita & Miyata, 2013) and many researchers were of the view that income level of a country or region is more suitable and feasible for analyzing the inequality levels (Bradshaw & Vartapetov, 2003; Anderson & Pomfret, 2004; Neckerman & Torche, 2007; Edgerton et al, 2008; Akhtar, 2008).

Regional disparity in Pakistan has a historical perspective and it became a serious issue in the 1960s because of the regional conflicts between East and West Pakistan (Hamid & Hussain, 1974; Hussain, 1993; Zaidi, 2015). Since then, the debate on regional disparity is relatively ignored and few studies have highlighted the issue of disparity in their studies. Pakistan has faced significant variations in the development process of different regions and it has created disparity within and between the regions of Pakistan (Jamal & Khan, 2003). High social inequalities create social imbalance and political unrest in the society (Zhang & Kanbur, 2005). A rise in the social inequalities affects the process of economic development which in the long run exacerbate the inequalities at the regional level. The geographical structure of Pakistan clearly identifies that most of the large and capital cities of the provinces are relatively more developed than other cities. Less developed areas are mostly covered in the Baluchistan province. All these differences at the regional and provincial level creates conflicts and a demand for transferring the resources to the provincial government. Rodríguez-Pose and Ezcurra (2009) in their study discussed the role of decentralization on regional inequalities by analyzing the developed and underdeveloped countries. They suggest that decentralization has a favorable effect on the high-income economies but in case of developing economies decentralization has increased the regional inequality. On 15th April 2010, in the eighteenth constitutional amendment

the government of Pakistan has shifted the distribution of resources to the provincial government. After this, the role of decentralization and its impact on the regional inequalities has received a lot of attention in Pakistan.

This study differs from the previous work in many aspects. Hamid and Hussain (1974) investigated the relationship between regional disparities and capitalist development. Whereas, Jamal and Khan (2003) evaluated the regional inequalities by examining multiple indicators. Akhtar (2008) studied the changing trends of regional disparities by analyzing the consumption inequalities. But the role of social inequalities in enhancing the disparities at the regional level is mostly ignored. This study examines the spatial patterns of social inequalities by analyzing the health and education sectors. As, development and prosperity of the population also depend on its better health and education facilities. After devolution, health and education become a subject of provincial government. Some economist and policy makers believe that decentralization is the beginning of new reforms and bring extensive changes in the economic structure. The main objective of the study is to analyze the changing trends of social inequalities (education and health) before and after decentralization at the inter-regional (provinces) and intra-regional (rural-urban) level in Pakistan.

The issue of regional inequality is mainly associated with the unequal distribution of income. The study will significantly contribute to the existing literature by providing better understanding of the changing trends of regional disparity in the health and education sectors. The study is also beneficial for the policy makers at the federal and provincial levels. It will encourage the policy enforcement at the local level and other stakeholders, in the economic growth and welfare paradigms of the country.

The study is organized as follows: Section 2 of the study gives the review on literature; Section 3 provides the detail information on the data and methodology used; Section 4 describes the empirical results and findings; Section 5 provides the conclusion, policy recommendations and limitations of the study.

2. Literature Review

This section provides the literature review on the issue of regional disparity in both the developing and developed countries. The causes of disparities in the world and how it's creating a sense of deprivation and dissatisfaction between the population of different regions are

explained in this section. Jamal and Malik (1988) analyzed the changing trends of regional development and rank ordering of the districts of Sind. Z-sum technique and Taxonomic distance methods are used to identify the ranking of the Sind districts from 1972 to 1981. The study concluded that in order to eliminate the issue of regional differences some policy measures were taken in the early 1970s in the province of Sind. But these implementations did not show any feasible improvement or development in the ranking of the districts. The analysis of the study gives mix results as some districts have ranked up while the development ranking of other districts has aggravated. Lu and Wang (2002) evaluated the spatial inequalities of China during the reform period at the three geographical scales. The data was collected for the period of 1978 to 1998 at the interregional, provincial and rural-urban level. The study used the multiple economic and socio-economic indicators for the analysis and per capita GDP, per capita consumption and per capita income are used to measure the inequality by applying the coefficient of variation, Theil and Gini index. Results predicted that overall inequality at the provincial and interregional level has decreased but rural-urban inequality shows rise and fall with huge differences in the rural-urban areas in the reform period.

Bradshaw and Vartapetov (2003) examined the trends of regional inequality by analyzing the social and economic indicators of Russia. Russia's regional inequality is measured through multiple economic and social indicators as gross regional product, personal income, unemployment, consumption variables, education level, life expectancy, infant mortality rate and infrastructure. Theil index, weighted and unweighted coefficient of variation is used for the period of 1990 to 2001. The study found that inequality patterns in the Russian regions are complex and they are not entirely moving towards inequality convergence or divergence. Elbers et al. (2003) analyzed the local inequality and its correlation with the geographical dimensions of three developing countries. Decomposition method and OLS technique is used to estimate the changing trends of inequality in Madagascar, Mozambique and Ecuador. Results depicts that community level inequalities are less than the overall inequality in all three countries. The study also indicated that inequality is linked and effected by the geographical features of that specific region. The areas with less favorable resources are experiencing high inequality then those areas which are geographically established.

Jamal and Khan (2003) evaluated the various dimensions of inter-temporal regional inequalities of Pakistan at the inter-provincial and inter-district level. Gini index and Factor analysis

techniques are used to measure the inequality levels for the period of 1980 to 2000. The results of the study show that the level of inequality has increased in Sindh, NWFP and Baluchistan. These provinces are badly affected by the increasing level of disparity at the inter-provincial and inter-district level. Sahn and Stifel (2003) evaluated the inequality in living standards of African countries by decomposing the rural-urban areas. OLS and Kakwani's improvement index is used to measure the performance of living standard of 24 African countries from 1987 to 1999. Inequality is measured by Gini and Theil index. The study shows that inequality level is higher in the rural sector in almost all countries and the quality of living standards in the urban areas is more than the rural population. The inequality gap in the living standards of rural-urban areas is also not decreasing.

Yu and Wei (2003) evaluated the conversion patterns of China's regional disparity in the period of liberalization. Coefficient of variation, GIS technique, Moran's index and OLS regression is used to measure the patterns of inequality in China from 1978 to 2000. The analysis of the study shows a U-shaped pattern of regional inequalities in the post-Mao period of China. GIS results indicate spatial clustering in the provinces and interprovincial inequality in the 1980s decline but in 1990s it starts rising. The study concluded that regional disparity at the national level has increased in the reform period. Anderson and Pomfret (2004) investigated the inequality in living standards across and within region of five Central Asian countries. The study used the expenditure model and OLS regression technique to estimate the results. The empirical evidence of the study showed that inequality within and across regions is increasing due to the differences in the area of the household, education and family structures. The study also concluded that household with more educated head have better conditions and spend more on the public goods as compared to the families with less educated head.

Bhattacharya and Sakthivel (2004) analyzed the patterns of regional inequality and growth in the pre- and post-reform period of India. The data of 17 major states of India is divided into two-time periods. The pre-reform period 1981 to 1990 and post-reform period 1991 to 2000. Coefficient of variation is used to measure inequality. Results of the study showed an increase in equality in the post reform period. The study also concluded that the performance of tertiary sector is better than agricultural and industrial sectors in most states of India in both periods. Zhang and Kanbur (2005) analyzed the existence of rising regional disparity in the health and education sectors of China. The study used various time periods starting from 1950 to 2000 to

measure inequality at the rural and urban level. Empirical results are identified by Gini and Theil index. The study showed that disparity has increased in both the rural and urban areas and this trend was more visible in the reform period. Education level has improved and health facilities are limited for the rural population.

Liu (2006) examined the rural inequalities of China at the regional level. Theil decomposition method is used to measure the rural inequality of 30 provinces in China from 1980 to 2002. The study identified an overall increasing trend in the income inequality at the rural level in the period of liberalization and there is a widening inequality gap between eastern and western areas of China. Novotny (2007) represented an alternative method for analyzing the spatial income inequality of regions. Theil decomposition method is used to measure the inequalities at the world, European and country level of 46 countries. The study showed that at the global level between region inequality is higher than the European and country level. At the country level between region inequality is less than the within region inequality. Cross-country analysis indicates that some other non-spatial factors like education, age and gender are also important for examining the regional inequality and its consequences.

Akhtar (2008) analyzed the changing trends of interprovincial and intraregional disparities in Pakistan. The data of four provinces of Pakistan is collected from 1998 to 2005. In order to investigate the poverty level and consumption inequality the method of headcount ratio and Gini index is used. The results indicated a rise in consumption inequality but social inequality has decreased at the provincial and national level. Chan and Wang (2008) identified the trends of regional disparities of China by investigating two sets of provincial population data. Weighted and unweighted coefficient of variation is used to measure inequality from mid 1990s to mid-2005. Results of de facto and de jure population showed serious statistical problems and gave over estimated results which portray a wrong picture of disparity in China. Fan and Sun (2008) analyzed the changing trends of inequality in China at the interprovincial level. Coefficient of variation, Gini and Theil Index are used to identify the disparity levels of income inequality by decomposing the interregional and intraregional levels for the period of 1978 to 2006. The results indicate that interprovincial inequality started to decrease after 2004. Whereas, interregional and intraregional inequality has also declined from 2004 to 2006. The study concludes that government efforts to reduce the level of inequality has achieved some success and observed convergence in the growth rate.

Sen and Ali (2009) investigated the spatial inequality in the process of social development of Bangladesh. Bi-variate regression model for the year 2000 is used to identify the factors responsible for creating inequality in social indicators. Multi-variate regression model is used with the pooled data of 1995 and 2000 for all districts. Inequality is measured by coefficient of variation. The empirical results show that there was a considerable decrease in the spatial inequality in context of the social development and level of poverty has also decreased. Sikander and Shah (2010) evaluated the existing social inequalities of the districts of Punjab. Multiple indicators of education, health and physical infrastructure are measured by Gini index and Factor analysis technique is used to group the indicators into one composite index for the year 2007-08. The results showed that basic social services are easily available in the provincial capital and other districts which are far away from the provincial capital are facing the issue of high inequality in the provision of basic social facilities.

Akita and Pirmansah (2011) investigated the inequality trends in the urban sector of Indonesia and explores the factors responsible for the rising inequality. Two approaches of Theil decomposition method are used to identify the within and between inequalities in the rural-urban areas for the period of 1999, 2002 and 2005. The study shows that improved GDP has created rapid disparity in the urban sector and the tertiary group of education has a great contribution in rising urban inequality. Fan, Kanbur and Zhang (2011) analyzed the regional policies and development of regional disparity in China. The level of disparity is measured through Gini and Theil index from 1952 to 2008. The study concluded that industrialization has created huge rural urban gap. Development policies of trade openness and decentralization has increased regional disparity in the coastal and inland regions. Fedorov (2011) investigated the changing patterns of regional inequality and polarization in the transition period of Russia. Inequality was measured by Gini index and General Entropy indices. Esteban-Ray and Wolfson indices are used to measure regional polarization from 1990 to 1999 of 77 regions. The results identify an increasing trend in the regional inequality and polarization. These trends have affected the population and created differences in the region.

Tvrdon and Skokan (2011) investigated the facets responsible for creating constant regional inequalities in the four visegrad countries (V4). Coefficient of variation, a comparison of maximum and minimum values, Gini index, Herfindahl and Theil index are used to measure inequality. Results of the study showed that inequality has increased in V4 countries and this

trend is more dominant in the metropolitan areas of the region. Akita and Miyata (2013) investigated the rural and urban areas of Indonesia and their educational distribution in the economic development. Theil two-stage nested decomposition method was used to estimate the inequality in the rural-urban and education sector for the period of 2008. The study showed that inequality has increased in urban areas more as compared to the rural areas. Differences in the level of education has a negative effect on urban inequality but it has no significant effect on rural inequality levels. He, Bayrak and Lin (2017) identified the changing trends in regional inequality of China at the provincial, prefectural and county level. Theil index is used for the inter and intraregional inequality. Markov Chain method is used to measure the growth of regional development for the period of 1997 to 2010. The results showed an increasing trend with a minimal low inequality in the selected time frame. No convergence trend was found in the long run and it is not easy for the lagged areas to enter the development path.

Literature on regional disparity and its comparative analysis at the inter-provincial and intra-regional level is quite limited. Few studies in the literature have explored the causes of inequality and factors responsible for increasing the disparity in the region. Aim to create equity among the people can only be achieved with the removal of regional differences. Inequality in the distribution of income cause various harmful effects on the social structure of the country. A rise in inequality also affects the social indicators like health, education and capital. These factors are very important and cannot be ignored for the economic development of a country.

Pakistan as a developing nation is also facing the consequences of regional inequality both at the inter-regional and intra-regional levels. Most work done on the regional disparity in Pakistan is among the provinces, inter-district level and between the rural-urban areas. Consumption, income and multiple social indicators are used to discuss the issue of inequality and their levels are measured through coefficient of variation, Gini and Theil index (Hamid & Hussain, 1974; De Kruijk, 1986; Jamal & Khan, 2003; Akhtar, 2008). But the social inequalities like health and education are mostly ignored and not studied as the main component of disparity in a region. All the theoretical and empirical investigations evaluated by the previous researchers identify the existence of regional disparity in Pakistan. The present study in its analysis examines the recent changes and trends of inequality in the health and education sector at the provincial and rural-urban level. It also tries to explore whether this widening gap between the regions has increased

or decreased and the implementation of decentralization is successful in reducing the inequality gaps between the regions.

3. Methodology and Data

3.1. Methodology

Inequality and its measurement among the individuals and regions has always remain a subject of interest for many researchers. Various economist through their empirical research has identified the existence of inequality between the population, countries and regions. The major issue in analyzing the inequality level is that, how can one identify that two regions are economically and socially unequal (Allison, 1978). What is the exact way of measuring inequality? Can the level of discrimination be measured? These are the questions which arose the need to measure the level of inequality in an appropriate manner. To measure the level of disparity is a tedious task and many measuring tools of inequality are presented by the researchers in their studies. The most commonly used measures are:

- Maximum to minimum value
- Gini Index
- Atkinson's Index
- Coefficient of variation
- Measures of Generalized Entropy.

One popular method is maximum to minimum value which is computed by comparing the highest and lowest values of the selected variable. This method is easy to understand and calculate but it has some weaknesses as well (Tvrdon & Skokan, 2011). Gini index, coefficient of variation and Theil index are the measures of dispersion. All three satisfy the property of scale invariant and principal of transfers. Gini index is mostly defined in terms of Lorenz curve and there are a number of mathematical ways to measure the Gini index. It has some unique properties of mean independence, population size independence, symmetry and Pigou-Dalton Transfer sensitivity which explains why it is mostly preferred by the researchers and economists. Gini coefficient ranges from 1 to 0. The high value of Gini coefficient depicts the high level of inequality and 0 means there is prefect equality in the region. Gini is preferable for measuring income inequality but it has some weaknesses too. The basic problem with Gini index is that it cannot decompose the inequality into subgroups. The sum of within and between group

inequality is not equal to the total of Gini index and because of this the researcher cannot evaluate the changing patterns of inequality that has developed over the period. (Meier & Rauch, 2005). Atkinson index is an inequality measure proposed by Atkinson. It is quite popular as the welfare based measure of inequality. The properties of Atkinson are very much similar to the Gini coefficient. It has a weighting parameter ε and it measures aversion to inequality. It ranges from 0 to 1. Thus, 0 means perfect equality and 1 represents maximum inequality.

3.1.1. Coefficient of Variation

To measure the overall inequality the method of coefficient of variation is mostly preferred by many researchers (Bhattacharya & Sakthivel, 2004; Bradshaw & Vartapetov, 2003; Chan & Wan, 2008; Fan & Sun, 2008; Lu & Wang, 2002; Tvrdon & Skokan, 2011; Yu and Wei, 2003). It is easy to understand and includes all the values in the data. It is immune to outliers if the selected data is weighted but it also has a disadvantage that it has no standard for an acceptable level of inequality. Coefficient of variation is the distribution's standard deviation divided by its mean. CV lies between 0 and 1. Where, value of 1 represents extreme inequality and 0 indicates perfect equality (Lu & Wang, 2002). In this study to measure the overall inequalities in the health and education sector at the inter and intra-regional level the method of unweighted coefficient of variation (CV) is used. The mathematical computation of unweighted coefficient of variation is defined as follows:

$$CV = \frac{\sqrt{\sum_{j=1}^{N}(x_{ij} - \bar{x})^2 / N}}{\bar{x}}$$

where N is the number of regions, in $x_{ij,}$ (i) is the indicator of education/health in the jth region and $\bar{x}$ is mean value of $x_{ij.}$ The education and health indicators are expressed as

x_{1j} = population that has completed the primary level or higher in the jth region.

x_{2j} = net enrollment rate at the primary level in the jth region.

x_{3j} = net enrollment rate at the middle level in the jth region.

x_{4j} = literacy rate in the jth region.

x_{5j} = percentage of children aged 12-23 months that have been fully immunized in the jth region.

x_{6j} = treatment of Diarrhea in children under 5 years in the jth region.

x_{7j} = pre-natal consultation in the *j*th region.

x_{8j} = post-natal consultation in the *j*th region.

3.1.2. Generalized Entropy Measures

The main purpose of the study is to identify inequality at the provincial and rural-urban level and its decomposition by the population group. There are several ways to decompose the inequality of a region. The generalized entropy class of measures as the Mean logarithmic deviation, Half of the squared coefficient of variation and Theil index are frequently used for the decomposition analysis (Shorrocks, 1980, 1984). The general entropy index is defined as:

$$E(\alpha) = \frac{1}{n(\alpha^2 - \alpha)} \sum_i \left[\left(\frac{y_i}{\bar{y}} \right)^{\alpha} - 1 \right]$$

E(α) shows different forms of measure as it depends on the value of α. If α is positive then its sensitive to the changes in the upper end of the distribution. If α is close to zero then its sensitive to changes in the lower end of the distribution. The values of α ranges from minus infinity to infinity. Two measures of general entropy are commonly used for the inequality measurement.

If α = 0, then it is defined as the Mean Logarithmic Deviation and the general entropy becomes:

$$E(0) = \frac{1}{n} \sum_i \ln \frac{y_i}{\bar{y}}$$

If α = 1, then it is called the Theil index and the general entropy expression becomes:

$$E(1) = \frac{1}{n} \sum_i \frac{y_i}{\bar{y}} \ln \frac{y_i}{\bar{y}}$$

The main aim of the study is to explore the spatial dimensions of inequality at the inter-provincial and intra-regional level. For this purpose, the study prefers the Theil inequality index as it can easily be decomposed and it satisfy many properties such as population size independence, anonymity, mean independence and Pigou-Dalton Transfer sensitivity (Shorrocks, 1980).

3.1.2.1. Theil Inequality Decomposition

The study is using the Theil index of the generalized entropy as it is additively decomposable. The advantage of measuring inequality through Theil index is that it gives the overall inequality of the region with its perfect decomposition of within and between group inequality of that region (Novotny, 2007).

$$T = \frac{1}{n}\sum_{i=1}^{n}\frac{y_i}{y}\ln\frac{y_i}{y}$$

where T denotes the total inequality, *n* is population size, *y* is the average per capita income, *yi* is the income of the *i*th individual.

In order to break the population into subgroups it can be decompose into two components. First, is the between group inequality as it identifies the inequalities among the regions. Second, is the within group inequality as it gives the inequality existing in the region. Theil inequality decomposition can be stated as:

$$T = \left(\sum_{j=1}^{m}\frac{n_j}{n}\frac{y_j}{y}\ln\frac{y_j}{y}\right) + \left(\sum_{j=1}^{m}\frac{1}{n}\frac{y_j}{y}\sum_{i=1}^{n_j}\frac{y_{ij}}{y_j}\ln\frac{y_{ij}}{y_j}\right) = T_B + T_W$$

where n_j is the population size of the *j*th region, y_j is the average income of the *j*th region, and y_{ij} represents the income of the *i*th individual in the *j*th region. The study in order to estimate the health and education inequalities at the inter and intra-regional level is going to use the above formula of Theil inequality decomposition.

3.2. Data

The data is based on the information collected from Pakistan Social and Living Standard Measurement (PSLM) survey published by the Federal Bureau of Statistics. The survey provides detail information on the health and education indicators. The performance of these indicators can be compared across regions before and after the decentralization. The time period selected for the study is 2005 to 2015 and further divided into two subgroups as a period of before decentralization from 2005 to 2009 and after the decentralization from 2011 to 2015. The study selected various indicators of health and education to identify the levels of disparity in Pakistan. To measure the education and health inequality the selected indicators are:

Education

- Percentage distribution of population that has completed the primary level or higher.
- Net enrollment rate at the primary level (age 5-9).
- Net enrollment rate at the middle level (age 10-12).
- Literacy rate (Population 10 years and older).

Health

- Percentage of children aged 12-23 months that have been fully immunized.
- Treatment of Diarrhea in children under 5 years.
- Pre-natal consultation.
- Post-natal consultation.

4. Results

4.1. Results of Education and Health Disparity at the Inter-Regional Level before and after Decentralization

4.1.1. Results of Education Disparity

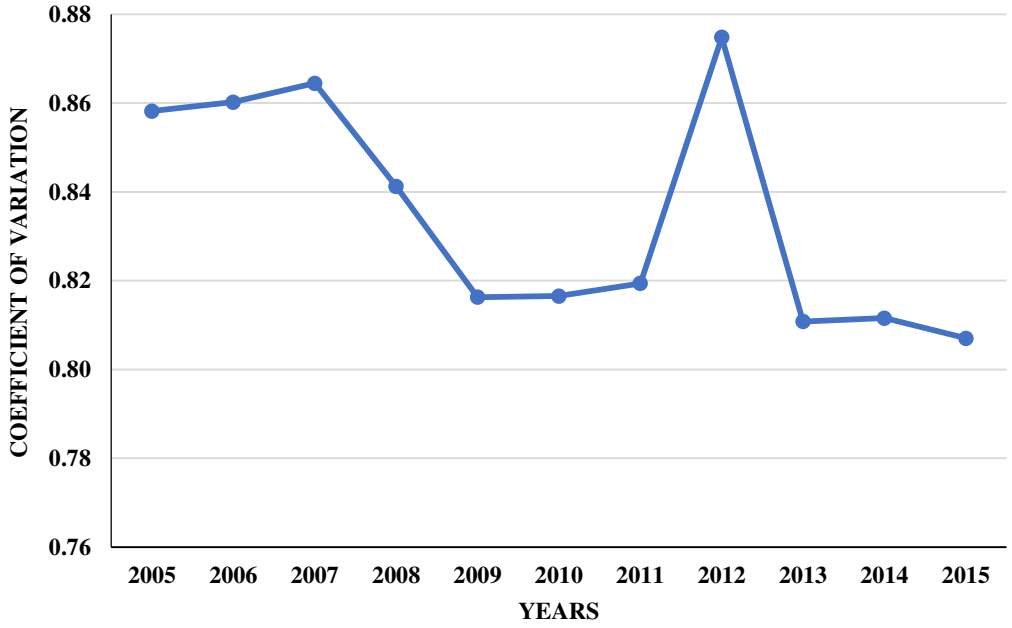
The main aim of the study is to analyze the performance of the inequality level in the education sector. Four indicators of education are selected to measure the variations at the provincial level for the period of 2005 to 2015. The years are further divided into two groups. One as the period before decentralization from 2005 to 2010 and the other group studies the performance of these indicators and their inequality levels after decentralization from 2011 to 2015. According to PSLM survey, literacy rate is defined as the population that is aged 10 years and older who can read and write a simple word. The second indicator is the number of population that has completed the primary or higher level of education. Net enrollment rate at the primary level is the third indicator define as the number of children attending the primary school between the ages of 5 to 9 years divided by the number of children in the same age group. Fourth indicator of education is net enrollment rate at the middle level which represents the number of children ages 10 to 12 years attending the middle school divided by the number of children between 10 to 12 years of age.

4.1.1.1. Results of Coefficient of Variation

First, the study analyzed the inter-regional inequality in the education sector through coefficient of variation which measures the average relative dispersion. The results of CV for the literacy rate are illustrated in Figure 4.1 which depicts that in the first period the inequality level has an increasing trend till 2007 with 0.86 CV but afterwards it starts decreasing and reached to 0.82 in 2009. After decentralization, inter-regional inequality in the literacy rate dramatically reached its highest peak of 0.87 in 2012 but in 2013 it decreased to 0.81 and remain the same till 2015. If we

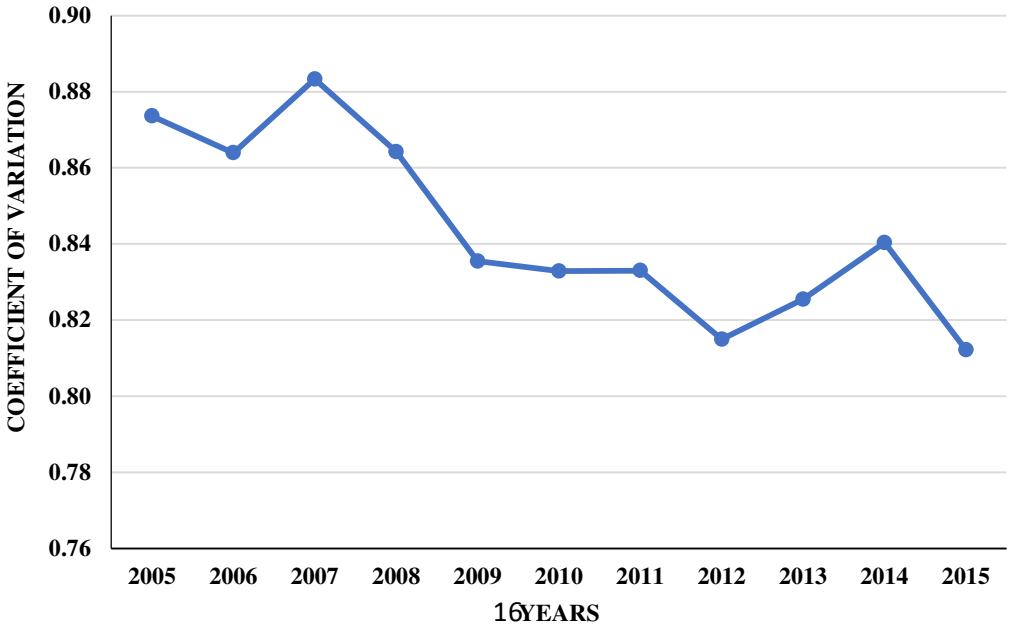
focus upon the graph of literacy rate, it shows visible fluctuations in the changing patterns of regional inequality.

Figure 4.1 Literacy Rate



Population that has completed the primary and higher education level is quite high in 2007 with 0.88 CV and it shows a decreasing trend with some ups and downs till 2015 as indicated in Figure 4.2. The period of decentralization gives a mix set of inequality patterns starting with 0.83 CV in 2011 and dropped to 0.81 in 2015. There is a clear rise and fall of inequality in the remaining studied period of decentralization.

Figure 4.2 Population that has completed Primary Level or Higher Education



Net enrollment rate at the primary level are presented in Figure 4.3 which indicates that in the first period the level of inequality has decline from 0.94 to 0.88 till 2010 and it further decreased to 0.87 in the starting year of decentralization. But afterwards there are visible fluctuations in the regional inequality trends till 2015.

Figure 4.3 Net Enrollment Rate at the Primary Level

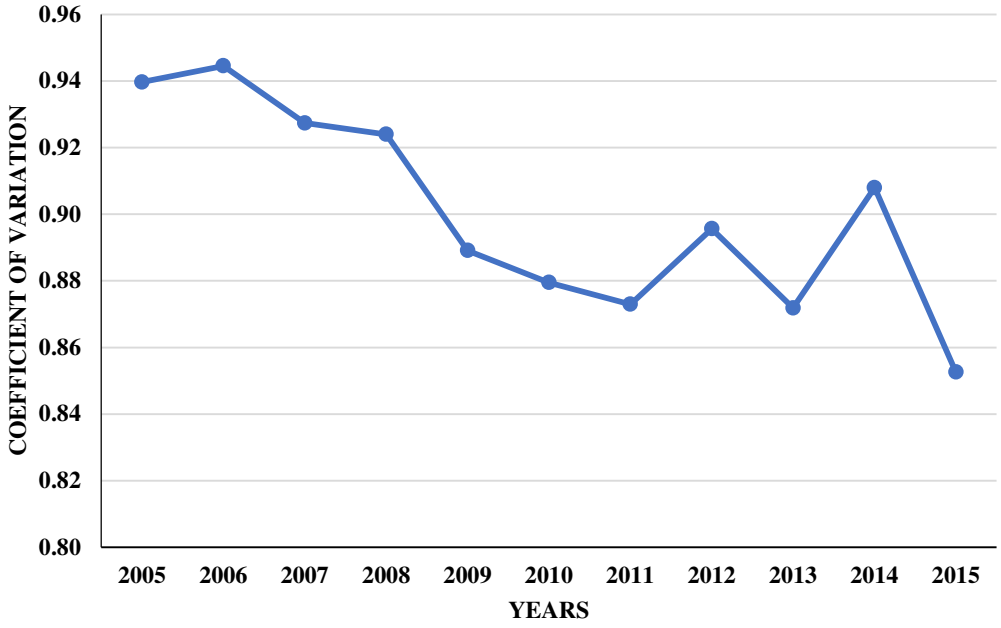
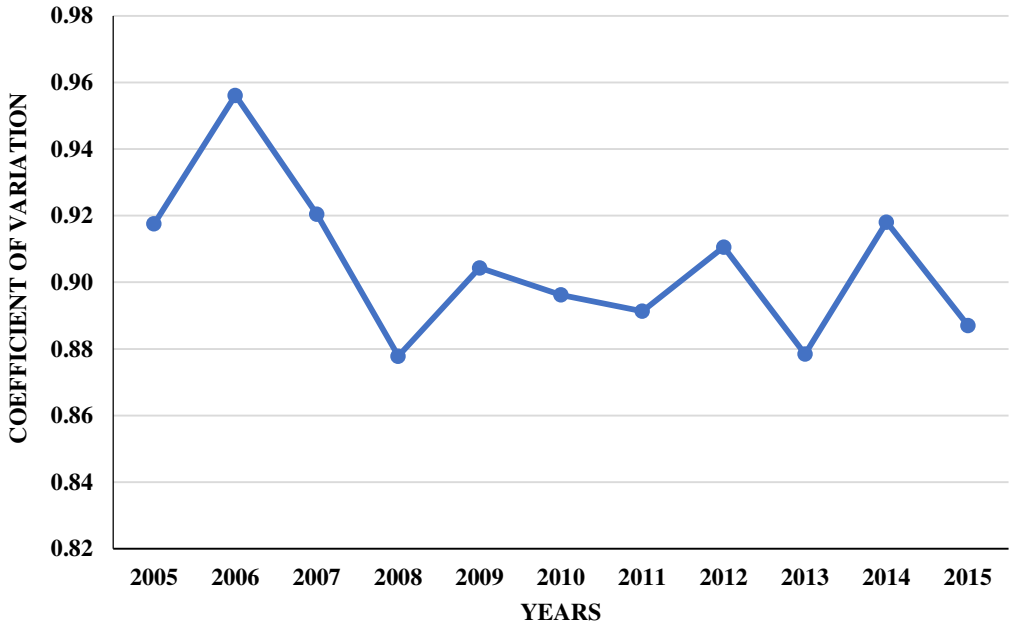


Figure 4.4 show the results of fourth indicator of education which is the net enrollment rate at the middle level predicts that regional inequality in the four provinces was quite high in the year of 2006 with 0.96 CV and it dropped to 0.88 in 2008. The period of decentralization gives disturbing picture of the regional inequality level with a significant rise and fall in the changing patterns of inequality. The overall disparity trend of the middle level education identifies that the performance of regional inequality at the middle level was better in the first period as compared to the period of decentralization.

Figure 4.4 Net Enrollment Rate at the Middle Level



By evaluating the results of CV in all the four indicators of education, the study revealed that the overall education inequality at the provincial level has declined a bit in the studied period. The period of decentralization is showing a continuous rise and fall of regional disparity at the provincial level in almost all the four education indicators. If the study compares the relative disparity of the four indicators the situation of literacy rate is showing considerable improvement at the provincial level.

4.1.1.2. Results of Theil Inequality Index

In order to analyze the situation of education disparity at the provincial level the method of Theil index of generalized entropy class is used as computed in Table 4.1. The results of the population that has completed the primary and higher education is giving almost the same inequality trends before and after decentralization as compared to the results of CV. The results of Theil also predict that the overall level of disparity in the studied years is giving a better and lower level of inter-regional inequality among the provinces than the results of CV. Now, the calculations of Theil inequality index in the literacy rate indicates that in the first period the disparity level was 0.36 in 2005 and remains the same till 2007. In 2008, there is a visible decline of 0.33 in the inequality of the literacy rate which remain stable till 2011.This stability persist till the starting

period of decentralization but afterwards there is a huge rise and fall of inequality in the period of 2012 and 2013.

Theil results of net enrollment rate at the primary level and middle level for the period of 2005 to 2015 are presenting a bit different scenario than the results of CV. The overall level of disparity in both indicators is low and shows less variations in the decreasing pattern as compared to the CV. Theil index for the primary level was 0.41 in 2005 and decreased to 0.37 in 2010. After decentralization, the changing trend of inequality shows ups and downs in the remaining period but these fluctuations are nominal. Inequality at the middle level shows stability from 2009 to 2011 but after decentralization there are visible fluctuations in the inequality trend.

Table 4.1 Results of Theil Inequality Index of Education

Years	Population that has completed Primary Level or Higher	Literacy Rate	Net Enrollment Rate at the Primary Level	Net Enrollment Rate at the Middle Level
2005	0.38	0.36	0.41	0.42
2006	0.37	0.36	0.42	0.44
2007	0.38	0.36	0.40	0.41
2008	0.37	0.33	0.40	0.37
2009	0.35	0.33	0.37	0.39
2010	0.35	0.33	0.37	0.39
2011	0.35	0.33	0.36	0.38
2012	0.33	0.37	0.38	0.40
2013	0.34	0.33	0.36	0.37
2014	0.35	0.32	0.39	0.40
2015	0.33	0.32	0.34	0.38

The calculated results of Theil inequality index in all the four indicators of education identify that the overall inequality in the studied period has declined and its much lower than the results of CV. But at the same time these disparities of education are showing a stagnant and slight improvement in the education inequality at the provincial level even in the period of decentralization.

The study also uses the Theil decomposition to break the population of the provinces at the district level into within and between group inequality as shown in Table 4.2. For this purpose, the period of decentralization from 2011 to 2015 is evaluated due to the unavailability of the data in the PSLM survey. Theil decomposition which is basically the sum of between and within group inequality shows that to what extent the inequality has increased or decreased in the provinces and among the provinces. The decomposition results of the population that has completed primary or higher level indicates that within inequality in the four provinces has increased as it was 0.44 in 2011 and rose to 0.45 in 2015. Within inequality in the literacy rate has also increased from 0.39 to 0.41 but these variations in the both education indicators are small. On the other hand, the situation of between inequality which represents the disparity between the provinces represents much lower inequality than the within inequality group with a smooth decreasing trend.

The computed results of net enrollment rate at the primary level depicts that Theil inequality index is showing an increasing trend with a slight decrease in 2015. This increasing trend is mainly due to the rise in the within group inequality as compared to the between group inequality which shows a decreasing trend.

Inequality in the net enrollment rate at the middle level has shown some decline in the overall inequality and this decline is also due to the low level of between group inequality. The within group inequality at the middle level is indicating some ups and downs in the disparity trend. Theil decomposition results of the education indicators predicts that relative regional inequality in all the indicators has decreased with the exception of literacy rate which give mix trends throughout the decentralization period. A decline in the overall inequality is because of the improvement in the between group inequality which shows a decreasing trend in all the four indicators.

Table 4.2 Results of Theil Decomposition

Years	**Population that has completed Primary level or Higher**			**Literacy Rate**			**Net Enrollment Rate at the Primary Level**			**Net Enrollment Rate at the Middle Level**		
	Theil Total	*Theil Within*	*Theil Between*	*Theil Total*	*Theil Within*	*Theil Between*	*Theil Total*	*Theil Within*	*Theil Between*	*Theil Total*	*Theil Within*	*Theil Between*
2011	0.70	0.44	0.26	0.64	0.39	0.25	0.60	0.34	0.26	0.69	0.42	0.28
2012	0.70	0.44	0.26	0.65	0.40	0.25	0.60	0.35	0.26	0.67	0.40	0.27
2013	0.70	0.45	0.25	0.65	0.40	0.24	0.61	0.35	0.26	0.65	0.38	0.26
2014	0.69	0.45	0.25	0.64	0.41	0.24	0.60	0.35	0.25	0.65	0.39	0.26
2015	0.69	0.45	0.25	0.65	0.41	0.24	0.59	0.35	0.25	0.67	0.40	0.26

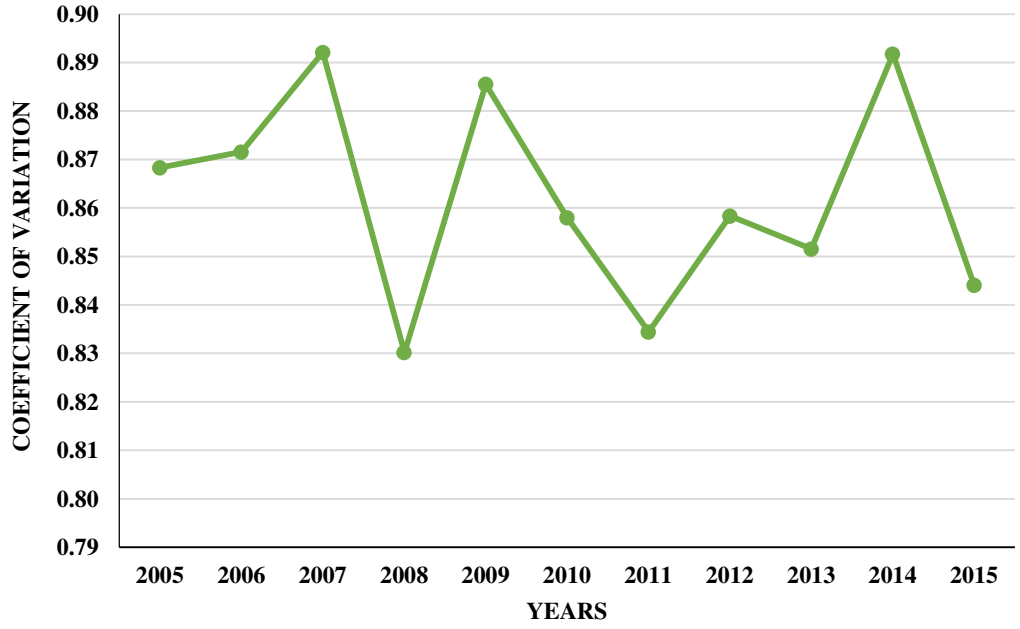
4.1.2. Results of Health Disparity

The second goal of the study is to analyze inequalities in the health sector at the provincial level in Pakistan by selecting four indicators of health related to the child and woman health. First indicator of child health is full immunization among children which is define as the percentage of children aged 12 to 23 months and data is based on the recall and record analysis. Second indicator for child health is the treatment of Diarrhoea among the children under 5 years of age and is consulted by a practitioner. The third and fourth indicators selected in the health sector are related to the health of mother and child during pregnancy. Pre-natal consultation is defined as the percentage of women in consulting the doctors, midwives or lady health workers during pregnancy and post-natal is related to the percentage of women consulting the doctors after giving birth.

4.1.2.1. Results of Coefficient of Variation

Figure 4.5 indicates the disparity level of children who are fully immunized by using the method of CV. Before decentralization regional inequality in full immunization was highest in 2007 and 2009 with 0.89 CV. In the early years of decentralization disparity level of full immunization has declined from 0.89 to 0.83 in 2011 but there are some noticeable variations in the inequality trend. The calculated results of coefficient of variation throughout the period identify dramatic fluctuations in the regional disparity level but in 2015 disparity level improved and drop to 0.84.

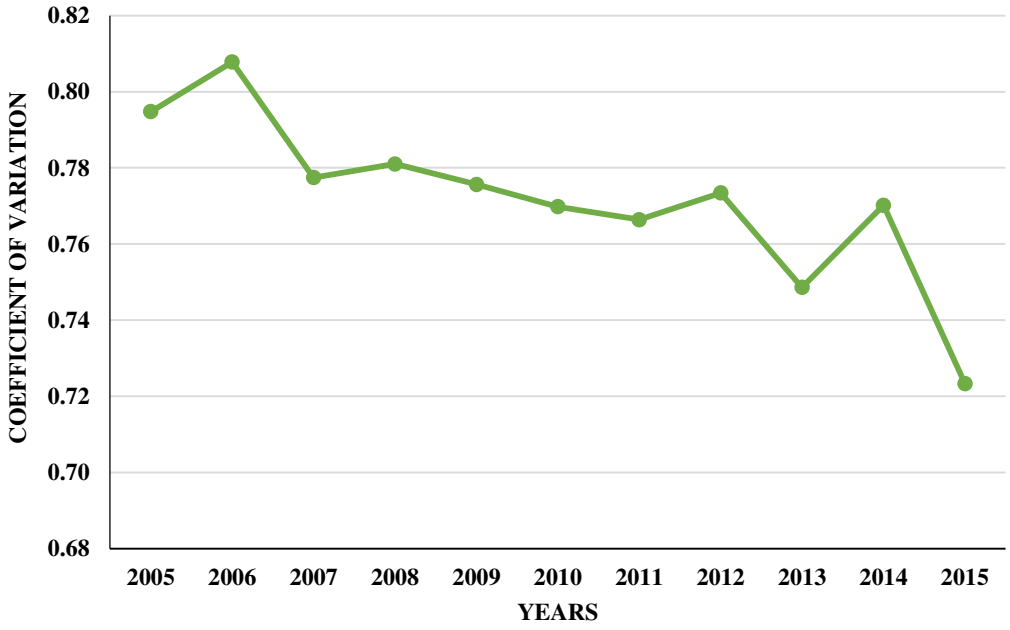
Figure 4.5 Fully Immunized Children



Trea

tment of Diarrhoea among the children with its inequality is predicted in Figure 4.6. The disparity level was quite high in 2006 with 0.81 CV but in the latter years it shows a decline in the inequality level. The disparity level of Diarrhoea treatment among the children reached to 0.72 in 2015 which is the lowest. Figure 4.6 also highlight an important aspect in the study that after decentralization inequality shows more variations in the pattern as compared to the period of before decentralization.

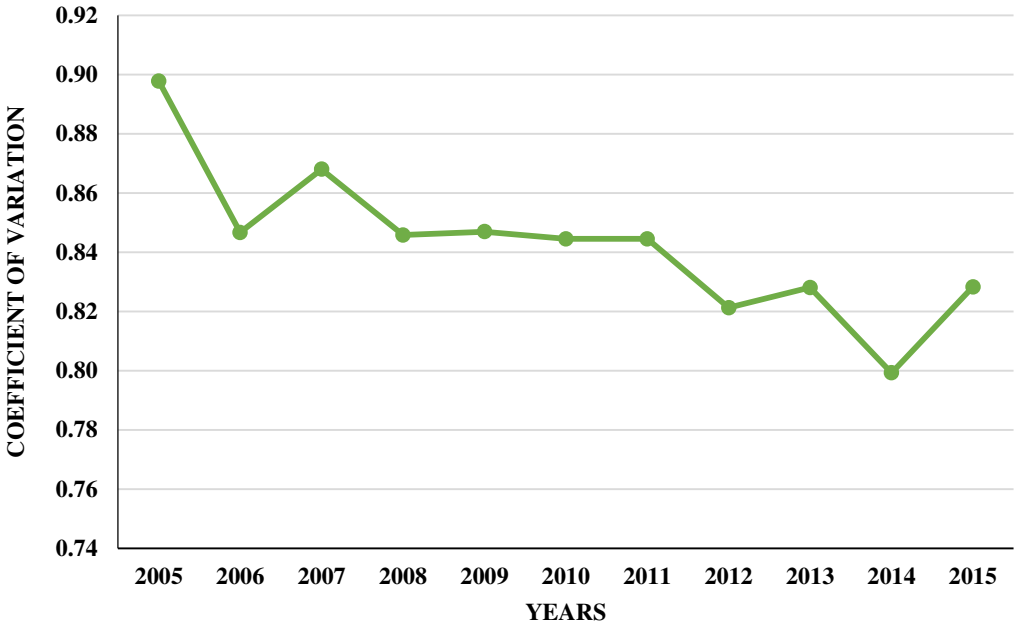
Figure 4.6 Diarrhoea Treatment



If the study looks into the overall performance of child health in completing the vaccination course and treatment of Diarrhoea through a proper practitioner. It illustrates that disparity in the child health has decreased and their performance have also improved at the provincial level in the studied period. But there are some huge fluctuations in the regional inequality level of both indicators. Decline in the disparity of Diarrhoea treatment is better than the disparity of full immunization.

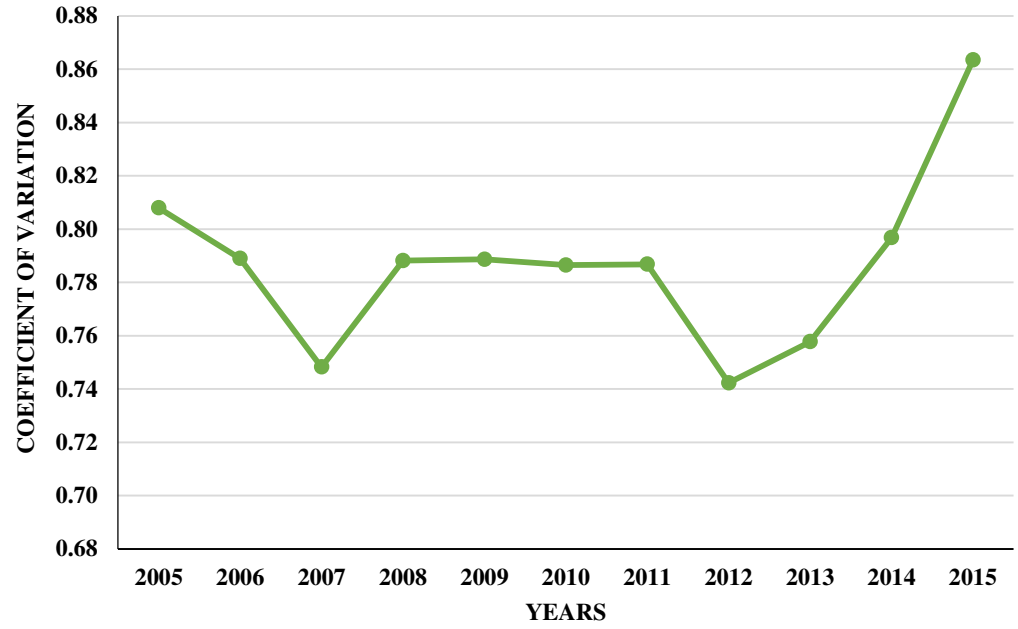
The third indicator is related to the health of woman during pregnancy. Figure 4.7 illustrates the results of pre-natal care at the inter-regional level. Pre-natal consultation disparity level was quite high in 2005 with 0.91 CV but after that it starts decreasing. It remains stable from 2008 to 2011 which include both periods. The period of decentralization indicates a decreasing trend with some ups and downs with 0.80 CV in 2014 which represents the lowest inequality in pre-natal consultation.

Figure 4.7 Pre-Natal Consultation



Post-natal care is related to the consultation of woman after giving birth. The results of coefficient of variation are displayed in Figure 4.8. Evaluation of the results conclude that disparity level in the post-natal consultation is lower than the pre-natal. As, it was 0.81 in 2005 and shows a decreasing and stable trend till 2013. Disparity level was lowest in the years of 2007 and 2012. The study observed an increasing trend in the inequality level in the period of decentralization with the highest value of 0.86 in 2015.

Figure 4.8 Post-Natal Consultation



The estimated results of the two indicators of health forecast that with the decline in the inequality level the trend of consulting a doctor or midwives during pregnancy has improved in all the provinces. But these improvements are not stable and there is a continuous rise and fall in the inter-regional inequality level. Whereas, the situation of post-natal care has worsened over the years especially in the period of decentralization.

4.1.2.2. Results of Theil Inequality Index

Theil inequality index is also used to evaluate the level of health disparity at the provincial level (Table 4.3). Relative disparity in full immunization of children was quite high in 2009 and 2014 with 0.38 but in 2015 it decreased to 0.35. If the whole period of full immunization disparity is considered which indicates that there is no consistency in the disparity level and there is clear rise and fall in the inequality pattern. Results of Theil inequality index are very much similar to the CV but it represents more equality in full immunization at the provincial level. Second indicator of child health is Diarrhoea treatment and its Theil results are depicted in Table 4.3. Disparity level of Diarrhoea treatment identifies more stable condition as compared to the full immunization. As, Theil inequality index of Diarrhoea treatment was 0.32 in 2006 and decreased to 0.26 in 2015. Inequality of Diarrhoea treatment was more stable between the years of 2007 to 2012 which include both periods. After decentralization, the disparity level has decline but this is nominal as compared to the period of before decentralization.

The inequality trend of pre-natal care is almost the same as the trend of CV. The only difference is that Theil inequality index is showing less disparity in the studied indicator as compared to the CV. Results of Theil inequality index in post-natal care gives a bit different scenario in the disparity pattern when compared with the CV. These differences are quite visible in the decentralization period. Post-natal disparity level was 0.33 in 2005 and it dropped to 0.30 in 2015. But in the period of decentralization the results of CV are showing continuous rise in inequality after 2012 whereas, Theil results are indicating a mix trend of lower level of inequality with a rise and fall after 2013.

Now, if the study considers the overall performance of these health indicators which are portraying the health of mother and child (Table 4.3). The study evaluates that the level of equality has improved in consulting a doctor for the Diarrhoea treatment but on the other hand the situation of completing the vaccination course among the children has not shown any visible improvement and its inequality is showing an irregular pattern at the provincial

level. The level of equity in consulting a doctor or midwife during pregnancy has also increased throughout the studied period. While the situation of consulting a medical practitioner after giving birth to a child has not shown any improvement and its decreasing trend of inequality is very nominal.

Table 4.3 Results of Theil Inequality Index of Health

Years	Fully Immunized	Diarrhoea Treatment	Pre-Natal Consultation	Post-Natal Consultation
2005	0.36	0.31	0.39	0.33
2006	0.37	0.32	0.35	0.33
2007	0.37	0.29	0.37	0.30
2008	0.33	0.29	0.35	0.33
2009	0.38	0.29	0.36	0.33
2010	0.36	0.29	0.35	0.33
2011	0.34	0.29	0.35	0.33
2012	0.37	0.29	0.34	0.32
2013	0.35	0.27	0.34	0.30
2014	0.38	0.29	0.32	0.34
2015	0.35	0.26	0.34	0.30

Table 4.4 gives the detail statistics of Theil decomposition at the provincial level for the period of decentralization. Decomposition provides a clear picture that how much disparity has increased or decreased between the provinces and within the province. The inequality of fully immunized children has decreased at the national level but its decline is very nominal as it was 0.55 in 2011 and dropped to 0.53 in 2015. Within group inequality has also decreased from 0.30 to 0.28 but between group inequality which represents the disparity between the provinces has remained stagnant throughout the period of decentralization. The level of disparity in the within group is more than the between group inequality.

Inequality level in Diarrhoea treatment has increased from 0.46 to 0.48 in the studied period. Within inequality has also increased and is more than the between group inequality. Between group inequality was 0.21 in 2011 and it dropped to 0.19 in 2015. This shows that in the period of decentralization total inequality has increased due to the increase in the within group inequality. The analysis of the two indicators predict that equity level of Diarrhoea treatment has decreased as compared to the equity level of full immunization among the children (Table 4.4).

Pre-natal consultation inequality trend is showing a nominal decrease throughout the years. Within group inequality and between group inequality has declined but the level of disparity in the within group is more than the between group inequality. Both the inequalities are showing the same trend. Post-natal consultation in the studied period has decreased from 0.71 to 0.57 in 2015. This tremendous decline in the disparity level is due to the decrease in the within group inequality. Between group inequality is showing a nominal decline. The results of these two indicators indicates that the equity level of pre-natal and post-natal has improved. The performance of the post-natal care is tremendous in the period of decentralization and it's because of the decline in the within and between group inequality.

4.1.3. Economic Implication of Inter-Regional Disparity in Health and Education

The study revealed that the results of CV in the education and health sectors are showing huge inequality levels than the results of Theil inequality index. By evaluating the four indicators of education it indicates that there is a slight improvement in the education inequality at the inter-provincial level. But if the two periods are examined separately, the study concludes that decentralization period is facing a continuous rise and fall of disparity in all the education indicators. The results of Theil index are much better than CV and these disparities are showing a stagnant trend in the education inequality at the provincial level even in the decentralization period. The results of Theil decomposition for the period of decentralization revealed that in the education indicators the regional disparity has decreased except literacy rate who is representing a mix trend of inequality. The reason of decline in the total inequality is because of the visible decline in the between group inequality as compared to the within group inequality. The results of health inequality in examining the mother and child health at the inter-regional level also revealed some interesting results. CV is presenting high inequality in all the four indicators of health. Whereas, Theil index gives a clearer picture of the changing trends of inequality. The child health inequality has shown some betterment in the treatment of Diarrhoea as its inequality level has decreased as compared to the full immunization among the children. The results of woman health reveal that inter-regional inequality in the pre-natal care has improved as compared to the post-natal care. In the decentralization period, within group inequality is more than between group inequality in full immunization and it remained stable. Inequality level of Diarrhoea treatment has shown an increasing trend as compared to full immunization in the period of decentralization. Pre-natal and post-natal consultation equity level has also increased but the improvement in the post-natal care is clearly visible in the studied period.

Table 4.4 Results of Theil Decomposition

Years	**Fully Immunized**			**Diarrhoea Treatment**			**Pre-Natal Consultation**			**Post-Natal Consultation**		
	Theil Total	*Theil Within*	*Theil Between*	*Theil Total*	*Theil Within*	*Theil Between*	*Theil Total*	*Theil Within*	*Theil Between*	*Theil Total*	*Theil Within*	*Theil Between*
2011	0.55	0.30	0.25	0.46	0.24	0.21	0.67	0.40	0.27	0.71	0.43	0.28
2012	0.55	0.30	0.25	0.46	0.25	0.21	0.65	0.39	0.26	0.64	0.39	0.26
2013	0.55	0.30	0.25	0.46	0.26	0.20	0.62	0.38	0.24	0.59	0.36	0.24
2014	0.54	0.29	0.25	0.47	0.27	0.19	0.62	0.37	0.25	0.58	0.34	0.23
2015	0.53	0.28	0.25	0.48	0.29	0.19	0.62	0.37	0.25	0.57	0.34	0.23

4.2. Results of Education and Health Disparity at the Intra-Regional Level before and after Decentralization

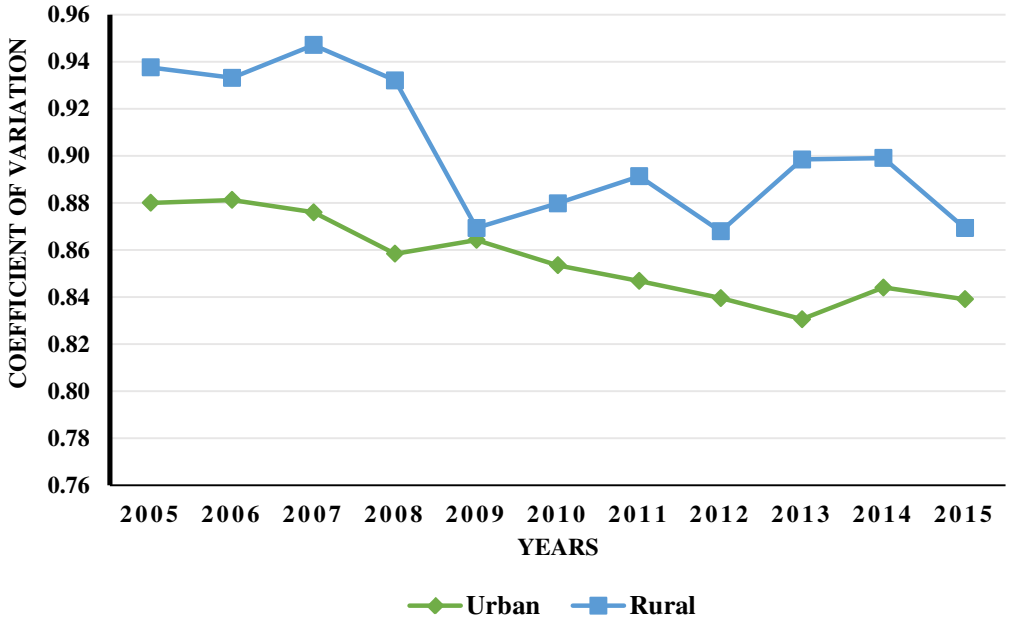
4.2.1. Results of Education Disparity

In order to analyze the disparity level in a country, the rural and urban areas and their differences at the social levels are of great importance. The second objective of the study is to evaluate the social inequalities by analyzing the education and health sectors in the urban and rural areas of Pakistan. The study explores the same indicators of education and health at the intra-regional level as used at the provincial level. The study evaluated the performance of educational inequality and to what extend the level of disparity has increased or decreased in the rural and urban areas of Pakistan. These are investigated by applying the methods of coefficient of variation and Theil decomposition.

4.2.1.1. Results of Coefficient of Variation

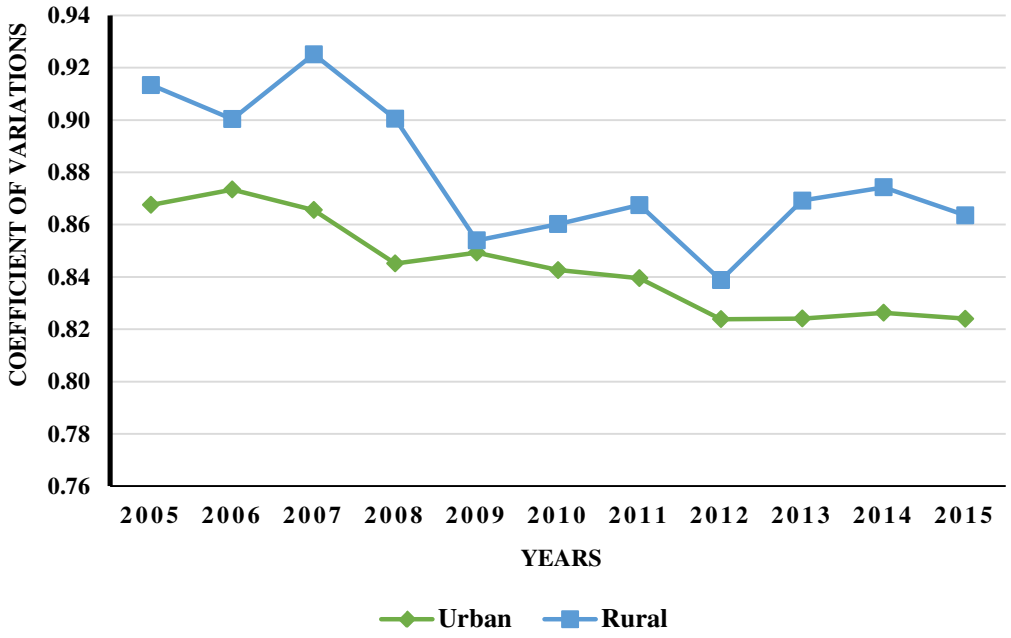
The computed results of CV are illustrated in Figure 4.9. The results of population that has completed primary level or higher education clearly shows that the disparity level of rural areas at the national level is higher than urban areas. As it was 0.95 in 2007 and dropped to 0.87 in 2015 at the rural level but it's still more than the urban areas of the studied period. The situation of urban areas in this indicator is a bit different as the changing pattern of inequality shows a downward movement with less fluctuations as compare to the trends of rural areas.

Figure 4.9 Population that has completed Primary Level or Higher Education



Literacy rate results are very much similar to the first indicator. The overall disparity level in the rural areas is greater than the urban areas. Although the level of disparity has decreased from 0.91 to 0.86 and 0.87 to 0.82 in the rural and urban population of Pakistan. The changing trends of inequality in urban areas are showing some stability after 2012 which is basically the period of decentralization. The inequality trends of rural population have also dropped in 2012 with 0.84 CV but there are visible fluctuations and increase in the inequality path after that period. Results of literacy rate are reported in Figure 4.10.

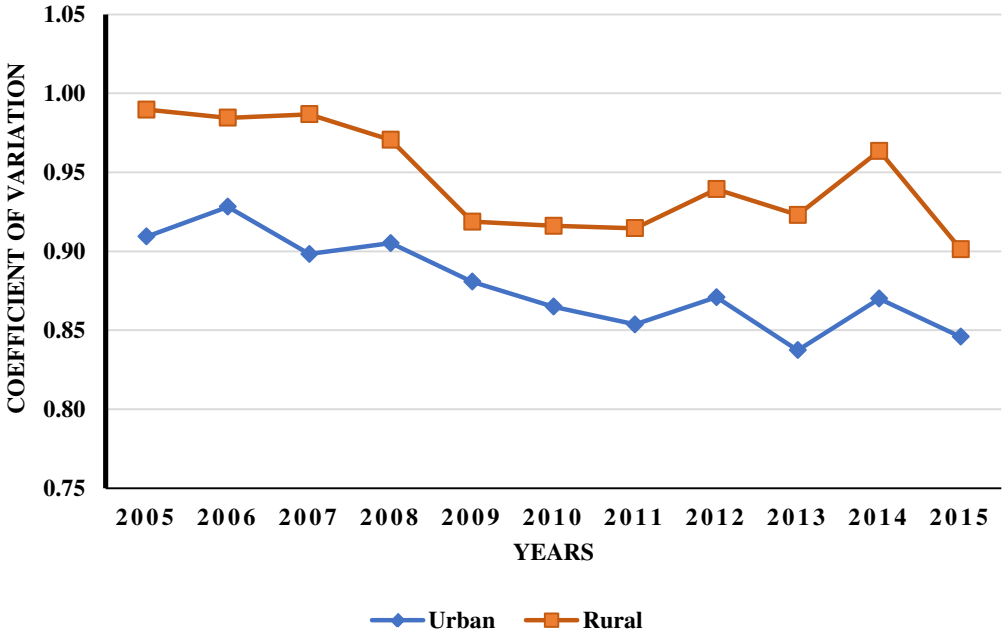
Figure 4.10 Literacy Rate



After the examination of the overall performance of the two education indicators the study concludes that the disparity level of the two indicators has serious issues in the rural areas. Their inequality trend is consistently facing huge fluctuations in rural areas. Whereas, the inequality of urban areas is showing some development especially after decentralization.

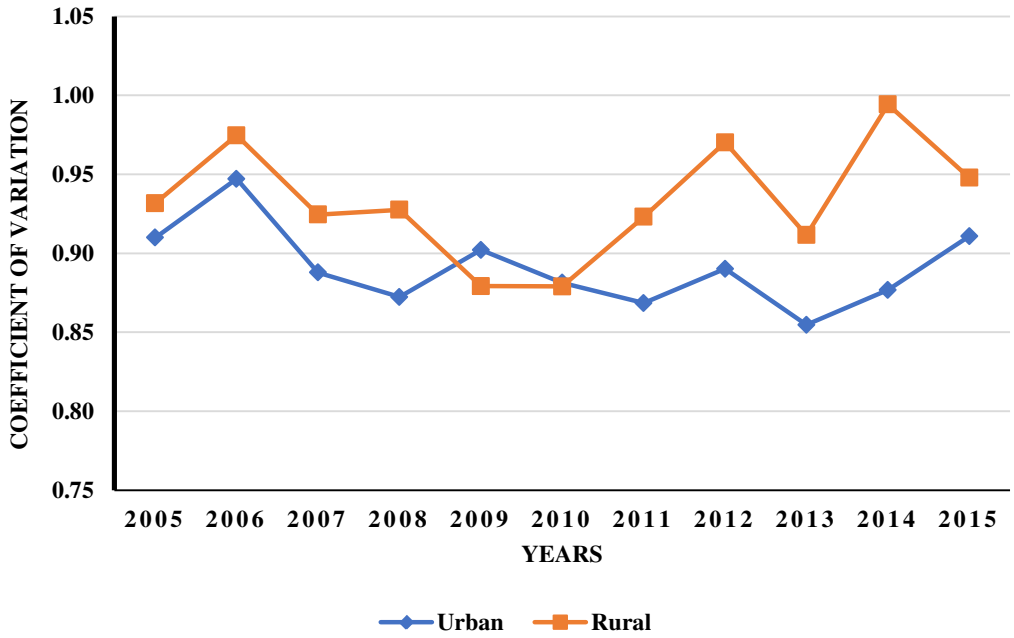
Primary education disparity level was dramatically high in the rural areas with 0.99 CV in 2005 (Figure 4.11). It dropped to 0.90 in 2015 which is still quite high. It remained stable from 2009 to 2011 but after that it faces some ups and downs in the decentralization period. Primary level in urban areas is also dealing with huge disparity levels but its performance is better than the rural areas.

Figure 4.11 Net Enrollment Rate at the Primary Level



Now, Figure 4.12 shows that inequality in the both rural and urban areas in analyzing the middle level education is facing a consistent rise and fall in the studied period. The disparity level has worsened in the period of decentralization in the urban areas and reached to 0.91 in 2015.

Figure 4.12 Net Enrollment Rate at the Middle Level



The computed results of the two indicators as illustrated in Figure 4.11 and 4.12 predicts that disparity levels of the primary and middle education are dealing with huge fluctuations throughout the period. During decentralization, the condition of middle level education has worsened in both rural-urban areas than the situation of primary education.

4.2.1.2. Results of Theil Inequality Index

Intra-regional inequality in the education sector is further sub-divided into rural and urban inequality of the four provinces. The results are computed through theil decomposition inequality index. Theil decomposition further highlight the within group and between group inequality in the rural-urban areas of Pakistan. In analyzing the results, the rural and urban share of each year are also considered in the study.

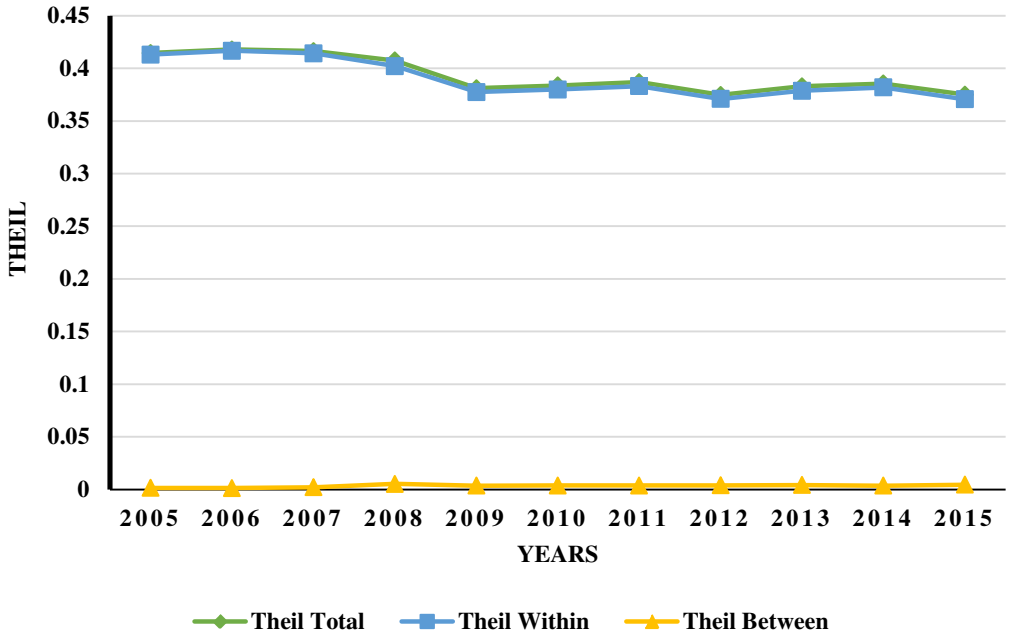
The results of table 4.5(a) show that total inequality in completing the primary and higher education is dramatically lower than the results of CV. Disparity level in the urban areas are representing a stable trend but its more than the disparity at the rural level which shows a decreasing trend in the studied period. The urban inequality is more than the rural inequality throughout the period but its share in increasing disparity is less than the rural share. As in 2005, urban and rural shares are 47% and 53% but in 2015 urban share decreases to 45% and rural share increases to 55%.

Table 4.5(a) Results of Theil Decomposition

Years	**Population that has completed Primary Level or Higher**							**Literacy Rate**						
	Theil Total	*Theil Within*	*Theil Between*	*Theil Urban*	*Theil Rural*	*Urban Share*	*Rural Share*	*Theil Total*	*Theil Within*	*Theil Between*	*Theil Urban*	*Theil Rural*	*Urban Share*	*Rural Share*
2005	0.41	0.41	0.0015	0.43	0.40	0.47	0.53	0.40	0.39	0.0054	0.42	0.38	0.45	0.55
2006	0.42	0.42	0.0013	0.43	0.40	0.47	0.53	0.40	0.39	0.0056	0.42	0.37	0.45	0.55
2007	0.42	0.41	0.0021	0.42	0.41	0.47	0.53	0.40	0.40	0.0075	0.41	0.38	0.44	0.56
2008	0.41	0.40	0.0054	0.41	0.40	0.45	0.55	0.39	0.38	0.0120	0.39	0.36	0.42	0.58
2009	0.38	0.38	0.0036	0.41	0.35	0.46	0.54	0.37	0.36	0.0087	0.40	0.33	0.43	0.57
2010	0.38	0.38	0.0038	0.41	0.36	0.46	0.54	0.37	0.36	0.0088	0.39	0.34	0.43	0.57
2011	0.39	0.38	0.0038	0.40	0.37	0.46	0.54	0.38	0.37	0.0088	0.39	0.35	0.43	0.57
2012	0.37	0.37	0.0039	0.40	0.35	0.46	0.54	0.36	0.35	0.0080	0.38	0.32	0.44	0.56
2013	0.38	0.38	0.0042	0.39	0.37	0.45	0.55	0.37	0.36	0.0093	0.38	0.35	0.43	0.57
2014	0.39	0.38	0.0036	0.39	0.37	0.46	0.54	0.37	0.36	0.0084	0.38	0.35	0.44	0.56
2015	0.38	0.37	0.0045	0.40	0.35	0.45	0.55	0.37	0.36	0.0092	0.38	0.34	0.43	0.57

Theil within and between group inequality of rural-urban areas are illustrated in Figure 4.13. Within group inequality is quite high whereas between group inequality is very minimal among the rural and urban areas in completing the primary or higher education. These results predict that there is significant rise of inequality inside the urban and rural areas than the inequality between these areas. As, within inequality is 0.37 in 2015 and between inequality was only 0.0045.

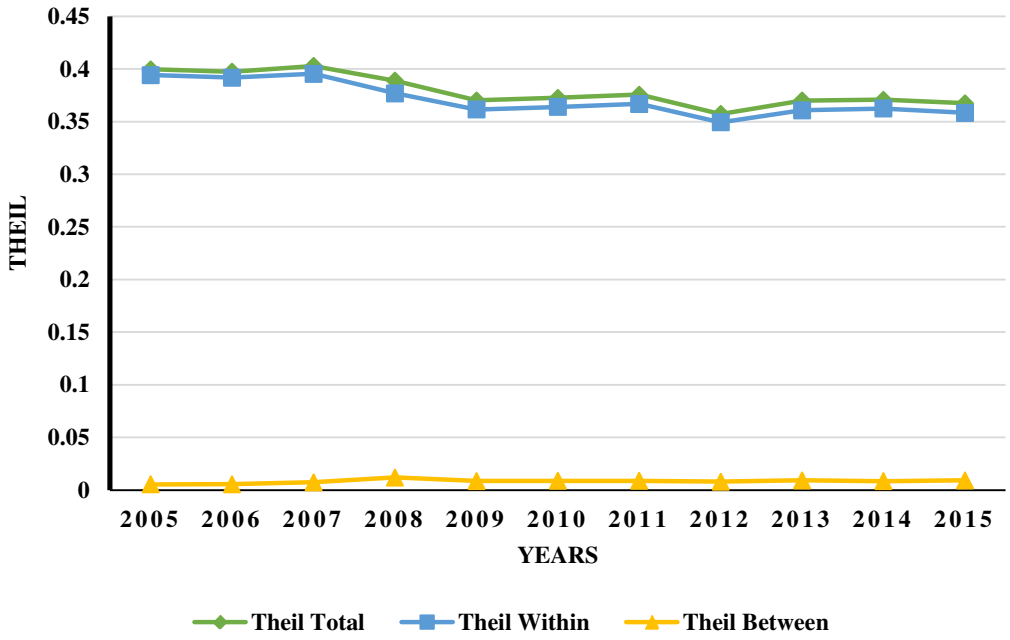
Figure 4.13 Population that has completed Primary Level or Higher Education



Disparity level in literacy rate is more in urban areas than rural areas but both shows a decreasing trend in the studied period. Theil inequality level was 0.42 in 2005 and decreased to 0.38 in 2015. Theil inequality in rural area decreased to 0.34 from 0.38. In Table 4.5(a), if the study examines the shares of the intra-regions it identifies that urban share was only 45% as compared to rural share (55%) in 2005. This trend of shares continues in the same pattern with 43% share in urban areas and 57% in rural areas. Therefore, it is quite visible that contribution of rural areas is more in creating inequality in the literacy rate than urban areas.

The decomposition of literacy rate is illustrated in Figure 4.14 which indicates that the overall level of disparity has decreased from 0.40 to 0.37 in 2015. It's changing pattern remains the same before and after decentralization. Equity level between the urban and rural areas is quite high and there is more disparity inside the rural and urban areas.

Figure 4.14 Literacy Rate



Net enrollment rate at the primary level as predicted in Table 4.5(b) shows that total inequality of the rural-urban areas has decreased from 0.47 to 0.40. But there are visible variations in both the periods. This overall inequality is also due the within group inequality and inequalities between the rural-urban areas is very low. Both the urban and rural inequalities are showing the same decreasing trend and the share of increasing the inequalities at the national in achieving the primary education is high of the rural areas with 60 to 61% share throughout the period. The situation of urban areas is much better with 39% share in 2015. Results of Theil decomposition in the net enrollment rate at the primary is reported in Figure 4.15.

Net enrollment rate at the middle level predicts that the theil total was 0.51 in 2006 which is the highest in the studied period and it dropped to 0.39 in 2013 but in the latter years it again starts increasing in the period of decentralization. This increase in the disparity level of middle education is created by the within group inequality which was also 0.51 in 2006. The results of between and within group inequality indicates that there are serious variations in achieving the middle level education within the rural and urban areas. Equity level between the rural and urban areas is almost the same.

If the study analyzes the rural and urban inequality separately than it predicts that both areas are having almost the same level of inequality in the middle education. The disparity level of the two areas are showing some ups and downs and facing continuous fluctuations in the

period of decentralization. Urban share is less than the rural share in increasing the inequality level as it was 44% and 56% in 2015. The evaluation of the middle level disparity concludes that both the rural and urban areas are dealing with the problem of inequality in completing the middle education but the situation of rural areas is more depressing than the urban areas of Pakistan. Results of Theil decomposition in the net enrollment rate at the middle level is reported in Figure 4.16 and in Table 4.5(b).

Figure 4.15 Net Enrollment Rate at the Primary Level

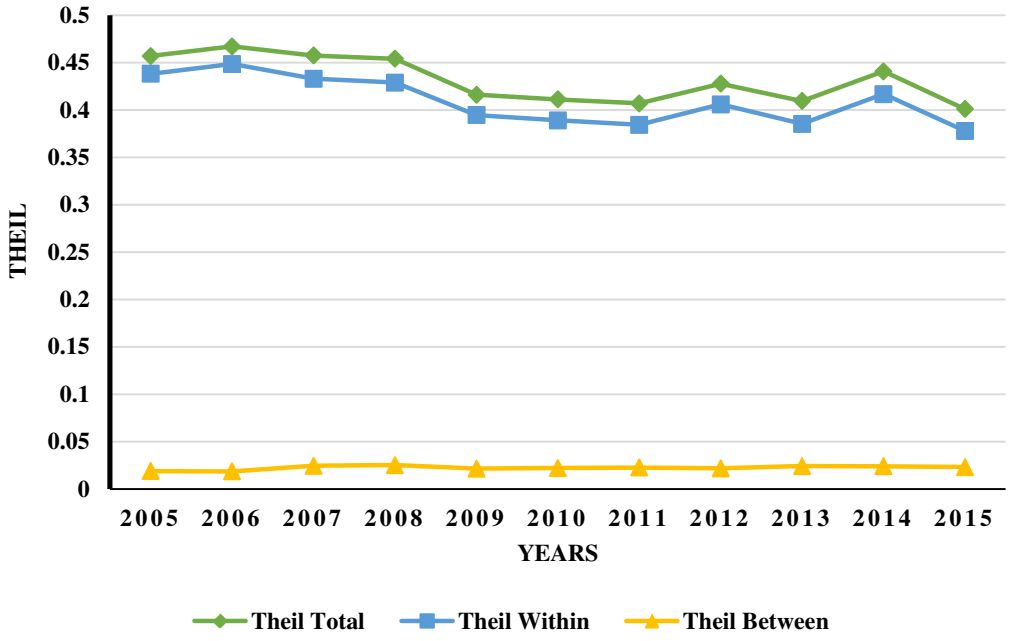


Figure 4.16 Net Enrollment Rate at the Middle Level

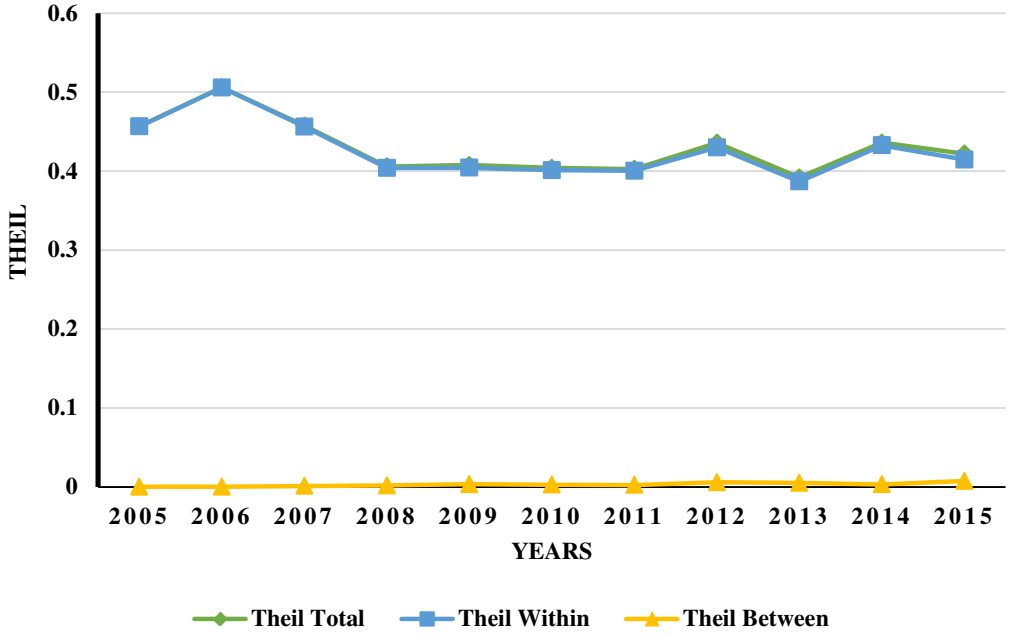


Table 4.5(b) Results of Theil Decomposition

Years	**Net Enrollment Rate at the Primary Level**							**Net Enrollment Rate at the Middle Level**						
	Theil Total	*Theil Within*	*Theil Between*	*Theil Urban*	*Theil Rural*	*Urban Share*	*Rural Share*	*Theil Total*	*Theil Within*	*Theil Between*	*Theil Urban*	*Theil Rural*	*Urban Share*	*Rural Share*
2005	0.46	0.44	0.0188	0.44	0.44	0.40	0.60	0.46	0.46	0.0002	0.45	0.46	0.49	0.51
2006	0.47	0.45	0.0186	0.46	0.44	0.40	0.60	0.51	0.51	0.0002	0.49	0.53	0.51	0.49
2007	0.46	0.43	0.0244	0.43	0.43	0.39	0.61	0.46	0.46	0.0011	0.43	0.48	0.48	0.52
2008	0.45	0.43	0.0251	0.43	0.43	0.39	0.61	0.41	0.40	0.0018	0.41	0.40	0.47	0.53
2009	0.42	0.39	0.0215	0.41	0.38	0.40	0.60	0.41	0.40	0.0033	0.43	0.38	0.46	0.54
2010	0.41	0.39	0.0221	0.40	0.38	0.40	0.60	0.40	0.40	0.0029	0.42	0.39	0.46	0.54
2011	0.41	0.38	0.0225	0.39	0.38	0.39	0.61	0.40	0.40	0.0024	0.41	0.39	0.47	0.53
2012	0.43	0.41	0.0217	0.41	0.40	0.40	0.60	0.44	0.43	0.0058	0.43	0.43	0.45	0.55
2013	0.41	0.39	0.0241	0.38	0.39	0.39	0.61	0.39	0.39	0.0050	0.39	0.39	0.45	0.55
2014	0.44	0.42	0.0239	0.40	0.42	0.39	0.61	0.44	0.43	0.0033	0.41	0.45	0.46	0.54
2015	0.40	0.38	0.0231	0.38	0.37	0.39	0.61	0.42	0.41	0.0074	0.42	0.41	0.44	0.56

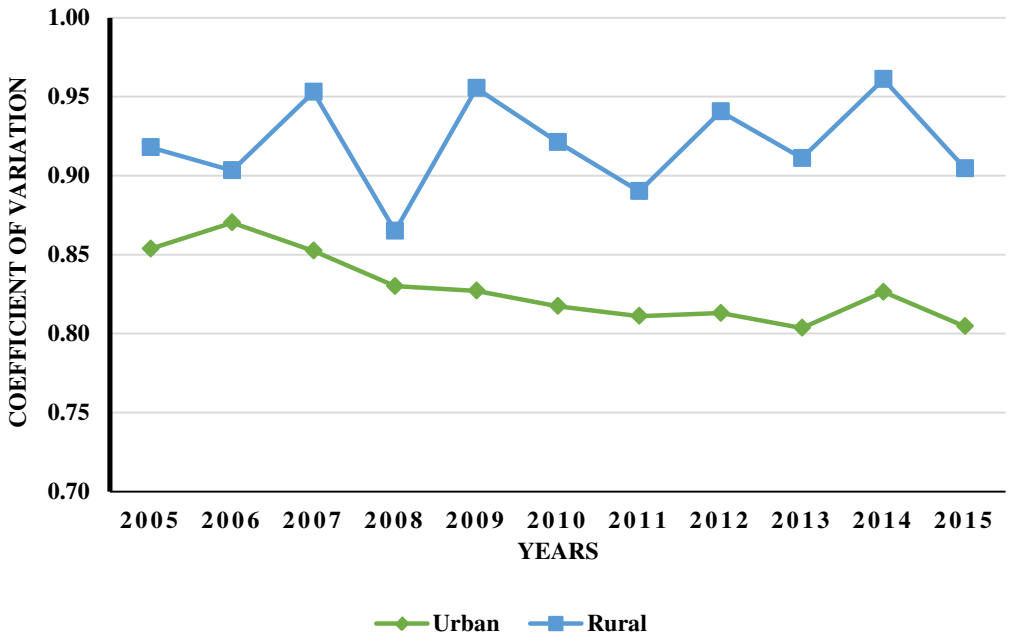
4.2.2. Results of Health Disparity

At the intra-regional level which represents the rural and urban areas of Pakistan the study evaluates the condition of health disparity before and after decentralization. Four indicators of health are used to analyze the inequality level in rural and urban areas. Same indicators as used at the provincial level will be examined. First, the results of coefficient of variation are discussed than the results of theil inequality decomposition. At the intra-regional level Theil decomposition is done for the period of 2005 to 2015 in which both periods are included.

4.2.2.1. Results of Coefficient of Variation

First, the study will discuss the condition of child health and to what extent health disparity has increased or decreased in the rural-urban areas of Pakistan. The overall results of the CV (Figure 4.17) are indicating high inequality level in fully immunized children in both areas. The rural areas of Pakistan in availing the facility of vaccination course for their children is dealing with some serious issues. The data indicates a continuous rise and fall in both the periods. Whereas, the situation of urban areas is a bit better than the rural areas. As it was 0.87 in 2006 and dropped to 0.80 in 2015.

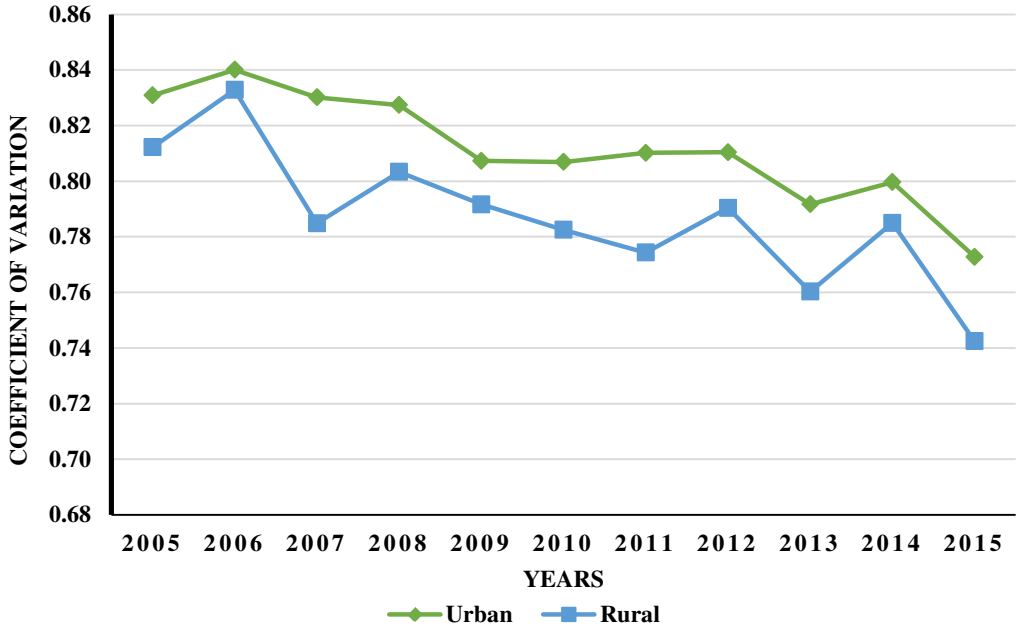
Figure 4.17 Fully Immunized Children



Inequality level in the treatment of Diarrhoea in urban areas was 0.84 in 2006 and it reached to 0.77 in 2015. The decline in the disparity level has remained stable from 2009 to 2012 but in the latter years some fluctuations can be seen in Figure 4.18. The situation of rural areas in

Diarrhoea treatment is also showing a decreasing trend with huge rise and fall in the studied period and these fluctuations are more visible in the period of decentralization

Figure 4.18 Diarrhoea Treatment



The analysis of the two indicators predict that in urban areas the disparity level of both indicators has shown some improvement. Although, there are some fluctuations in the decentralization period but its level of disparity has declined. On the other hand, the situation of rural areas is giving a different scenario. Disparity level of fully immunized children has remained high throughout the studied period whereas the inequality level of Diarrhoea treatment has shown satisfactory improvement in both the periods which indicates that equity among the population of rural areas of Pakistan has improved in consulting a doctor for the Diarrhoea treatment.

The starting years of pre-natal consultation is facing high inequality levels in the rural areas but after 2008 it shows a stable position till 2014 and dropped to 0.83 from 0.95 in 2005. Disparity level of urban areas is lower than the rural areas and it shows a continuous decline in the inequality level of pre-natal care. The situation of pre-natal consultation has improved in the period of decentralization as it remains stable in this period as illustrated in Figure 4.19.

Figure 4.19 Pre-Natal Consultation

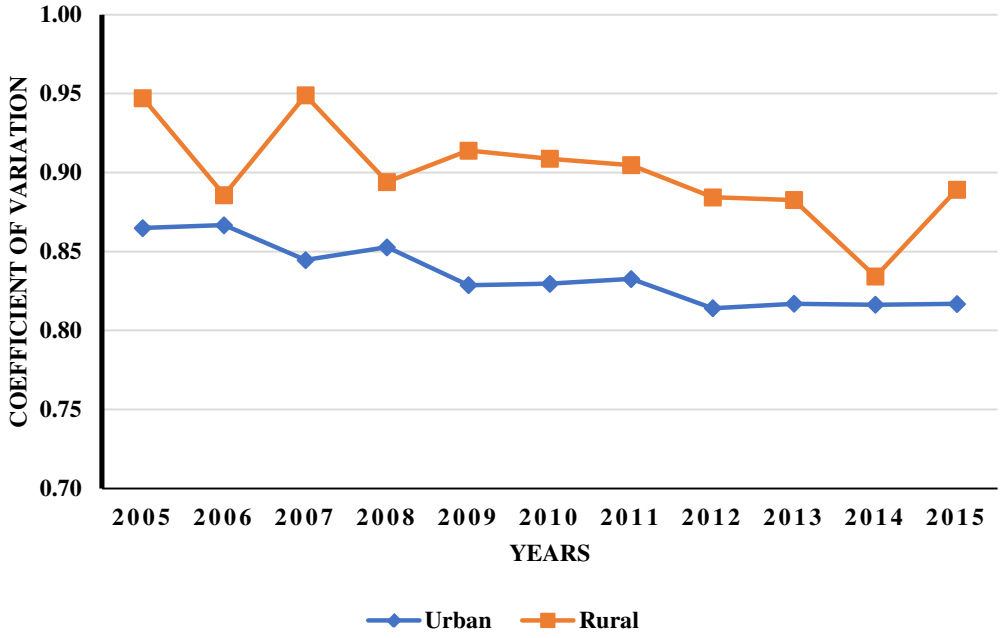
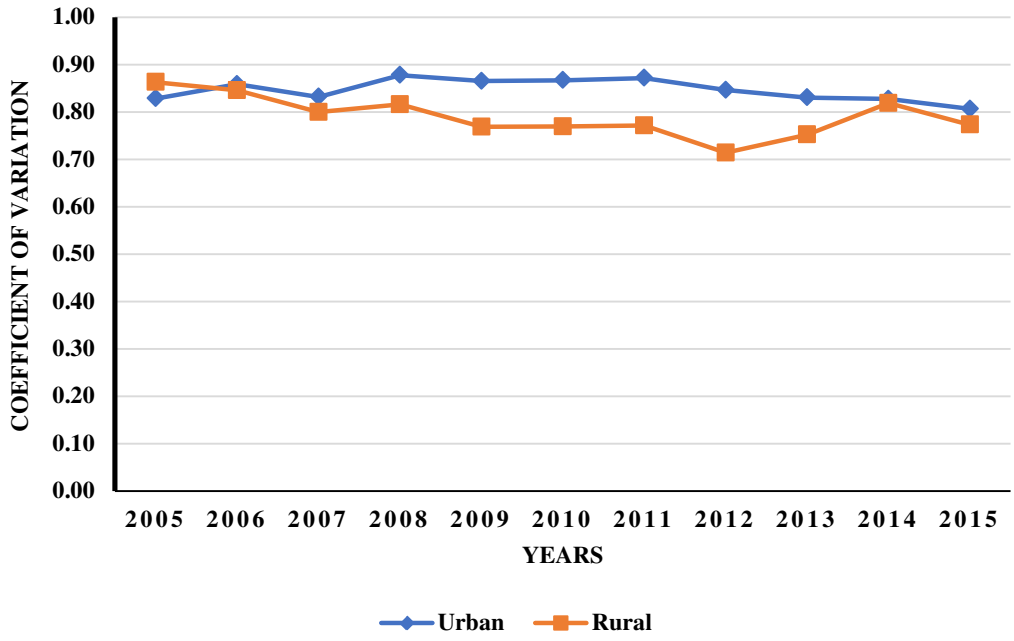


Figure 4.20 is depicting the results of post-natal care which indicates that the inequality level in urban areas has increased to 0.88 in 2008 which is the highest in the studied years but in the latter years it starts decreasing and reached to 0.81 in 2015. In rural areas, the highest disparity level was 0.86 in 2005 but after that it starts decreasing and dropped to 0.71 in 2012. In the last years of the study it shows an increasing trend in the post-natal care.

Figure 4.20 Post-Natal Consultation



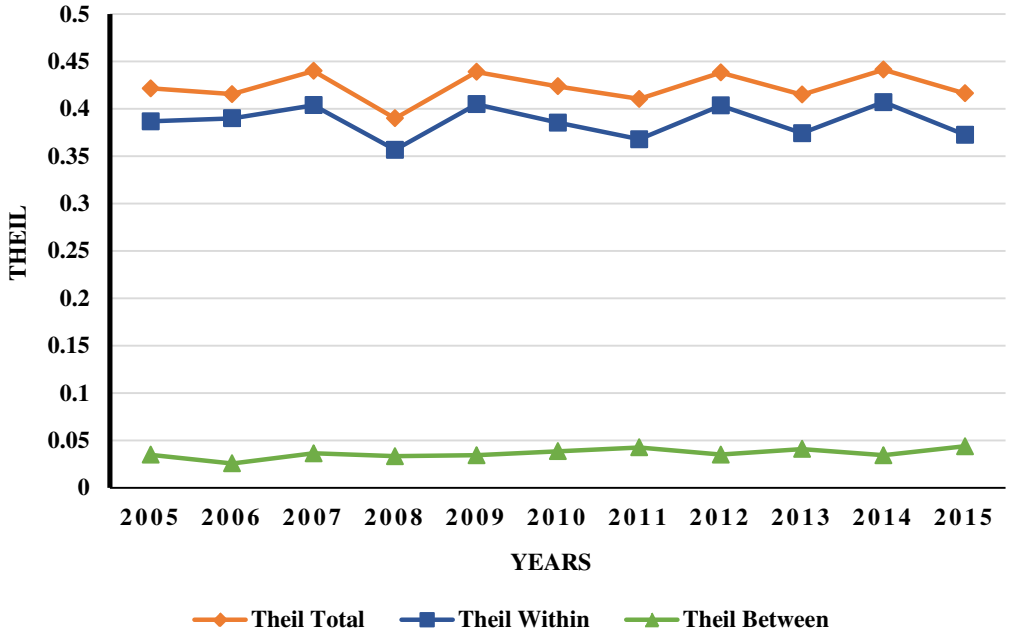
The overall results of the pre-natal and post-natal care states that women health in the urban areas has improved as compare to the rural areas of Pakistan. Whereas, the facility of availing

the pre-natal consultation is dealing with low equity in the rural areas but the situation of post-natal consultation has improved as its overall inequality has decreased.

4.2.2.2. Results of Theil Inequality Index

The four indicators of health are analyzed by applying the Theil inequality decomposition in order to predict the level of disparity at the intra-regional levels of Pakistan. The results of Theil decomposition identify that within inequality and total inequality of fully immunized children are showing the same patterns (Figure 4.21). There is a consistency of fluctuations in the whole period. Between group inequality has increased a minimal but its effect on the total inequality is very nominal. Urban inequality has decreased from 0.41 to 0.36 in 2015 and inequality in rural areas is dealing with the rise and fall throughout the period. Its share in creating disparity is also very high with 65% contribution as compare to the share of urban areas which is only 35% in 2015 as illustrated in Table 4.6(a).

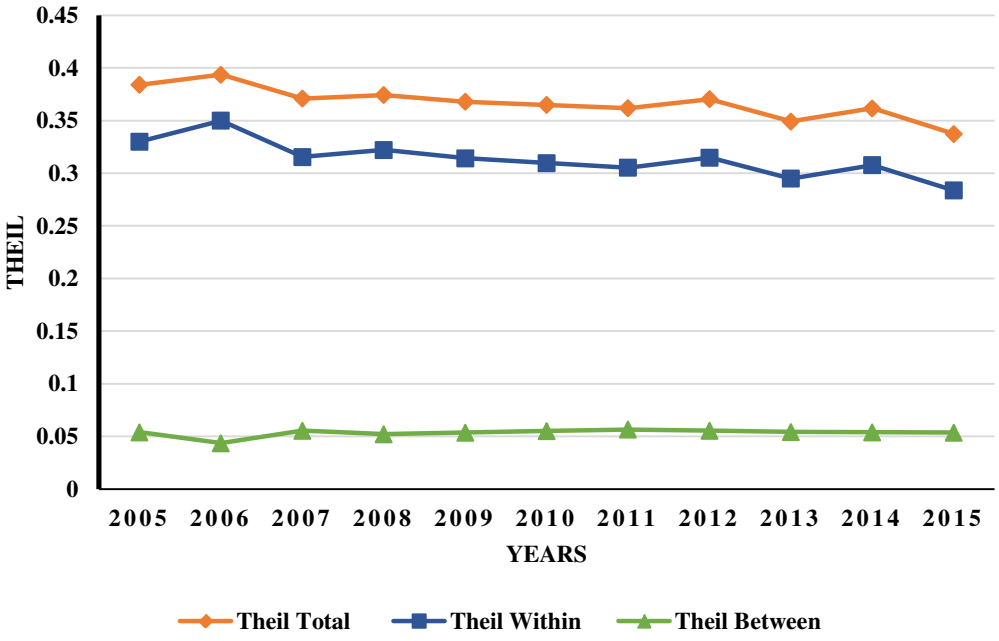
Figure 4.21 Fully Immunized Children



The disparity level of Diarrhoea treatment in both rural-urban areas has declined. The contribution of rural areas in increasing disparity is quite high with 66% share in almost all years. Now, the situation of Theil total inequality is showing a continuous decline in the disparity level as it was 0.38 in 2005 and decreased to 0.34 in 2015. But its performance is much better in the period of decentralization. The comparison of the between and within group inequality indicates that within group inequality has shown some improvement and between group inequality has remain the same throughout the period and its very nominal.

The changing patterns of the total and within group inequality are same and identical. Results of Theil decomposition of Diarrhoea treatment are reported in Figure 4.22 and in Table 4.6(a).

Figure 4.22 Diarrhoea Treatment



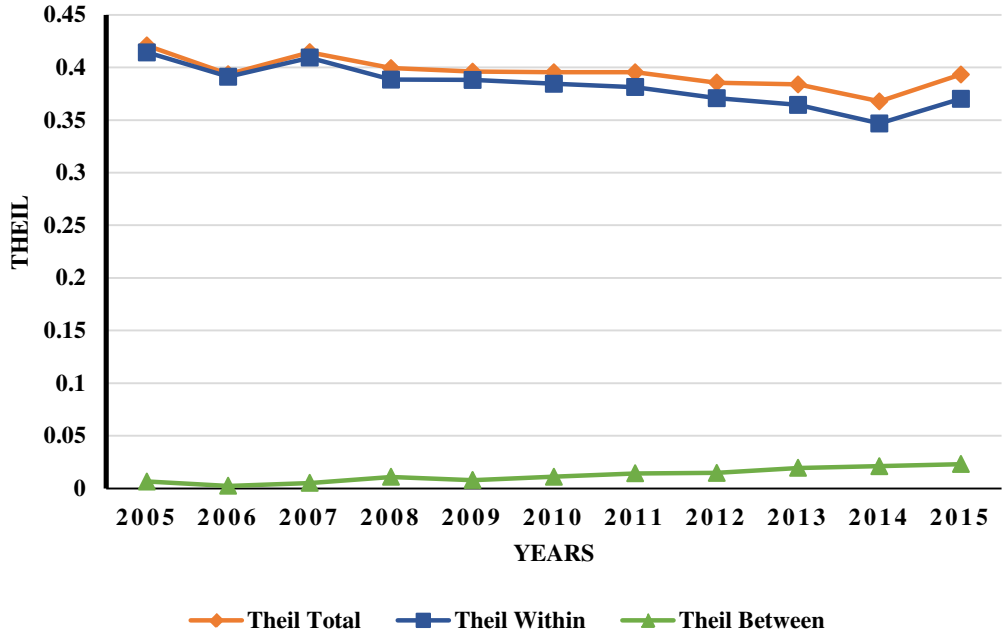
The analysis of the two indicators show that disparity level of between group inequality is very nominal and within group inequality has also declined but its performance is much better in the Diarrhoea treatment especially in the period of decentralization. The situation of full immunization is dealing with some problems in eliminating the inequality level in both the rural-urban areas while its graph has shown some betterment in the treatment of Diarrhoea among the children and equity level has increased in the rural areas.

Table 4.6(a) Results of Theil Decomposition

Years	**Fully Immunized**							**Diarrhoea Treatment**						
	Theil Total	*Theil Within*	*Theil Between*	*Theil Urban*	*Theil Rural*	*Urban Share*	*Rural Share*	*Theil Total*	*Theil Within*	*Theil Between*	*Theil Urban*	*Theil Rural*	*Urban Share*	*Rural Share*
2005	0.42	0.39	0.035	0.40	0.38	0.37	0.63	0.38	0.33	0.054	0.38	0.31	0.34	0.66
2006	0.42	0.39	0.026	0.41	0.38	0.39	0.61	0.39	0.35	0.044	0.39	0.33	0.35	0.65
2007	0.44	0.40	0.036	0.40	0.41	0.37	0.63	0.37	0.32	0.055	0.38	0.29	0.34	0.66
2008	0.39	0.36	0.033	0.37	0.35	0.37	0.63	0.37	0.32	0.052	0.37	0.30	0.34	0.66
2009	0.44	0.40	0.034	0.38	0.42	0.37	0.63	0.37	0.31	0.054	0.36	0.29	0.34	0.66
2010	0.42	0.39	0.038	0.37	0.40	0.36	0.64	0.36	0.31	0.055	0.36	0.29	0.34	0.66
2011	0.41	0.37	0.043	0.36	0.37	0.36	0.64	0.36	0.31	0.057	0.36	0.28	0.33	0.67
2012	0.44	0.40	0.035	0.37	0.42	0.37	0.63	0.37	0.31	0.055	0.36	0.29	0.34	0.66
2013	0.41	0.37	0.041	0.36	0.38	0.36	0.64	0.35	0.29	0.054	0.35	0.27	0.34	0.66
2014	0.44	0.41	0.034	0.37	0.43	0.37	0.63	0.36	0.31	0.054	0.35	0.29	0.34	0.66
2015	0.42	0.37	0.044	0.36	0.38	0.35	0.65	0.34	0.28	0.054	0.33	0.26	0.34	0.66

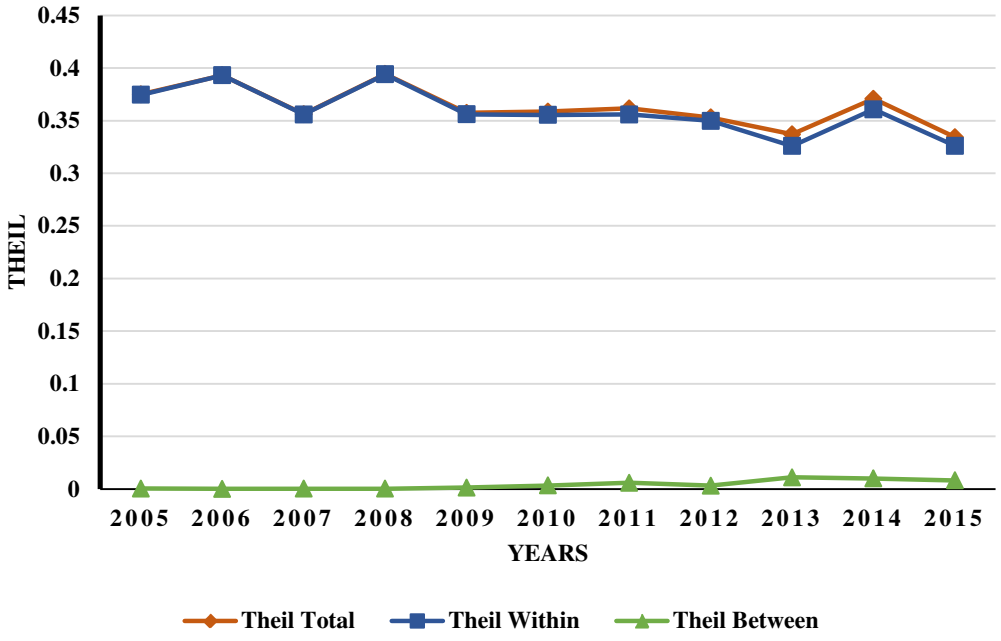
Disparity level of pre-natal consultation has shown some stability in the studied period and this decline is more visible in the period of decentralization as illustrated in Figure 4.23. The graph of pre-natal care also predicts that overall inequality is due to the differences within the urban and rural areas as compared to between group inequality. Between group inequality has shown an increase in the decentralization period but its inequality level is very low and has no favorable effect on the total inequality. Urban and rural inequalities both have decreased but the disparity trend of urban area is moving much smoothly than rural inequality. If the study analyzed the contribution of rural-urban areas in determining the inequality level than rural share has increased in the decentralization period and urban share has decreased as computed in Table 4.6(b).

Figure 4.23 Pre-Natal Consultation



Post-natal disparity level (Figure 4.24) decreased from 0.39 in 2006 to 0.33 in 2015. This decline is more prominent in the period of decentralization. The total inequality in the post-natal care is all because of the within group inequality. Between group inequality is very nominal throughout the period and it has no effect on the total inequality level. Both rural and urban inequalities are showing almost the same pattern in both periods. In the starting years both are experiencing high inequality but after 2008 the inequality trend become more stable and dropped to 0.37 in urban and 0.29 in rural areas in 2015 as computed in Table 4.6(b).

Figure 4.24 Post-Natal Consultation



The evaluated results of the two indicators show that disparity level of pre-natal and post-natal care has declined in the period of decentralization in both the rural and urban areas. These results predict that the facility of consulting a doctor or midwife during and after pregnancy has increased among the population of rural and urban areas.

Table 4.6(b) Results of Theil Decomposition

Years	**Pre-Natal Consultation**							**Post-Natal Consultation**						
	Theil Total	*Theil Within*	*Theil Between*	*Theil Urban*	*Theil Rural*	*Urban Share*	*Rural Share*	*Theil Total*	*Theil Within*	*Theil Between*	*Theil Urban*	*Theil Rural*	*Urban Share*	*Rural Share*
2005	0.42	0.41	0.0065	0.42	0.41	0.44	0.56	0.37	0.37	0.0004	0.39	0.35	0.51	0.49
2006	0.39	0.39	0.0024	0.43	0.36	0.47	0.53	0.39	0.39	0.0001	0.44	0.35	0.51	0.49
2007	0.41	0.41	0.0052	0.41	0.41	0.45	0.55	0.36	0.36	0.0003	0.41	0.30	0.51	0.49
2008	0.40	0.39	0.0109	0.42	0.37	0.43	0.57	0.39	0.39	0.0003	0.45	0.33	0.51	0.49
2009	0.40	0.39	0.0079	0.39	0.38	0.44	0.56	0.36	0.36	0.0013	0.42	0.30	0.47	0.53
2010	0.40	0.38	0.0110	0.39	0.38	0.43	0.57	0.36	0.36	0.0033	0.43	0.30	0.46	0.54
2011	0.40	0.38	0.0142	0.40	0.37	0.42	0.58	0.36	0.36	0.0058	0.43	0.29	0.45	0.55
2012	0.39	0.37	0.0148	0.37	0.37	0.41	0.59	0.35	0.35	0.0032	0.42	0.29	0.46	0.54
2013	0.38	0.36	0.0195	0.38	0.36	0.40	0.60	0.34	0.33	0.0110	0.39	0.28	0.43	0.57
2014	0.37	0.35	0.0211	0.38	0.33	0.40	0.60	0.37	0.36	0.0100	0.40	0.33	0.43	0.57
2015	0.39	0.37	0.0231	0.37	0.37	0.39	0.61	0.33	0.33	0.0082	0.37	0.29	0.44	0.56

4.2.3. Economic Implication of Intra-Regional Disparity in Health and Education

The study analyzed the intra-regional disparity in the health and education sector through coefficient of variation and Theil inequality decomposition. The results of CV in the education and health sector are indicating very high inequality in all the selected indicators. Whereas, the computed results of Theil decomposition are showing low inequality at the intra-regional level. In the education sector, disparity level of the four indicators have declined in the rural and urban areas. But the inequality level of middle education was quite high in the early years and it shows great improvement after decentralization. By analyzing the inequality in child health, the condition of Diarrhoea treatment has improved but there are some visible fluctuations in the period of decentralization. While, the inequality level to avail the facility of full vaccination course has shown no considerable improvement in the studied period.

Women health predicts that inequality in the pre-natal care has remained stable till the starting years of decentralization and shows a decreasing trend but this decline is very nominal. The situation of post-natal care has improved in the decentralization period. Overall inequality in all the indicators of health and education is due to the existence of within inequality in the rural-urban areas whereas, between group inequality is very nominal and had no effect on the total inequality.

5. Conclusion

Growing regional disparity has remained a serious concern for the economic, social and geographical researchers. Rising differences within a country creates regional imbalance and political instability, this may lead to affect the economic growth and development. The study analysis the changing trends of social inequalities at the inter-regional and intra-regional level. This study explores the existence of widening regional inequalities in the education and health sector during the period of 2005 to 2015 in Pakistan. Empirical research is conducted before and after decentralization at the provincial and rural-urban level.

Major findings of this study reveal that education inequality has shown a slight improvement at the inter-provincial level during the period of decentralization. The results of coefficient of variation are indicating high disparity in education. But decomposition of education inequality shows that in all the four indicators, regional disparity has decreased, whereas, literacy rate is portraying visible fluctuations in decentralization period. Education inequality has declined

because of between group inequality as compared to the within group inequality. This predicts that there are vast regional differences in achieving the basic education within the provinces. At intra-regional level, results of CV depict that there are cyclical movements in the rural areas and education inequality is higher than urban areas. Whereas, decomposition of education inequality indicates low disparity in all the indicators and inequality of middle level education is predicting a significant improvement in decentralization period.

Health status of mother at the inter-provincial level has improved. Results of CV are showing huge variations and high inequality in the four indicators and situation of post-natal care is quite alarming during decentralization. Decomposition analysis are indicating different scenario of health disparity. One important exception is that health inequality in pregnant women has narrowed in the decentralization period. In rural and urban areas, results of CV are showing significant improvement in the urban areas but women related health disparities are facing cyclical movements in rural areas of Pakistan. Theil results suggest that overall women health disparity has declined. Pre-natal care inequality has remained stable with a slight decline in the decentralization period and equity level of post-natal care is more satisfactory.

Disparities in child health gives mix results. There are huge variations in Diarrhoea treatment and full immunization as indicated by the results of CV. But inequality of Diarrhoea treatment has improved and declined as compare to full immunization. Decomposition results indicates that overall inequality of full immunization and Diarrhoea treatment has both declined but inequality trend of Diarrhoea treatment is more stable. At the inter-provincial level, within inequality has declined in full immunization and between group inequality remained stable. Whereas, within inequality of Diarrhoea treatment has increased and between inequality is showing a decreasing trend. Intra-regional disparities, in child health indicates cyclical movements in full immunization and Diarrhoea treatment as depicted by CV in rural areas but inequality trend of urban areas is more stable. Decomposition of Diarrhoea treatment reveals that urban and rural both inequalities has declined but situation of full immunization has improved in urban as compared to rural areas. The situation of full immunization does not show any improvement even during decentralization. The indicators of health reveal that overall disparity is due to the existence of within differences in rural-urban areas and between group inequality is very nominal and had no effect on total inequality.

On the basis of the results, following are the policy recommendations:

- Decentralization has slightly improved the situation in both areas, however, such economic and social policies should be adapted which helps to eliminate the issue of regional inequality and develop the backward regions.
- Government should take serious measures and promote effective development programs which equalize the access to basic education and health facilities in all the regions.
- Disparity at the intra-regional level is quite alarming especially in rural areas. Stringent policy decisions should be made at both the federal and provincial level to alleviate the increasing gap between the urban and rural areas.

Limitations of the study are:

- The study is unable to decompose the rural-urban areas at the district level due to the unavailability of the data.
- At the intra-regional level, the issue of rural population migration and huge urbanization in the province of Punjab is not considered in the study.

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