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POLITICAL ECONOMY OF URBANISATION AND GROWTH IN PAKISTAN: A New Demographic and Geo-Strategic Analysis at District Level

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Abstract

The present study aims to explore the association between urbanisation and economic well-being in Pakistan at the district level from a new perspective that has yet to be considered theoretically and empirically in past studies. The study's findings have shown that the urbanisation process has contributed significantly to better economic lives and the well-being of people. The data contains 100 districts of Pakistan from 4 provinces (Punjab, Sindh, KPK, Baluchistan), while Gilgit-Baltistan and FATA have been excluded due to the lack of data availability. Districts of Pakistan with high urban populations tend to have higher living standards and income levels and increasing trends in population growth. This research descriptively analyses the misallocation of land size to districts, showing a lack of land availability in districts with a high urban population. Moreover, the horizontal growth of cities also substantially hampered the economy. A huge amount of land is left vacant in districts with lower population levels. Higher population densities in districts encourage higher income levels, supported by the agglomeration economies theory in the literature. Poor Governance and political instabilities in Pakistan have failed the efficient urbanisation growth patterns that generally stalled the stable economic growth rate.

Keywords: Urban Population, Income Levels, Land Allocation, Economic growth.
JEL Classification: Q56, R14, P25, D31.

I. Introduction

Pakistan is facing various challenges in maintaining and sustaining a high rate of economic development. Urbanisation in Pakistan is to be critically analysed as the urban sectors are the most important part of the nation, contributing to multiple economic sectors and capital accumulation, which fosters the social chain and develops the factors important for the nation's welfare. Urbanisation associated with better economic well-being both have a positive impact on each other, while no country has ever

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reached middle-income status without a significant population shift into cities. Urbanisation is necessary to sustain, though not necessarily drive growth in developing countries, but it also yields other benefits. The relationship between urbanisation and the welfare of the masses should be a vital policy development concern for any nation. The capability and threshold of urbanisation in stimulating economic growth are deeply influenced by the institutional structures of the society and economy [Turok and McGranahan (2013)].

Different studies have indicated the problem of urbanisation in Pakistan, and their findings showed that political, economic and social crises have led Pakistan towards poor utilisation of natural resources and broadly added up to economic impairment. Understanding the different forms of urbanisation patterns contributing towards economic prosperity is important. At the same time, the government cannot encourage or discourage urbanisation straightforwardly without proper long-run policy measures and general accountability. Historical activities and communities around the globe have deeply influenced urbanisation processes. For thousands of years, urban cities have been the nerve centres of communities throughout the world, which not only strengthened the political, economic and social institutions in the respective regimes but also enabled the growth of the economic network within different sectors of the communities. Since the Industrial Revolution, economies began to expand and accelerated the growth of urban cities, which had been attracting economists to understand the role of urbanisation in the social and political build-up of global economies. Economists labelled the big cities as heterogeneous and dense by evaluating the processes of the Industrial Revolution, imperialism, colonialism and the role of capitalism in the economy. They boosted economies of scale with the diffusion of knowledge and education, stimulating technological aspects through research and development and creating divisions of labour and specialisations.

Now the question is, 'Why is it important to understand the urbanisation in Pakistan?' Urbanisation and its key characteristics in transitional societies are significant and major determinants of the economic, political and social processes. Society relates through the urban sectors, and the majority of the political personnel are involved in the administration and decision-making for the progress of the nation. Although the growth rate of capital is succeeded by a big contribution from the urban cities, it gets difficult for the nation internally to accumulate and consume the natural resources as they deplete due to population growth.

The urban sector and its structure greatly influence the social, political, and economic conditions of the nation. Most of the capital growth and economic activities occur in the urban sectors, whereas the market systems mostly take place in the urban sectors. The institutions work and make rules, designing the standards of the nation that are undertaken in the urban sectors. Urbanisation greatly affects the economic activities, development, and growth of the nation. The increase in the urban sectors has diminished the rural sector's growth and decreased the land availability and labour in-

terests in agriculture. Local Governance plays an important role in maintaining the stable economic growth of urban sectors [Hardoy, et al., (2001)].

It has been theoretically and empirically proven in the literature that the urbanisation process contributes towards the economic development and prosperity of the nation. Interestingly, in developing nations like Pakistan, urban areas are expanding rapidly. However, the corresponding factors, i.e. infrastructure, land utilisation, transportation services, urban employment, economic situations for urban populations in agglomerations below 1 million, etc., are not transformed accordingly due to which Pakistan is facing an insufficient pace of development, unemployment, lack of housing space by horizontal growth of cities, inappropriate land utilisations and trends of Rural-Urban migration etc. The main question that arises under the research is whether or not urbanisation's political economy impacts people's economic well-being significantly by using comparative analysis among various districts of four provinces. The existing literature related to this perspective in the context of Pakistan is very thin and almost absent at the micro level; however, it is expected that this piece of research may help young researchers and policymakers to understand the dynamics between urbanisation and better income levels in Pakistan through demographic and geo-strategic approach.

The remainder of this study is structured as follows: Section II reviews the relevant literature, while Section III outlines the theoretical framework. Section IV details the data collection process and the sources of variables. Section V discusses the methodology employed, and Section VI presents the results and analysis. Finally, Section VII concludes the study with policy recommendations.

1. Objectives

To find the impact of urbanisation on the economic well-being of its people living in various districts of four provinces using cross-sectional data for each district of Pakistan.

To make a descriptive analysis of the socio-economic factors for each district of Pakistan.

Hypothesis (H_1): Urbanisation at the district level significantly impacts the average monthly income levels (economic well-being) of people in Pakistan's districts.

II. Literature Review

Recently, Liang and Yang (2019) developed a model of urbanisation-economic growth with a simultaneous equation model for the economy of China. The results of the model confirmed that urbanisation is contributing to the economic growth of China via improving knowledge of physical and human capital.

Bakirtas and Akpolat (2018) developed a nexus between energy consumption, urbanisation and economic growth using the Dumitrescu-Hurlin panel Granger causality test for New Emerging-Market Countries for the period 1971–2014. The findings of the study showed that urbanisation increases energy consumption, which ultimately leads to economic growth. Moreover, the authors gave policy recommendations for introducing policies related to urbanisation, which will improve economic growth.

Tripathi and Mahey (2017) empirically found the determinants of urbanisation in Punjab (India) and then the impact of urbanisation on economic growth using micro-level analysis. The authors suggested to policymakers that in developing nations, where the agriculture sector dominates, policymakers should try to divert urban investments to such regions for building infrastructure and improving service delivery to enjoy the impact of agglomeration economies.

Chen, et al., (2014) explained that the higher urbanisation level groups comprise a higher level of GDP per capita. The developing nations attempt to catch up with high levels of urbanisation, but they still have a relatively lower GDP per capita in their economy. The findings of the study highlighted the forward and backward conditions of the urbanisation processes in order to achieve benefits from accelerated urbanisation.

Turok and McGranahan (2013) found no simple linear relationship between the effects of urbanisation and agglomeration economies and suggested that good government intervention strategies are encouraged for urbanisation stabilities. Institutional structures are very much influencing the incidence. At the same time, if the government reduces the problems of urbanisation, e.g., reducing the barriers to rural-urban migration aspects, supportive policies are still required to keep the impact of urbanisation positive and efficient.

Goldstone (2010) proved that Urbanisation processes have been determined to be socially destabilising processes and also have the capability of creating widespread social unrest and stimulating social, political and economic unrest and violence in the nation. The rapid and exponential growth of urbanisation, typically in developing nations, has been observed to be a consequence or a source of social strain and stress, also creating enough motives to enable the activation and mobilisation of urban unrest.

Blanco and Grier (2009) conducted a study in Latin America, incorporating the role of political instability within this nexus and observed that urbanisation growth rate significantly and negatively correlated with political instability. The index of political instability includes the indicators of social riots and strikes. The uncontrolled GDP growth rate shows a significant negative correlation between the urban population growth rate and political instability under the conduct of analysis.

Moomaw and Shatter (1996) proved that excessive urbanisation is observed to be the outcome of political forces in the political administrations, inefficient migration and relocation factors of the rural population and industrial aspects. A panel data study comprising a sample of 90 countries explained the behavioural traits of urbanisation in the economy. Studies showed that the economies which are having a larger share of

the population in industries and manufacturing, rather than in the agriculture sector, are more urbanised, respectively, and there is a positive relationship between GDP and urbanisation, and an increase in the GDP per capita raises urbanisation level.

There has been a non-linear relationship between spatial concentration (agglomeration) and economic growth rate, as explained by Williamson's hypothesis in 1965. It has been suggested that agglomeration economies or large agglomerations positively impact the economic growth rate, but only in the early stages of the economic development of the respective area. In the early stages of development, there is a scarcity of transportation and communication infrastructures. In contrast, in the later stages of development, agglomeration or spatial concentrations have a negative impact on the economic growth rate [Williamson (1965)].

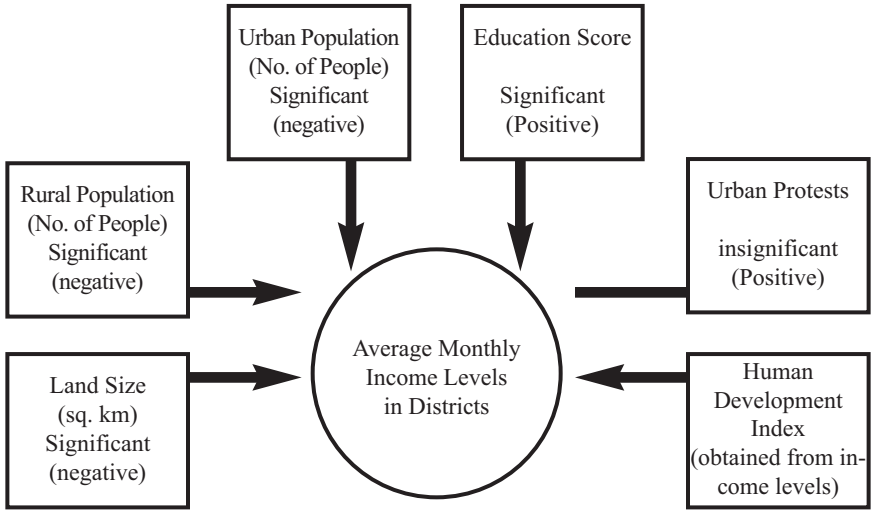
Cross-country analysis was conducted to evaluate the impact of special concentration (agglomeration) on the economic growth rate using cross-sectional OLS and dynamic panel GMM techniques. It made a conclusion similar to the Williamson hypothesis that agglomerations boost economic growth rate but only up to a certain level. The study evaluates agglomerations from the urban shares and indices of spatial concentrations from the sub-national data [Brülhart and Sbergami (2008)].

A panel data study evaluated in India has explained the relationship between urban agglomeration and urban economic growth rates. The study used 52 large cities in India over a period of 2000 to 2009. There has been a strong positive impact of urban agglomeration (population in large cities of India) on the economic growth rate, while the results support Williamson's hypothesis that agglomeration increases economic growth up to a certain level of economic development. Furthermore, the results indicate that human capital accumulation promotes the economic growth rate [Tripathi (2015)].

III. Theoretical Framework

This section explains the study's theoretical framework, which was developed with the help of various past research findings. Since the 1950s, traditional urbanisation theories have given major attention towards the spatial role of labour dynamics and the structural and institutional economic changes through different regimes. Economists have determined the role of urbanisation primarily as the expansion of the industrial, manufacturing and services sectors, which boosted economic growth and simultaneously gained the attention of the labour surplus in rural areas to move towards the city hubs. Cities provided higher wage rates, while the economic backwardness of the rural areas gave the incentive to the labour surplus to migrate towards the cities for higher wage rates and a better standard of living. The term 'urbanisation' has been labelled as the urban pull and the rural push in most of the literature in the academic output. The phenomenon later turned into the problem of unemployment, resulting from the structural mechanism of over-urbanisation rates and misallocation or inefficient resource allocation [Lewis (1954)].

In order to understand the demographic transition and specifications, the demographers have identified three proxies for the urban population growth rate labelled as the natural increase in the urban population, also known as the crude/natural birth rate; the net-in migration, which has been identified as the net population inflow in urban areas from the rural areas; and reclassification which is resulting from the natural increase in the urban population [Cohen (2004)]. Demographers are of the opinion that the increase in the birth rates in rural areas raises the population at an increasing rate while the urban-pull and rural-push factors drive a large amount of the rural population towards the urban cities. Keeping in view these various findings and theoretical grounds, a schematic framework of this study is given below.



Source: Authors'estimation.

FIGURE 1

Theoretical Framework

Figure 1 depicts the theoretical framework of the present study. The average monthly income is taken as the dependent variable upon which the impact of urbanisation, along with many other covariates (HDI, Protests, Education, Rural population, and Land size), is to be derived in this research.

IV. Data Collection and Variable Sources

This study makes use of secondary data sources, mostly extracted from the Pakistan Bureau of Statistics. The data contains 100 districts of Pakistan from 4 provinces (Punjab, Sindh, KPK, Baluchistan), while Gilgit-Baltistan and FATA have

been excluded due to the lack of data availability. Moreover, time irregularities are also observed in the collected data. Details about the variable description and its source are given in Table 2. However, Table 1 shows the districts which are utilised as the sample observations for the research objective.

TABLE 1

Districts of Pakistan

Punjab	Sindh	Khyber Pakhtunkhwa	Baluchistan
Islamabad	*Karachi*	*Abbotabad*	*Gwadar*
Lahore	*Hyderabad*	*Peshawar*	*Quetta*
Rawalpindi	*Sukkur*	*Haripur*	*Kech*
Chakwal	*Naushahro-Feroze*	*Nowshera*	*Mastung*
Sialkot	*Khairpur*	*Malakand*	*Sibbi*
Jhelam	*Nawabshah*	*Mansehra*	*Kalat*
Gujranwala	*Jamshoro*	*Chitral*	*Khuzdar*
Gujrat	*Dadu*	*Charsada*	*Dera Bughti*
Faisalabad	*Sanghar*	*Mardan*	*Kharan*
Attock	*Mirpur Khas*	*Lower Dir*	*Chaghi*
Sarghodha	*Larkana*	*Swat*	*Ziarat*
Mianwali	*Ghotki*	*Kohat*	*Pishin*
Sheikhupura	*Shikarpur*	*Bannu*	*Panjgur*
MandiBahuddi	*Thatta*	*Swabi*	*Awaran*
Toba Tek Sing	*Badin*	*Karak*	*Lasbella*
Multan	*Tharparkar*	*LakkiMarwat*	*Jafarabad*
Khushab	*Jaccobabad*	*Shangla*	*JhalMagsi*
Narowal		*Tank*	*Qilla Abdullah*
Sahiwal		*Hangu*	*Zhob*
Layyah		*Upper Dir*	*Kohlu*
Hafizabad		*Dera Ismail Khan*	*Lorali*
Kasur		*Batagram*	*QillaSaifullah*
Okara		*Kohistan*	*Nasirabad*
Dera Ghazi Khan			*Barkhan*
Bhakhar			*Musa Khel*
Khanewal			
Vehari			
Jhang			
Bahawalnagar			
Lodhran			
Pakpatten			
Bahawalpur			
MuzaffarGarh			
Rahim Yar Khan			
Rajanpur			

Source: Punjab Bureau of Statistics.

TABLE 2

Data Description and Sources

Variables	Code	Description	Source and Notes
Average monthly income levels (PKR) 2017	*income*	Forecasted value of average monthly income levels in 2017 for each district from past values of 2009, 2011, 2013 and 2015 from PSLM surveys	Calculations from PSLM 2009/2011/2013/2015 by the author microdata file section 'e'
Urban Population 2017	*urban pop*	Number of people living in the district in urban areas calculated from the national census	District Wise Census Results, Census 2017, Pakistan, Pakistan Bureau of Statistics publications.
Rural Population 2017	*ruralpop*	Number of people living in the district in rural areas calculated from the national census	District Wise Census Results, Census 2017, Pakistan, Pakistan Bureau of Statistics publications.
Population Density per sq.km 2017	*density*	People living in per square kilometre area on average in the whole district	Online source, Pakistan administrative division, Districts classifications, *www.citypopulation.de/php/pakistan-admin.php*
Land size km. 2017	*land*	Land size is allocated to the district units are measured in km2.	Online source, Pakistan Administrative Division, Districts classifications, *www.citypopulation.de/php/pakistan-admin.php*
Education Score 2017	*education*	Score of education varies from 0-100 for each district. Showing closer to 100 as good Score.	Alif Ailaan 2017. Pakistan District Education Rankings, Islamabad, vi-66. ISBN: 978-969-7624-06-5
Protests/Riots 2017	*protests*	Total number of recorded protests/riots conducted by public, recorded by media sources, official	Data classified in districts through ACLED (Armed Conflict Location and Event Data Project) Pakistan Database, *www.acleddata.com*
Human Development Index 2015	*hdi*	Human Development Index value with international calculation standards calculated for each district values from 0-1.	HDI index, (2017). Pakistan Human Development Index Report, published for the United Nations Development Programme (UNDP), Printed in Pakistan by Khursheed Printers, ISBN: 978-969-8736-19-4
Average Annual Growth rate (total population) 2017	*Pop growth*	The average growth rate of the total population in each district of Pakistan.	District Wise Census Results, Census 2017, Pakistan, Pakistan Bureau of Statistics publications.
Total Population of Districts 1972, 1981, 1998 & 2017	*Used for Descriptive Analysis*	The total population of districts was calculated using the official census of Pakistan using the last 3 censuses.	Online source, Pakistan administrative division, Districts classifications, *www.citypopulation.de/php/pakistan-admin.php*

Source: Authors' estimation.

The average monthly income levels of the districts of Pakistan have been derived from the official publications of the PSLM 2014/2015 survey through questionnaires in the respective districts. Calculations have been made by obtaining the STATA file from PSLM online publications for data sources provided by the Pakistan Bureau of Statistics. Section E in the data file obtained provides the required data for each observation. Some observations provide the annual income of people in each district of Pakistan, while some observations provide the monthly income of people in each district of Pakistan. As there are more observations for the provision of monthly income, the monthly income levels have been selected for the research work for more reliable data. Obtaining the monthly income of each person under the sample from each district of Pakistan, we have calculated the average value by the following formula:

$$\textit{average monthly income level} = \frac{\textit{monthly income of people in the district}}{\textit{the number of observations in a sample size of the survey}}$$

Urban and Rural Population levels for each district of Pakistan have been provided in the official publications of the Pakistan Bureau of Statistics, obtained from the official national census of Pakistan in 2017. Similarly, the average annual population growth rate of each district is also provided in the official publication by the Pakistan Bureau of Statistics. Population density per square kilometre in each district of Pakistan has been calculated by the following formula utilised:

$$\textit{population density} = \frac{\textit{number of people living in a district}}{\textit{Total land size of district in a square kilometer}}$$

The land size of each district of Pakistan has been recorded by the official publications of the Pakistan Bureau of Statistics and has usually been unchanged over the years since the land was allocated during the distribution of land for the areas of Pakistan.

The education score for each district of Pakistan was obtained from the official publication of the District Education Report 2017. The Score ranges from 0 to 100, and a score close to 100 indicates a good quality of education.

The Human Development Index (HDI) for each district of Pakistan is obtained from the official publication of the Human Development Report 2015. HDI measures the living standards of people.

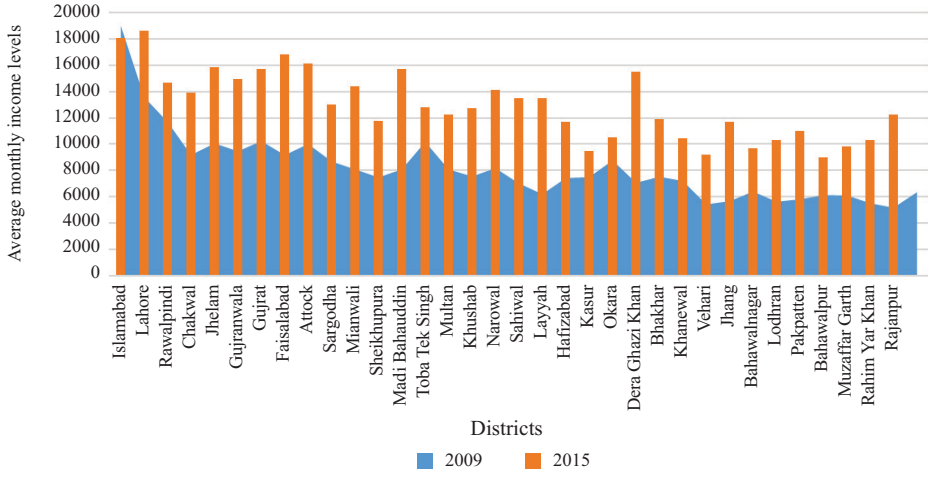
Riots/Protests have been calculated from the official publications of the ACLED online database for Pakistan. Each event has been recorded in the database, and the number of events added up is appointed as a single event in each observation irrespective of its duration. Each event recorded counts as 1, and there can be more than 1 event in a single day. The events include Riots/Protests, Remote violence, Violence against civilians, and Battles with no change of territory.

ACLED (Armed Conflict Location and Event Data Project) collects information from media sources about protests and violence in different countries. It is registered as a non-governmental organisation working in the United States and receives financial support from the Bureau of Conflict and Stabilization Operations (CSO) of the US Department of State (ACLED).

1. Descriptive Statistics

This section contains the graphical representations of the data collected from each district for the respective year in order to better understand the dynamics and differentiate amongst the variables calculated from PSLM. Figures 2, 3, 4, and 5 depict the position of each district in four provinces monthly income-wise. The data analysis shows that in Punjab, Sindh, KPK and Balochistan, it is very clear. Lahore, Karachi, Malakand and Kohlu are the high-average monthly income districts.

Rural/urban population trends in four provinces show that in the case of Punjab, Faisalabad and Rahim Yarkahn are populated, and the latter one is congested with a larger rural population. For Sindh province, district Sukkhar seems to be a more dense district population-wise, with a larger share of the rural population. In the case of KPK and Balochistan, all districts are mostly rural-based populated with minimal magnitude of urban population. Now, discussion of the growth trends of the population in various consensus shows all provinces are observing a fast trend of rise in their population

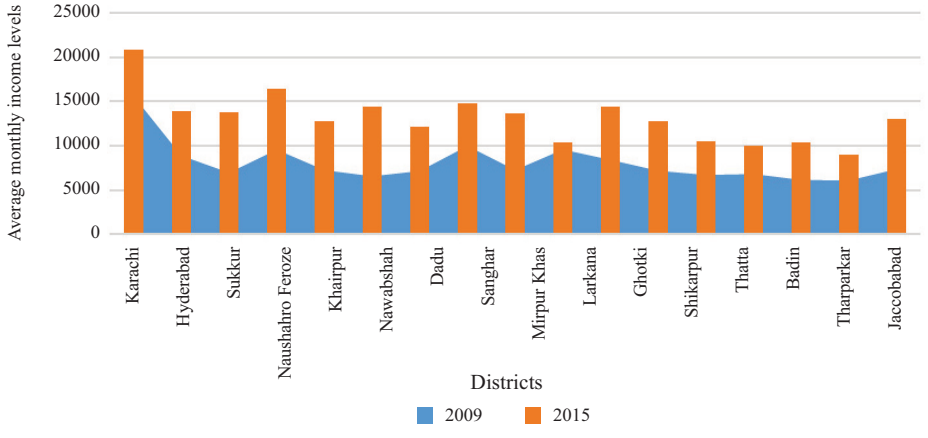


Source: Authors' estimation from PSLM 2008/2009 and 2014/2015.

FIGURE 2

Average Monthly Income of Districts (Punjab)
for year 2009 and 2015

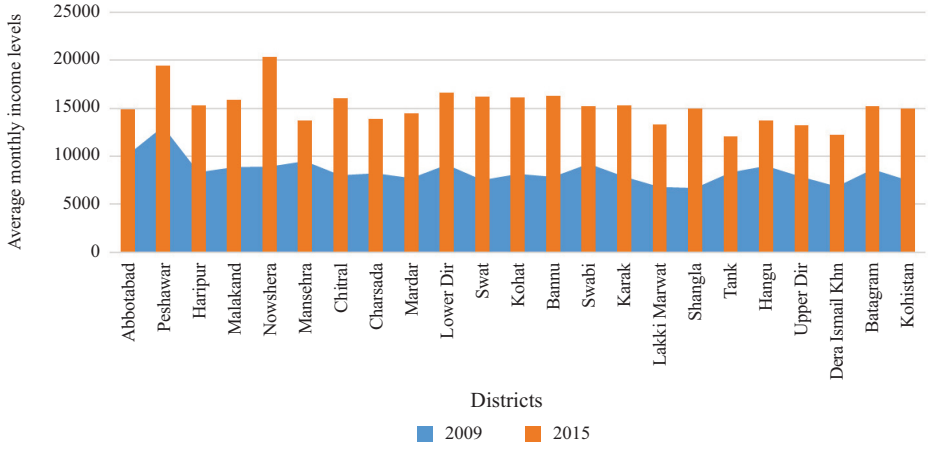
growth rates compared to 1972 as the base year till 2017 consensus. The rest of the detailed descriptive picture of data used in this study is given in the Table A-1 to A-8 (Appendix). This concerns the provincial distribution of districts, their respective HDI (human development index) levels, and land allocation.



Source: Authors' estimation from PSLM 2008/2009 and 2014/2015.

FIGURE 3

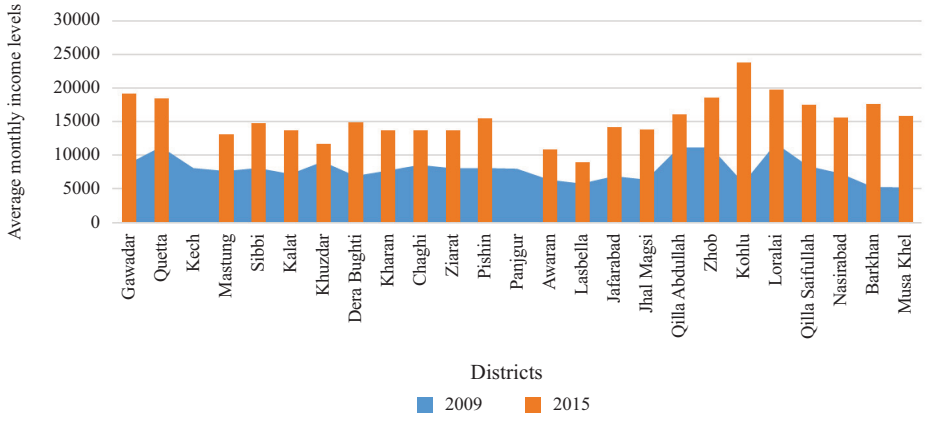
Average Monthly Income of Districts (Sindh)
for year 2009 and 2015



Source: Authors' estimation from PSLM 2008/2009 and 2014/2015.

FIGURE 4

Average Monthly Income of Districts (Khyber Pakhtunkhwa)
for year 2009 and 2015



Source: Authors' estimation from PSLM 2008/2009 and 2014/2015.

FIGURE 5

Average Monthly Income of Districts (Khyber Pakhtunkhwa)
for year 2009 and 2015

V. Methodology

Due to the lack of availability of time consistency, the data for variables are time indifferent; however, the parameters can be considered good estimates for knowing the nature of the relationship among the variables. The study will evaluate the relationships between urbanisation and the average monthly income levels of people from various districts using Model (I) by applying the OLS (ordinary least squares) method.

$$income_i = \alpha_i + \beta_{i1}\, urbanpop + \beta_{i2}\, ruralpop + \beta_{i3}\, land + \beta_{i4}\, education + \beta_{i5}\, protests + \gamma_{i1}\, dumeducation + \gamma_{i2}\, dumhdi + \delta_{i1}\, urbanpop^2 \quad \text{(I)}$$

The study uses a variety of dummy variables. For example, in order to capture the effects of 'high standard groups' and 'lower standard groups' the variable is defined as follows with the help of Equation (1);

$$\gamma_{i1}\, dum_{education}\ (score\ of\ education > 60 = 1\ and\ score\ of\ education < 60 = 0) \quad (1)$$

Districts with scores of more than 60 out of 100 are assumed to have a 'good education system', and the people there are assumed to be more educated and urbanized are presented below using Equation (2).

$$\gamma_{i3}\, dum_{hdi}\ (value\ of\ hdi > 0.599 = 0\ and\ hdi < 0.599 = 1 \quad (2)$$

A HDI (Human Development Index) value greater than 0.599 shows the districts with high, medium high, and medium HDI values under the system of categories, while the districts with HDI values below 0.699 are in the medium low, low, and very low categories, respectively [HDI index (2017)].

As the data has been obtained from different secondary sources and the units of the variables are indifferent, it is important to set a standard for the variables for the consistent interpretation of the variables being used in the model. Using a double-log model, we have developed a new model.e., Model (II), for evaluating the impact of urbanisation at the district level;

$$log(income)_i = \alpha_i + \beta_{i1} log(urbanpop) + \beta_{i2} log(ruralpop) + \beta_{i3} log(land) + \beta_{i4} log(education) + \beta_{i5} log(protests) + \gamma_{i1} dum_{education} + \gamma_{i2} dum_{hdi} + \delta_{i1} log(urbanpop)^2 \quad \text{(II)}$$

The coefficients are now in terms of elasticity, i.e., the rate of responsiveness of the percentage change in the dependent variable by the percentage change in the independent variable on average, respectively.

For the district-level estimates model, the time period selected is 2017. Unfortunately, for the dependent variable 'income', data for the year 2017 has not yet been published by PSLM. So, in order to cope with the problem, a proxy variable has been generated for the average monthly income levels of districts of Pakistan for 2017, using projected values calculated from the past values of the PSLM surveys of 2009, 2011, 2013 and 2015. Average monthly income levels have been calculated for each year for each district of Pakistan, and using the four values for each district, a forecasted value for 2017 has been generated for the proxy variable. A variety of forecasting methods prevail in the literature, and each method carries its own significance. In order to obtain the forecasted value, the following two methods were utilised to generate a value for 2017, and a comparative analysis was conducted using both methods in the district-level model to assess the difference of the coefficients obtained.

1. Forecasting Value Using a Simple Exponential Smoothing Method (ETS)

The exponential smoothing method is a procedure for forecasting to enlighten more about recent data experiences. The method assigns an exponentially decreasing weight as we move towards the older observations in the dataset. This allows a relatively higher weightage or importance to the recent observations than the previous observations. Exponential smoothing has different forms of smoothing methods, including single, double, and triple (additive and innovative) smoothing methods. As for the forecasting, the time period is small; the single exponential smoothing can be handy. Single exponential smoothing is also known as simple exponential smoothing. It is mainly used for short-range forecasting. The assumption primarily states that the data fluctuates around a stable mean with no trend or consistent pattern of growth [Kalekar (2004)].

For the simple exponential smoothing method, the following model derives each value of the smoothed term as explained by the literature for the method in Equation (3);

$$S_t = \alpha X_t + (1 - \alpha) S_{t-1} \tag{3}$$

Where;

S_t is the new smoothed value forecast
X_t is the current observation
α is a parameter in the model to assign weight, if =1, then previous observation is ignored

The results for the forecasted value are obtained using a simple exponential smoothing method for the values of the next time period, 2017, from the previous values in the years 2009, 2011, 2013 and 2015, respectively.

2. Compound Annual Growth Rate Method (CAGR)

Compound annual growth rate or CAGR, is a specific term for the geometric progression ratio, which provides the constant growth rate over a specific period of time. The growth rate obtained from CAGR is assumed to be constant over a period of time. The method is widely used in accounting, business, and economic comparative analysis. CAGR is almost similar to the idea of compound interest, as it is the average annual growth rate while compounding is taken into account [Anson et al., (2010)]. In economics, CAGR has certain limitations as time series usually show a trend, and assumptions include variations in the growth rate over a given time period. CAGR can be a handful in comparative analysis of the benchmarks of the GDP growth rate, stock index growth, and inflation in economics, and the values can be assessed with the value of CAGR to eventually judge if the growth rate has been attractive [Chan (2012)].

Average monthly income levels have been obtained from the PSLM survey of 2009, 2011, 2013, and 2015, respectively. To obtain CAGR, we have utilised the values of 2009 and 2015 by using the formula as prescribed in the literature [Chan (2012)].

$$\text{CAGR} = \left(\frac{FV}{PV}\right)^{\left(\frac{1}{n}\right)} - 1$$

Where;

FV is the future value or the final value
PV is the previous value or the initial value
N is the number of years between the final and the initial value

CAGR has been calculated for each district of Pakistan by placing the average monthly income levels in 2009 and 2015 as shown in the following formula.

$$\text{CAGR} = \left(\frac{income2015}{income2009}\right)^{\left(\frac{1}{6}\right)} - 1$$

Using CAGR for each district, the value for the average monthly income level for 2017 has been estimated to make our model fit. The value of CAGR provided estimate for the year 2016 and then for the year 2017.

1. Model Estimates

Under this section, the results have been provided and a complete model for the research, for both the district level and national level analysis Table 3 using Model (II), in order to understand urbanisation in Pakistan. The following estimates have been obtained from the regression analysis in Table 3.

TABLE 3

Dependent Variable: LOG(INCOME); (Forecast ETS)

Variable	Coefficient	Standard Error	T-statistics	P-value
C	11.1579	1.1551	9.6591	0.0000
LOG(URBANPOP)	-0.2647*	0.1444	-1.8324	0.0704
LOG(RURALPOP)	-0.0884*	0.0323	-2.7368	0.0076
LOG(LAND)	-0.0475*	0.0237	-2.0024	0.0485
LOG(EDUCATION)	0.4699*	0.1677	2.8011	0.0063
LOG(PROTESTS)	0.0111	0.0179	0.6226	0.5352
LOG(URBANPOP)^2	0.0102*	0.0058	1.7566	0.0826
DUMMY_EDUCATION	-0.1645*	0.0670	-2.4522	0.0163
DUM_HDI	-0.04893	0.0638	-0.7665	0.4455
TEST SIGNIFICANCE				
R-Squared				0.3621
Adjusted R-Squared				0.3013
F-Statistic				5.9610
Prob(F-Statistic)				0.000005

Source: Authors' estimation.
'*',Significance levels at 1%.

$$log(income)_i = 11.1579 - 0.2647log(urbanpop) - 0.0884log(ruralpop) - 0.0475log(land) + 0.4699log(education) + 0.0111log(protests) - 0.1645dum_{education} - 0.0489dum_{hdi} + 0.0102log(urbanpop)^2$$

The value of R^2 represents that there is almost 36 per cent contribution towards the dependent variable, which means the change in independent variables contributes 36 per cent to the change in the dependent variable. The value is relatively high and does not show a spurious regression, so the model is acceptable. Similarly, the F-statistic provides us with a significant value, which shows the goodness of fit for our model, explaining that the model is overall statistically significant.

Now, comparing the coefficients from both analyses, we can observe that both models have almost the same coefficients. Forecasting at simple exponential smoothing method incorporates the weightage towards different time periods over the dataset. At the same time, CAGR assumes a constant growth rate over the years, the results provided by the Forecast ETS (simple exponential smoothing method) can be more reliable. The coefficients in this methodology are more significant than the coefficients in CAGR methodology in estimating dependent variable.

TABLE 4

Dependent Variable: LOG (INCOME); (CAGR method forecast)

Variable	Coefficient	Standard Error	T-Statistics	P-Value
C	11.43116	1.4632	7.8119	0.0000
LOG(URBANPOP)	-0.3155*	0.1811	-1.7421	0.0852
LOG(RURALPOP)	-0.0960*	0.0406	-2.3644	0.0204
LOG(LAND)	-0.0549*	0.0302	-1.8157	0.0731
LOG(EDUCATION)	0.5325*	0.2121	2.5102	0.014
LOG(PROTESTS)	0.0171	0.0227	0.7551	0.4523
LOG(URBANPOP)^2	0.0121*	0.0073	1.6579	0.1012
DUMMY_EDUCATION	-0.1840*	0.0871	-2.1106	0.0378
DUM_HDI	-0.0687	0.0805	-0.8539	0.3956
TEST SIGNIFICANCE				
R-Squared				0.3216
Adjusted R-Squared				0.2554
F-Statistic				4.8595
Prob(F-Statistic)				0.000063

Source: Authors' estimation.
'*',Significance levels at 1%.

$$log(income)_i = 11.4311 - 0.3155log(urbanpop) - 0.0960log(ruralpop) - 0.0549log(land) + 0.5325log(education) + 0.0171log(protests) - 0.1840dum_{education} - 0.0687dum_{hdi} + 0.0121log(urbanpop)^2$$

The value from the R-squared from the forecasting ETS method is greater than the R-squared from the CAGR method; hence, forecasting ETS has better goodness of fit relative to the CAGR method.

VI. Results and Findings

According to the results obtained from the district-level analysis, the urban population in the districts has a positive and significant impact on the Average monthly income levels of the districts, while the rural population has a negative impact. The model for the district-level analysis having average monthly income levels as a dependent variable under the Forecast ETS methodology can be interpreted as follows;

$$log(income)i = 11.15797 - 0.264719log(urbanpop) - 0.088497log(ruralpop) - 0.047559log(land) + 0.469905log(education) + 0.011161log(protests) - 0.164524dum_{education} - 0.048927dum_{hdi} + 0.010221log(urbanpop)^2$$

- 1% Δ in ↑ of urbanpop leads to 0.26% ↓in income on average
- 1% Δ in ↑ of ruralpop leads to 0.08% ↓in income on average
- 1% Δ in ↑ of land leads to 0.04% ↓in income on average
- 1% Δ in ↑ of education leads to 0.46% ↑in income on average
- 1% Δ in ↑ of protests leads to 0.01% ↑in income on average (insignificant)
- Square of log (urbanpop)^2 is positive and significant while log (urbanpop) is negative, which states that a percentage increase in urbanpop will decrease income but at an increasing rate.

As we move towards the districts having a higher population, the average monthly income levels decrease but at an increasing trend. Both the urban and rural population levels showed a negative relationship with the average monthly income levels, while the urban population level has explained an increasing rate of impact. An increase in land size shows a significant and negative impact on income levels. Furthermore, the educational Score shows us the positive and significant coefficients identifying a positive relationship with income levels. Improvements in health, education, and living standards do raise the average monthly income levels at the district level. The improvement in human capital and most of the education development mechanisms in the economy are majorly prevailing in the urban sectors of the economy, and the development of human capital development institutions provides a boost to the economy. The results from the regression analysis provide the coefficients to be positive for the human

development over the urban population, as the better the human development and education score in a certain area, the more the urban population prevails, and those regions generate a significant positive impact over the economic growth rate of Pakistan. The dummy variables used in the analysis have shown a significant coefficient for the education score of the districts, which shows us that there is a structural break in the impact of the respective variable of the dummy coefficients when they exceed the value as assigned by the range of the values in the dummy variables. The dummy variable for HDI has an insignificant coefficient, so it is less reliable.

VII. Conclusions and Policy Recommendations

Under the investigations from the district levels, human development is proven to be contributing both towards urbanisation and better economic well-being of the people, while urban districts yield a higher average monthly income level of people on average. The impact of the urban population from the districts has a negative relationship with average monthly income levels. However, the square term indicates the impact to be decreasing at an increasing rate. Districts of Pakistan, which have a relatively higher urban population ratio, tend to have higher living standards and average monthly income levels, and also have higher growth rates of population. The misallocation of land size to districts is descriptively analysed in the research, showing a lack of land availability in districts having a high urban population while a huge land size is left vacant in districts having less population levels. The land allocation needs to be revised in order to control the real estate price mechanisms. Higher population densities in districts encourage higher income levels, which provides evidence that agglomeration economies are productive and efficient towards the economic growth of the nation and the districts as a whole. The rural push and urban pull have been identified under the evaluations of the results by observing the relationship between the urban and rural populations. Overall, the analysis of all four provinces led us to a conclusion regarding the lack of ineffective land utilisation patterns, while Sindh and Baluchistan have not been able to distribute the population equally in order to maximise effective land utilisation. Most of the urbanised districts can be observed to have a very low land ratio, while the districts with high rates of rural population have a large portion of land size. There is a big factor of agriculturist economies in the rural sectors, and agriculture in Pakistan is majorly land-intensive. The lack of land availability in the districts that are more urbanised has led to the problem of urban sprawl, high population densities, and economic concentrations towards the centres of the city hubs. The trend of horizontal growth in the urban cities and lack/discouragement of vertical growth, as well the problem of lack of land availability, have led to an increase in the prices of real estate, and properties have become so expensive that they require a generation to build a house in a big city.

As Pakistan is a developing nation and is currently facing a variety of social, economic and political factors, long-term sustainable planning and development policies

are crucial for the nation. Urbanisation in Pakistan is very much important to be analysed and the policies which have been adopted in the nation are required to be revised and re-evaluated, in order to promote sustainable urbanisation patterns and agglomeration economies.

Following are some of the recommendations provided for the betterment of urbanisation in Pakistan.

- The factors that affect urbanisation have been identified as having a significant impact on the urban population at district level, i.e., income levels, rural population, education score, land size, population growth rates, population density levels, and protests. Improvements in these factors can help improve urbanisation.
- According to the results from the district-level evaluation, one percent increase in urban population leads to 0.26 percent decrease in income on average, while a one percent increase in rural population leads to 0.08 percent decrease in income levels on average, which states that population expansion needs to be controlled across Pakistan.
- A one percent increase in educational scores of the districts leads to 0.46 percent in income levels on average, which clearly states the improvements in education system across the nation can greatly increase the average monthly income levels of the districts of Pakistan.
- It is recommended that the current status of urbanisation and the trend of urban population in Pakistan be critically evaluated. This is important to understand the differentiated outcomes of different sectors of urban areas regarding the economic growth rate in Pakistan and how agglomeration economies play their role in developing the economy of Pakistan.
- Lack of data availability is a big constraint towards research in Pakistan, as the data for different economic indicators, e.g., the average income levels of the districts, lacks reliability and regularity. It is also essential to keep the income levels of the districts in record efficiently and avoid the limitations of income evaluation methods to effectively and efficiently evaluate the productivity status of the districts of Pakistan.
- Human Development and raising human capital in the districts are required in which there is a low urban population, poor education quality, and high poverty rates. This is crucial to raise the equality levels and diminish the inequalities amongst the districts in Pakistan. Re-evaluating the resource allocation for every district of Pakistan is crucial.
- A one percent increase in the land size of the districts leads to a 0.04 per cent decrease in income levels on average. Most of the districts that share high population and income levels share the least land size. Poor governance and poor political strategies eventually discourage the stable economic growth of the cities, which results in a big problem of inefficient utilisation of land in cities. Inefficient utilisation of land is a major cause of inefficient urbanisation patterns.

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APPENDIX

The following are graphical representations in radar formulation of the provincial distribution of districts and their respective HDI (human development index) levels. The closer to the centre of the circle, the lower the HDI value.

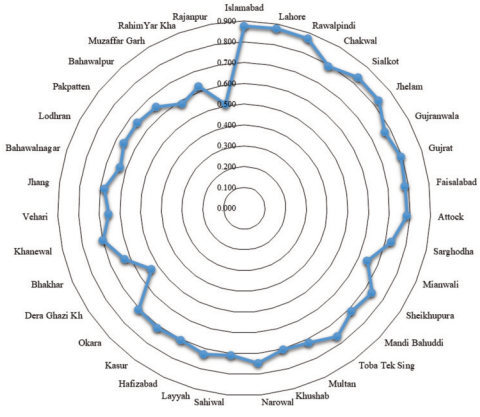

FIGURE A-1

HDI of District
(Punjab)

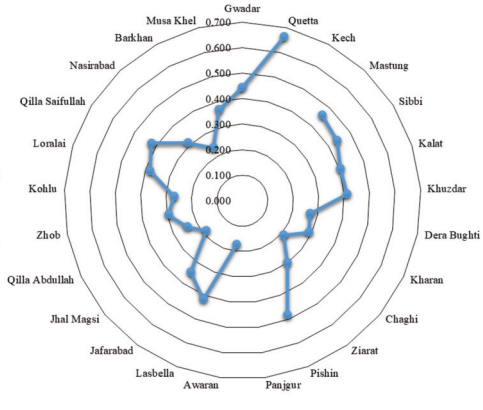

FIGURE A-2

HDI of District
(Baluchistan)

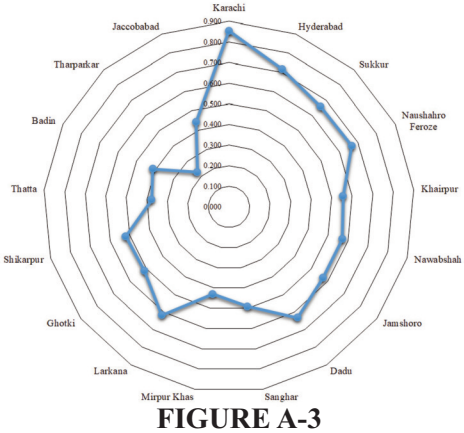

FIGURE A-3

HDI of District
(Sindh)

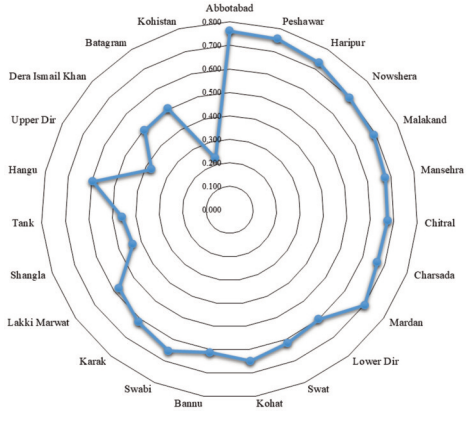

FIGURE A-4

HDI of District
(Khyber Pakhtunkhwa)

Source: HDI index, (2017). Pakistan Human Development Index Report, published for the United Nations Development Program (UNDP).
Note: District Kech and Panjgurdistrics from province Baluchistan are missing from PSLM survey.

The following are graphical representations in the pie chart formulation of the provincial distribution of districts and their respective land size in square kilometres, as well as the percentage of the land utilised by the district from each of the respective provinces. The figures carry the value of the land size and the percentage of the land size of each district out of the total land size of each province, respectively.

The respective graphs can be useful for summarising the land allocation. By observing the population for each district, we can understand the inadequate land utilisation for population distribution.

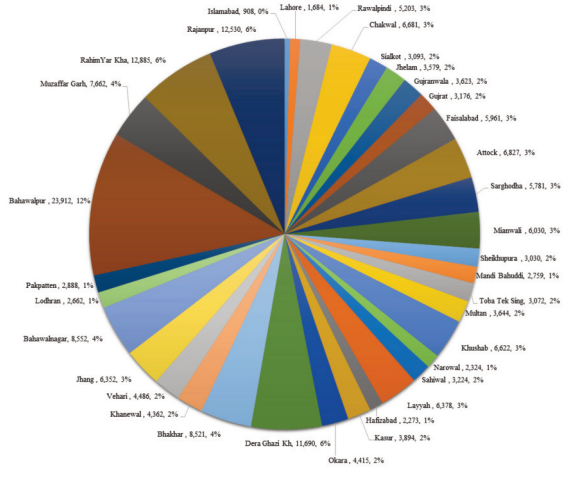

FIGURE A-5

District Land Size (Punjab)

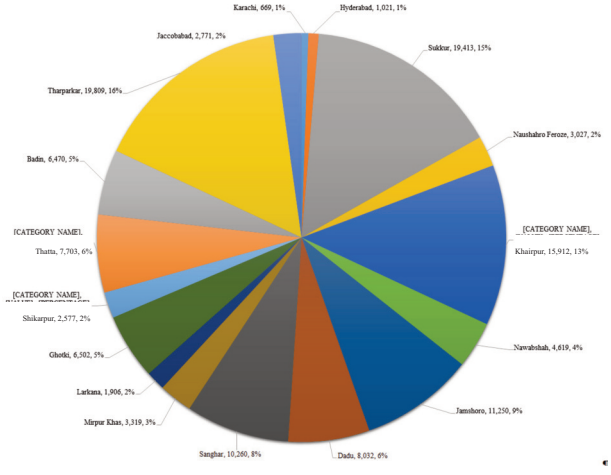

FIGURE A-6

District Land Size (Sindh)

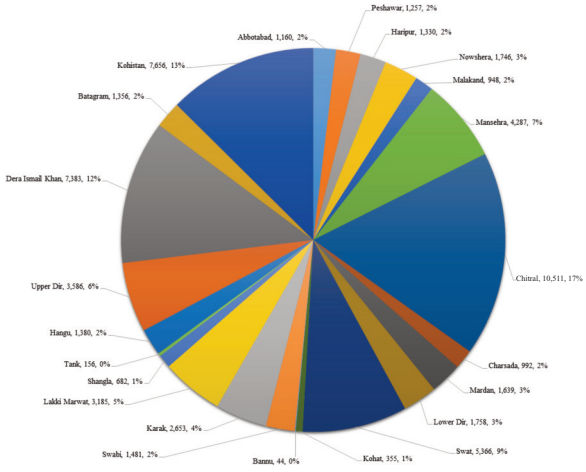

FIGURE A-7

District Land Size (Khyber Pakhtunkhwha)

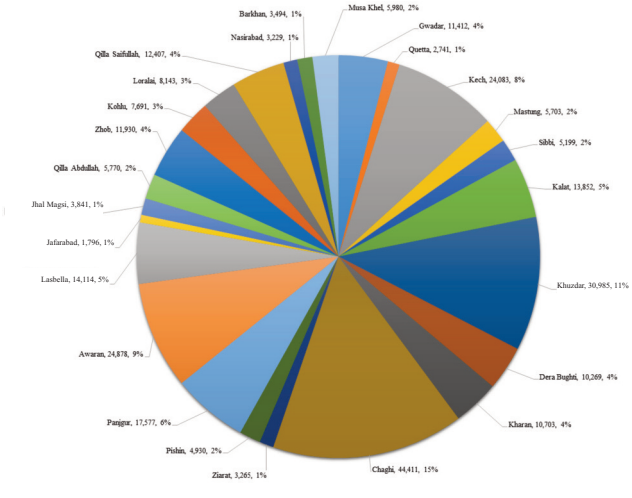

FIGURE A-8

District Land Size (Baluchistan)