



Disparities in Welfare: The Spatial and Temporal Dynamics across Districts of Pakistan

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ABSTRACT

The concept of welfare has multidimensional perspectives in economic literature. There is no consensus on the definition of economic welfare among experts as they have paradoxical and divergent views about multidimensional alternatives of the economy. Welfare in any particular region can be extracted from the average level of per capita income, income distribution, poverty, and human development in the region. The present study aims to present interregional comparison; special attention has been paid to comparing the level of welfare among different regions of Pakistan. The measures acquired to present welfare are district-wise multidimensional poverty, the Gini coefficient, and the Human development index. Moreover, to explore further the Welfare index based on average income and Gini coefficient is calculated for each district across four provinces. The data employed from Pakistan Social and Living Standard Measurements (PSLM) 2005-06 and 2013-14 to measure the level of welfare in districts as well as in provinces. The overall findings elucidate that district-wise inequality exists in terms of income and living conditions to maintain quality of life. The deprivation is more in the majority of the districts in Balochistan and two-thirds of its total districts' rank deteriorated in 2014-15 followed by KP and Sindh where the rank of one-half of the total districts declined. The welfare conditions of the Punjab districts are much better, and the Federal capital is at the top among all districts of Pakistan. Therefore, it is recommended that the redistribution of resources and allocation of funds through the Public Sector and private sector should be undertaken to reduce these disparities.

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1. Introduction

No country in the world has emancipation from disparities in the realm of welfare to its people and regions. There is hardly any country on the world map where disparities do not exist in the economy either developed or underdeveloped. The economic wellbeing of a country or a region depends upon its rate of economic development and industrialization. Economists agree that a single factor i.e., economic development or industrialization does not merit analysis, but a more considered opinion is that equal distribution of wealth plays a pivotal role in the development of a region (Stewart, 1999) prevalence of regional disparity is a common phenomenon i.e., present in both advance and least-developed countries. However, developing, and underdeveloped countries majorly face this issue (Hall, 1984; Martinez, 2009). Naturally, different regions of a country grow at a very unequal rate which results in inter-regional and intra-regional imbalances. All those backward regions where political awareness is present among the masses may result in chaos and upheaval. The study of regional disparity or district dualism is very important for the policymakers in the state apparatus (Capello & Nijkamp, 2019).

Regional disparities may appear at any point in history in any region or country due to regional differences in the distribution of natural resources, demography and characteristics of the population, political exploitation, or historical accident. When special attention to development is paid in a region, it is natural that other regions of the same country feel discrimination (Tirado, Díez-Minguela, & Martínez-Galarraga, 2016). Sometimes this discrimination is translated into the disintegration of a country. The Soviet Union is a novel example. It was disintegrated into fifteen states in 1990 because of disparity in welfare among its regions. One of the most dangerous drawbacks of selective region development is that it promotes politicization which is dangerous and is a major trembling block in the way of national integration. Regional thinking has always had adverse economic effects. Furthermore, a selective regional development framework leads to bureaucratic inefficiency (Goletsis & Chletsos, 2011).

Pakistan has a unique geographical location and is the only country in the world that has an elevation from 0 to 28,251 ft. It has an average length of 1875 km while its breadth is around 400 km. Because of the distinctive nature of its areas, the regional disparity in physical features, demographic characteristics, climate, and population is extremely wide (Pakistan Demographic and Health Survey, 1992, 2018). These regional disparities have given rise to imbalanced development not only in the economy but also in social development and welfare provisions. The increasing widening gap aggravates the migration from rural to urban areas (Charles-Edwards, Bell, Bernard, & Zhu, 2019). The present study is unique particularly in the context of Pakistan because it will appraise policymakers to readdress the economic disparity to create national harmony.

In Pakistan, living standards vary among households living in different regions. The major portion of the population is unable to pursue the resources to fulfill their needs and therefore encompasses malnutrition and health issues. Being illiterate unable to get employment and may not be able to participate in economic activities. According to the estimates of the Asian Development Bank (ADB, 2019), the proportion of the population in 2017 is 24.3% of the total that lives below the national poverty line in Pakistan. The proportion of the population i.e., 40.7% of urban and only 32.4% of the rural regions were using safely managed drinking water services in 2015 (ADB, 2019). The report (*Global Nutrition Report Shining a Light to Spur Action on Nutrition 2018*, 2018) by the International Food Policy Research Institute regarding the malnutrition burden in the region of Pakistan depicts that 37.6% national prevalence of under-five stunting prevails, which is quite higher than the average of 25% in developing countries. Pakistan Bureau of Statistics also reported that the income of 53% of the households was reduced in the regions of Pakistan due to the ongoing pandemic during 2020 (Special survey for evaluating socio-economic impact of COVID-19 on well being of people, 2020). The vulnerable communities need social safety nets to overcome the economic brunt and to maintain an adequate standard of living. Hence designing social policies as a tool to promote the wellbeing of individuals in society is needed.

The linkage between the data and geographic location is called georeferencing. The demographic, socio-economic, or regional activity is highly related to the spatial dimension. The concept of welfare is also related to time and location therefore spatial analysis of welfare is more relevant to locate high and low welfare regions. The main objective of the study is to calculate the social welfare levels of the districts with a social welfare index. The score of the index enables one to rank the districts of Pakistan. It will contribute to understanding and determining the needs of resources to be allocated by the policymakers. Therefore, the current study intends to highlight the high and low welfare regions and locations across Pakistan along with spatial rankings of districts. The literature review, data, and methodology are presented in sections 2 and 3 respectively. The discussion on empirical results and spatial analysis are presented in section 4. The conclusion and recommendations are presented at the end.

2. Literature Review

The significant sign of less development is inequality and its different dimensions (Kangmennaang, Smale, & Elliott, 2019). The development of society is mainly depicted through the indicators like social wellbeing and economic prosperity (Anand & Sen, 1994). The existence of inequality may take the country towards underdevelopment (Easterly, 2007) of the society. Hence it retards sustainable economic growth and significantly affects further the efficient allocation of resources (Goletsis & Chletsos, 2011). It is being recognized in recent years that the growth of a country and its economic development is potentially linked with regional

disparities. The argument given in the report of the United Nations is that in the early stages of development, spatial disparities increase and later decrease with the achievement of high-income status (United Nations., 2009).

The economic growth approaches and poverty are directly linked with disparities and to assess inequality is needed (Birdsall & Londoño, 1997; Ravallion, 2001). The existence of any type of inequality always results in the stimulation of a sense of deprivation (Ifcher, Zarghamee, & Graham, 2019; Veneri & Murin, 2019). If this sense of deprivation is exploited by politicians and international powers may at any juncture in history be translated into disintegration in a country. The rankings of the regions vary with the analysis based on the different measures of inequality. Therefore, the selection of the appropriate measure has its importance for practitioners and researchers (Josa & Aguado, 2020). The Gini coefficient and Lorenz curve as well as Theil index (Oancea & Pirjol, 2019; Raj & Koerts, 2012) are mainly utilized to measure inequality.

The essential component of social policy is social protection which is widely used by different countries to reduce poverty and inequality; therefore, such policies are ultimately fruitful in improving welfare levels (Shahidi et al., 2016). Before determining these policies, the requirement is to highlight the disparities in living conditions of households residing in different regions. The spatial analysis assists in this regard to trigger the problem of low welfare by identifying the location more accurately and contributing to alleviating the hitches. It may utilize for implementing policy decisions to provide welfare facilities in these locations for the households.

Disparities issue in the field of economics coupled with welfare exists. Therefore, resolving the issue of inequality and improving social welfare is needed (Satz & White, 2021). All researchers have convergence that a state must allocate more resources for deprived people and regions to address the problem of welfare and underdevelopment. The empirical evidence (Zhang & Churchill, 2020) exhibited that a reduction in inequality increases the average level of social wellbeing. Along with reducing inequality, the resource allocation by the planners of the public and private sectors is a challenge because it may affect the marginal welfare gains of the households.

2.1. Economic disparity and welfare: Overview in the context of Pakistan

Since the inception of Pakistan, many commissions were mandated to develop strategies for equal development of all parts of Pakistan. These commissions very articulately formulated operative recommendations to the policymakers but due to the lack of interest and will of the ruling elite, these were never implemented. Therefore, the allocation of government expenditure is not only inefficient but also induced by political pressures. The impact of government policies influences the social welfare of households. The findings of the study say that increasing the direct taxes and decreasing the indirect taxes have a positive effect on social welfare because it not only helps to reduce inequality but also improves the living standards of the households (Moen-ud-Din, Naqvi, Khan, & Iqbal, 2022). Furthermore, poverty gets reduced in the provinces of Pakistan through transfer payments (Khan, Iqbal, Khan, & Bilund).

The allocation of funds in the development program by the government of Pakistan may be for those who are more vulnerable and the identification of vulnerability in the different districts can be done through a multidimensional measure rather than monetary measures (Najam, 2022). The schemes of social safety nets are announced by the government to aid the impoverished population i.e., through cash transfers and conditional cash transfers which are also needed to be transferred through convenient modes of transactions.

Copious research did not exist for the case of Pakistan, but few studies were conducted to highlight the disparities issue of different regions mainly within provinces or between provinces over the past three decades. In this regard, a study related to Sindh (Jamal & Malik, 1988) was conducted and it elucidated that policy measures taken in the early 1970s to remove disparities, did not contribute to the improvement of rank ordering of the Sindh districts. The rank ordering of the districts in Sindh province was identified by using the Z-sum technique and Taxonomic distance methods. (Pasha, Malik, & Jamal, 1990) also captured disparities across regions of Pakistan. The ranking of districts in terms of economic and social development generated (Ghaus, Pasha, Ghaus, & Chaudhary, 1996) and concluded that substantial variation in the social

development exists across the districts within the province. Likewise, disparities across the regions of Pakistan were also elucidated by (Jamal & Khan, 2003). The disparities in the health expenditures incurred by households also exist, health expenditures are relatively high in the regions of Balochistan and KP which is dragging the households into more poverty (Farooq & Masud, 2021).

The interprovincial disparities were analyzed by utilizing the headcount ratio and Gini index (Akhtar, 2008). It is determined that the trend of consumption inequality was changed, and it is rising at the national and provincial levels while social inequality was observed to be declining. A study (Cheema, Khalid, & Patnam, 2008), conducted for district-level analysis reveals the high poverty rates and the high incidence of poverty that exists in both southern and western regions of Punjab. The social inequalities particularly for the districts of Punjab were analyzed by developing a composite Index of different indicators (education, health, and physical infrastructure) and by the Gini Index for the years 2007-08. It is seen that high social inequality exists in the districts located away from the provincial capital of Punjab (Sikander, Shah, & Malik, 2010).

In another study, the inequality-adjusted human development index was composed to analyze the disparities across districts of Pakistan for the period of 2012-13 using PSLM data (Jamal, 2016). The transition analysis was ignored in the study as well as the spatial disparity between districts in other years. Pakistan Poverty Alleviation Fund (PPFA) and Sustainable Development Policy Institute (SDPI) jointly published a report in which the adjusted headcount ratio as an alternative of MPI (Multidimensional Poverty Index) is utilized to calculate the deprivation at the national, provincial, and district levels. The findings to highlight the multidimensional poverty regions were presented for the years 2008-09 to 2012-13 (Naveed, Wood, & Ghaus, 2016). The poverty estimates show that districts of Balochistan are more deprived, in the north KP (Khyber Pakhtunkhwa), south of Sindh, and Punjab. To analyze the levels of development (Rana, Bhatti, & Arshad, 2017) selected the five-city districts of Punjab province in Pakistan and concluded that development disparity exists in these main city districts. Moreover, (Mohey-ud-Din, 2017) concluded that the enclave of high inequality are rural regions, and the situation is worse than in urban districts. In the case of Pakistan (Rana, Routray, & Younas, 2020), explored the levels of disparities by composing an index through 15 indicators, and employing a coefficient of variation for the dataset of the Lahore region. The work by researchers in exploring the disparities was comprised of the analysis of a few selected regions i.e., province-wise. Moreover, proxies for many indicators were utilized due to the unavailability of data for the analysis in these studies.

The nascent literature on social welfare has yet fully explored the political and economic factors which shape the social fabric of society is not at an advanced stage. There is a need for social dynamics taking place within districts of Pakistan to deeply be studied because it will be a great help in the decision making processes. Furthermore, the study which is being taken along lines of empirical assessment will give the right path in building the social fabric of society. It will address the issues of socio-economic inequality and stratification processes within different districts of Pakistan. The research article has examined the literature to develop a critical framework to identify the limits and potential of government for interventions to address the issues of inequality, multidimensional poverty, and social welfare. The research objective whilst developing a structure for notions of a balanced society and to structure a comparative model to compare inter districts imbalances.

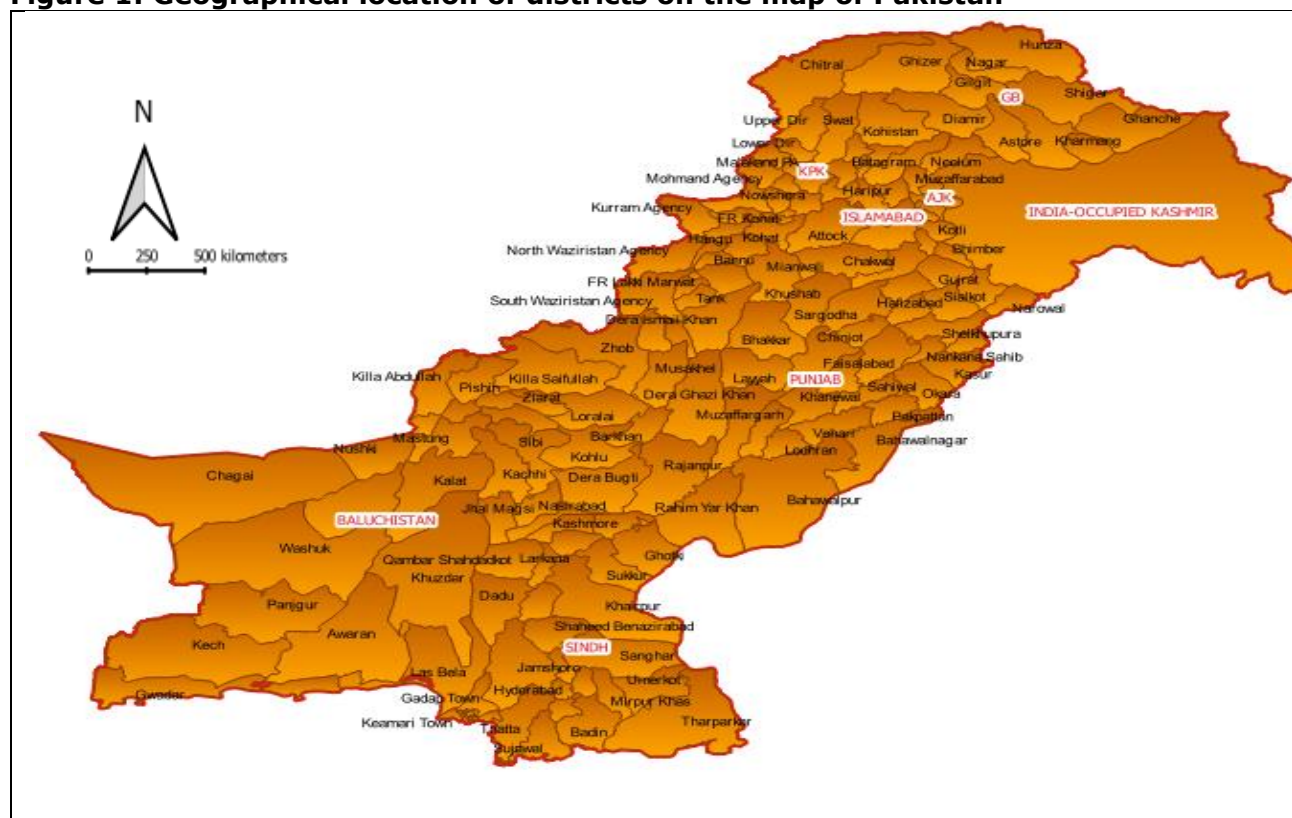
3. Data and Methodology

This study is mainly based on district-level administrative units in Pakistan. The districts are ranked to identify the level of welfare and disparities among them. There are 151 districts in Pakistan and Figure 1 shows the location of the district in each province of Pakistan. The spatial analysis is based on the data of the PSLM (Pakistan Social and Living Standard Measure) survey from the latest round of 2014-15 and the previous round of 2006-07. The two rounds' data is analyzed to compare and observe how much variations in the living conditions take place over time. The district-level survey was conducted by the Pakistan Bureau of Statistics (PBS) for both rounds to collect data on households. In the round of 2014-15, data was collected from Islamabad, 25 districts of Khyber Pakhtunkhwa (KP), 36 districts of Punjab, 30 districts of Balochistan except

for 2 districts¹, and 24 districts of Sindh. The data regarding Islamabad, 24 districts of KP, 35 districts of Punjab, 26 districts of Balochistan², and 16 districts of Sindh were collected in the round of the PSLM survey for 2006-07. The data of these two time periods are analyzed to draw conclusions by observing changes across time.

The data of indicators like the population in each district, number of beds in hospitals/dispensaries (to develop population to bed ratio), the number of doctors (Population to doctors ratio), and the number of paramedical staff (Population to staff ratio) for 2014-15 is employed from development statistics compiled by Pakistan Bureau of Statistics of all four provinces for each district. The data regarding paramedical staff includes the number of nurses, the number of Lady Health Visitors (LHVs), and midwives.

Figure 1: Geographical location of districts on the map of Pakistan



Source: Authors' work

The indexes of social welfare employed to map disparities regarding the welfare of households in the districts of Pakistan are MPI (Multidimensional Poverty Index), Gini Coefficient, and HDI (Human Development Index). The indicators, satisfaction from the services of police of the households, Literacy rate, Basic health unit along with population to bed (hospital/dispensaries) ratio are also utilized to map the non-monetary disparities. The welfare measure to calculate the overall level of social welfare in each district is also employed to rank districts. The description of measures and indicators is given in table 1. To compute the levels of social welfare, the welfare measure is composed of the average per capita income of households in each district and the statistics of the distribution of income are utilized. Therefore, in this regard, a welfare measure proposed by (Amartya Sen, 1984) to capture living conditions is selected, which depends mainly on mean incomes and the index of income inequality i.e., Gini Index. Figure 2 is depicting the scenario of achieving social welfare. It explains that the social objectives to achieve high welfare are primarily based on the mean income and the income gap. The equitable allocation of resources is required to achieve equality in opportunities and capabilities. On the other side rise in average income contribute to improving the social welfare of the households. Thus, the main determinants of welfare i.e., Gini coefficient and mean real per capita income of the households are computed by employing data of households in all the

¹ Panjgur and Kech not covered by survey team in 2014-15 round due to law-and-order situation

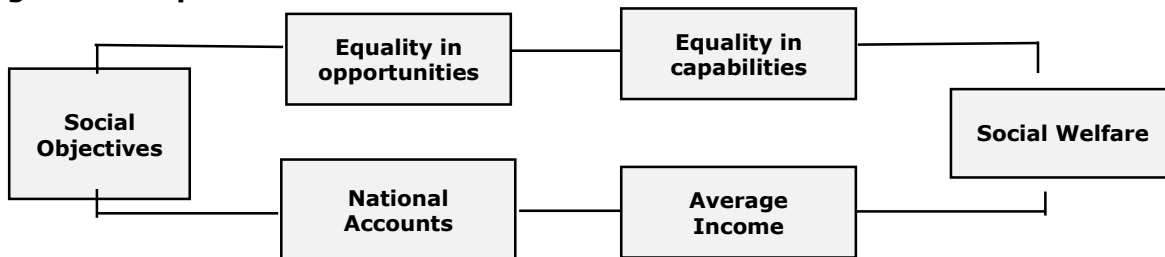
² Data of Dera Bugti and Kohlu was not collected

districts of Pakistan. The index utilized to assess the level of welfare across districts is presented in equation (1).

Table 1: Measures and Indicators

Variable Name	Description of the variable	Source
Welfare Index (W_i)	The index is composed of the Average per capita income and inequality index.	The welfare index is calculated by utilizing PSLM data to rank districts.
Multidimensional Poverty Index (MPI)	The Multidimensional poverty index incorporates poverty incidence and headcount ratio i.e. adjusted headcount index	"Multidimensional Poverty in Pakistan" by Government of Pakistan, UNDP, and OPHI
Gini Index (Gini)	The deviation from mean income is calculated through Gini Coefficient.	Gini Index of each district is calculated by employing PSLM data
Human Development Index (HDI)	HDI employed to measure the quality of life through three main dimensions	UNDP Report
Adult Literacy rate (ALR)	Percentage of literate people of age 15 and above.	PSLM (Various Issues)
Satisfaction from services in Basic Health Unit	Percentage of the population satisfied by services in BHU	PSLM (Various Issues)
Population (000) to Bed ratio	No. of beds available in hospitals or Dispensaries/RHU per 1000 population	PSLM (Various Issues)
Population (000) to Doctors ratio	No. of doctors available per 1000 population	Pakistan Bureau of Statistics
Population (000) to paramedical staff ratio	No. of paramedical staff services available per 1000 population	Pakistan Bureau of Statistics
Satisfaction from Services in Police	Percent distribution of households' satisfaction by facilities & services uses of Police.	PSLM (Various Issues)

Figure 2: Graphical Framework of Social Welfare

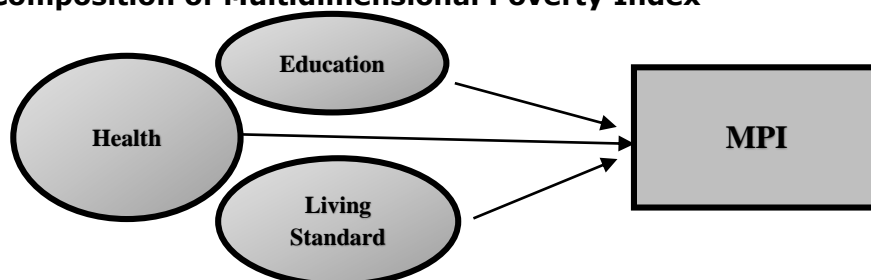


Source: Authors' work

$$SW_i = \mu_i(1 - G_i) \tag{1}$$

Where SW_i is the level of social welfare of district i in equation (1), μ_i is the mean per capita income of households in district i and G_i is the Gini coefficient for the district i , SW_i taken here as a measure of income gap as discussed above. The social welfare measure in equation (1) is simply the weighted sum of the ordered incomes of each district. Equation 1 implies that social welfare is going to decline in each district with the increase in inequality among the households. So, the loss in welfare occurs due to inequality. The MPI is a measure to assess deprivation in material and nonmaterial wellbeing. The composition of MPI is based on fifteen indicators, presented in table 2 with weights. The set of dimensions utilizes to develop MPI is shown in Figure 3. The higher value of the index shows more deprivation and vice versa.

Figure 3: Composition of Multidimensional Poverty Index



Source: Author's work

Table 2: Dimensions and Indicators with weights of MPI

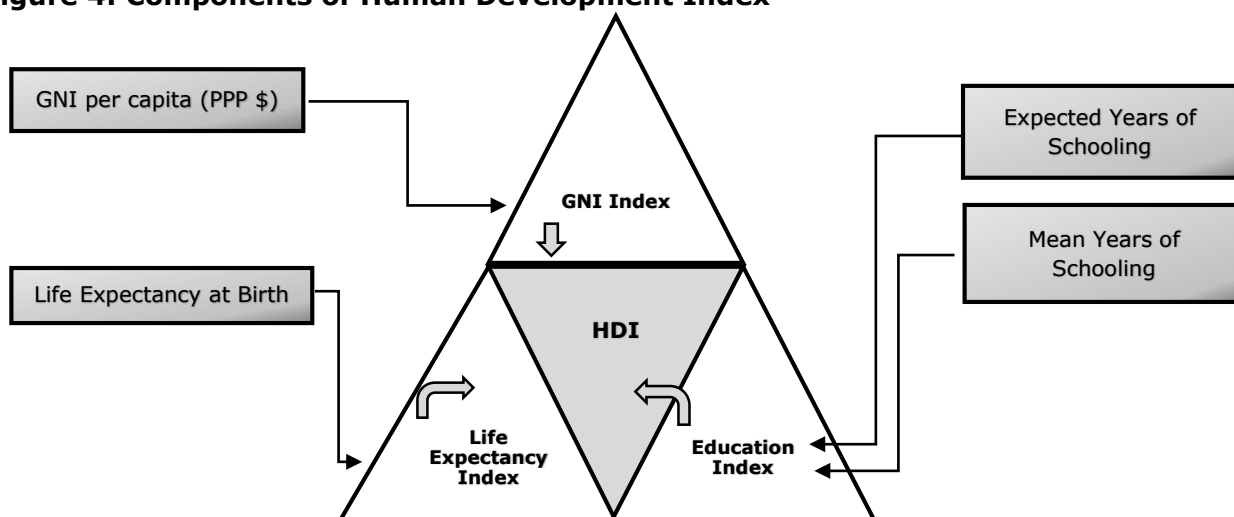
Dimensions	Education	Health	Standard of living
Indicators (weights)	Years of schooling (1/6)	Access to health facilities (1/6)	Access improved source of Water (1/21)
	Child School Attendance (1/8)	Immunization (1/8)	Sanitation (1/21)
	School Quality (1/24)	Ante-natal care (1/8)	Walls (1/42)
		Assisted delivery (1/8)	Overcrowding (1/42)
			Electricity (1/21)
			Cooking Fuel (1/21)
			Assets (1/21)
			Land and Livestock (1/21)

The modern social welfare approach linked with inequality measures was initiated by (Atkinson, 1970; Kolm, 1996; AK Sen, 1973). There are options regarding the measures of inequality, as different aspects of inequality are measured by many. The consistent way that offers to discuss the statistics of measuring the deviation of the income distribution from perfectly equal distribution among households is the Gini Index. It elucidates the distribution of resources among the population whether equitable or not. The inverse correlation is illustrated in equation (2) among income-ranked base weights and sizes of income. The concept of the Gini index was introduced by Max O. Lorenz. Sen defined the theoretical framework of the Gini formula (AK Sen, 1973) given in equation (1).

$$G = \frac{n+1}{n} - \frac{2}{n^2\mu_{dy}} \sum_{i=1}^n (n+1-i)dy_i \tag{2}$$

Where n is the total population, μ is the real mean income, and dy_i is the income of i^{th} district in the population. The weights assigned to the rich's income are higher where to poor's income is lower. The endeavors to elucidates conditions of human living, foremost quality of life progressing or not is the focus of development economics. To articulate and examine these features of life, a statistical tool was developed called Human Development Index (HDI) by United Nations Development Programme (UNDP). The framework of the composition of HDI is depicted in figure 4. It includes indicators related to the level of education, the health of individuals, and their economic conditions. The measures of deprivation engulf two main nonmonetary indicators of welfare i.e., education and health. Therefore, to analyze and compare which factor is contributing more to creating disparities are mapped separately in terms of adult literacy rate, Basic health unit, Population to bed ratio, Population to doctor ratio, and Population to paramedical staff ratio.

Figure 4: Components of Human Development Index



Source: Authors' work compiled from (UNDP, 2017)

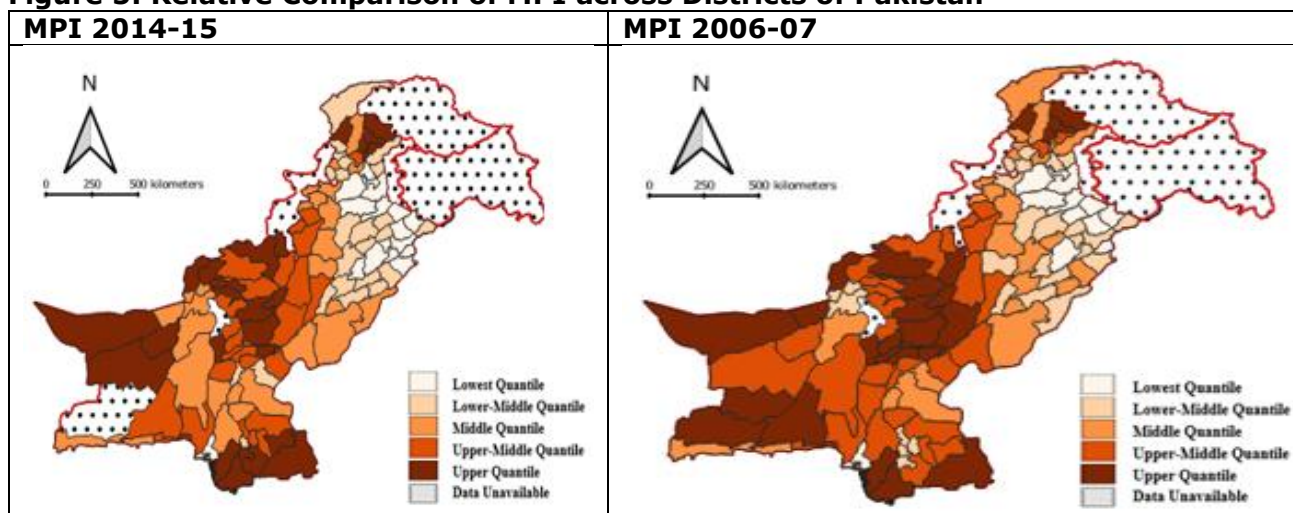
4. Results and Discussion

In the present section, results based on geographic mapping are presented regarding the welfare of districts. The dynamics of spatiotemporal results are the baseline of the analysis. Not all the districts in Pakistan showed the same level of poverty, derive here by MPI. Geographical relative positions of the districts in 2006-07 and 2014-15 are presented in Figure 5. The spatial

analysis clearly shows the differences in deprivation that exist in monetary aspects of welfare as well as in other aspects. The households face shortages in encompassing nonmonetary needs like healthcare services, education, and other amenities of almost all communities across the regions of Pakistan. The districts of Balochistan and Sindh are more deprived in terms of poverty than the districts of Punjab and KP. The MPI, overtime reduces in the districts of northern Punjab whereas increases in the districts of southern Punjab. It represents that districts of northern Punjab are experiencing a reduction of poverty in all dimensions than districts of Southern Punjab. The intensity of poverty has increased in the districts of Balochistan over time.

The incidence and intensity of poverty are severe mainly in the district Chaghi, Kohlu, Dera Bugti, Killa Abdullah, Musakhel, Nasirabad, Noshki, Panjgur, Loralai, and Killa Saifullah according to 2006-2007 estimates. These are the bottom ten districts where the average share of deprivation is above 55%. There are almost 23 out of 32 districts of Balochistan face a 50% average share of extensive deprivation in terms of poverty. It is also evident from figure 5 that districts in Balochistan have darker shaded areas articulating caveats of more poverty. The shaded area of quantiles gets darker over time showing a rise in poverty in these regions. Further analyzing KP, the most deprived districts in the province are Kohistan, Torghar, Upper Dir, Shangla, and Battagram. The districts of Sindh are also vulnerable to poverty in which Amarkot, Tharparker, Tando Muhammad Khan, and Sujawal are poorer in all dimensions of poverty than other districts of Sindh. The MPI of Azad Jammu Kashmir (AJK) is 0.115 for the year 2012-13 in which the incidence of poverty according to the Headcount ratio is 24.9% showing that 24.9% of the population of AJK is poor and the average intensity of deprivation is 46.3% which each poor in AJK is facing (Alkire, 2016).

Figure 5: Relative Comparison of MPI across Districts of Pakistan



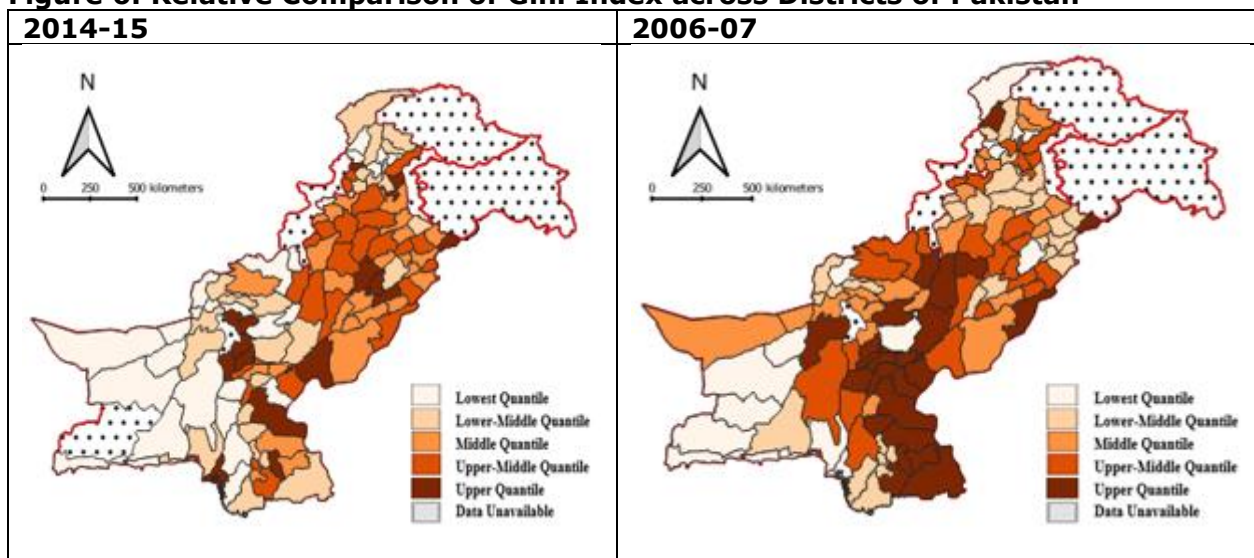
Source: Authors' work and data source. The lower quantile shows less poverty whereas the upper quantile depicts a high poverty rate.

The district-wise Gini coefficient for the regions of Pakistan is calculated. The mapping of the Gini Index of the districts in KP, Punjab, Balochistan, and Sindh using QGIS shows an insight into income inequality and is presented in figure 6. It is observed that the income distribution is becoming more equitable across the district over time. But still, in 2014-15 the Gini coefficient is exacerbating in many regions of Punjab and KP. The darkest zones of figure 6 revitalize the debate that the districts of northern Punjab, KP, and a few districts of Sindh experiencing high inequality. In Balochistan province, most of the districts lie in the lower quantile showing less magnitude of the Gini coefficient and elucidating less unequal distribution of income in these regions. On the other hand, income dispersion is high in districts Nasirabad, Jhal Magsi, Sibbi, and Jaffarabad than in other districts in this province. Moreover, relative comparison elicits that inequality reduces over time in the districts all over Pakistan, but the spatial clustering of income inequality is experienced in the Punjab and KP. The spatiotemporal patterns of the districts in Pakistan regarding HDI for both the rounds of 2006-07 and 2014-15 are presented in figure 7.

The noticeable differences in the shaded area across the regions illustrate the regional differences in the level of development and quality of individual's life in different districts of Pakistan. The regional disparities demonstrate that human development is high in most of the

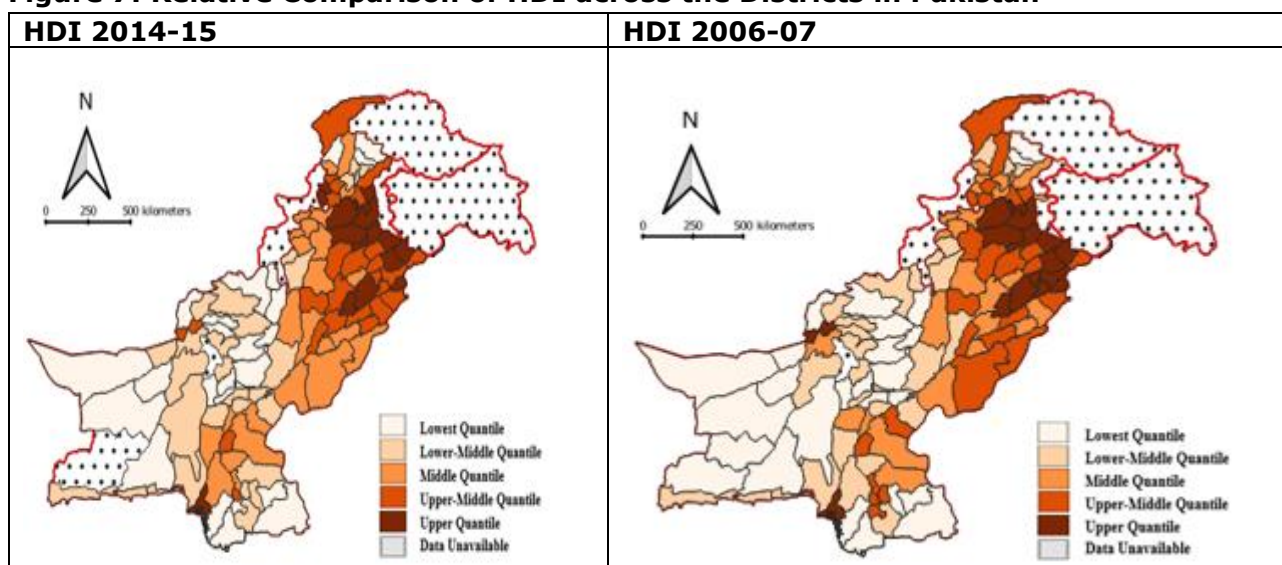
districts of the Punjab province than others however districts of KP also display a better picture in this regard. In Balochistan, the Quetta district seems the most developed whereas Awaran, Jhal Magsi, Harnai, Washuk, and Chaghi are less developed according to HDI (2014-15). However, a decrease in human development was noticed over time in the districts of Balochistan. In KP, districts Kohistan, Torghar, Upper Dir are less developed than other districts whereas in the Punjab region the district Rajanpur, Dera Ghazi Khan (DG Khan), and Muzaffargarh are deprived in terms of human development. The HDI in the districts of Sindh is getting low over time whereas pushes up high in the districts of Punjab.

Figure 6: Relative Comparison of Gini Index across Districts of Pakistan



Source: Authors' work. Lower quantile indicates the more equal distribution of income whereas upper quantile indicates high income inequality

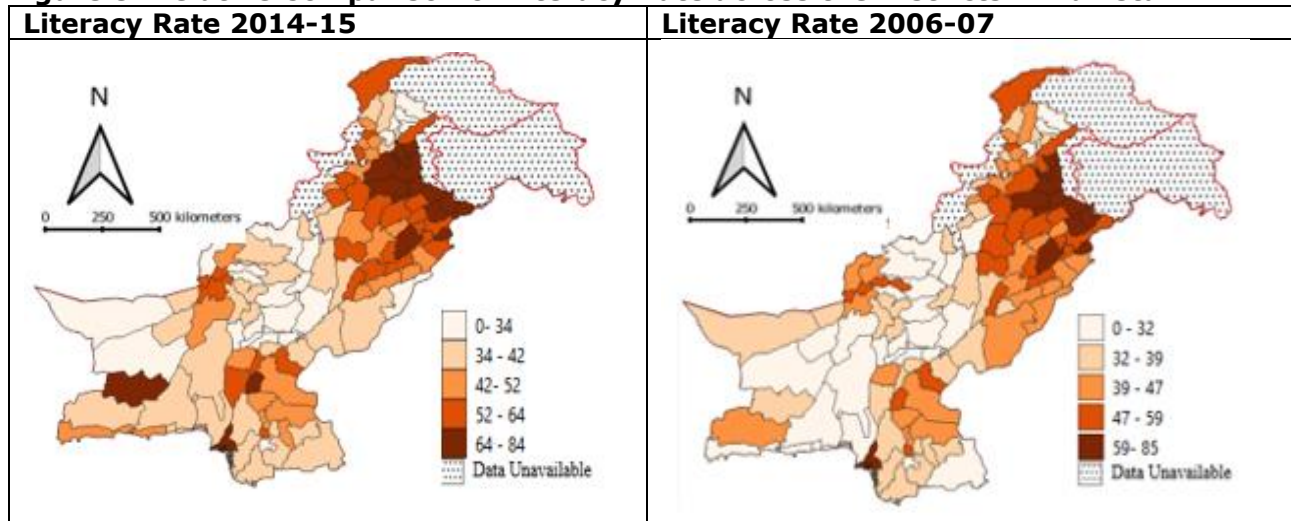
Figure 7: Relative Comparison of HDI across the Districts in Pakistan



Source: Author's work. High quantile indicates a higher rank of human development in a region whereas a lower quantile indicates a lower rank of human development in a region

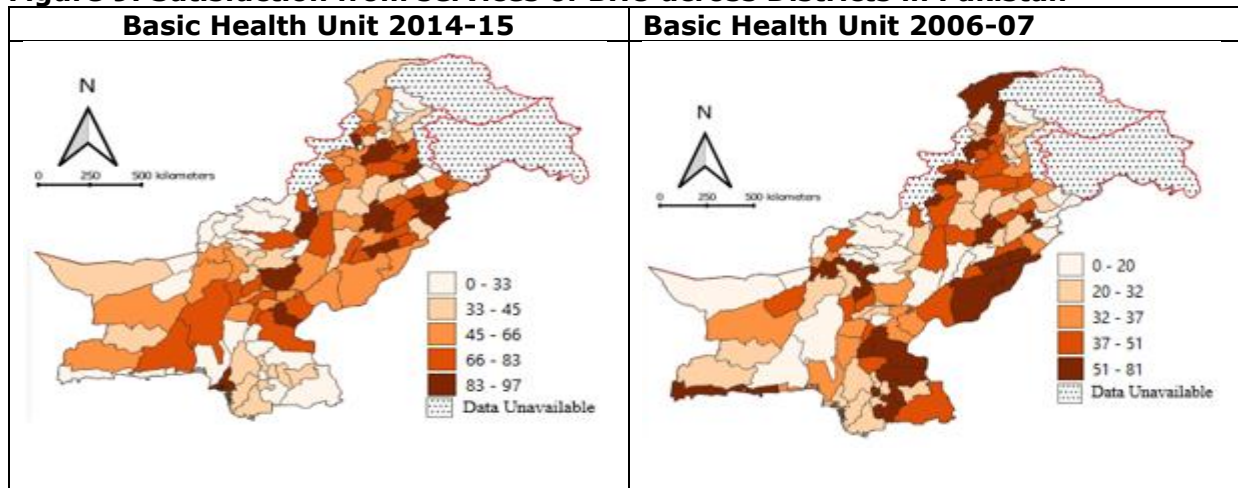
The data on households' perceptions regarding services provided by the government represented the satisfaction level. By linking survey data with geographical locations of indicators literacy rate, Basic Health Unit (BHU), population to beds of hospital/dispensaries/Rural health centers ratio, total population to number of doctors ratio along with population to paramedical staff ratio in each district and perception regarding services of police is also presented in Figures 8, 9, 10, and 11 respectively. The satisfaction level of households in the districts regarding BHU increases, and the literacy rate decreases. The disparities were observed in both dimensions, but the situation is worse in education as compared to health. It shows that the factor contributing more to the low welfare of the districts is education.

Figure 8: Relative Comparison of Literacy Rate across the Districts in Pakistan



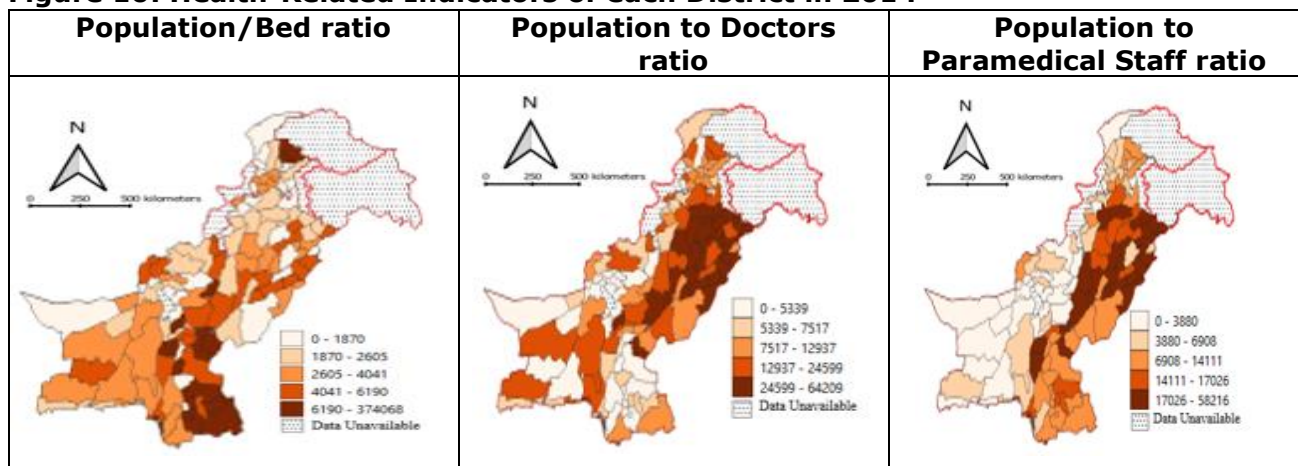
Source: Authors' work, upper quantile indicates a higher literacy rate in a region whereas the lowest quantile indicates a lower literacy rate in a region

Figure 9: Satisfaction from services of BHU across Districts in Pakistan



Source: Author's work upper quantile indicates more satisfaction from BHU lower quantile indicates a lower level of satisfaction from BHU.

Figure 10: Health-Related Indicators of each District in 2014

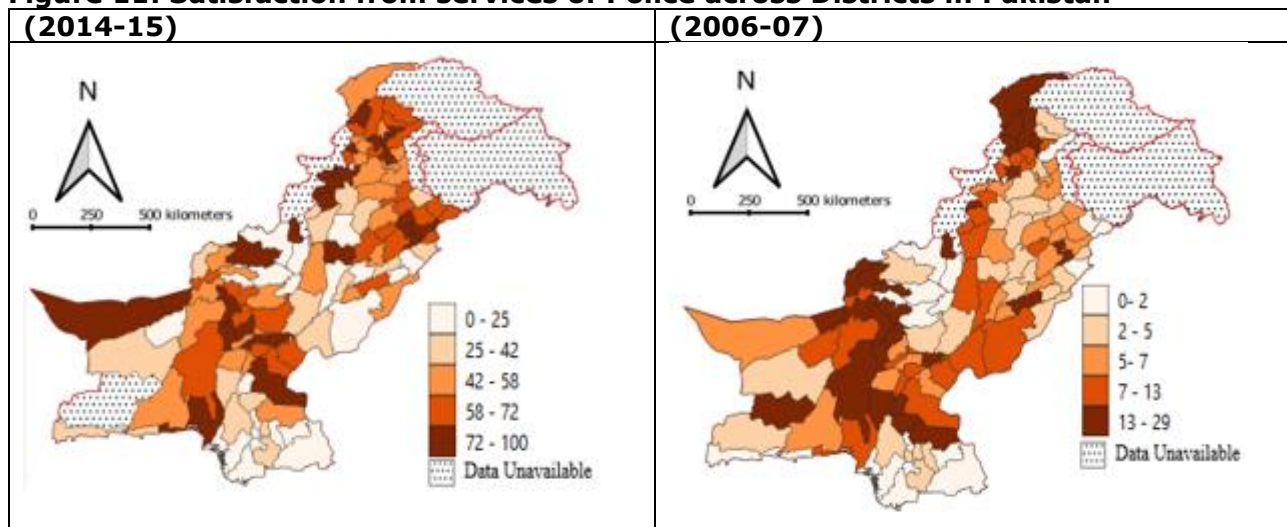


Source: Author's work upper quantile indicates a high ratio of population/Bed (Hospital, Dispensaries, & RHC) whereas lower quantile indicates low population/Bed (Hospital and Dispensaries/RHC). In 2 & 3 lower quantile indicates high human resources in medical units whereas upper quantile indicates low human resources in medical units.

Satisfaction with police services also reduced in Pakistan, especially in the districts of Balochistan and Punjab. The availability of inpatient service in several districts also shows spatial disparity, with the darker regions showing a low number of beds because the population-to-bed

ratio is high. The regions of Balochistan and KP seem less deprived of the availability of doctors and paramedical staff. However, eastern, and southern Punjab districts are facing a deficiency of human resources in hospitals and other medical units due to high population density. The district Tank, Kohistan, Battagram, Hangu from KP and Kech, Washuk, Khuzdar, Lasbella from Balochistan, and Shikarpur, Tharparkar in Sindh have fewer medical services and availability of human resources.

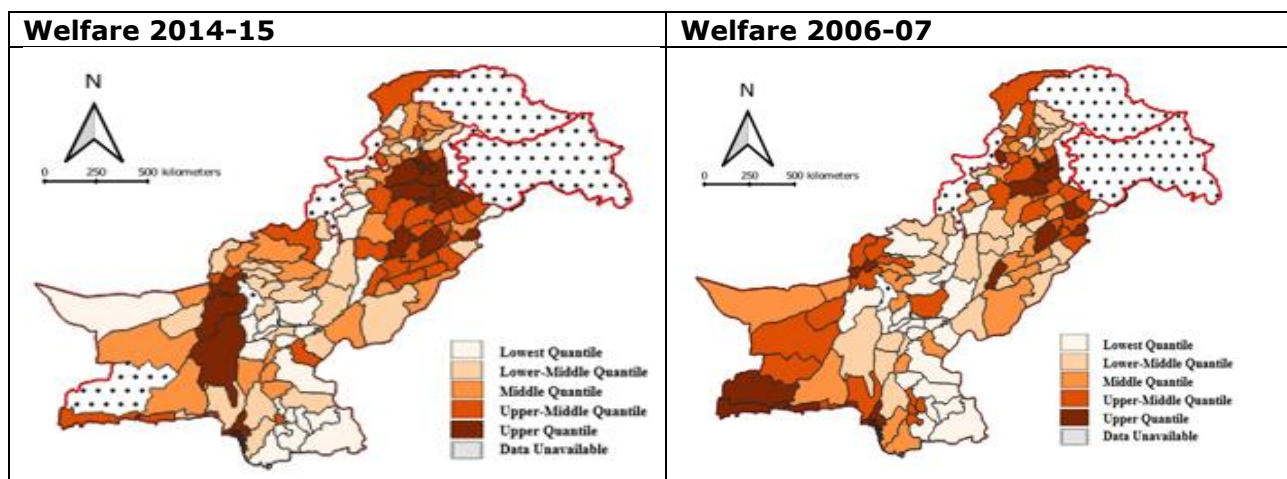
Figure 11: Satisfaction from services of Police across Districts in Pakistan



Source: Authors' work upper quantile indicates more satisfaction from the services of police whereas lower quantile indicates less satisfaction.

The Kech and Khuzdar of Balochistan and most districts of Punjab seem more deprived of the availability of doctors and paramedical staff. It is evident from figure 10 that districts Sialkot, Narowal, Kasur, Okara, Rajanpur, and Muzaffargarh have fewer services in terms of three health indicators. The districts of Sindh are also deficient in the availability of beds in health units and services of paramedical staff. Hence, disparities occur across districts in the availability of health services.

Figure 12: District wise levels of Social Welfare of Pakistan



Source: Authors' work. The upper quantile indicates the highest level of social welfare whereas the lower quantile indicates a low level of social welfare.

The spatial analysis postulates that deprivation prevails regarding the living standards in the district of all four provinces. The economic disparities in social welfare exist and can be noticed in Figure 12. The welfare level in the districts of KP is lowest mainly in the districts of Upper Dir, Tank, and Buner. The regional disparities in the province of Punjab posit unequal distribution of resources, Narowal, Muzaffargarh, and Rajanpur district experience vulnerable living conditions. Whereas improvement in the living standard of households in the districts of Sindh has been observed during 2014-15 as compared to 2006-07. Moreover, the lighter-shaded

region in lower Sindh (2014-15) elucidates households are deprived in terms of social welfare in these districts. The districts of Balochistan Nasirabad, Jhal Magsi, and Jaffarabad show the lowest welfare. The average per capita income is low in the districts of Balochistan and has low income inequality levels within districts. Therefore, economic welfare is not too low due to low income inequality in these regions. Furthermore, the districts near the capital districts (Quetta, Peshawar, Lahore, and Karachi) of the provinces have high social welfare as compared to those which are distant from the capital districts.

The ranking of 100 districts according to the lowest to highest welfare level of Pakistan is presented (see Appendix A). The ranks according to other indicators (MPI, Gini Index, HDI, literacy rate, satisfaction from BHU, and police services) in 2006-07 to compare with the rank of districts based on above stated indicators in 2014-15 are also reported. There are six districts in Punjab and two of Balochistan (ranked sixth and seventh) grabbed the position in the top ten districts of high welfare. The only district Karachi from Sindh is observed on the third rank among all districts of Pakistan. Whereas the bottom 10 districts of Pakistan facing vulnerable conditions in the living standard are Nasirabad, Jhal Magsi, Jaffarabad, Kacchi, Dera Bugti from Balochistan, Umerkot, Mirpur Khas, Khairpur from Sindh and Upper Dir, and Tank from KP.

In most of the districts like Abbottabad, Bannu, Charsadda, Lakki Marwat, Mardan, Peshawar, Shangla, Swabi, Swat, and Tank of KP, inequality increased in 2014-15 and are experiencing a diminishing trend in welfare levels. However, a few districts' ranks in social welfare has improved in 2014-15, and the rank deteriorated in terms of income inequality than 2006-07. Inequality has risen in 27 districts of Punjab out of 36 but ranks according to the level of welfare have improved in most of the districts in 2014-15. It implies the rise in real per capita income of households in the districts in this round than the previous round. Whereas in Balochistan, fifteen out of twenty-six districts' rank deteriorated in terms of welfare in 2014-15. The real per capita income remains low in the districts of Balochistan over time, causing deterioration in the ranks. In the district Awaran, Dera Bugti, Gwadar, Jhal Magsi, Lasbela, Pishin, Quetta, and Sibbi inequality rise within the district which results in low welfare in these regions during 2014-15 as compared to 2006-07. Only nine districts' Gini coefficient falls, therefore, the welfare level rises there. Nasirabad district remains on the lowest rank among all districts of Pakistan as before.

While comparing inequality and social welfare of the districts in Sindh, the trend of inequality is in a downward direction of its twelve districts. However, rank in terms of welfare improves only in eight districts during 2014-15 (see Appendix A). Other districts whose rank deteriorated include Mirpur Khas, Noushero Feroz, Sanghar, Tharparker, Thatta, and Khairpur. However, inequality is less than before in these regions even then deterioration in rank takes place. It implies that the decline in the real per capita income of the households occurred in these regions. Lastly, the ranks of the districts elucidate that districts with high real per capita income are facing a rise in inequality in the round 2014-15 than 2006-07. Moreover, it is inevitable to state that all the capital districts of the four provinces are also encompassing deleterious effects of inequality causing deterioration in their rank of welfare levels during 2014-15.

5. Conclusions and Policy Implications

The exploration of spatial inequalities facilitates policymakers to adopt policy mainly for the remedial of inefficient levels of agglomeration and market imperfections. The following conclusions and recommendations have been framed for policymakers.

The spatial analysis reveals that there is a high degree of disparity in social welfare among the districts of Pakistan. Although income disparity is very low in different districts of Balochistan compared with other districts of Pakistan, the per capita income is too low. The result is compatible with the empirical findings of UNDP that the economies with low income showed a decrease in inequality (UNDP, 2011). In the case of Punjab and KP, inequality is very high in the districts of these two provinces, which is consistent with the findings of a study (Khalid, Zahid, Ahad, Shah, & Ashfaq, 2019). The results show that the most deprived districts are mainly located in the southern part of the Punjab province (Rajanpur, Muzaffargarh, and Dera Ghazi Khan) compatible with the findings of (Paras, Mohey-ud-din, & Fareed, 2018). According to the evidence from previous data by Cheema et al. (2008), the regions in the southwest and southeast of Punjab face poverty. The data evidence in the current study shows the same poverty zones, in addition to high levels of inequalities. It shows that districts located in the southeast and southwest of Punjab are still ignored in terms of the provision of services. According to the

Research and Advocacy for the Advancement of Allied Reforms (RAFTAAR) report, government spending in terms of per capita development expenditure in the districts of Punjab reveals that more resources are allocated in the northern and central part especially in the Lahore district than in other districts (*Raftar-Public-Expenditure-Policy-Report-2015*, 2015).

The districts of Sindh are experiencing low welfare as well as have largely low-income households. The livelihood in the district Mirpurkhas, Khaipur, Badin, Tharparker, and Shikarpur are more compromised than the other districts.

As far as the intra-regional disparities are concerned, the problem is more complex and multi-dimensional. It has been revealed that there is no balanced development in different districts of Pakistan. The analysis highlights the key policy challenges to work for the improvement of wellbeing as the findings on the multidimensional aspects of welfare show that the districts with low social welfare are mostly deprived of all basic dimensions, especially education, and health. SDPI report on multidimensional poverty also reveals that extreme poverty zones are more deprived in all dimensions (Alkire, 2016 ; Naveed et al., 2016). The districts not located near to provincial capital districts are deprived, clearly showing the inequitable allocation of resources in the province. Regional disparities may be reduced but they cannot be eliminated. However, this objective can only be achieved by developing uniform policies and through new legislation.

One of the key findings is that more progress in education is needed as it is seen that districts deprivation level is higher in education than health. The percentage contribution of education is more in the districts' MPI, also explored by (Alkire, 2016). Keeping in view the above, it is suggested that a people-based targeted policy in the districts be implemented to reduce regional inequality.

5.1. Recommendations

The results reveal that inequality exists in the districts of Pakistan. Government expenditure strongly affects welfare indicators (Rossignolo, 2017). Hence, the federal and provincial governments need to play a role in the socio-economic development and improvement in living conditions.

The districts with poor human development especially the backward districts (bottom ranked) in the whole of Pakistan must be the prime target for special policy interventions to bridge and remove disparities. It is also recommended that the provision of public services in the farthest regions from capital districts be ensured by the federal and provincial governments. It will reduce the multidimensional impoverishment of households and the spatial disparities in the level of social welfare.

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Appendix A: Ranking of the Districts with respect to different indicators (2006-07 & 2014-15)

District Name	Rank-W	Rank-MPI	Rank-Gini	Rank-HDI	Rank Liter	Rank-BHU	Rank-PolServ
Nasirabad	100 (100)	80 (97)	94 (100)	87 (99)	94 (75)	95 (75)	98 (95)
Jhal Magsi	99 (90)	94 (88)	99 (76)	99 (93)	76 (88)	16 (81)	38 (14)
Mirpur Khas	98 (88)	78 (70)	97 (99)	74 (87)	52 (64)	68 (19)	95 (84)
Jaffarabad	97 (99)	79 (86)	70 (93)	85 (81)	47 (91)	79 (13)	75 (94)
Upper Dir	96 (94)	87 (89)	20 (85)	83 (78)	77 (77)	60 (85)	32 (11)
Khairpur	95 (86)	51 (54)	88 (88)	58 (54)	51 (45)	32 (18)	9 (32)
Bolan	94 (85)	81 (84)	34 (91)	86 (89)			65
Dera Bugti	93 (21)	91 (99)	28 (2)	91 (100)	78 (86)	91 (35)	83 (33)
Tank	92 (51)	73 (62)	66 (15)	70 (71)	71 (71)	63 (8)	45 (37)
Buner	91 (89)	72 (57)	16 (73)	61 (52)	88 (81)	74 (38)	67 (29)
Tharparkar	90 (87)	90 (95)	41 (86)	96 (97)	79 (90)	76 (27)	97 (96)
Narowal	89 (91)	16 (33)	93 (90)	16 (26)	10 (32)	44 (90)	29 (88)
Muzaffargarh	88 (58)	66 (71)	78 (66)	56 (67)	66 (68)	65 (80)	82 (42)
Chaghi	87 (43)	95 (92)	18 (38)	97 (92)	84 (85)	93 (87)	93
Badin	86 (97)	84 (72)	72 (95)	79 (79)	73 (73)	89 (2)	79 (74)
Dera Ismail Khan	85 (77)	71 (74)	51 (55)	66 (69)	65 (78)	59 (36)	21 (25)
Shikarpur	84 (93)	64 (75)	23 (97)	62 (65)	61 (58)	39 (82)	35 (27)
Lakki Marwat	83 (57)	63 (67)	74 (24)	57 (63)	37 (63)	34 (30)	12 (23)
Musakhel	82 (83)	68 (94)	73 (89)	84 (96)	38 (39)	38 (15)	51 (15)
Rajanpur	81 (98)	70 (93)	36 (92)	64 (70)	82 (89)	50 (86)	69 (72)
Sanghar	80 (79)	74 (63)	44 (82)	67 (59)	55 (47)	88 (14)	61 (7)
Lasbela	79 (34)	77 (77)	30 (10)	77 (76)			100 (69)
Kharan	78 (24)	89 (79)	4 (5)	90 (90)	81 (95)	12 (76)	89 (92)
Sibbi	77 (50)	65 (60)	91 (51)	72 (73)	89 (94)	22 (32)	7 (44)
Ziarat	76 (26)	96 (64)	3 (32)	88 (80)	26 (13)	75 (55)	24 (26)
Kasur	75 (22)	13 (21)	58 (27)	24 (23)	33 (42)	9 (89)	77 (91)

Ghotki	74	(92)	69	(73)	84	(94)	63	(62)	70	(62)	36	(50)	27	(31)
Jacobabad	73	(95)	76	(87)	46	(96)	73	(88)	83	(82)	29	(64)	10	(60)
Bahawalpur	72	(52)	54	(44)	47	(42)	45	(37)	59	(52)	58	(17)	86	(39)
Charsadda	71	(35)	41	(34)	64	(44)	15	(58)	57	(60)	27	(11)	68	(52)
Harnai	70	(49)	99	(59)	7	(50)	98	(72)					99	(21)
Mansehra	69	(59)	38	(45)	71	(71)	34	(47)	23	(24)	64	(66)	4	(89)
Dera Ghazi Khan	68	(68)	67	(68)	68	(83)	60	(49)	69	(57)	31	(33)	56	(38)
Killa Abdullah	67	(33)	100	(96)	17	(34)	93	(98)	92	(93)	2	(47)	22	(76)
Kohlu	66	(96)	92	(100)	10	(87)	92	(94)	74	(83)	94	(46)	5	(35)
Mardan	65	(39)	23	(25)	31	(8)	29	(31)	54	(53)	26	(4)	52	(41)
Hangu	64	(73)	52	(46)	15	(59)	55	(43)	80	(66)	54	(26)	23	(54)
Thatta	63	(41)	85	(83)	8	(25)	82	(82)	72	(76)	40	(54)	96	(79)
Karak	62	(82)	49	(42)	60	(48)	52	(51)	25	(30)	42	(12)	3	(34)
Bannu	61	(31)	57	(55)	55	(35)	53	(46)	42	(38)	20	(9)	34	(13)
Killa Saifullah	60	(80)	75	(90)	48	(77)	76	(91)	68	(74)	53	(71)	6	(12)
Bhakkar	59	(62)	50	(51)	81	(70)	48	(48)	44	(28)	72	(74)	88	(48)
Barkhan	58	(78)	98	(85)	9	(52)	94	(83)	90	(72)	70	(91)	8	(58)
Bahawalnagar	57	(72)	47	(32)	86	(79)	47	(36)	87	(40)	41	(22)	64	(86)
Swat	56	(29)	53	(40)	22	(18)	51	(29)	67	(35)	51	(21)	26	(2)
Rahim Yar Khan	55	(76)	58	(61)	87	(64)	49	(44)	63	(69)	48	(39)	71	(40)
Batagram	54	(61)	83	(78)	12	(7)	65	(64)	85	(59)	77	(49)	16	(22)
Dadu	53	(66)	48	(69)	13	(74)	46	(60)	18	(56)	86	(56)	78	(18)
Shaheed Benazirabad	52	(81)	61	(58)	35	(84)	59	(61)	50	(43)	84	(40)	76	(17)
Naushahro Feroze	51	(36)	42	(43)	26	(40)	36	(35)	15	(21)	83	(10)	87	(3)
Lower Dir	50	(48)	31	(53)	14	(30)	54	(56)	45	(46)	57	(65)	57	(10)
Nowshera	49	(23)	25	(18)	29	(45)	31	(17)	41	(36)	61	(34)	63	(8)
Pishin	48	(17)	88	(76)	33	(6)	68	(77)	49	(84)	43	(61)	55	(24)
Sheikhupura	47	(15)	12	(16)	52	(28)	17	(14)	16	(19)	11	(92)	2	(49)
Loralai	46	(64)	62	(91)	21	(39)	81	(86)	75	(87)	15	(94)	84	(90)
Swabi	45	(38)	39	(49)	40	(33)	43	(45)	60	(55)	78	(23)	17	(30)
Lodhran	44	(60)	44	(50)	54	(62)	40	(53)	46	(70)	21	(45)	62	(57)
Kohat	43	(47)	45	(30)	57	(58)	42	(38)	48	(48)	52	(31)	19	(61)
Kohistan	42	(67)	97	(98)	27	(54)	95	(95)	95	(92)	82	(83)	39	(81)
Larkana	41	(74)	33	(65)	85	(80)	50	(55)	36	(61)	30	(29)	59	(36)
Awaran	40	(56)	82	(81)	1	(26)	100	(85)	64	(80)	33	(78)	49	(63)
Malakand	39	(30)	26	(48)	98	(4)	32	(50)	31	(31)	55	(62)	18	(9)
Khanewal	38	(44)	30	(37)	61	(31)	30	(40)	35	(34)	46	(88)	90	(77)
Shangla	37	(28)	86	(82)	11	(3)	75	(68)	86	(67)	85	(57)	37	(16)
Khushab	36	(37)	37	(19)	79	(49)	26	(24)	34	(20)	71	(70)	70	(80)
Mianwali	35	(13)	46	(35)	82	(23)	44	(28)	39	(18)	49	(60)	73	(67)
Sargodha	34	(32)	24	(24)	69	(60)	20	(27)	20	(22)	73	(73)	58	(47)
Sukkur	33	(40)	35	(38)	5	(78)	39	(32)	22	(17)	7	(51)	33	(50)
Okara	32	(63)	28	(41)	67	(69)	28	(42)	43	(54)	62	(52)	91	(66)
Abbottabad	31	(19)	21	(17)	92	(61)	13	(16)	13	(9)	66	(67)	54	(51)
Gwadar	30	(5)	59	(56)	3	(1)	71	(66)	62	(65)	69	(6)	25	(5)
Zhob	29	(75)	93	(80)	2	(56)	89	(75)	93	(37)	90	(93)	74	(20)
Hafizabad	28	(45)	22	(13)	76	(53)	27	(33)	32	(33)	25	(44)	15	(55)
Hyderabad	27	(12)	17	(20)	65	(36)	22	(18)	21	(23)	80	(3)	85	(68)
Multan	26	(11)	27	(28)	59	(21)	21	(30)	27	(25)	35	(79)	66	(45)
Gujranwala	25	(10)	9	(7)	80	(13)	11	(9)	9	(8)	47	(69)	31	(64)
Sahiwal	24	(53)	18	(27)	95	(65)	25	(19)	29	(27)	28	(41)	80	(43)
Pakpattan	23	(69)	29	(36)	56	(67)	38	(39)	53	(49)	24	(20)	92	(65)
Vehari	22	(54)	36	(26)	43	(46)	41	(34)	58	(44)	6	(1)	28	(6)
Sialkot	21	(14)	8	(12)	45	(20)	5	(10)	6	(11)	23	(77)	43	(93)
Chitral	20	(25)	32	(47)	42	(11)	35	(21)	30	(29)	67	(7)	11	(19)
Layyah	19	(71)	43	(31)	49	(81)	19	(25)	24	(26)	45	(28)	14	(70)
Quetta	18	(4)	40	(15)	19	(16)	37	(12)	56	(51)	92	(42)	60	(4)
Peshawar	17	(8)	20	(23)	63	(37)	14	(20)	28	(50)	14	(5)	44	(28)
Toba Tek Singh	16	(55)	14	(14)	89	(72)	12	(13)	17	(14)	10	(63)	53	(75)
Khuzdar	15	(70)	56	(66)	6	(75)	78	(84)					13	
Jhang	14	(65)	34	(39)	90	(68)	33	(41)	40	(41)	13	(16)	41	(82)
Mandi Bahauddin	13	(42)	19	(11)	50	(43)	23	(15)	19	(16)	87	(59)	30	(62)
Haripur	12	(46)	15	(22)	24	(63)	18	(22)	12	(12)	56	(72)	20	(83)
Faisalabad	11	(9)	11	(10)	37	(12)	10	(11)	11	(10)	17	(68)	40	(46)
Gujrat	10	(27)	10	(5)	38	(47)	7	(7)	7	(7)	81	(53)	72	(53)
Attock	9	(18)	6	(8)	83	(29)	9	(6)	14	(15)	3	(37)	47	(78)
Chakwal	8	(7)	7	(9)	75	(19)	8	(8)	8	(6)	19	(25)	50	(73)
Kalat	7	(84)	55	(52)	39	(98)	80	(74)					94	
Mastung	6	(20)	60	(29)	25	(41)	69	(57)	91	(79)	37	(43)	1	(1)
Lahore	5	(3)	2	(2)	77	(17)	1	(4)	4	(5)	1	(95)	36	(71)
Jhelum	4	(16)	5	(6)	53	(14)	6	(5)	5	(3)	4	(24)	42	(85)
Karachi	3	(2)	3	(3)	96	(9)	4	(3)	3	(4)	5	(58)	81	(87)
Rawalpindi	2	(6)	4	(4)	62	(22)	3	(2)	2	(2)	18	(48)	48	(59)
Islamabad	1	(1)	1	(1)	100	(57)	2	(1)	1	(1)	8	(84)	46	(56)

Source: Authors' calculations, Note: Values in parenthesis present district ranking for the year 2006-07

The Ranking of districts regarding social welfare in 2014-15 is presented in the first column. Rank 100 shows the lowest Welfare and 1 shows the highest welfare and ranks according to other indicators are also presented in ahead columns (MPI, Gini Index, HDI, Literacy rate, Satisfaction from BHU and Police services)

Rank (other indicators): 100th rank depicts most deprived in that dimension and rank 1 depicts vice versa.