PhD Dissertation

INCLUSIVE DEVELOPMENT IN PAKISTAN: A HOUSEHOLD-BASED DIAGNOSTIC ANALYSIS

By

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(02/PhD/PIDE/2012)

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Abstract

It is a well-established fact that common people in Pakistan are suffering from multidimensional exclusion resulting in social unrest and adverse state of human development. The present study attempts to provide an empirical base for designing an appropriate policy framework for inclusive development in Pakistan. Towards this end the household-based Human Development Index (HDI) & Inequality-adjusted HDI (IHDI), and the indices of standard of living, education, and health are estimated at the national, provincial, and district levels. The national and provincial analysis is elaborated at the urban and rural regions as well. The distribution of these indices across households are utilized to measure inequality and inclusiveness coefficients. At the district level the impact of economic, social, demographic, and locational factors on inclusive development are also investigated. The results demonstrate that Pakistani households reside on average in low category of actual human development experiencing high inter-regional and intra-regional disparities and exclusions. When the analysis is further drilled down to provincial and district levels the inequalities in human development and exclusions are even more pronounced, indicating that aggregated analyses suppress the intra-regional disparities and segregations. The rural regions are far below in terms of inclusive development than their urban counterparts in all provinces. Based on the district level findings, it is asserted that the investment in human capital (especially in education), the density of communication infrastructure (particularly road networks), and the demographic factors including population density, sex ratio, and urbanization are statistically significant determinants of inclusive development in Pakistan.

Key Words: Inclusive development, Household-based Human Development Index (HDI), Inequality Coefficient, Inclusion Coefficient, Determinants of inclusive development

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ACRONYMS

ARDL	Autoregressive Distributed Lag
Cloglog	Complementary log-log
CLRM	Classical Linear Regression Model
DHIS	District Health Information System
DHS	Demographic and Health Surveys
ECM	Error Correction Model
FA	Factor Analysis
FDI	Foreign Direct Investment
GNI	Gross National Income
GNP	Gross National Product
GNP	Gross Domestic Product
GPI	Global Peace Index
HDI	Human Development Index
HDR	Human Development Report
HIES	Household Integrated Economic Survey
IHDI	Inequality-Adjusted Human Development Index
KPK	Khyber Pakhtunkhwa
MCA	Multiple Correspondence Analysis
MDGs	Millennium Development Goals
MICS	Multiple Indicator Cluster Survey
MPI	Multidimensional Poverty Index
NHDIR	National Human Development Index Report
NHDR	National Human Development Report
NIHDI	Non-Income Human Development Index
PCA	Principal Component Analysis
PDHS	Pakistan Demographic and Health Survey
PPCA	Polychoric Principal Component Analysis
PSLM	Pakistan Social and Living Standards Measurements
SDGs	Sustainable Development Goals
SOL	Standard of Living
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
VIF	Variance Inflation Factor

CHAPTER 1

Introduction

It is a well-established fact that the exclusion of masses from political, economic and social processes leads to an unfair, violent, fragile, and less prosperous society (Acemoglu & Robinson, 2012; McCartney & Naudé, 2012; Stewart & Brown, 2009)[1]. The literature indicates that a substantial proportion of the world population is excluded from the arena of development (Kato, 2014; UNDP, 2016). According to United Nations (United Nations, 2009), the dream of shared society could only be created by adopting a complete and cohesive approach to inclusive development[2]. Inclusive development is a broad concept including multidimensional growth coupled with its equitable distribution in all segments of society especially the deprived ones (Rauniyar & Kanbur, 2010)[3]. Masses in Pakistan are also suffering from multidimensional exclusion resulting in social unrest and non-coherence (Burki, Memon, & Mir, 2015; UNDP Pakistan, 2016; UNDP, 2016). Pakistan is paying a huge toll for exclusion in the form of human development, human lives, social harmony, peace, and massive security expenditures, to name a few[4]. There is an urgent need to formulate a comprehensive plan integrated regionally and nationally to raise the level of inclusiveness in all dimensions

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[1] In this study exclusion refers to social and economic exclusion. Social exclusion is a multi-dimensional, complex process that encompasses the lack of or denial of resources, rights, goods and services, and the inability to contribute in the normal relationships and activities, accessible to the majority folks in a society. This exclusion could be whether in social, cultural, economic or political arenas (European Urban Knowlelge Network, n.d.).

[2] The term "shared societies' is coined in 2007 by CLUB DE MADRID and is defined as societies where people share an equal capacity to participate in economic, political and social opportunities regardless of their religion, ethnic or linguistic groups, and where consequently relation between groups are peaceful, are inherently desirable (McCartney & Naudé, 2012, p. 16).

[3] In this dissertation following the general trend the term inclusive growth and inclusive development are used interchangeably, unless mentioned.

[4] Elaborated in detail with references in section 1.1.

of development (UNDP Pakistan, 2016). The foremost steps in this regard are to evaluate the present status of all aspects and dimensions of human development at all possible administrative levels and to identify the factors influencing inclusive development. The existing literature is unable to serve this purpose adequately. Based on aggregated data, a few studies including Jamal (2016) and Pakistan National Human Development Index Report (NHDIR) (2017) elaborate on the potential level of human development (represented by HDI) at the national, provincial, and district levels[5]. However, these studies are unable to provide information about the distributional aspects of human development including disparities and inclusion, especially at intra-district level. The annual human development report (HDR) of United Nations Development Programme (UNDP) give information about inequalities of human development only at the national level since year 2010. Keeping in view the significance of the subject matter and the research gap, this study carries out a diagnostic analysis of inclusive development for Pakistan at the national, provincial, and district levels, based on household measure of human development and its dimensions (standard of living (SOL)/economic wellbeing, education, and health). The analysis is further extended to urban and rural regions at the national and provincial levels. This household-based study is a unique and resourceful contribution in that it provides appropriate information about inter-regional and intra-regional distribution of human development and all its dimensions. This study also examines factors (including economic, social, demographic, and locational factors) influencing inclusiveness of development at the district level. The three underlying aspects of inclusive development: development enhancement, inequality reduction and inclusion of the marginalized are covered in this study

[5] These studies are mentioned specifically as these are utilizing same measure of human development (HDI) and same data source (PSLM 2014-15) as the present study.

by measuring and analyzing household-based human development index (HDI), inequality-adjusted HDI (IHDI), loss due to inequality, and coefficient of inclusiveness. The Classical Linear regression model (CLRM) is employed for analyzing the determinants of all aspects of inclusive development. It is demonstrated by this study that an average Pakistani household resides in low category of human development, accompanied with high inter-regional and intra-regional disparities and substantial exclusion at all administrative levels. The rural regions are far behind their urban counterparts in all aspects of inclusive development. The district level investigations reveal that statistically significant determinants of inclusive development in Pakistan are the level of public investment in human capital (especially in education), the density of communication infrastructure (particularly road networks), and the demographic factors such as population density, urbanization and sex ratio.

1.1 Background and Motivation

Rising concerns about human security and sustainability in both developed and developing worlds gave rise to the slogan of 'Leaving no one behind'[6]. Inclusive development is the only pathway that leads to the ideal society where everyone gets an opportunity to reap the fruits of development (Acemoglu & Robinson, 2012; McCartney & Naudé, 2012). It raises people's well-being by promoting the equality of opportunity for all members of the society, particularly the poor, the vulnerable, and the disadvantaged groups that are generally excluded from the process of development (Kozuka, 2014). Inclusive development is increasingly becoming a global demand and development agenda[7]. Being a key requisite of human security and sustainability

[6] It is SDG goal no. 10. For detailed description of phrase 'leaving no one behind' see (Dutt, 2016) and (Melamed, 2015).
[7] See (Anand, Mishra, & Peiris, 2013, p. 1) & (Kozuka, 2014, p. 109).

(Murotani, 2014), it is a prime concern of Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) agenda[8,9]. Widening disparities and non-decreasing multidimensional extreme poverty trends all around the world shifted the development paradigm from income growth to inclusive development (Ranieri & Ramos, 2013)[10]. The UNDP (2016) maintains that several sections of society are excluded from development due to gender, ethnicity, age, disability, or poverty. The poorest fifty percent of world's population own only one percent of all assets, whereas the richest ten percent own 85 percent. Almost one quarter of the world population (24%) is living in extreme poverty below $1.25 a day (Kato, 2014). The World Bank Group (2016) projected that 700 million people in 2015 were living below poverty line of $1.90 a day. A high proportion of those poor reside in Sub-Saharan Africa and South Asia.

Pakistan is a South Asian country with a vital geostrategic position and abundant natural and human resources[11]. However, the current level of human development reveals that it could not exploit its advantageous position and abundant resources successfully to construct a shared and resilient society (Najam & Bari, 2017). According to Easterly (Easterly, 2001), Pakistan has been demonstrating the paradox of 'growth without development' because of its failure to achieve the level of human development corresponding with the standards for other countries at similar level of per capita Gross

[8] At the Millennium Summit in September 2000 world leaders adopted the UN Millennium Declaration, committing their nations to a new global partnership to reduce extreme poverty and setting out a series of time-bound targets, with a deadline of 2015, that have become known as the Millennium Development Goals (MDGs) (UNDP, 2015)

[9] In a meeting at the United Nations Headquarters in New York from 25-27 September 2015 world leaders have decided on new global Sustainable Development Goals (SDGs) also known as the Global Goals, with a dead line of 2030 to implement. Implementation of SDG Agenda started on January 1, 2016 (CAFOD, the Catholic development agency for England and Wales, 2016; UNDP, 2016).

[10] Sachs in a paper (Inclusive Development Strategy in an era of Globalization, 2004) elaborates this issue in detail.

[11] Cited in Pakistan Overview by The World Bank (2016) and Pakistan Economic Survey 2015-16 (p. 199).

National Product (GNP). Akmal Hussain (1988) stated, “The texts of most official documents paint a rosy picture, ...as soon as one goes behind the veil of aggregate growth figures a very different picture emerges”. The echo of these long-ago findings is getting louder[12]. Despite strong constitutional base, and government’s policies and plans in this direction during the last seventy years, Pakistan is unable to create a society with inclusive development[13]. According to the Insight Report “The Inclusive Growth and Development” by World Economic Forum (2015), Pakistan falls in lower 20 percent of the lower middle-income economies based on most of the indicators of inclusive growth and development.

Elimination of poverty, reduction of inequality in various dimensions, and inclusion of the marginalized are complementary objectives of inclusive development (Kozuka, 2014; Rauniyar & Kanbur, 2010). Pakistan is far behind in achieving these objectives. High poverty rates and rising economic and non-economic disparities in Pakistan are leading to an increase in social and political strain, upsetting social cohesion[14]. Over 50 percent of population in Pakistan lives below poverty line of $2.5 a day and almost one third (29.5%) of Pakistanis live below poverty line of $1 a day (Pakistan Economic Survey 2015-16)[15]. According to Multidimensional Poverty Index (MPI), 38.8 percent Pakistanis are poor (Burki, Memon, & Mir, 2015; Ministry of Planning, Development & Reform, Pakistan, 2016)[16]. The UNDP Pakistan (2016) indicates that Gini coefficient has risen from 0.35 in 1987-88 to 0.41 in 2013-14. The income shares of richest 20 percent are 48.9 percent and that of poorest 20 percent are 6.8 percent. A

[12] For detail analysis of the track of human development in Pakistan between 2005 to 2015 see Pakistan Human Development Index Report (Najam & Bari, 2017).
[13] Article 38 of 1973 constitution: Promotion of social and economic well-being of the people. For detail see (Qureshi, 2001).
[14] For detail discussion see (UNDP Pakistan, 2016).
[15] Pakistan Planning Commission in April 2016 presented a revised headcount poverty measure based on Cost of Basic Needs approach (CBN). The new poverty line is Rs.3030 ($30) per adult equivalent per month.
[16] MPI includes health, education and living standards.

report by Oxfam mentions that consumption expenditure of richest 20 percent is five times higher than those of poorest 20 percent (Burki, Memon, & Mir, 2015) and it is reported seven times higher by UNDP Pakistan (2016). In Pakistan, stark regional disparities are reported, proportion of multidimensional poor people in urban areas (9.4 %) percent is significantly lower than (54.6 %) in rural areas (UNDP Pakistan, 2016). Similarly, research works based on HDI as measure of human development at provincial and district levels shows high regional disparities (Jamal, 2016; UNDP Pakistan, 2016; Pakistan Human Development Index Report, 2017).

The performance of the social sector in Pakistan has always been disappointing (Ismail, 2016). Pakistan is a middle-income country but in social indicators it falls amongst the least developed countries. Educational indicators are miserably low; the number of out of school children in Pakistan is second highest in the world after Nigeria at around 24 million (I-SAPS, 2016). One third of the primary school age children are out of school and illiterate population of age 10 years and above is 42 percent (Pakistan Education for All 2015 National Review, 2014). Pakistan ranks amongst the countries with the worst health indicators. Infant mortality rate of 66 per 1000 in Pakistan along with Afghanistan is highest in South Asia (The World Bank, 2016). Pakistan's under five mortality rate is 81 per 1000 and it ranks 23rd in the world (UNICEF State of the World's Children 2015). The ratio of stunted children is 44 percent and 9.6 million children experience chronic nutritional deprivation (UNICEF, 2015). Maternal mortality rate in Pakistan is among the highest. It was ranked 149th out of 179 countries in 2015 on the Maternal Mortality Ratio Index (Ali S. W., 2016).

The rising disparities and social and economic exclusion are a serious threat for peace and cohesion of the whole nation. Because of these exclusions Pakistan is facing massive losses in the form of human development, human lives, social harmony, peace, and massive security expenditures, to mention but a few. Pakistan's HDI value for 2014 is 0.538 which place the country in the low human development category. Its HDI rank is 147 out of 188 countries and territories, with no improvement in rank since 2009. When HDI value is discounted for inequality, it falls to 0.377, a loss of 29.9 percent due to inequality in the distribution of the HDI dimensions indices. Average annual growth of HDI has declined from 1.62 in 2000-2010 to 0.79 in 2010-2014 (UNDP, 2015). In South Asian region Pakistan ranks below its counterparts Sri Lanka, India, and Bangladesh and its HDI is lower than regional HDI average of 0.621. A study conducted by a group of international physicians' organizations in 2015, revealed that at least 80,000 Pakistanis have been killed in the US-led 'War on Terror'[17]. According to Global Peace Index (GPI) (2016) Pakistan ranks 153 out of 163 countries and is second least peaceful country in South Asia, just behind Afghanistan. Direct and indirect cost incurred by Pakistan economy due to war on terror has been estimated $118.32 billion or Rs9,869 billion during past 15 years (Pakistan Economic Survey 2015-16).

To properly address the problems of Pakistan caused by widening disparities and non-inclusive process of development serious efforts are required; otherwise it will keep languishing in low-human development situation. Careful examination of the process of inclusive development is necessary to understand the state of the world today, and it is imperative to design a new development framework for the future. The foremost step in this regard is to formally and methodically assess the existing status of human development and level of its inclusion. The next step is to inspect the factors influencing inclusive development so that appropriate policies and action plans could be designed. A substantial research work for Pakistan covers the income dimension of

[17] This group includes, PSR: Physicians for Social Responsibility; PGS: Physicians for Global Survival; IPPNW (International Physicians for the Prevention of Nuclear War).

development and inequality at national and sub-national levels. A few attempts have been launched to measure income and non-income dimensions of human development comprehensively specially at sub-national level[18]. Furthermore, a very few studies are carried out to capture the development inclusiveness in Pakistan using income and non-income dimensions separately[19]. All these studies are based on average measurement of human development which hides the intra-regional disparities. A comprehensive measurement of human development inclusiveness, at national and subnational levels and analysis of its determinants remains limited for Pakistan. Keeping in view the importance and practical application of the subject, and the existence of research gap, this dissertation undertakes the task of a household-based analysis of human development to assess prevailing level of development, its inequalities, and its inclusiveness at national, provincial, and district levels. The focus of this work is human development as it is the core idea of inclusive development and ultimate objective of all development efforts (Anand & Sen, 1994)[20].

Inclusive development is a broad concept including income, social, political, spatial, environmental and inter-generational aspects. However, this research work focusses mainly on standard HDI, encircling information about standard of living (economic wellbeing), health and education as essential components of human development. Economic wellbeing is one of the main objectives of inclusive development. On the other hand, health and education are central in building people's physical and mental capacities, and hence any serious inequality of opportunity in these areas will aggravate inequality in their future (Kato, 2014)[21].

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[18] It includes, Pakistan National Development Report 2003: Poverty, Growth and Governance (Hussain D. A., 2003), Jamal & Jahan (2007), Iqbal & Nawaz (2015), Jamal (2016), and Pakistan Human Development Index Report, 2017 (Najam & Bari, 2017).
[19] Asghar & Javed (2011), Tirmazee & Haroon (2014).
[20] Cited from (Kozuka, 2014).
[21] Education and heath are discussed as two essential elements of inclusive development in (Sachs, 2004).

1.2 Research Objectives

The main objectives of this study include the following:

- To investigate the existing state of human development and its dimensions (SOL, education, and health) at the national, provincial and district levels in Pakistan.
- To assess the magnitude of inter-regional and intra-regional disparities and subsequent losses in human development and its dimensions[22].
- To evaluate the level of inclusiveness regarding human development and its dimensions at the three administrative levels.
- To explore major economic, social, demographic, and locational determinants of inclusive development.

1.3 Research Plan

To accomplish the above stated objectives, household's HDI and IHDI, the co-efficients of inequality and inclusiveness for distribution of these indices across households are utilized[23]. Inclusive development ensues when average attainments of human beings in income and non-income dimensions increases, and inequalities in these attainments decrease (Rauniyar & Kanbur, 2010). The measurement of HDI and IHDI provides the information about these two aspects of inclusive development. HDI is a measure of potential human development when achievements across dimensions are distributed equally among the individuals, while the IHDI captures the realized level of human development after penalizing for inequality across dimensions and among people (Alkire & Foster, 2010). The third aspect of inclusive development, inclusion of

[22] In this dissertation both 'inter-regional' and 'intra-regional' terms, region refers to district and province along with rural and urban regions.
[23] Distribution sensitive HDI could be an appropriate measure of inclusive development, for discussion see (Rauniyar & Kanbur, 2010).

marginalized is captured by measuring the coefficient of inclusiveness from the distribution of HDI and its dimensional indices across households.

HDI represents Amartya Sen's "capabilities" approach to gauge human well-being. "Key capabilities are instrumentalized in HDI by the inclusion of proxies for three important ends of development: access to health, education, and goods" (Stanton, 2007). The rationale for choice of this multidimensional, integrated measure of human development is that it is simple, transparent and more powerful than a dashboard of many indicators[24]. The IHDI that is employed in this study is based on Atkinson's index of inequality (instead of commonly used Gini coefficient), developed by Foster, López-Calva, & Székely (2005). It satisfies all desirable properties of distribution sensitive index of human development, including kolm transfer principle, subgroup consistency and path independence[25].

There are three main segments of this research. First is the empirical assessment of existing level of human development and prevailing inter-regional and intra-regional inequalities regarding this development. To achieve this end, household-based HDI and IHDI for the year 2014-15 are constructed at district, provincial, and national levels, using data from PSLM (2013-14 & 2014-15) on the lines proposed by Alkire and Foster (2010). Regional indices (rural and urban) are also constructed at provincial and national levels. For issues, specific to household-based study this research consults mainly Lopez-Calva & Ortiz-Juarez (2011) and Harttgen & Klasen (2012). The Atkinson's measure of inequality and loss in human development due to this inequality are also estimated for HDI and its dimensions indices. The analysis of inequality is augmented by computing coefficient of human inequality for all indices.

[24] For rationale to use integrated index see (Streeten, 1994). For Criticism and counter criticism on HDI as a measure of human development see (Stanton, 2007).
[25] For detail of these properties and proof see (Foster, López-Calva, & Székely, 2005).

The second segment supplements this analysis by examining the profile of inclusive development at national, provincial, and district levels using a unified measure of inclusion, 'Coefficient of Inclusive Development'. It is based on distribution of households' IHDIs and its dimensional indices across households, generated in the first segment. To capture the extent of inclusive development at the district, provincial, and national levels this coefficient is estimated for household's IHDI, and dimensional indices of standard of living (economic wellbeing), education, and health. Rural and urban coefficients of inclusiveness are also estimated at provincial and national levels. The methodology that is used to measure coefficient of inclusion is proposed by Suryanarayana (2008). This method uses 60% of median (known as the "at-risk-of-poverty" rate) as the threshold for inclusion.

Third segment comprises of empirical analysis of the prerequisites of inclusive development. To determine the proximate factors that influence inclusive development, district-wise HDI, inequality coefficient and coefficients of inclusive development are regressed on various economic, social, demographic, and locational factors considered to be influential for inclusive development in literature.

1.4 Main Findings

The findings of the research pursued in this dissertation reveals that Pakistani households at the national, provincial, and district levels are experiencing a low level of average human development (after discounting for inequalities), high inter-regional and intra-regional disparities, and substantial exclusion. The substantial loss of human development is mainly due to the inequalities. These findings are common for overall development as well as development in the dimensions of SOL, education, and health. The inter-dimensional comparison exhibits that in most of the regions the health index falls in the lowest category, disparities are highest in educational achievements, and

SOL is characterized with highest exclusion. The top twenty percent of the households are enjoying a five times higher level of human development than the bottom twenty percent. At the national level, 27 percent loss is incurred in overall human development due to inequalities. It is found that more than 50 percent of the households (with HDI below median) fall in the exclusion zone of human development. There are 33 districts in Pakistan that exhibit virtually a state of perfect exclusion from the mainstream development[26]. The regional (urban-rural) analysis at the national and provincial levels demonstrates that rural regions are far behind the urban regions in all aspects of inclusive development. It is exhibited by inter-provincial comparison that overall performance as well as district-wise performance of Punjab is ranked first, followed by Khyber Pakhtunkhwa (KPK), Sindh, and Balochistan regarding all aspects of inclusive development. However, KPK leads in SOL dimension and is characterized with lowest urban-rural disparities in all dimensions. The districts exhibiting adverse status of inclusive development mostly belong to Sindh and Balochistan. In Punjab most of the western and southeastern districts and in KPK most of the northern districts are at very low ranks of inclusive development. The analysis of determinants demonstrates that human capital formation in the form of public expenditure on education and health; and infrastructure development represented by road density and airports significantly enhance the inclusive development in Pakistan. The other significant determinants indicated by the study are the demographic factors including population density, urbanization, and sex ratio.

[26] The state of perfect exclusion refers to the situation where not a single household in the lower half of distribution resides in the inclusion zone.

1.5 Contribution and Significance

The significance of the research pursued in this dissertation lies in its uniqueness and effectiveness. This is a pioneer study of household-based comprehensive diagnostic analysis of inclusive development that encompass estimating its existing status (with respect to all its three aspects) and identification of its significant determinants. The novelty of this research is the empirical diagnosis of inclusive development. Most of the existing work on inclusive development is theoretical policy analysis that has not originated from empirical or other scientific methods. The major contributions of this study are highlighted in the following:

First, it is a leading study in Pakistan to construct HDI, IHDI, and HDI's dimensional indices at the household level. This study is also credited for being the pioneering in estimating the household-based national, provincial, and district level HDIs and IHDIs. All the previous works on this subject involve aggregated data at a certain level that suppress the inter-regional variations. Several factors that play a vital role in raising disparities at micro level have remained unaddressed. The household is preferred as the basic unit in this work, as it is the smallest possible unit for which required data is available in Pakistan. A household-based HDI immediately allows the analysis of human development by any kind of population subgroups and by household socioeconomic characteristics.

Second, for the first-time across households' inequalities in HDI and its components at the provincial (overall, rural, and urban) and district levels are estimated for Pakistan. The construction of household level HDI allows measuring of inequalities across households as well as across three dimensions of development. Furthermore, it allows application of any sort of inequality measure to the HDI across population sub-groups and over time. Based on the households' HDIs, the association sensitive HDIs at the national and sub-national levels could also be constructed.

Third, to our knowledge, it is a pioneering work that calculates a unified measure of inclusive development. To utilize households HDIs' distribution for computing coefficient of inclusive development at the regional or national level is a valuable addition to the state of the art. As a unified measure of inclusive development, coefficient of inclusive development is an efficient tool for the analysis of its dynamics and determinants.

Fourth, it also provides status of inclusion in each dimension of HDI. In this way, the findings of this study are comparable with that of previous studied for Pakistan that are focused on inclusiveness in individual dimensions.

Fifth, this study investigates and identifies major economic, social, demographic, and locational determinants of inclusive development at the district level.

In summary, this dissertation provides a comprehensive empirical analysis of inclusive development in Pakistan which is missing in the existing literature. All the three fundamental aspects of inclusive development: improvement in the level of development, reduction of inequalities, and inclusion of deprived are covered in this study. It carries out an integrated analysis of two complementary aspects of inclusive development i.e. equitable distribution of opportunities (access to resources helpful for socio-economic development) and of outcomes (present level of socio-economic well-being). In the first and second segments, analysis is outcomes based while the third segment integrates outcomes with opportunities.

The current study is also important in the wake of adoption of SDGs and Vision 2025 by Pakistani government, the local government elections, and devolution resulting from Pakistan's 18th Constitutional Amendment. The district level study of inclusive development and its determinants would assist local, provincial and national governments in identifying areas and sectors that require greater attention, enabling them to allocate resources accordingly. The assessment of relative standing of different Pakistani provinces and districts would provide direction for policy design to realize vision 2025. This work would contribute in formulating more appropriate and adequate policy measures and development frameworks, leading Pakistan towards a 'Shared Society' with high resilience. Last but not the least, this study is also expected to generate dialogue and further research to deepen understanding of the dynamics and key drivers of inclusive development in Pakistan.

1.6 Organization of the Dissertation

The organization of the remaining parts of this dissertation is as follows: A review of the literature covering the contents of existing research is presented in the second chapter. The third chapter is devoted to the data sources and issues, and research methods utilized in the current work. Chapter 4 describes the procedures to estimate households' development indices and their distributional inequality. Chapter 5 presents an analysis of development indices and inequality coefficients. Chapter 6 outlines the estimation results and presents the analysis of Inclusiveness coefficients. The determinants of inclusive development are analyzed in Chapter 7. The conclusions of the study are highlighted in Chapter 8. This chapter also provides the summary of the work executed in this dissertation, and the recommendations for policy and future research.

CHAPTER 2

Literature Review

The review of literature is organized per the component issues of this research including, concept of inclusive development, human development index, measurement of inclusive development, and analysis of its determinants.

2.1 Description of Inclusive Development

Inclusive development is a broad concept, there is no agreed and common definition of inclusive growth or inclusive development. Generally, it is referred to as growth or development coupled with equal distribution of opportunities and benefits, and consisting of economic, social, and institutional dimensions (Rauniyar & Kanbur, 2010).

Describing the concept of inclusive development, generally two aspects are focused. First, the distinction between growth and development and second, the description of the term 'inclusiveness'. Rauniyar & Kanbur (2010) describe that in general, growth is a unidimensional concept of wellbeing i.e. income, while development refers to multi-dimensional well-being, which includes not only increases in income but also enhancements in other areas such as health and education. Inclusiveness is referred to equitable distribution of wellbeing. Thus, inclusive growth is related to the level and distribution of achievement in income; whereas, inclusive development is associated with the distribution of achievements in multidimensions including, specifically, income, education and health. Kozuka (2014), Klasen (2010), and McKinley (2010) concur with this distinction between inclusive growth and inclusive development.

A substantial literature about inclusive development bring about the distinction among inequalities created by unequal opportunities (circumstances) and by unequal outcomes followed by modern egalitarian philosophers, like Ronald Dworkin and John E. Roemer which pursue for equal opportunity rather than equal outcome. Ali and Zhuang (2007), Zhuang and Ali (2009), African Development Bank (2012) , Flipe (2012), and Kozuka (2014) employ Roemer's distinction between inequalities arising from effort and those arising from circumstances, and maintain that Inclusive development strategy should address opportunity-related inequalities. However, UNDP report (2013) emphasized both equal access to opportunities and equality of outcomes as underlying concepts of inclusive development, "Equal outcomes cannot be achieved without equal opportunities, but equal opportunities cannot be achieved when households have unequal starting points". Teichman (2016) & World Bank ((2006) & (2009)) also describes inclusive Development on same lines.

Another issue describing inclusive development is its comparison with pro-poor development and two of its approaches absolute and relative. Klasen (2010) describes that the difference of targets is the main distinction between pro-poor growth and Inclusive Growth. Focus of pro-poor development is poor, whereas, Inclusive development focuses not only on the poor but on a broader segment of people including groups excluded from the process of development, such as the disabled, minorities and marginalized, to name but a few. World Bank (2009) and African Development Bank (2012) are concerned with the majority of the labor force, the poor and middle-class alike, and Klasen (2010) admits that Inclusive Growth could benefit all levels of society, including even the rich. World Bank (2009) relates Inclusive Growth with absolute pro-poor growth, in contrast, Klasen (2010) aligns inclusive growth to the relative pro-poor growth. According to Rauniyar & Kanbur (2010) inclusive development is necessarily pro-poor, but reverse is not true.

2.2 Human Development Index and Inequality-Adjusted Human Development Index

In the year 1990, the United Nations introduced HDI proposed by Dr. Mahbub ul Haq, as an index of human wellbeing to measure countries' development status[27]. Since then HDI has become a recognized indicator of national and regional development and one of the few largely used multidimensional welfare measures[28]. The conceptual framework of HDI is based on Amartya Sen's idea of capabilities and functionings[29]. Since 1990 HDI has had three dimensions: a long and healthy life, knowledge, and a decent standard of living. The indicators used to enlighten each dimension have, however, changed over time, most recently changes are in the 2010 HDR and some refinements were made in 2014 HDR[30]. To capture the three dimensions four indicators are used. Proxy used for long and healthy life is life expectancy at birth; for knowledge, the proxies are mean years of schooling of population of ages 25 and over and expected years of schooling for children; standard of living is proxied by the gross national income per capita adjusted by purchasing power parity based on $US (UNDP, 2014). A substantial literature published in the last twenty-eight years covers the research work related to HDI. Several regional and global annual human development reports are included in this literature. More than one hundred countries have constructed their own national or sub-national HDIs (Hou, Walsh, & Zhang, 2015).

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[27] In 1975 United Nations started calculating the HDI for its member and first Human Development Report was published in 1990 (Hou, Walsh, & Zhang, 2015).
[28] For detail see (Alkire & Foster, 2010), (Stanton, 2007), (Hou, Walsh, & Zhang, 2015).
[29] For detail see (Sen, Issues in the measurement of Poverty, 1979).
[30] See section 6 of (UNDP, 2014) for refinements made in 2014, and for changes over time see box at the end of same document.

Despite its popularity, for being transparent, and simple to calculate and interpret, the HDI is criticized for several reasons[31]. Stanton (2007) states the main points of criticism as poor data, incorrect choice of indicators, various problems with the HDI's formula in general, incorrect specification of income and redundancy. One of the most common critiques of the traditional HDI is that is does not take into account distributional inequality across regions and people. It is a valid and significant issue as unequal development is a major concern in the assessment of human development (Kovacevic, 2010).

IHDI is the outcome of efforts to incorporate distributional considerations in standard HDI. Anand and Sen (1995) developed an index that discounts the gender-based inequality in human development. Anand and Sen (1992) and Hicks (1997) presented distribution sensitive HDI based on Gini index. Sen's (1995) index ignores within group inequality and do not satisfy the property of subgroup consistency. Hicks' index is criticized as it violates the properties of subgroup consistency and path independence. To overcome these limitations, Foster, Lopez-Calva, and Szekely (2005) proposed Inequality-Adjusted HDI using the Atkinson inequality measure, which satisfy all basic properties of distribution sensitive indices including subgroup consistency and path independence. They empirically illustrate this method by using the Mexico's Population Census data for year 2000 and analyze the distribution of human development at the national and state levels.

Grimm et al. (2006) &, suggested an approach to compute the inequalities of human development across income quintiles. They empirically illustrated this approach

[31] For detail see (Stanton, 2007), (Alkire & Foster, 2010), (Grimm M. , Harttgen, Klasen, & Misselhorn, 2008), and (Herrero, Marti´nez, & Villar, 2012).

by utilizing data from 13 low and middle-income countries and 2 industrialized countries. HDR 2006 utilized the same methodology for a sample of 11 OECD countries and 21 developing countries. Grimm et al. (2009) extended the analysis of Grimm et al. (2008) to a sample of 21 low and middle-income countries and 11 industrialized countries. Grimm et al. (2008) & (2009) found a negative relationship between Inequality in human development and its average level.

A human development index is proposed by Seth (2009) that incorporates not only the inequality in the distribution of human development, but also the interaction between dimensions (association sensitivity). The Seth index fulfills most of the basic properties, except path-independence, and it also unable to calculate the contribution of each dimension to the overall index.

Alkire and Foster (2010) proposed an Inequality-Adjusted HDI which penalize for inequalities both within each of its dimensions and across its dimensions. Its general methodology is based on Foster et al. (2005), however, it employs the geometric mean instead of arithmetic mean to aggregate the achievements both within and across dimensions. Following the same lines Suryanarayana et al. (2011) explored disparities prevailed in major Indian states by estimating HDIs and IHDIs at state level. Suryanarayana and Agrawal (2013) extended above stated study in two dimensions. First, they estimated HDIs and IHDIs for minor states of India. Second, local goal posts were used to contextualize estimation of HDI and IHDI to consider the feasibility limits defined by the domestic constraints.

All above stated studies calculated HDI or IHDI using data aggregated at a certain level which minimize the losses due to inequality and suppress the intra quintile or intra-regional inequalities. Several studies tried to address this issue by constructing household-based distribution-sensitive human development indices at national and sub-national levels. For example, Arim and Vigorito (2009) used surveys with census data to estimate the Foster et al. (2005) class of indices for twelve Latin American countries. To calculate the income index, they used household per capita income without rescaling to national income. The average years of schooling for adults with or above the age of 25 instead of literacy and enrollment was used for education index. For the health dimension they used mortality rates at the state level. Harttgen and Klasen (2012) used a regression-based approach to calculate the households HDIs. Based on these household indices they estimated traditional HDI; and IHDI proposed by Foster et al. (2005), and Seth (2009); for fifteen developing countries and their population subgroups. They collected information for income and education indicators from household surveys and mortality data from the Demographic and Health Surveys (DHS). In the case of the income index, they combined an asset index approach in defining well-being proposed by Filmer and Pritchett (2001) and Sahn and Stifel (2000) with an income simulation approach given by Harttgen and Vollmer (2010). For education index they used the traditional indicators of literacy and enrollment. To predict missing values in households without individuals aged for school they scaled the average rate in surveys to the official enrollment rate and estimated a stochastic regression. For health index, they regressed child mortality data on socioeconomic variables, and then household average mortality rate is calculated by using the predicted values. Lopez-Calva & Ortiz-Juarez (2011) proposes a simple methodology to estimate a household-based distribution-sensitive human development index. They estimated IHDI for Mexico, Nicaragua and Peru using micro data. They combined income and education indicators from nationally representative household surveys with mortality indicators from census data. To calculate the income index, they used household per capita income with rescaling to national income. For construction of health index, they used the child survival rate at municipal level instead of the life expectancy at birth; and for education index, they replace gross enrollment rate by a variable apprehending the years of schooling.

The approaches discussed above provides useful guidelines to construct household-based human development index, however, they may suffer from important shortcomings. For example, Arim and Vigorito (2009) ignored missing data on enrollment and zero values on literacy, by using the average years of schooling for adults aged 25 or above. Moreover, information on education for individuals below the age of 25 was excluded. By the use state level health data, within-state variations are completely suppressed, and the between-state inequality is partially suppressed, which bias the index upwards as number of states is small compared with the large number of households in a survey. In regression-based approach used by Harttgen and Klasen (2012), the major drawbacks are complex procedures and strong assumptions for predicting education and health indicators. Although the approach proposed by Lopez-Calva & Ortiz-Juarez (2011) is straight forward but it also suppress the within municipality inequality completely and between municipality variations partially which bias the index upward.

UNDP Pakistan's NHDR (2003) for the first-time estimated HDIs at provincial and district levels for the year 1998. Due to data constraints at sub-national levels, this study used some crude proxies for income and health components and used primary level enrolment rate instead of combined enrolment rates as an indicator of education index. As data was not available, for Islamabad's Gross Domestic Product (GDP) per capita and infant survival rate the average of these indicators for Pakistan and Punjab were utilized, and for districts respective provincial infant survival rates were utilized. Jamal and Khan (2007) updated sub-national HDIs for the years 1998 and 2005 by using standard UNDP-HDI indicators for the health and education components. However, provincial level estimated life expectancy was used for respective districts as death rates were not available at district level which suppressed between districts inequalities. They were also not able to use a better proxy for district level income. Both studies used agriculture and manufacturing value-added as a measure of the income of districts. Thus, the income component was underestimated due to non-representation of the service sector, furthermore, sources for information on sectoral value added were unauthentic[32]. Jamal (2016) developed National and Sub-National HDIs for Pakistan based on household data from Pakistan Social and Living Standards Measurements (PSLM) 2014-15. In this study all indices are computed by adopting standard methodology given in HDR 2010, except for some variables different proxies are used due to non-availability of data. UNDP Pakistan's NHDIR (2017) is the most recent publication that estimates and analyzes national, provincial, and district level HDIs for year 2015 and is based on PSLM 2014-15 data. This report too constructed HDI by employing methodology of HDR 2010. However, due to data constraints this report replaces life expectancy by self-reported satisfaction with healthcare facility and child immunization rates (aged 12 to 23 months). Instead Gross National Income (GNI) per capita it utilizes living standard index based on household assets and housing facilities borrowed from global MPI reported in the global HDRs. Both Jamal (2016) and Pakistan NHDR (2003) exclude information on health indicators for household with no children by using some proxies of child and/or maternal health as health indicators. Moreover, Jamal (2016) used household per capita income to measure standard of living index regardless of high rate of missing individual data. Health index in Pakistan NHDIR (2017) is based partially on introspection that lacks reliability. All above stated studies estimate HDIs based on aggregated data that suppress the intra-regional inequalities.

[32] See Jamal (2016) for details.

2.3 Measurement of Inclusive Development

A decade ago mostly in development literature, poverty, inequality, and economic growth analyses had been carried out separately under the influence of trade-off between equity and efficiency, as suggested by Okun (1975). In recent work (Berg, Ostry, and Zettelmeyer, 2011; and Berg and Ostry, 2011), it is discovered that when growth is looked at over the long term, the trade-off between efficiency and equality may not exist. In fact, equality appears to be an important ingredient in promoting and sustaining growth. "…it would be a big mistake to separate analyses of growth and income distribution" Berg and Ostry (2011). In the last decade, various studies analyzed inclusive growth as a unified way of studying equality (inequality) and growth. However, the inclusiveness of non-economic dimensions of human development was analyzed infrequently.

The measures of inclusive growth or development could be broadly categorized in two classes, absolute measures and relative measures. "Relative measures of inclusion are preferred over absolute measures as they consider excluded (deprived) ones as "social beings" whereas absolute measures consider them as "physical beings" (Townsend & Kennedy, 2004). Suryanarayana (2008) proposed a relative measure of inclusive growth. He suggested a methodology to calculate the coefficient of inclusiveness based on Foster-Greer-Thorebecke (1984) class of deprivation measures corresponding to 60% of the median. He employed this method to measure the mainstream and regional inclusiveness of growth in various Indian states by using per capita nominal consumption in year 2004-05. Suryanarayana & Das (2014) extend the same study by adding few more states and extending the period from 1993-94 to 2011-12.

An absolute measure of inclusive growth is proposed by Ali & Son (2007). Their suggested methodology is based on social opportunity function and associated concentration curve to measure inclusive growth. This approach captures the inclusiveness of growth partially by means of opportunity cure which has a one to one relationship with social opportunity function. By using tools of opportunity curve and opportunity index this paper made an empirical dynamic analysis of access to and equity of educational and health services in Philippines. Its findings suggest that availability of education and health facilities is inequitable and is non-inclusive over time and across the regions in Philippine. By using the same approach at macro level, Anand et al. (2013) carried out a research for a panel of emerging markets to assess the dynamics and determinants of inclusive growth. This study witnessed the exclusion in development process. McKinley (2010) also suggests absolute measure of inclusive growth, a composite inclusive growth index. In this index county wise appropriate indicators in the areas of growth, productive employment, economic infrastructure, income poverty and equity, human capabilities, and social protection; are combined based on scoring method and a weighting system. The effectiveness of this methodology is tested for cases of Bangladesh, Cambodia, India, Indonesia, the Philippines, and Uzbekistan. A similar approach is adopted by World Economic Forum (WEF) in Inclusive Growth and Development Report (2017). By assigning equal weight to the three pillars of inclusive development namely growth, inclusion, and intergenerational equity and to their 12 indicators, an inclusive development index at country level is calculated for 109 countries of the world. This approach of composite index also suffers from the limitation of suppressing sub-national disparities. The weighting system in this methodology implicitly encompasses value judgments (2010). Sen K. (2014) construct a compound variable for inclusive growth (POVINQ), the summation of the headcount ratio and the

Gini coefficient. This simple measure captures both the poverty and inequality dimensions of inclusive growth. However, this method also inherits all the limitations of absolute measure of inclusiveness.

The social and economic development and its inequality (a partial analysis of inclusive development) in Pakistan has been analyzed over time and across regions in several studies by utilizing various techniques and measures. Social development across districts of Pakistan is analyzed by Aisha, Pasha, & Ghaus (1996) by applying the techniques of Principal Component Analysis (PCA) and Z-Sum. To measure the level of social development this study uses indicators relating to the education, health and housing sectors. Most of the indicators used in this study belongs to input for development, a few are from output side. Haq (1998) analyzes welfare in Pakistan by using welfare index proposed by Sen (1974). It carries out a decomposition analysis of consumption expenditure from 1979 to 1993 to measure inequality in urban rural sectors and in overall Pakistan. Baluch & Razi (2007) utilizes ordinal approaches of Lorenz Dominance and Generalized Lorenz Dominance; and cardinal approach of Sen's Social Welfare Function; to measure social welfare in Pakistan. The multidimensional inequality trends in Pakistan are captured by Burki, Memon, & Mir (2015) by employing Gini coefficient, Palma index and consumption share by quintiles across regions using household data from 1990 to 2013. They analyze distribution of income, wealth, educational attainment, investment in human capital, road infrastructure. They also examine the intergenerational mobility and the inequalities generated by regressive taxation, inflation tax and gender bias. The findings of these studies witness the presence of income and non-income inequality traps and widening polarization levels in Pakistan. Siddiqui (2008) carries out a district wise analysis of human development and its inequality by using micro survey data for the year 1998-99. The study calculates head count ratio of poverty, Gini coefficient for inequality, literacy rates and several indices as proxies for public investment in provision of social services at the district level. By developing and estimating a basic need policy model for various indicators of human capability, this study analyzes the role of poverty and inequality in determining level of human capabilities. Haq et al. (2010) analyzes empirically intra-district variations in Punjab at tehsil-level in quality of life measured by constructing indices for quality of persons and quality of conditions using principle component analysis. This study utilizes Multiple Indicator Cluster Survey (MICS) Punjab 2007-08 data for analysis.

There are few studies that are focused to measure status of inclusive growth in various economic and social dimensions individually in the context of Pakistan. However, there is barely any study which address comprehensively the issue of inclusive development in Pakistan. Asghar & Javed (2011) based on social opportunity function approach estimates the level of inclusive growth using education and employment opportunities available to the population. By constructing Opportunity Index (OI) and Equity Index of Opportunities (EIO) for PSLM data of 1998-99 and 2007-08, it measures the extent of growth and distribution in these two socio-economic components of development. It concludes that growth in both dimensions is inclusive however is unequal. The same approach is adopted by Tirmazee & Haroon (2014) to measure inclusive growth in Pakistan using income per capita and a household asset index during the period 2008-09 to 2010-11. This study witnesses the non-inclusive nature of growth in Pakistan. By employing the methodology developed by Asian Development Bank (McKinley, 2010); Khan, Khan, Safdar, Munir, & Andleeb (2016) estimated the inclusive growth indices of Pakistan for the years 1990 to 2012. This study concludes that Pakistan exhibits satisfactory inclusive growth. The limitations of these studies are to employ absolute measure of inclusion and to use aggregated data at national level. Absolute measure of inclusion accounts only for physical aspect of development and ignores its social aspect (Townsend & Kennedy, 2004). The distributional feature of inclusive growth could not be appropriately analyzed by using aggregated data.

2.4 Determinants of Inclusive Development

Inclusive development is a multidimensional concept that comprises of multidimensional wellbeing, reduction in inequalities and inclusion of marginalized in all its dimensions. An ample literature analyzes the determinants of inclusive growth and other dimensions of inclusive development individually. There is hardly any work that empirically analyze the determinants of inclusive development broadly, taking in to account all its aspects and dimensions. Most of the literature on determinants of inclusive development comprises of theoretical analysis[33]. This section investigates some literature that empirically analyze determinants of inclusive growth and HDI.

A variety of techniques are utilized to investigate the factors influencing economic growth. Anand, et al. (2013) caries out a panel regression analysis of determinants of inclusive growth for a panel of 143 countries (emerging markets) from 1970–2010. They identify macroeconomic stability, human capital, trade openness and structural changes as the important determinants of inclusive growth in emerging markets. However, this study ignores health component of human capital development and demographic factor such as population density. By applying the same technique the impact of institutional factors on inclusive growth during different phases of developmewnt is analyzed by Sen Kunal (2014). This study provides empirical

[33] Inclusive Development Strategy in an era of Globalization (Sachs, 2004), Conceptualizing Inclusive development: with application to Rural infrastructure and Development Assistance (Rauniyar & Kanbur, 2010), Perspectives on the post 2015 Development agenda (Kozuka, 2014), Linking Growth and Governance for Inclusive Development and Effective International Cooperation (Michel, 2014)

evidence from a cross country analysis that the various institutional factors impact differently to accelerate economic growth and to lead towards inclusive growth. Tella & Alimi (2016) analyze the role of health and population growth on the achievement of inclusive growth. In this study the methodology presented in Anand, et al. (2013) is utilize for measurement of inclusive growth. Its findings suggest that adequate health financing positively affects the inclusive growth, whereas population growth has an adverse impact on inclusive growth. Raheem, Isah, & Adedeji (2018) examined the significance of government expenditure on education and health, and natural resource rents in enhancing the inclusive development process in SSA countries by utilizing neoclassical model by Mankiw et al. (1992). This study concludes that both education and health expenditure augmented with natural resource rents affect significantly in enhancing the inclusive growth in SSA. Oluseye & Gabriel (2017) analyze the relationship between inclusive growth and its determinants in Nigeria using annual data from 1981 till 2014. This study employs the autoregressive distributed lag model (ARDL) and the Error Correction Method (ECM) to investigate the long-run and the short-run parameters. The findings suggest that government consumption and education expenditure adversely affect the inclusive growth in the short-run as well as in the long-run. The effect of inflation and population growth is positive on inclusive growth in the short-run but converts to negative in the long-run. The impacts of Foreign Direct Investment (FDI) and initial capital are negative in the short run, however, in the long run they exhibit a significantly positive influence on inclusive growth. In the context of Pakistan Khan, et al (2016) analyze the financial development, globalization, and macroeconomic stability as determinants of inclusive growth in Pakistan by employing ARDL and error correction approach. This study establishes a significant positive impact of financial development and globalization and negative effect of inflation rate (used as a measure of macroeconomic stability) on inclusive development in the long run. Employing same econometric techniques Aslam & Zulfiqar (2016) utilize the measure of inclusive growth proposed by Kunal Sen (2014) to assess the impact of education, health, trade openness, inflation, GDP per capita and institutions on inclusive growth for less and middle developed Asian countries including Pakistan. This work provides empirical evidence for long run associations of education, health, trade openness, inflation, GDP per capita and institutions with inclusive growth. All the studies cited above investigate the determinants of inclusive growth at county level, hence are unable to provide any guidance for effective policy measures and efficient resource utilization at regional or local levels.

Some studies investigate the determinants of development level by utilizing HDI as regressand. Most of these are cross country studies and a few analyse the subject at sub-national level. Binder & Georgiadis (2010) compare the dynamics and determinants of economic development and human development in a panel of 84 countries from 1970 to 2005. They apply a dynamic panel data model with state-dependent coefficients to study the effects of a set of macroeconomic policy variables including investment in physical capital, government consumption and trade openness on the development of HDI and GDP per capita. This study concludes that overall macroeconomimic policies affect more strongly GDP per capita than HDI. Moreover, economic development is affected by macroeconomic policies with less delay than recommended by convensional econometric contexts, whereas HDI is affected with longer delay. Eren, Çelik, & Kubat (2014) employ binary Logit, Probit, and Tobit models to analyze the determinants of HDI for 84 countries demonstrating "very high" and "high" HDI for year 2011. The factors analyzed in this study are GDP per capita, mean years of schooling, expected years of schooling, adult literacy rate, pupil-teacher ratio, life expectancy at birth, percentage of female seats in national parliament, labour participation rate (female-male ratio), and urban population.The regression results suggests that GDP per capita, labour participation rate, life expectancy at birth, and expected years of schooling significantly affect the development level. In the reference of Pakistan Qasim & Chaudhary (2014) evaluate the socioeconomic determinants of human development disparities across 35 districts of Punjab. This research analyze the impact of social infrastructure, remittances, industrialization and population density on HDI and Non-Income Human Development Index (NIHDI). The regression results exhibits that all four variables have a significant positive effect on HDI and except population density the rest of three have significant positive affect on NIHDI.

At sub-national level Siddiqui (2008) analyze the determinants of capability development instead of HDI across the districts of Pakistan. The findings of study suggests that households per capita income and provision of public social services have a positive impact on capability development and poverty is negatively related with capability development.

The present study tries to fill the existing dearth of research by analyzing various aspects, dimensions, and determinants of inclusive development comprehensively in the context of Pakistan. No study is available for Pakistan measuring IHDI at the national or regional level. Only in Global HDR by UNDP one could find the national level IHDIs for Pakistan however, it is based on aggregated data. All existing studies estimate HDI using aggregated information at the national or sub-national levels and hence suppress within region variability. In this backdrop, this study tries to bridge the research gap by calculating the national and subnational (districts & provincial) HDIs, IHDIs, and inequality measures based on households' level information on living standard, health and education. It is tried to utilize better proxies for HDI dimensions and to collect data for all three dimensions of HDI from same survey. The existing studies that measure the extent of inclusiveness of development or its dimensions are quite limited. These studies either do not consider the distributional aspect of inclusive development or take it in to account at some aggregated level. None of these studies utilized the relative measure of inclusiveness. The present study estimates a relative measure of inclusiveness based on distribution of IHDI across households at national and sub-national levels. The determinants of inclusive development are analyzed for all its aspects including level of development, inequality in development and inclusiveness of development individually at district level. This help to indicate the local factors influencing all aspects of inclusive development and to recommend the policies in the regional context that could accelerate the process of inclusive development by elevating the level of development, reducing inequalities, and raising inclusiveness simultaneously.

CHAPTER 3

Data and Research Methodology

3.1 Data

The two essential features of this study - computation of the human development level of households and the inequality in its distribution across households require a data source that contains the distribution of economic wellbeing, education, and health indicators across the entire population. It constitutes a challenge due to two main issues. First, indicators used in the traditional HDI are not available in the same household survey, so appropriate proxies must be utilized. Second, in most household surveys data on education (school enrollment) and health indicators (life expectancy) is missing as these hinges on the presence and age of household members. Best efforts are executed to handle these data limitations. Two available household level nationwide surveys that contains the distribution of material wellbeing, education, and health indicators are PSLM, and Pakistan Social and Living Standard Measurement and Household Integrated Economic Survey (PSLM-HIES). The PSLM collects information on key Social indicators at district level whereas PSLM-HIES collects provincial level information on social indicators as well as on income and consumption and employment status in detail, and these are conducted at alternate years. PSLM which is a district level survey lacks information on income, consumption and child mortality. PSLM-HIES data cannot be utilized for district level estimations. As one of the main objectives of this study is district wise analysis of human development and its inclusiveness, therefore, the focus of analysis is PSLM survey. For health indicator, information on child mortality is obtained from PSLM-HIES and is integrated with PSLM. The latest surveys that contain required information are PSLM 2014-15 (Pakistan Bureau of Statistics, 2016) and PSLM-HIES 2013-14 (Pakistan Bureau of Statistics, 2015).

The main data that is utilized in this study to analyze various aspects of inclusive development at household, subnational, and national level is from PSLM 2014-15. It is a district as well as provincial and national level representative survey which covers 78635 households and provides a set of representative estimates of social indicators. The universe of survey consists of all urban and rural areas of the four provinces and Islamabad excluding military restricted areas. PSLM 2014-15 microdata is not available for Azad Jammu & Kashmir and Gilgit-Baltistan. Kech/Turbat and Panjgur districts of Balochistan were also dropped from the space of PSLM 2014-15 (Pakistan Human Development Index Report, 2017). Data for households' assets, housing, literacy, years of schooling, and demographic features is compiled from this survey. However, data on child mortality (health indicator in this study) is not available in this survey. PSLM-HIES 2013-14 is utilized to collect information on child death and survival period for estimation of household's child mortality rate. Then by using data fusion technique households' child mortality rates are predicted for PSLM (2014-15). PSLM-HIES (2013-14) is provincial and national representative survey covering 17989 households from four provinces and Islamabad excluding military restricted areas. It collects data on social indicators, income and consumption.

Most of the District-wise data for the determinants of inclusive development is collected from various publications of Pakistan Bureau of Statistics for the years 2014 and 2015. The data about education and health institutions, total area, forest area, cultivated area, tube wells, tractors, threshers, harvesters, road length, registered factories, police stations, and reported crimes is collected from provincial development statistics.

Few missing observations about some districts of Sindh are collected from district profiles published by USAID. The data of doctors and paramedics in government hospitals of Punjab is taken from District Health Information System (DHIS) annual report (2014). Data about population and sex ratio is collected from Pakistan Census 2017 as these figures are close approximates for year 2014-15.

3.2 Methodology for Construction of Household-based HDI And Its Dimensional Indices

The general methodology utilized here to construct household-based HDI is taken from Alkire and Foster (2010). For issues, specific to household-based study this research consults mainly Lopez-Calva & Ortiz-Juarez (2011) and Harttgen & Klasen (2012). Technical notes for human development reports (2014; 2015) are consulted for technical details of index construction, inequality measurement, and loss due to inequality. The first step of calculating the household's HDI is to create three separate indices for each of the three dimensions; standard of living, education, and health. These dimension indices are then used to calculate the household's HDI and IHDI. In each dimension index, a household's achievements are normalized to a score between 0 and 1 using extreme values across country, called domestic goal posts. HDI and, hence, IHDI are contextualized regarding domestic goalposts to consider the national realities and priorities. Domestic goalposts provide a realistic assessment of the relative progress made by different provinces and districts in Pakistan.

3.2.1 Methodology for Construction of Household's Standard of Living Index

Household's income, consumption expenditure, and wealth/assets are three commonly used bases to measure standard of living (economic wellbeing)[34]. Considering the merits of asset-based index approach, issue of availability of reliable households' income data, and unavailability of households' expenditure data at district level for Pakistan, this research utilizes assets-based indices to evaluate households' living standard.

Traditionally researchers use measures based on income or consumption expenditure computed from household budget and consumption surveys to assess household living standards (Stiglitz, Sen, & Fitoussi, 2009; Ward, 2014). Income and consumption expenditure are the most direct measures of living standards (O'Donnel, Doorslaer, Wagstaff, & Lindelow, 2007). These measures are valuable since they have monetary value and can easily be used to evaluate the impacts of various policies on social outcomes such as development, poverty, and inequality. However, these measures can be tricky for several different reasons, particularly in developing countries. Firstly, in many household surveys of the developing countries either accurate income and expenditure data are not available or is difficult to collect (Filmer & Scott, 2012). Secondly, data is often troubled with measurement error and systematic biases related to questions asked and memory (Ngo, 2012; Scott & Amenuvegbe, 1999). Stated household incomes include only wages or market income and generally ignores kind earnings, the value of home production and leisure time. Similarly, stated consumption expenditures generally comprise of only market transactions, and the con-

[34] Consumption expenditure is the overall consumption of goods and services valued at current prices, regardless of whether an actual transaction has taken place. An individual's income, in contrast, is the maximum possible expenditure the individual can spend on consumption of goods and services, without depleting the assets held (Foster, Seth, Lokshinl, & Sajaia, 2013, p. 46).

sumption of home-produced goods and services, and the value of non-market transactions are ignored. Moreover, measure of well-being based on current expenditures fails to consider the long-term utility gains from durable goods (Ward, 2014). Thirdly, complex adjustments to expenditure figures are required to adjust for spatial and time-based price differences. Fourthly, some components of welfare which are difficult to measure in monetary terms are excluded from these traditional measures (Deaton & Zaidi, 2002).

Asset based indices have been widely used for measuring household's economic well-being, poverty, and inequality in low and middle-income countries since late 1990s (Filmer & Pritchett, 1999; Grimm M. , Harttgen, Klasen, & Misselhorn, 2008; Harttgen & Klasen, 2012; McKenzie, 2005; Sahn & Stifel, 2003; Wittenberg & Leibbrandt, 2017; Ward, 2014). By combining observed measures of a household's physical living conditions, the assets-based index captures a dimension of economic standing (Filmer & Scott, 2012). The appeal for assets-based indices is based on their ease of calculation and their extensive availability in household surveys for developing countries (Smits & Steendijk, 2013). These indices are considered better proxy for living standard of households as they are less vulnerable to economic shocks and fluctuations over time than income or expenditure, which is in accordance to the conceptual basis of HDI (McKenzie, 2005). The assets are suggestive of the household's capabilities or freedoms and its multidimensional welfare, therefore, provide a more complete picture of a household's well-being and permit for a better analysis of policy impacts (Sahn & Stifel, 2003; Sen A. , 1987). Moreover, data required for asset-based indices can be more dependably measured than those needed for computing income or expenditure indices (Filmer & Scott, 2012).

These indices are also criticized on certain grounds. First, being discrete functions, these might be clustered around certain values. The clumping and truncation are related major challenges. Second, their distribution could tend to be more equal than income distribution hence showing lesser than actual inequality of living standard. Third, they might not capture actual inequality across sub-groups e.g. between urban and rural areas (Harttgen & Klasen, 2012). Fourth, the ownership does not always apprehend the quality of assets, however, in many countries, this would not change the overall picture of wealth distribution (Falkingham & Namazie, 2002). The first criticism is answered by adding various types of variables that capture inequality between households. The index based on housing characteristics, access to utilities, and durable asset ownership, yielded the evenest distribution of socioeconomic status free from clumping or truncation (McKenzie, 2005). The second criticism is answered as the using log transformed income component and normalizing it between zero and one in HDI construction might reduce inequality to the level just like caused by assets-based index (Smits & Steendijk, 2013). Amartya Sen argues strongly against third criticism that if the assets in question add to the capabilities of the household, and that lives in an area where the asset is cheaply available, then indeed the household is wealthier (Levy, 2013).

The main idea of asset index approach is to construct an aggregated uni-dimensional index over the range of different dichotomous variables of household assets capturing housing durables (ownership of cheap utensil and expensive utensil, car, motorcycle, bicycle, TV, refrigerator, phone etc.); information on the housing quality (number of sleeping rooms, quality of roof material, floor material, wall material, and toilet facility etc.); and access to public facilities (water, electricity, natural gas, telephone etc.), that indicate the material status (living standard) of the household[35].

Assets index as a proxy for Standard of SOL index is obtained by normalizing asset scores. A general formula for estimating the asset scores is:

$$AS_i = \gamma_1 a_{i1} + \gamma_2 a_{i2} + \cdots + \gamma_k a_{iK} \text{ -----------------------------(3.1)}$$

where AS_i refers to the asset scores for i =1, ..., N households and k=1, ...K household assets, the a_{ik} is the respective asset of the household i recorded as discrete variables in the data sets and the γ represent the respective weights or scores for each asset that would be estimated. AS_i is normalized between zero and one using goal posts to obtain SOL index: it equals one when household 'i' possesses all assets in the list and zero when it possesses none. Asset index or SOL index (S_i) is obtained by normalizing asset scores as (Keho, 2012):

$$S_\mathrm{i} = \frac{AS_i - AS_{min}}{AS_{max} - AS_{min}} \text{ --(3.2)}$$

where AS_{max} and AS_{min} are the maximum and minimum values (domestic goal posts) of the asset scores AS_i.

Based on the standard of living index, households are ranked into quintiles; with first quintile corresponds to the poorest 20 percent of households, second quintile corresponds to the lower middle 20 percent, third quintile corresponds to the middle 20 percent, forth quintile corresponds to the upper middle 20 percent, and the fifth quintile corresponds to the richest 20 percent. A descriptive analysis of these quintile provides an overview of inclusive development in standard of living dimension. Classification

[35] These indicators are used to construct asset index in a number of studies including Filmer & Pritchett ((1999), (2001)), Sahn & Stifel ((2000), (2003)), Kolenikov & Angeles ((2004), (2009)), Howe, Hargreaves, & Huttly (2008), Harttgen & Klasen (2012), Smits & Steendijk (2013), Habyarimana, Zewotir, & Ramroop (2015), and Wittenberg & Leibbrandt (2017).

of households in standard of living quintiles would be utilized to test the reliability of SOL index.

An appropriate technique is required to assign weights or coefficient to assets for construction of Asset index from a set of variables[36]. Several techniques for assigning weights are utilized and advocated in various research papers (Moser & Felton, 2007). These range from the arbitrary approach of assigning equal weights to more sophisticated techniques like polychoric principle component analysis. Alternative weighting methods include equal weights (EW)[37], asset prices used as weights, the inverse of the proportion of the population owning the item used as weights, regression-based approach, principle component analysis (PCA), Factor Analysis (FA), Multiple Correspondence Analysis (MCA), Filmer–Pritchett procedure, Ordinal principle components analysis, and polychoric principle components analysis (PPCA) to name a few[38]. The asset index presented in this paper are constructed, using PPCA. In PPCA principal component analysis is executed on a correlation matrix that consists of a mixture of polychoric, polyserial, and Pearson correlation coefficients (estimated). The PPCA is utilized in this research to construct household's asset index, as it is the most comprehensive technique to measure relative wellbeing of a household for the type of asset indicators used in this study (Ward, 2014; Kolenikov & Angeles, 2009). For methodological details of PPCA see Technical appendix.

The standard PCA technique is designed for normally distributed and continuous variables (Kolenikov & Angeles, 2004), whereas data utilized for asset index is of

[36] In many papers, this term is referred to as wealth index, however, the measure is more accurately reflected by the term asset index (Filmer & Scott, 2008).
37 Smits & Steendijk (2013) provided empirical evidence that EW are adequate to measure asset index and results are like that obtained by applying PPCA and FA.
38 These techniques with their advantages and limitations are discussed in Kolenikov & Angeles (2004), Vyas & Kumaranayake (2006), Moser & Felton (2007), O'Donnel, Doorslaer, Wagstaff, & Lindelow (2007), Kolenikov & Angeles (2009), Habyarimana, Zewotir, & Ramroop (2015).

discrete nature and most of variables are ordinally measured. The standard method is unsatisfactory to preserve the discrete nature of the underlying asset ownership indicators, to compute weights for each discrete measure, and to compute weights for both owning and not owning the asset (Ward, 2014). The PPCA was designed by Kolenikov and Angeles (2004) specifically for categorical variables as an improvement on PCA. Polychoric PCA has many advantages over classical PCA (Moser & Felton, 2007). PCA correlation matrix comprises of Pearson correlations only, which assume all variables are normally distributed. Normality of variable is not a condition for PPCA technique, since PPCA correlation matrix comprises of polychoric, polyserial and Pearson correlations (Kolenikov & Angeles, 2009). It is more apposite method than PCA when discrete indicators are used. Coefficients of PPCA are more accurately estimated than with standard PCA. PPCA is preferred to Filmer–Pritchett procedure as it avoids the spurious correlations generated in the later technique (Kolenikov & Angeles, 2009). It can be utilized for both discrete and continuous data types at a time unlike MCA which handles only discrete data (Moser & Felton, 2007). PPCA is preferred to ordinal principle components analysis as proportion of explained variance is reported correctly only by the polychoric method (Kolenikov & Angeles, 2004). For detail discussion about choice of factor analysis technique see Kolenikov & Angeles (2009), Moser & Felton (2007), and Vyas & Kumaranayake (2006). PPCA assigns weight/coefficient to each value of a discrete variable and order of values of an ordinal variable is followed by its coefficients. Another advantage of PPCA is that it permits to compute coefficients of both possessing and not possessing an asset. This is desirable because sometimes not having something conveys more information than having it (Moser & Felton, 2007).

3.2.1.1 Scree Plot

In the construction of the asset-based index it is worthwhile to check that the first component really stands out relative to the second one, and others. This objective is achieved by analyzing scree plot. A visual plot of eigen values is referred to as scree plot (Costello & Osborne, 2005). If the first two eigenvalues are relatively close to each other in scree plot, then the first component may not be very stable, and the households' ranking based on estimated standard of living may be disingenuous (Kolenikov & Angeles, 2004). Contrarily, if the line is almost flat with a relatively large break succeeding first component, it certifies the high significance of first component (Kolenikov & Angeles, 2009).

3.2.1.2 Test for the reliability of standard of living index

In this study SOL index is tested for three desirable features; internal goodness of fit, internal coherence, and robustness. The most classical measure of internal goodness of fit is the proportion of explained variation by the first principal component, it is classically desired to be as high as possible (Kolenikov & Angeles, 2009). Internal coherence refers to the consistency of index in classifying poor, middle and rich households for each asset included in the index. Robustness requires SOL index based on different subsets of assets must produce similar classifications of households (Filmer & Pritchett, 2001; Habyarimana, Zewotir, & Ramroop, 2015). SOL index is tested for robustness by two general measures, quantile comparison and Spearman rank correlation. These measures are commonly used for such assessments (Filmer & Pritchett, 2001; Kolenikov & Angeles, 2009; Ward, 2014).

3.2.2 Methodology for Construction of Household's Education Index

Traditional component of education index are adult literacy and enrollment indicators. However, the household-based calculation of enrollment imposes the problem of missing data in households without children, as enrollment depends on the presence of individuals aged for school. In this work education index is calculated by replacing enrollment with a continuous variable capturing the years of schooling for individuals of or above the age of 7 (the age required to complete the first year of primary education). Using this variable, missing values are avoided by imputing the household i's average schooling to children below the age of 7, under the assumption that children could achieve at least such average over the course of their lives (Lopez-Calva & Ortiz-Juarez, 2011).

3.2.2.1 Schooling index

To construct schooling index of a household, firstly for each household member of age 7 years or above, an indicator of the years of schooling is computed and is compared it with a minimum value of zero and a maximum value that depends on age. For instance, a 7-year aged person must have 1 year of schooling as maximum; an 8-year aged person must have 2 years of schooling as maximum, and so on up to a maximum of 18 years of schooling which corresponds to individuals aged 24 or above. If a person aged 7 has 2 or more years of schooling, the value would be fixed up to 1; if a person aged 8 has 3 or more years of schooling, it would be fixed up to 2, and so on. The schooling index for individual j in household 'i' is calculated by normalizing his/her schooling years as:

$$Sci_j = \frac{Sc_j - Sc_{min}}{Sc_{max} - Sc_{min}} \text{ --- } (3.3)$$

with Sc_j being the observed years of schooling for individual j, and Sc_{min} and Sc_{max} the reference values. The average of the individual indices is calculated and imputed to children aged below 7 years. The schooling index for household i (Sc_i) is the average of schooling for all the individuals in that household. To avoid the underestimation of index, all the zero values are replaced by 0.02 under the assumption that individuals have accumulated some learning and experience throughout their lives, regardless of if they have attended school or not[39].

3.2.2.2 Adult literacy index

In the case of adult literacy, if an adult with or above the age of 15 declared to be able to read and write in any language with comprehension a short simple statement on his/her everyday life, he/she is considered as literate[40]. Hence, the adult literacy index is denoted as the proportion of population aged 15 years and older who can read and write with understanding in any language. Household literacy rate (l_i) is then calculated as:

$$L_i = \frac{1}{n}\sum_{j=1}^{m} l_j \text{ --(3.4)}$$

with n being the total number of adults in household i, m the total number of literate adults, and l_j an indicator taking the value of 1 if the adult j is literate, and 0 otherwise. This rate is equivalent to the literacy index. For the same reasons outlined in the case of schooling, a minimum level of 0.05 is attached instead of 0 in those households with all illiterate adults.

3.2.2.3 Education index

The education index for household i (E_i) is computed as weighted average of household's adult literacy index and schooling index. The weights proposed and used by UNDP in human development reports 1991-1994 are 2/3 for literacy and 1/3 for schooling. Using these weights education index is calculated as:

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[39] The value of 0.02 is selected arbitrarily keeping in view very low mean years of schooling index in Pakistan i.e. 0.3133 according to Human Development report 2014.

[40] A person is literate who can read and write a paragraph (3 lines) in national/regional language with comprehension (National Literacy Policies Pakistan, 1997). The adult literacy rate is defined as percentage of population aged 15 years and above who can read and write with understanding a short simple statement on his/her everyday life (UNESCO).

$$E_i = \frac{2}{3}L_i + \frac{1}{3}Sc_i \text{---(3.5)}$$

3.2.3 Methodology for Construction of Household's Health Index

In traditional HDI, health component uses data on life expectancy at birth[41]. This indicator cannot be estimated at the household level with available data in PSLM. Some other indicators of household health used in previous studies to construct regional level HDI's health component for Pakistan are children immunization rate, pre-natal care and mother's tetanus vaccination and infant survival rate[42]. The child immunization rate cannot be used to construct household health index as more than 48% households surveyed in PSLM 2014-15 do not have any under-five child. For pre-natal care and tetanus vaccination approximately 60% of the data is missing, therefore, this also cannot be employed. Keeping in view all these limitations and technical issues, the child survival rate (one minus child mortality rate) is employed as a proxy for life expectancy to construct household's health index[43]. Some studies have justified the use of this indicator as it has a significant impact on life expectancy[44]. Child mortality rates (and hence child survival rates) are the important indicators of a nation's development as they serve as crucial pointers of health equity and access (Marmot, 2007; Bhutta, et al., 2010). Moreover, this choice is justified particularly for Pakistan as high child mortality and hence low child survival rate is one of the most frightening health challenges faced by Pakistan[45].

[41] Life expectancy at birth is defined as the number of years a new-born infant could expect to live if prevailing patterns of age-specific mortality rates at the time of birth were to stay the same throughout the child's life (UNDP, 2010, p. 224).
[42] Hussain D. A., (2003); Jamal, (2016).
[43] The under-five mortality rate refers to the probability of dying before age 5 years per 1,000 newborns (UNICEF).
[44] Gakidou & King, (2001) provide arguments for child survival rate as a proxy for life expectancy.
[45] According to a report "State of Children in Pakistan (2015)" one in every 14 Pakistani children (7.1%) die before their first birthday, and one in every 11 (9.1%) do not survive to their fifth birthday. In 2015 under five mortality rate for Pakistan is reported as 81 per 1,000 live births (UNICEF data: Monitoring

Data fusion technique with survival analysis is utilized to calculate mortality rates at the household level. Survival analysis would be beneficial to overcome the problem of households without children that results in a loss of data and to obtain higher variation in the data[46]. For details of survival analysis are elaborated in Technical appendix. In this study survival analysis is executed by employing discrete-time model with a complementary log-log (cloglog) link to estimate the households under five mortality rates. The child survival time is intrinsically a continuous random variable; however, it is mostly observed in discrete intervals of time e.g. in days, months or years (interval censoring). The child survival data used in this study is observed retrospectively in a cross-sectional survey, where dates are recorded to the closest month or year. The survival time is therefore measured discretely also called interval-censored because the only information is that an event happened at some point during an interval of time[47]. Accordingly, the appropriate choice for modeling child mortality rate is discrete time model. As recipient data set do not have survival time information, therefore, no type of time function is included in the set of common covariates for duration dependence. It is assumed that hazard rate remains constant over time. Discrete-time model are commonly estimated by maximum likelihood using logit link for logistic hazard and cloglog link for proportional hazards. According to Rodríguez (2010) cloglog link would be more suitable if time is continuous but is only observed in grouped form[48]. The cloglog model is not symmetrical around 0.5 unlike logistic model, and it is more appropriate when the probability of an event is very small or very large (Allison, 2012).

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the Situation of Children and Women). Pakistan ranks 23rd in the world for under-five deaths (UNICEF State of the World's Children 2015).

[46] Since in most household either none, one or two children died resulting in a household specific mortality rates clustered around 0 (for which no life expectancy is computable), and values such as 0.25, 0.33, or 0.5.

[47] For detail see Steele & Washbrook, (Discrete-time Event History Analysis Lectures, 2013).

[48] For the choice of discrete-time cloglog model for modeling hazard functions with discrete outcomes in more detail, see Allison P. , (2012) Rodríguez, (2010).

Keeping in view the nature of mortality data, very low probability of child death (6.46 % in PSLM 2013-14), and data limitations a cloglog link is utilized to estimate household's child mortality rates in this study. The cloglog hazard model is a discrete-time version of Cox proportional hazards model. As data is collected from a cross-sectional survey, covariates are assumed to be fixed over time. For Cox proportional hazards model see Technical appendix.

Since, the focus of this study is the district level representative survey PSLM 2014-15 which do not contain information on child mortality, PSLM 2013-14 is utilized for survival analysis using household level covariates which are common in PSLM 2013-14 and 2014-15. As a first step of data fusion, child mortality is regressed on a set of household's basic socioeconomic characteristics using Complementary log-log model (discrete-time proportional hazard model). Subsequently, coefficients of survival model obtained in previous step are used to predict the child mortality rates for all households in PSLM 2014-15.

The child survival rate is obtained from child mortality rate as:

$$csr_i = 1 - cmr_i \qquad (3.6)$$

where cmr_i and csr_i are the child mortality rate and child survival rate respectively for household i. The health index for household i is then calculated by following expression:

$$H_{\text{i}} = \frac{csr_i - csr_{min}}{csr_{max} - csr_{min}} \qquad (3.7)$$

where csr_{min} and csr_{max} are the minimum and maximum values respectively for households' child survival rates. For maximum, the maximum household's child survival rate obtained for PSLM 2014-15 is used. To calculate minimum value, the formula is[49]:

$$le_{nat} = \frac{csr_{nat} - csr_{min}}{csr_{max} - csr_{min}} \text{-------------------------------(3.8)}$$

where csr_{nat} is the national child survival rate, calculated as the population weighted average (geometric mean) of the predicted households' child survival rates from PSLM 2014-15 ; $csr_{max}$is the households' maximum child survival rate predicted from the same survey ; and le_{nat} (UNDP, 2016) is the national life expectancy index for year 2015. Solving equation (15) for csr_{min} the minimum value for child survival rate is obtained.

3.2.3.2 Test for the coherence of donor and recipient data sets

Before data fusion it is necessary to evaluate the coherence of data sets to be matched. D'Orazio, Zio, & Scanu (2006) suggested to test the harmony in definition of units, reference period, completion of population, distribution and classification of variables, adjustment for measurement errors, adjustment for missing data, and derivation of variables. For most of these coherence issues, survey reports of target data sets are consulted. Coherence of matching variables requires that the two sample surveys should represent the same population i.e. the common variables designated as matching variables should have the same distribution in the two datasets. In this study, the equality of distribution in two data sets is tested by comparing descriptive statistics for all varia-

[49] This formula is used by Lopez-Calva & Ortiz-Juarez (2011) to calculate households' minimum child survival rate in a country.

bles. In addition, distribution equality of discrete variables is tested by utilizing quantile-quantile plot and weighted histogram. Pearson's chi square test and likelihood ratio test are also carried out to test the equality of distributions in case of categorical variables[50].

3.2.3.1 Data fusion or statistical matching

Data fusion, also known as statistical matching, is a technique to integrate the information of two or more independent data sources. In this study, its simplest form unilateral fusion is employed, in which there are only two data sets. It comprises of matching two already conducted surveys to transfer part of the information which is contained in one survey to a second one which is short of this information. The first survey is called donor survey; the second is called recipient survey (Piscitelli, 2008). Statistical matching necessitates that the units in the concerned data sets should come from the same population, however generally these are not overlying (Leulescu & Agafitei, 2013).

The objective of unilateral data fusion is imputation of the target variables from a donor to a recipient data set at the individual level (Aluja-Banet, Tomàs, Daunis-i-Estadella, Brunsó, & Mompart-Penina, 2015). The missing values in such a case correspond to variables missing by plan and a complete block of data would be imputed (Aluja-Banet, Daunis-i-Estadella, & Pellicer, 2007). The sample from donor survey is with X and Y variables (X_0; Y_0), and from recipient survey with only X variables (X_1). The X variables are referred as common, link, hinge or bridge variables, while the Y variables are referred as the specific, imputing or fusing variables. Let f (X, Y) be the joint (unknown) density function. Let n_0 and n_1 be the sizes of the donor and recipient

[50]According to Leulescu & Agafitei (2013) since complex sampling designs applied in social surveys is consider in these methods, it could give a stronger base to the conclusions on resemblance/inconsistency between distributions coming from the two sources.

data sets respectively. The objective is to complete the recipient file (X_1, $\hat{Y}_1$) in such a manner that it can be a subset of f (X, Y). The relation between common variables with the specific variables observed only in donor data set is used to impute the variables not directly observed to the units of the recipient data set (see Figure 3.1). However, imputed data is not “real” data but estimates. Therefore, such data must be used only at aggregated level very carefully (Aluja-Banet, Tomàs, Daunis-i-Estadella, Brunsó, & Mompart-Penina, 2015).

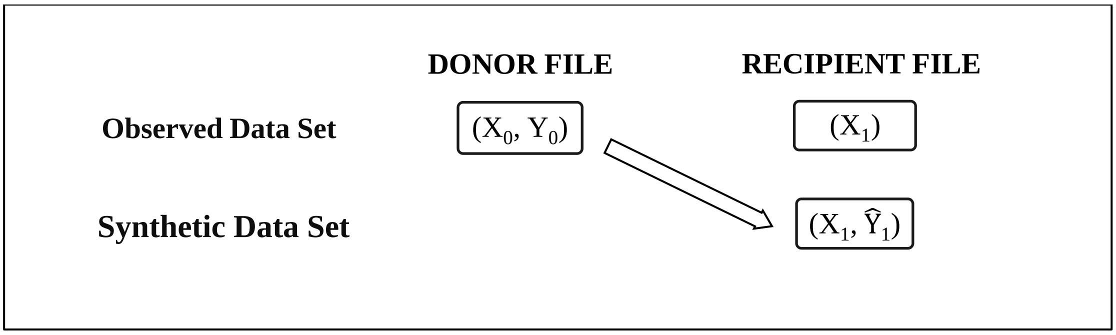


Figure 3.1 Unilateral Data Fusion

In literature different techniques have been proposed for data fusion, and these can be categorized in two groups (Aluja-Banet, Tomàs, Daunis-i-Estadella, Brunsó, & Mompart-Penina, 2015; Piscitelli, 2008). The first group is based on explicit model-based imputation and the second group is based on the implicit models for imputation. First group techniques are based on estimating a model for the variables (to be imputed) in the donor survey and then applying it to the recipient survey to impute missing data. Usually regression models based on maximum likelihood methods or least square methods are employed and they yield good imputations. However, these are criticized for underestimating the variance of the imputed variables. In the second group, for each statistical unit of the recipient survey, one or more donor units are selected that are as similar as possible. The values of the donor units are then imputed to the recipient survey (Piscitelli, 2008). In this research work, keeping in view the data limitations, explicit model-based approach of data fusion is employed for imputation of household child mortality rate.

3.2.3.3 Test for the validity of imputed data

To assess the validity of the imputed data classically conditional independence assumption is employed. It is reformulated by Aluja-Banet, et al. (2015) as the assumption of "predictive relevance" of the common variables (with respect to the specific ones). According to this assumption common variables account for all significant variability of the specific variables, given the imputation model. It can be stated as Y= g(X)+e, where g(X) stands for the imputation model and 'e' represents random variations. The goal of data fusion in this paper is to simulate real data, which implies that conditional distribution of Y must be same in donor and recipient data sets i.e. f $(\widehat{Y}_1/X_1)$ = f (Y_0/X_0) (Aluja-Banet T. , Daunis-i-Estadella, Brunsó, & Mompart-Penina, 2015). Thus, the validity of imputed mortality rates is tested by equality of its distribution in donor and recipient data sets. It is tested by comparing descriptive statistics, weighted kernel density plots, and quantile-quantile graphs in two data sets.

3.2.3.4 Complementary Log-Log Discrete-Time Hazard Model

A discrete-time model with a cloglog link, approximates the Cox proportional hazards model. It is based on a proportional hazards' assumption like Cox model in continuous time. The coefficients of cloglog model are analogous to the coefficients of Cox proportional hazards model (Steele & Washbrook, 2013). Therefore, cloglog link is sometimes preferred over logit link, as it provides analytic continuity (Steiger, 2010). Like the logit and probit transformation the cloglog transformation restricted to a binary response of 0 or 1. Unlike logit and probit the complementary log-log model is asymmetrical around 0.5, it is commonly used when the probability of an event is very small or very large (Allison P. , 2012). In a proportional hazards' framework, complementary log-log model can be represented as[51]:

$$log[-log\{1 - h_i(t)\}] = \alpha + \beta x_i \text{ , or}$$

$$log[-log\{1 - h_i(t)\}] = \alpha + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots \beta_m x_{mi} \text{------(3.9)}$$

where $h_i(t)$ refers to the hazard of failure at discrete time t for individual i, $\alpha = log[-log\{1 - h_0(t)\}]$ is the cloglog transformation of the baseline hazard, x_i is a vector of values on m covariates (assumed fixed over time) for individual i, and β is the row vector of regression coefficients. The expression on the left-hand side of equation (3.9) is called cloglog transformation. The model in equation (3.9) defines the cloglog of the individual hazard and the transformation to obtain the estimated hazard is the inverse cloglog transformation:

$$\hat{h}_i(x,t) = 1 - exp\,[-exp(\alpha + \beta x_i)] \text{-------------------------------------(3.10)}$$

The cloglog function in equation 3.9 can be fitted to discrete survival data by applying maximum likelihood technique. Estimation makes use of the property that the sample likelihood can be rewritten in a form identical to the likelihood for a binary dependent variable multiple regression model and applied to a specially organized dataset. For the organization of discrete survival data, a set of virtual observations is created as: Suppose individual i dies or is censored at time point $t_{j(i)}$. A death indicator d_{ij} is created that takes the value one if individual i died at time j and zero otherwise, generating one for each discrete time from t_1 to $t_{j(i)}$. This indicator works as time-varying indicator for the occurrence of event. To each of these indicators a copy of the covariate vector x_i is associated and a label j identifying the time point. The proportional hazards model can then be fitted by treating the d_{ij} as independent Bernoulli observations with probability

[51] For more technical details see Rodríguez, (2010); Berglund, (2011)

given by the hazard h_{ij} for individual i at time point t_j. Additionally, for complex sample survey data each individual-time record should contain the weight(s), strata and cluster variables along with the main variables described above.

The estimated regression coefficients in equation 3.9 are substituted in equation 3.10 to predict the hazard rate for each individual i. In this study hazard rate is the child mortality rate and individuals are the households. Imputed mortality rates are used to calculate child survival rates and health index for each household from equations 3.6, 3.7, and 3.8.

Before proceeding to discrete-time cloglog model certain tests are performed for the selection of covariates to be included in final model. These tests are referred to as univariate survival analysis. For categorical covariates Kaplan-Meier curves are utilized. This will provide perception into the shape of the survival function for each category and give an idea of whether the survival curves for categories are proportional (i.e. the survival functions are almost parallel). To test the potential candidature for final model, generally log-rank test is used for categorical variables and Cox test is used for continuous variables. However, in this study for all variables, Cox test is utilized as it allows for sampling weights which is not allowed in log-rank test[52]. These tests check for the equality of survival time among the different groups/categories of the covariate. Criterion to include the covariate is that the test has a p-value of 0.2 – 0.25 or less. If the covariate has a p-value greater than 0.25 in this test it is very less likely that it will contribute anything to a model in presence of other covariates (UCLA: Statistical Consulting Group, 2017).

[52] For detail see https://www.stata.com/manuals13/stststest.pdf

A basic assumption of discrete-time cloglog model is proportional hazards. To test this assumption a Schoenfeld residual test based on Schoenfeld and scaled Schoenfeld residuals is utilized [53]. In this method proportionality of each covariate is tested along with proportionality of the whole model. Hypothesis of proportionality assumption cannot be rejected if the tests are insignificance (p-values over 0.05) and it is concluded that proportional assumption is not violated. For each covariate, graph of the scaled Schoenfeld assumption is also used to test the proportionality. A horizontal line in the graphs reinforces that there is no violation of the proportionality assumption.

3.2.4 Methodology for Construction of Human Development Index

Once indices of achievements in three dimensions of HDI namely, standard of living, education and health; has been estimated for each household next step is to estimate human development indices. The dimensional indices are aggregated by using appropriate means for estimation of HDIs and Inequality-Adjusted HDIs; at household, national, and sub-national levels. In this study the general means are utilized for aggregation of these dimension indices based on (Foster, López-Calva, & Székely, 2005). For a household's HDI/IHDI aggregation of achievements across dimension is employed at a single stage. To construct household-based national or sub-national HDI/IHDI, aggregation of achievements at two stages is executed i.e. first across dimensions (within a household) and then across households or first within dimensions (across households) and then across dimensions. The inequality in distribution of human development across households is also captured by an inequality measure suggested by Alkire & Foster (2010).

[53] See at UCLA: Statistical Consulting Group's site, https://stats.idre.ucla.edu/stata/seminars/stata-survival/.

Foster, Lopez-Calva, and Szekely (2005) proposed the use of a general mean or equally distributed equivalent (ede) achievement level for aggregation of achievements to account for inequality in development. The generalized mean can be referred as $\mu_\alpha(x)$, and for a population of size n it is commonly expressed as:

$$\mu_\alpha(x) = \begin{cases} \left(\frac{x_1^\alpha + x_2^\alpha + x_3^\alpha \ldots\ldots\ldots + x_n^\alpha}{n}\right)^{1/\alpha} & if\ \alpha \neq 0 \\ (x_1 \times x_2 \times \ldots\ldots.. \times x_n)^{1/n} & if\ \alpha = 0 \end{cases} \text{--------------(3.11)}$$

Though α may take any value in the interval (− ∞, + ∞), four means in this family are more familiar than others: arithmetic mean, geometric mean, harmonic mean, and Euclidean mean. For α= 1, $\mu_\alpha(x)$ becomes the arithmetic mean, for α= 0, $\mu_\alpha(x)$ is known as the geometric mean, for α= -1, $\mu_\alpha(x)$ is called the harmonic mean, for α=2, $\mu_\alpha(x)$ is called the Euclidean mean (Foster, Seth, Lokshinl, & Sajaia, 2013). The general means for $\alpha < 1$ are generally interpreted as measures of social welfare. Atkinson (1970) proposed this form of welfare function. The general mean is Atkinson (1970) ede level of achievement. He defines "equally distributed equivalent" as the level of achievement, which yields the same welfare level as that of the original distribution if the achievement were distributed evenly, with perfect equality. Atkinson used the parameter $\varepsilon = 1 - \alpha \geq 0$ ($\alpha \leq 1$) to index the class of edes; he interpreted ε as an inequality aversion parameter in the aggregation method of achievements (which he considered to be welfare). It begins with the case when inequality aversion is zero i.e. $\varepsilon = 0$ and it increases steadily. As ε tends to 1 (or α tends to 0) the value of the ede tends to the geometric mean of achievements. In case of a higher inequality aversion as ε tends to 2 the ede tends to harmonic mean (Alkire & Foster, 2010).

The IHDI suggested by Foster, Lopez-Calva, and Szekely (2005) is a parametric family of measures H_ε obtained by applying the associated generalized mean to the household's dimensional achievements (Alkire & Foster, 2010). In this class of HDI same parameter of inequality aversion (ε) is utilized at both steps of aggregation and ε ≥0 (α ≤ 1) (Seth, 2009). The case of ε = 0 yields the HDI that is based on the arithmetic mean, which is insensitive to inequality in achievements. It is the standard HDI used in human development reports (HDRs) up till year 2009. It accounts neither cross dimensional inequalities nor for within-dimension inequalities (across households). The value of ε=1 yields IHDI which is obtained by the geometric mean to evaluate achievements. This is the IHDI which has been cited in HDRs since year 2010. Harmonic mean is employed for IHDI for ε =2 and so forth. For ε > 0, the IHDI discounts for both kinds of inequalities i.e. cross dimensional and within-dimensions according to the level of inequality aversion indicated by its associated parameter ε. This family of human development indices can be formally expressed as:

$$H_\varepsilon = \mu_\alpha(\mu_\alpha(h_{1.}), \mu_\alpha(h_{2.}), \dots, \mu_\alpha(h_{n.}))\text{-----------------}(3.12)$$

It can be expressed in another way as:

$$H_\varepsilon = \mu_\alpha(\mu_\alpha(h_{.1}), \mu_\alpha(h_{.2}), \mu_\alpha(h_{.3}))\text{----------------------}(3.13)$$

where $\mu_\alpha(h_{.i})$ is the generalized mean (of order α) of an ith individual's achievements in all the three dimensions of HDI and i=1, 2, …, n; and $\mu_\alpha(h_{.j})$ is the general mean of n individuals in dimension j, where j=1,2,3.

The Foster-López-Calva-Székely (FLS) class of indices satisfies all basic axioms of a welfare index including path independence, subgroup consistency, distribution sensitivity. The property of path independence ensures that identical final number is obtained whichever path of aggregation is used. This property is the consequence of using same value of inequality aversion parameter at two stages of aggregation. The subgroup consistency implies that regional changes in human development are in accordance with national changes in human development. This class of indices is strictly distribution sensitive for $\alpha < 1$, however, it is not strictly association sensitive (Alkire

& Foster, 2010; Seth, 2009). It is additively decomposable for $\alpha = 1$, which implies that overall HDI can be obtained by weighted (by population shares of the regions) sum of the HDIs of two regions of a country. IHDI ($\alpha < 1$) of this class is not additively decomposable.

Alkire & Foster (2010) proposed another Inequality-Adjusted HDI based on generalized mean with two parameters. It is suggested as a base human development index in order to assess the impact of within dimensions inequalities on IHDI. It accounts for cross dimensional inequalities but suppresses within-dimension inequalities. For this index at first stage achievement are aggregated aross individuals by using arithmetic mean and at second stage these dimensional indices are aggregated by employing geometric mean. It is expressed as:

$$H_{(\alpha,\beta)} = \mu_\alpha(\mu_\beta(h_{1.}), \mu_\beta(h_{2.}), \dots, \mu_\beta(h_{n.})) \text{ -------------(3.14)}$$

where α=0 and β=1. This HDI satisfies all basic axioms of a welfare index except the additive decomposability. It does not posses the property of path independence. This index has been reported in HDRs since year 2010 as base HDI.

The inequality measure proposed by Alkire & Foster (2010) is based on Atkinson's measure of inequality. The measure is given as:

$$A_\varepsilon = 1 - \frac{H_\varepsilon}{H_0} \text{ --(3.15)}$$

where A_ε represents the proportion of per capita achievement lost as a result of unequally distributed achievements. Thus, A_ε is the percentage loss in potential human development or welfare (evaluated by H_ε) ensuing from inequality.

3.2.4.1 Construction of household's human development index

To calculate HDI for a household i, its indices in three dimensions are aggregated by arithmetic mean and is given as:

$$HDI_i = (S_i + E_i + H_i)/3 \text{ ----------------------------------(3.16)}$$

The use of the arithmetic mean guarantees that there is no concern for inequality (Alkire & Foster, 2010)[54]. For Inequality-Adjusted HDI for a household i, its indices in three dimensions are aggregated by using geometric mean and is given as:

$$IHDI_i = \sqrt[3]{S_i \times E_i \times H_i} \text{ ----------------------------------(3.17)}$$

This index accounts for inequality across the dimensions in a household's development level.

3.2.4.2 Construction of human development and its dimensional Indices at national and sub-national levels

To construct a dimensional index of human development at national or sub-national level, household's indices for that specific dimension are aggregated. The arithmetic mean of households' dimensional indices is employed to obtain a national or sub-national dimensional index without accounting for inequality. It is given as:

$$I_x = (x_1 + x_2 + \cdots + x_n)/n \quad (x = \text{S, E, H}) \text{ -----------(3.18)}$$

where *x* is the achievement in a dimension of HDI and *n* is the number of households. The three indices are standard of living index (I_S), education index (I_E), and health index (I_H).

To obtain national or sub-national dimension wise Inequality-Adjusted development indices, the resident households' indices in each dimension are aggregated by using geometric mean as:

$$I_{ix} = \sqrt[n]{x_1 \times x_2 \times \ldots\ldots\ldots\ldots \times x_n} \quad (x = \text{S, E, H}) \text{ --------(3.19)}$$

The three indices I_{iS}, I_{iE}, and I_{iH} represents respectively the Inequality-Adjusted indices for standard of living, education, and health.

[54] For detailed discussion see (Foster, Seth, Lokshinl, & Sajaia, 2013).

To evaluate potential human development at national and sub-national levels two human development indices are utilized in this study. First is human development index (HDI^*) with two parameters (proposed by Alkire & Foster) given in equation (3.16). This index accounts for inequalities across dimensions but suppress within dimensions inequalities. It is a type of Inequality-Adjusted human development index. For construction of HDI^*, the households' indices in three dimensions, standard of living, education, and health are aggregated by using geometric mean, given as:

$$HDI^* = \sqrt[3]{I_S \times I_E \times I_H} \text{ -----------------------------------(3.20)}$$

Second is the standard human development index (HDI). The standard HDI (HDI) is expressed as a "mean of means", where mean is arithmetic mean. It does not take in to account any inequality. This measures potential human development, rather than actual human development (Alkire & Foster, 2010). There are two routes to obtain this traditional HDI which yield the same index. In route one the three dimensions indices; standard of living index (I_S), education index (I_E), and health index (I_H); are aggregated by using arithmetic mean to obtain national/ sub-national HDI, given as:

$$HDI = (I_S + I_E + I_H)/3 \text{ ---------------------------------(3.21)}$$

In second route the order of aggregation is reversed, the national/ sub-national HDI is obtained by aggregating the households' averaged achievements HDI_i using arithmetic mean, given as:

$$HDI = (HDI_1 + HDI_2 + HDI_3 + \cdots + HDI_n)/n \text{ ----------------(3.22)}$$

To account for human development inequalities across households at national and sub-national levels, the generalized mean based on geometric means is utilized in this work. Foster, Lopez-Calva, and Szekely (2005) suggested this Inequality-Adjusted human development index (IHDI). The IHDI is calculated by two routes which yield same results. In first route the three Inequality-Adjusted dimension indices; standard of living index (I_{iS}), education index (I_{iE}), and health index (I_{iH}), are aggregated by using geometric mean to obtain regional/national IHDI as:

$$IHDI = \sqrt[3]{I_{iS} \times I_{iE} \times I_{iH}} \text{ ----------------------------------(3.23)}$$

In second route, households' $IHDI_i$ are aggregated using geometric mean to obtain national/sub-national IHDI as:

$$IHDI = \sqrt[n]{IHDI_1 \times IHDI_2 \times \dots \dots \dots \dots . \times IHDI_n} \text{ --------------(3.24)}$$

3.2.5 Measuring Distributional Inequality of Human Development Index

Atkinson (1970) family of inequality measures is used to calculate inequality in underlying distributions of HDI and its dimensions. To calculate inequality within each dimension of HDI across households, Atkinson measure of inequality with inequality aversion parameter ε=1 is employed. It can be expressed as:

$$A_x = 1 - \frac{I_{ix}}{I_x} \qquad (x = \text{S, E, H}) \text{ -------------------------(3.25)}$$

where *x* represents the level of achievement. The inequality measure A_x represents the share of per capita achievement *x* that is wasted because of inequalities in its distribution across households. It is regarded as the percentage loss in potential human development or welfare arising from inequality in distribution of achievement across households in a specific dimension.

To evaluate overall inequality in human development the inequality measure is calculated by comparing $IHDI$ to HDI. To capture inequality in human development distribution across households (within dimensions and across dimensions); the Atkinson inequality coefficient is used and is expressed as:

$$A_{HD} = 1 - \frac{IHDI}{HDI} \text{ --(3.26)}$$

A_{HD} is a measure of the aggregate inequalities in a society across all achievements (Alkire & Foster, 2010). It represents the percentage loss in potential human development (HDI) or welfare arising from inequalities within dimensions and across dimensions.

To evaluate the within dimension inequality or to compute the percentage loss in potential human development arising from within dimension inequality, HDI^* is compared to $IHDI$. The inequality coefficient for within dimensions inequalities can be expressed as:

$$A^*_{HD} = 1 - \frac{IHDI}{HDI^*} \text{-------------------------------------}(3.27)$$

Another measure of human development inequality discussed in UNDP (Technical Notes, 2015), is coefficient of human inequality (C_{HI}). It is an unweighted average of inequality coefficients of standard of living, education, and health. It averages these inequalities using the arithmetic mean and is given as:

$$C_{HI} = \frac{A_S + A_E + A_H}{3} \text{-------------------------------------}(3.28)$$

When magnitude of all inequalities in dimensions are equal the coefficient of human inequality and the loss in HDI, arising from within dimension inequality (A^*_{HD}) vary insignificantly. When magnitude of inequalities varies, the loss in HDI inclines to be larger than the coefficient of human inequality.

3.3 Methodology to Estimate Coefficient of Inclusion

To compute unified measure of inclusive development at district, provincial, and national level a method proposed by Suryanarayana (2008) is adopted in this study. Suryanarayana(2008) and Suryanarayana & Das (2014) uses nominal consumption expenditure to measure the inclusiveness of growth in Indian States. In the present study HDI and its dimensional indices are utilized for analysis of inclusiveness of human development in Pakistan.

Suryanarayana (2008) proposes a methodology to measure inclusive growth in terms of median consumption. Choice of this approach for present research is mainly due to its two distinguishing features. First, it is a relative measure; and second, it is based on median, an order-based average. Relative measure of inclusion is chosen over absolute measure as it considers excluded (deprived) ones as "social beings" whereas absolute measures considers them as "physical beings". Relativity is considered as one of main elements to define "social exclusion" as identified by Tony Atkinson of Oxford University. Relativity implies that exclusion must be from a specific society, in a specific place and time (Townsend & Kennedy, 2004). The median is preferred over mean, because mean as an average is not a robust measure for skewed distributions of variables related to human wellbeing[55].

Methodology proposed by Suryanarayana (2008) assesses the economic standing of relatively deprived regarding a threshold, specified as a function of the median. The underlying idea is that the growth process under review will be inclusive if it is beneficial for deprived sections of the society. To identify the deprived, this approach compares the economic achievement of individual units of the society (individuals/ households/ regions) relative to the average economic achievement of the society. The population having economic achievement below sixty percent of median economic achievement of the society is considered as deprived. The same approach is adopted to measure inclusiveness of development in this study. The phenomenon of development cannot be captured by economic achievement alone; it requires an assessment of socio-economic achievement. Hence, IHDI as an indicator of socio-economic achievement is

[55]For detail discussion see (Birdsall & Meyer, 2014; Townsend & Kennedy, 2004).

utilized to assess the deprivation and hence inclusion in the mainstream of development[56]. Thus, the segment of population which is deprived of development is defined regarding a threshold of Inequality-Adjusted human development, specified as a function of median IHDI. The population (households) having IHDI below sixty percent of median IHDI is considered as deprived. The 60% of median, and 50% of the mean are two commonly used thresholds for relative income deprivation; the former measure is probably the most extensively used measure nowadays (Townsend & Kennedy, 2004)[57]. In this study the application of this threshold is extended to development and its dimensions including economic well-being (SOL), education, and health. The deprived proportion of population is given as:

$$\theta = F(\delta\xi_{0.5}) = \int_0^{\delta\xi_{0.5}} f(x)dx \text{---------------------------(3.29)}$$

where θ = incidence of the deprived (ID), $0<\delta< 1$, and 'x' is the variable to be analyzed for inclusion. The $\xi_{0.5}$ represents the median such that:

$$\int_0^{\xi_{0.5}} f(x)dx = \frac{1}{2} = \int_{\xi_{0.5}}^{\infty} f(x)dx \text{-------------------------(3.30)}$$

The value of δ is kept 0.6. The variable (x) to be analyzed for inclusion in this study is development which is represented by HDI and its dimensions. F is the cumulative distribution function and $f(x)$ is the density function of 'x'. Some important features and implications are as follows:

The value of θ lies in the open interval (0, 0.5).

(i) θ tends to 0 implies bottom half of the distribution concentrates in the "inclusion zone", given by [$\delta\xi_{0.50}$, $\xi_{0.50}$]

[56] As a measure of actual human development IHDI is utilized instead of HDI which represents the potential human development.

[57] The poverty threshold as 60% of median household income (known as the "at-risk-of-poverty" rate), is used by the European Union, UK government and many other countries. The advantage of this threshold is that it will not change by the rise of incomes in the deprived section unless they cross the median income. (Mack, 2016; Bradshaw & Mayhew, 2011).

(ii) θ approaches to 0.5 implies bottom half of the distribution concentrates in the “exclusion zone”, given by [0, $\delta\ \xi_{0.50}$].

From a conceptual viewpoint, case (i) denotes a situation where in the development is inclusive with the poor participating in the development process and hence, experience an improvement in their socio-economic status; and case (ii) emerges when the development process is exclusive with little or negative participation by the poor. Hence, whether the development process being analyzed is inclusive or exclusive could be demarcated and evaluated regarding the concentration of the distribution in/out of the “inclusion zone” given by the interval [$\delta\xi_{0.50}$, $\xi_{0.50}$]. The value of θ represents the exclusion.

3.3.1 Coefficient of Inclusion in a Homogeneous Society

Assuming society consisting of a homogeneous group with heterogeneity in development across households, a “Coefficient of Inclusion” is defined by suitable standardization regarding its limits. Inclusion Coefficient (IC) denoted by ‘Ψ’ is given as:

$$\Psi = 1 - 2\int_0^{\delta\xi_{0.5}} f(x)\mathrm{d}x \text{-----------------------------(3.31)}$$

where $0 < \Psi < 1$. It has the following relevant properties:

(i) The value of Ψ tends to the value 0, when no relatively poor is participating and hence, benefiting from the mainstream development process; it approaches to unity, as the all relatively poor falls in the inclusion zone.

(ii) A value of Ψ greater than ½, indicates a situation where the proportion of the bottom half of the population falling in the inclusion zone is greater than the proportion in the relative deprivation-zone, implying a state of inclusion.

(iii) Positive improvement in Ψ and its positive covariance with median level of development indicates inclusive development; a constant Ψ implies continuation of status quo and a deterioration in Ψ with negative covariance with median level of development indicates the state of exclusion.

3.3.2 Coefficient of Inclusion in a Non-Homogeneous Society

The economic and social welfare is not evenly distributed across regions in Pakistan (Jamal, 2016; UNDP Pakistan, 2016), exhibiting a scenario of non-homogeneous society. Consequently, inclusiveness of development is analyzed in two ways i.e. across the regions (inter-regions) and within the regions (intra-region).

3.3.2.1 Inter-regional inclusion

Inter-regional inclusion is examined with reference to disparities in median levels of human development across regions. It is measured by closeness of regional median ($\xi^{R}_{0.5}$) to national median $\xi^{M}_{0.5}$ (of the national/mainstream population). For a given δ such that $0 < \delta < 1$, there can be two scenarios:

(i) $\xi^{R}_{0.5} < \delta\, \xi^{M}_{0.5}$ implies exclusion of the specific region.

(ii) $\xi^{R}_{0.5} \geq \delta\, \xi^{M}_{0.5}$ implies inclusion of the specific region.

3.3.2.2 Intra-regional inclusion

Intra-regional inclusion is examined in terms of inclusion coefficients (ICs) defined with respect to regional as well as national median. Intra-regional inclusion for any given region 'i' is measured with respect to either own median ($\xi^{R}_{0.5}$) providing a measure of Ψ^{R}_{i} (IC Regional) or overall national median ($\xi^{M}_{0.5}$) providing a measure of Ψ^{M}_{i} (IC Mainstream). These two measures are distinct and different for situations when there is inter-regional exclusion; and converge with progressive inter-regional inclusion.

IC Regional (Ψ^{R}_{i}) measures the extent of inclusion of the bottom half population of the region under review in its own progress. Its limits and properties are the same as discussed for the inclusion coefficient of a homogeneous society. IC Mainstream (Ψ_i^M) measures the extent of inclusion of the population (laying below national median) of concerned region in the progress of the country/ society. The limits for IC Mainstream (Ψ_i^M) are as follows:

Ψ_i^M= -1 implies exclusion of the entire region

Ψ_i^M = 1 implies inclusion of the entire region

3.4 Determinants of Inclusive Development

An important objective of this study is to determine the factors which are responsible for higher levels and pace of inclusive development. The determinants of inclusive development are analyzed at district level by estimating regression models for three of its aspects i.e. level of human development, its distributional inequality, and inclusion of marginalized in development process. To achieve this end HDI, inequality coefficient (A_H), IC-Mainstream (Ψ_i^M), and IC-Regional (Ψ_i^R) are regressed on various potential factors for inclusive development. The selection of these probable determinants is based on evidence from existing literature and availability of data at district level. The choice of variable is constrained severely due to data availability at district level. Inclusive development is influenced by several diversified factors, however, the factors considered in this study are grouped in to four major categories, economic factors (EF); social factors (SF); demographic factors (DF); and locational factors (LF). The generalized form of the model is given below:

Inclusive development = f (EF, SF, DF, LF) ---------------------------(3.32)

Economic factors comprise of unemployment rate, industrial development (measured by no. of registered factories per hundred thousand of population), agricultural development (measured by percentage of cultivated area; number of tube wells, tractors, threshers, and harvesters per thousand hectors of cultivated area), percentage of forest area, and level of physical infrastructure (measured by road density, airport, and railway station) at district level. Social factors include public education and health facilities, and law & order condition at district level. Public education facilities are proxied by district-wise number of government schools and colleges per hundred thousand population, and student-teacher ratios at school and college levels. District-wise number of government hospitals per hundred thousand population and number of health personnel per ten thousand population are utilized to proxy public health facilities. Law and order facility are assessed by number of police stations per hundred thousand population and reported crimes per ten thousand population at district level. Demographic factors utilized in this study are the population density, ratio of male to female population (sex ratio), and urbanization (ratio of urban population to total population). Locational Factors include the dummies for province and divisional capital.

The functional forms of the regression models are given as:

$$HDI = \alpha_1 + \beta_1 EF + \gamma_1 SF + \delta_1 DF + \xi_1 LF + \varepsilon_1 \text{----------------------------} (3.33)$$

$$A_H = \alpha_2 + \beta_2 EF + \gamma_2 SF + \delta_2 DF + \xi_2 LF + \varepsilon_2 \text{----------------------------} (3.34)$$

$$\Psi_i^M = \alpha_3 + \beta_3 EF + \gamma_3 SF + \delta_3 DF + \xi_3 LF + \varepsilon_3 \text{----------------------------} (3.35)$$

$$\Psi_i^R = \alpha_4 + \beta_4 EF + \gamma_4 SF + \delta_4 DF + \xi_4 LF + \varepsilon_4 \text{----------------------------} (3.36)$$

where ε_1, ε_2, ε_2, and ε_4 represents the random error terms in the models.

The classical linear regression model (CLRM) is employed to estimate the above stated equations. To produce robust estimates, possible violations of the assumptions of the CLRM relevant for cross-sectional data are explored. Shapiro-Wilk test is utilized to check the normality of residuals since it is recommended the best choice for testing the normality of data by some researchers (Thode, 2002). To deal with the possibility of heteroskedasticity, robust standard errors (heteroskedasticity-consistent) are utilized as it is a common and popular technique in this respect (Berry, 1993). Multi-collinearity is tested by analyzing the Variance Inflation Factor (VIF) that is the most extensively used diagnostic for multicollinearity (Allison P. , 2012). The data issues pose a serious limitation on testing endogeneity of the model as the appropriate instruments could not be found for the district level data. Therefore, to establish the causality between inclusive development and its determinant is beyond the scope of this study. In this scenario the objective of this work is to identify the significant covariates of inclusive development.

CHAPTER 4

Estimation of Human Development Indices and their Distributional Inequality

To conduct a household-based analysis of human development, the first task is to construct human development indices at household level. At next stage this measure is used to analyze the aggregate level of human development at national and sub-national levels. This chapter discusses in detail that how methods discussed in previous chapter are applied for estimation of households' development indices and their aggregation. Most of the tasks in construction of indices of human development and its dimensions are achieved with software Stata, version 13. For some of the calculations; and for organization, and presentation of results, the programme Excel from office 365 is utilized. The following sections discuss in detail the construction of these indices.

4.1 Construction of Standard of Living Index

All steps of household's SOL index construction, including PPCA execution and analysis, are performed with Stata. As no built-in procedure is available in this software for PPCA, a user written program 'polychoric' is utilized. The polychoric Stata module does allow for sampling weights as sampling design affect estimates through weights (Kolenikov & Angeles, 2004). Thus, PPCA is executed taking in to account the sampling weights. These executions are discussed in next sections.

4.1.1 Selection of Variables of SOL Index

Based on empirically established identification of SOL variables in previous studies[58], information on eight housing characteristics, and twenty-three durable asset

[58] Filmer & Pritchett (2001), Sahn & Stifel (2003), McKenzie (2005), Vyas & Kumaranayake (2006), Smits & Steendijk (2013), Ward (2014) and many others established empirically the relationship of

ownerships is collected respectively from section 'G' and section 'F' of PSLM 2014-15, for SOL index construction. Some of the housing quality data is re-ordered such that increasing measures indicate increasing living standard as it is advantageous to have positive correlation with underlying variable being explained (standard of living in this case) and indicator variables (Ward, 2014). Categories with low counts are merged with other closely related categories to avoid unnecessary classification and low variation (Vyas & Kumaranayake, 2006).

A descriptive analysis of all the variables is carried out so that appropriate variables can be selected for PPCA. There is no missing observation in SOL variables under consideration. Table A.1 in appendix A reports SOL variables that fall under each of the two broad classifications. Relative frequencies of SOL variables are given in Table A.2 in appendix A. Commonly used criteria to select more appropriate subset of variables for PCA are to exclude the variables with relatively low variation across households (Fontes & Soneson, 2011; Psaki, et al., 2014), and eliminate variables with smaller PCA scoring weights (Davila, McCarthy, Gondwe, Kirdruang, & Sharma, 2014). Variables with low scoring coefficients has relatively lower variation and hence are insignificant in differentiating households' living standards (McKenzie, 2005; Vyas & Kumaranayake, 2006). Wall material, lighting fuel, VCR, car, cooking range, microwave oven, chingchi or rikshaw are excluded because of low frequency. For example, less than 2.97 percent of households has wall material of wood or bamboo and majority of household are clumped in burnt bricks or blocks or stone category. Some variables are excluded due to relatively low variability, and their specification only for extreme weather areas; like air cooler, air conditioner, heater. These are excluded to avoid any

households' socioeconomic status with housing quality indicators and consumer durables for various countries including Pakistan.

possible bias in asset index. These variables are eliminated stepwise, initially variables having very low count in any of its categories are eliminated one by one and PPCA is performed (detail of PPCA procedure is discussed in next sections) with rest of the variables and results are compared for percentage of explained variation. At each execution of PPCA it is observed that low variability of variables is mostly coupled with low scoring weights and their elimination increase the percentage of explained variation. Asset like radio and bicycle are dropped due to very low scoring weights along with low variation. Finally, a set of 18 variables is selected, PPCA with these variables generates first principle component with highest proportion of explained variation. As a reference eigen values and percentage of explained variation with all thirty-one SOL variables (full SOL index) and with eighteen final variables (final SOL index) are given in Table A.4, appendix A; and in Table 4.1 respectively. The variables used for construction of final SOL index are; number of rooms in dwelling, roof material, source of drinking water, toilet facility, cooking fuel, telephone, iron, fan, sewing machine, table, clock, TV or LED or LCD, fridge or freezer, computer or laptop or tab, motorcycle, stove, washer or spinner, and UPS or generator or solar panel.

4.1.2 Execution of Polychoric Principle Component Analysis

The execution of PPCA with 18 variables and 78635 observations took about 15 minutes on a 2.80 GHz Windows 10 computer and with same setting and 31 variables it took about 40 minutes. Its output comprises of a polychoric correlation matrix, a table of eigen values with percentage and cumulative percentage of explained variation, and a table of scoring coefficients/weights for first three principle components.

Initially polychoric correlation matrix is estimated including all SOL variables (see Table A.3, appendix A). Most of the correlation coefficients are positive and significantly high which shows that data is quite suitable for application of PPCA (Moser

& Felton, 2007). Three of the variables which are excluded from the final analysis; bicycle, chingchi or rikshaw, and truck or tractor has most correlation coefficients very low with negative signs. None of the Polychoric correlation matrices for subsets of asset variables considered for index construction in this study are positive definite. Correlation matrix for final eighteen variables has one negative eigen value (see Table 4.1). A matrix is positive definite if all its eigenvalues are positive. According to Kolenikov & Angeles (2009) negative eigen values can result because of the use of polychoric correlation coefficients that do not promise positive definite correlation matrices even in complete data. Sampling fluctuations are the cause of non-positive eigen values of polychoric correlation matrix and must be small. In this analysis, negative values are very few and quite small. Moreover, focus of this study is first principal component and hence the largest eigenvalue, the negative smaller values are not troublesome (Kolenikov & Angeles, 2009).

The eigen values and percentage of variation explained for each principle component is given in Table 4.1. Polychoric PCA produced first principal component explaining 56 percent of the variance, which is believed to be quite accurate (Kolenikov & Angeles, 2009). Hence SOL index constructed by this first principle component explains a large percentage of variation in households' living standard. The second and third components adds around 9 percent and 6 percent respectively to total explained variation, which falls further with each next component. It highlights the dominance of first component in explaining variation in households' standard of living.

Table 4.1 PPCA for Final SOL Index

Principal Component	Eigenvalues	Proportion of explained variation	Cumulative proportion of explained variation
1	10.0771	0.5598	0.5598
2	1.5501	0.0861	0.6460
3	1.1412	0.0634	0.7094
4	0.7716	0.0429	0.7522

Table 4.1 (Continued)			
5	0.6939	0.0386	0.7908
6	0.6490	0.0361	0.8268
7	0.5335	0.0296	0.8565
8	0.4597	0.0255	0.8820
9	0.4136	0.0230	0.9050
10	0.3813	0.0212	0.9262
11	0.3680	0.0204	0.9466
12	0.2934	0.0163	0.9629
13	0.2092	0.0116	0.9745
14	0.1649	0.0092	0.9837
15	0.1546	0.0086	0.9923
16	0.0975	0.0054	0.9977
17	0.0500	0.0028	1.0005
18	-0.0087	-0.0005	1.0000

With non-positive definite correlation matrix, auto-built commands for scree plot and asset scores cannot be utilized. Thus, user written commands are used to obtain scree plot and asset scores which is relatively laborious. The scree plot is displayed in Figure 4.1 showing that the first component is highly significant as compared to the second component on. It is observed that the line is almost flat with a relatively large break succeeding first component. So, the Scree test would too lead us to retain only the first component for SOL index construction.

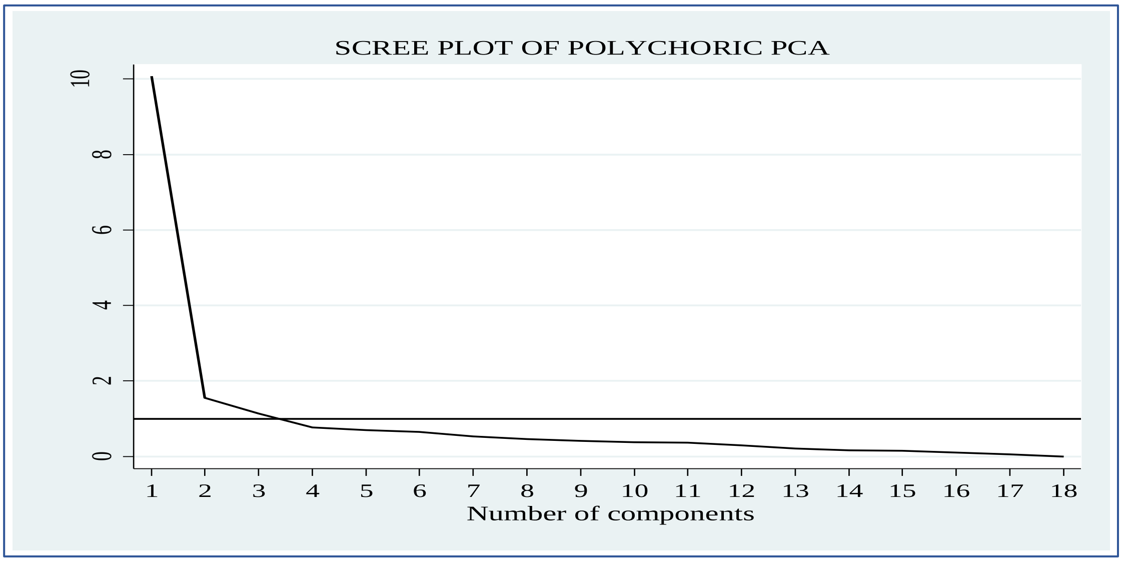


Figure 4.1 Scree Plot of PPCA for Final SOL Index

The scoring coefficients/weights for final SOL index are cited in second column of Table 4.2. The signs of the weights allocated to each indicator variable were not counterintuitive. These scoring weights show the desirable monotonicity for all variables i.e. the estimated coefficients increase with the rising quality of each asset. Thus, the weights produced by PPCA are consistent with the ordering information that higher category is expected to be superior to the lower one[59]. An asset with a positive scoring coefficient or weight, contributes to higher living standard; on the contrary an asset with negative factor score weighs contributes towards lower living standard (Habyarimana, Zewotir, & Ramroop, 2015; Vyas & Kumaranayake, 2006). Scoring weights are positive for ownership of assets, but negative for non-ownership. For example, owing fridge or freezer has a positive coefficient and not owing has a negative coefficient. A variable receives a coefficient near zero if it contains no information about ownership of other assets and hence about household's living standard (Moser & Felton, 2007). Its example is ownership of bicycle (in full asset index) having coefficients near zero and very low correlation coefficients (see Table A.2 & Table A.3, appendix A). A larger positive or negative number mean that the variable provides more "information" on the household's living standard (Moser & Felton, 2007). For example, one of the larger negative coefficients is on having no toilet facility at home. This means that a household that lacks toilet facility is very likely to fall in the bottom categories of the other types of assets like wall material, source of drinking water, main cooking fuel, telephone. Similarly, a household with gas or electricity as main cooking fuel (the highest level within cooking fuel category) is likely to have scored highly on the other

[59] For scoring coefficient's desirable monotonicity and consistency with ordering information see (Kolenikov & Angeles, 2009).

Table 4.2 PPCA scoring coefficients and relative frequency distribution of final SOL index Variables

SOL Variable	Category	Scoring Coefficient	Poorest 20%	Lower Middle 20%	Middle 20%	Upper Middle 20%	Richest 20%
Number of rooms in Dwelling	—	0.15	1.59*	2.00*	2.37*	2.56*	3.11*
Roof material	Wood/ Bamboo/ Others	-0.28	74.71	43.01	25.42	9.54	1.34
	Garder/ T-Iron	-0.02	24.94	52.43	60.55	41.13	10.37
	RCC/ RBC/ Sheet/ Iron/ Cement	0.25	0.35	4.56	14.03	49.33	88.29
Main Source of drinking Water	No facility at home	-0.36	31.32	13.30	6.77	3.69	1.38
	Hand pump	-0.16	58.38	40.42	16.77	4.80	1.01
	Motorized Pumping	0.00	9.52	30.23	47.97	46.51	28.66
	Piped water/ Mineral Water/ Filtration plant/ Water tanker/ Others	0.21	0.79	16.05	28.49	45.00	68.96
Toilet facility	No facility at home	-0.37	44.75	17.22	2.82	0.55	0.04
	Dry raised latrine/Dry pit latrine/others	-0.19	44.00	27.94	9.53	2.06	0.37
	Flush connected to open drains	-0.09	9.49	22.39	22.37	15.82	5.87
	Flush connected to covered sewerage	0.16	1.76	32.45	65.28	81.56	93.72
Main Cooking fuel	Dung cake/ Crop residue/others	-0.31	25.41	22.16	15.33	6.17	1.17
	Firewood/ Kerosene oil/ Charcoal/Coal	-0.07	74.26	70.79	59.08	38.21	11.42
	Gas/ Electricity	0.20	0.33	7.06	25.59	55.62	87.41
Own Telephone	No	-0.39	27.56	8.20	3.33	1.56	0.57
	Cell phone	0.01	72.44	91.27	95.76	96.50	74.30
	only landline/ Cell phone & Landline	0.44	0.00	0.53	0.91	1.94	25.13
Own Iron	No	-0.40	70.00	29.24	8.41	2.64	0.20
	Yes	0.10	30.00	70.76	91.59	97.36	99.80
Own Fan	No	-0.45	39.13	12.95	4.85	2.44	0.68
	Yes	0.05	60.87	87.05	95.15	97.56	99.32
Own Sewing machine	No	-0.20	80.53	50.91	28.68	18.10	11.03
	Yes	0.14	19.47	49.09	71.32	81.90	88.97

Table 4.2 (Continued)								
Own Table	No	-0.28	82.57	48.01	22.66	10.56	4.26
	Yes	0.13	17.43	51.99	77.34	89.44	95.74
Own Clock	No	-0.36	60.82	30.24	12.16	3.35	0.73
	Yes	0.10	39.18	69.76	87.84	96.65	99.27
Own TV/ LED/ LCD	No	-0.26	86.09	56.53	34.54	21.38	6.96
	Yes	0.16	13.91	43.47	65.46	78.62	93.04
Own Fridge/ Freezer	No	-0.22	98.59	79.63	49.99	23.69	5.23
	Yes	0.24	1.41	20.37	50.01	76.31	94.77
Own Computer/ Laptop/Tab	No	-0.06	99.94	99.27	95.70	85.48	47.11
	Yes	0.43	0.06	0.73	4.30	14.52	52.89
Own Motorcycle	No	-0.11	81.26	62.60	54.83	48.19	34.83
	Yes	0.16	18.74	37.40	45.17	51.81	65.17
Own Stove	No	-0.18	95.89	86.25	62.92	29.70	10.12
	Yes	0.20	4.11	13.75	37.08	70.30	89.88
Own Washer/ Spinner	No	-0.22	98.05	81.39	48.97	21.51	4.41
	Yes	0.24	1.95	18.61	51.03	78.49	95.59
Own UPS/ Generator/ Solar panel	No	-0.05	98.06	94.89	91.95	79.38	47.24
	Yes	0.34	1.94	5.11	8.05	20.62	52.76

* Mean numbers of rooms in each Quintile

items as well. Knowing that one household owns a computer provides with more information about that household's living standard than a table does, as owing computer receives a higher coefficient.

4.1.3 Estimation of Standard of Living Indices and Inequalities in its distribution

Households' asset scores (AS_i) are calculated by adding up weighted asset indicators for each household. As Stata's polychoric already accounts for scale, asset indicators are used without rescaling to compute asset scores[60]. Using its extreme values, household's asset scores are normalized to obtain SOL index (S_i) for each household *i* as given in equation 3.2. Households' weighted SOL index quintiles are computed by using estimated households' health indices. These indices and quintiles would be provided on request.

[60] For detail see (Kolenikov & Angeles, 2009).

The households' SOL indices are used to estimate SOL index (I_S) and Inequality-Adjusted SOL index (I_{IS}), at national and sub-national levels as given by equations (3.18) and (3.19) respectively. The Atkinson's measure of inequality for SOL (A_S) across households is estimated by equation (3.25), using these households' indices. The SOL indices, Inequality-Adjusted SOL indices, and inequality measures of SOL estimated for national and sub-national levels, are reported and discussed in chapter 5.

4.1.4 Reliability Test for Estimated Standard of Living Index

SOL index estimated in this study possesses all the three desirable features for which it is tested; namely internal goodness of fit, internal coherence, and robustness. Internal goodness of fit is quite high as 56 percent of the variance in assets possession is explained by first principal component. The results for internal coherence test are cited in Table 4.2. This table reports the scoring coefficients for each category of 18 variables included in SOL index and their respective percentages in the SOL quintile. In last five columns average ownership of each asset is compared across the poorest, lower middle, middle, upper middle, and richest households' quintiles. Significant differences are observed for average ownership of all assets and housing facilities across SOL quintiles which reflects the internal coherence of SOL index. The variables' categories with high scoring coefficients are owned by large percentage of households in richest quintile and this percentage declines for each successive lower quintile. The categories with small or negative coefficients are owned by large percentage of households in poorest quintiles and this percentage falls for each successive higher quintile. For instance, 93.72 percent of households in richest quintile have facility of flush connected to covered sewerage as compared to 81.65 percent of households in upper middle quintile, 65.28 percent of households in middle quintile, 32.45 percent of households in lower middle quintile, and 1.76 percent of households in poorest quintile.

Washer/Spinner ownership is 1.95 percent for the poorest versus 95.59 percent for the richest. Biomass is main cooking fuel for 25.41 percent of the poorest versus 1.17 percent of the richest. Low quality roof material (Wood/ Bamboo/ others) is used by 74.71 percent of households in poorest quintile, 43.01 percent of households in lower middle quintile, 25.42 percent of households in middle quintile, 9.54 percent of households in upper middle quintile, and 1.34 percent of households in richest quintile.

Robustness of SOL index ranking to index specification is given in Table 4.3. First measure of robustness is the consistency of quintile ranking between final SOL index and SOL indices based on (a) all variables except toilet facility & cooking fuel, (b) housing quality indicators only, and (c) ownership of consumer durables only. Quintile comparison shows that SOL index constructed with different subgroups of variables generates very similar classifications. The percentage of households that are inconsistently classified is roughly 26, 49, and 30 for ‘a’, ‘b’ and ‘c’ specifications respectively. While this appears excessive, it should be noted that almost no households classified in the poorest group by the index using all variables would be classified as rich or vice versa by any of the indices with limited specification. The robustness of the ranking is similar for the other quintiles. Second measure of robustness is the rank correlation coefficient, which compares the degree to which two indices with different specifications yield the same ranking of households. The Spearman rank correlation of final SOL index with SOL index based on all variables except toilet facility & cooking fuel is 0.91, with SOL index based on housing quality indicators only is 0.79, with SOL index based on consumer durables only is 0.90 (all correlation coefficients are significant at less than 1 percent level). These rank correlation coefficients measure the robustness of SOL index.

Table 4.3 Robustness of SOL Index Classification to Index Specifications

Percent of Households with Classifications Consistent with Final SOL Index (% Consistently Classified)			
SOL Indices with different specifications	All variables except toilet facility & cooking fuel	Housing quality indicators only	Consumer durables only
1st Quintile (Poorest 20%)	86.09	83.95	74.91
2nd Quintile (Lower middle 20%)	62.2	67.11	44.18
3rd Quintile (Middle 20%)	59.17	68.48	42.57
4th Quintile (Upper middle 20%)	67.07	67.93	40.85
5th Quintile (Richest 20%)	73.55	82.96	50.61
Quantile rank consistency	0.91*	0.79*	0.90*
Percent of Households with Classifications Inconsistent with Final SOL Index (% inconsistently Classified)			
SOL Indices with different specifications	All variables except toilet facility & cooking fuel	Housing quality indicators only	Consumer durables only
Poorest 20% / Richest 20%	0	0	0
Richest 20% / Poorest20%	0	0	0
Overall Inconsistency Percentage	25.91	49.38	30.38

*Spearman rank correlation coefficient, Significant at less than 1% level

4.2 Construction of Education Index

A household's education index is composed of its adult literacy index and schooling index. Information about adult literacy and schooling years of a household's members are collected from section 'C' of PSLM 2014-15.

For schooling index, at first step data about years of schooling for individuals of or above the age of 7 is collected from three questions. First of these questions is, "what the highest class /level of education is completed?". The answer to this question comprises twenty different categories (classes/levels) with specific value labels. The years of schooling are assigned to each class/level according to educational system prevailing in the country. The years of schooling assigned to each class along with its value label are given in Table 4.4. Two main issues are addressed while collecting schooling years information from this question. Firstly, for 46 percent of individuals of or above the age of 7 this information is missing. This issue is resolve by collecting information from the second question, “has ever attended any educational institution?”. For all the individuals in target age group with missing answer for first question, the answer of second question is ‘no’. Thus, these missing values are replaced with 0 years of schooling. Second issue is that class/level ‘other’ do not provide information for schooling years. The Class/level ‘other’ with label value of 20, comprises 0.51 percent of the data (see Table 4). Another question in section C, “What type of educational institution currently attending?” helped in this case. Out of individuals with class/level ‘other’ 55 percent are attending Deeni Madrissa (religious institution), about 3 percent are attending other kind of institutions, and about 42 percent has missing response, hence,

Table 4.4 Years of Schooling Assigned to each Class/Level and its Value Labels

Class/Level	Label Value	Years of Schooling	Relative Frequency
Class-I	1	1	6.44
Class-II	2	2	6.27
Class-III	3	3	5.63
Class-IV	4	4	6.16
Class-V	5	5	15.99
Class-VI	6	6	4.20
Class-VII	7	7	4.10
Class-VIII	8	8	9.70
Class-IX	9	9	3.59
Class-X	10	10	12.48
Poly-Technic Diploma/other Diplomas etc.	11	12	0.28
F.A./F.Sc./ I.com.	12	12	5.65
B.A./B.Sc./B.Ed./BCS	13	14	2.93
M.A./M.Sc./M.Ed./MCS	14	16	1.78
Degree in Engineering	15	16	0.11
Degree in Medicine	16	17	0.12
Degree in Agriculture	17	16	0.02
Degree in Law	18	16	0.08
MPhil/Ph.D.	19	18	0.03
Other	20	5	0.51

Source: Pakistan Social and Living Standards Measurement Survey 2014-15 arbitrarily 5 years of schooling is assigned to 'other'. However, it is tested that by decreasing or increasing schooling years for this category overall results remain unaffected, as this category comprises very low percentage of target age group individuals.

At second step the schooling index for everyone of or above the age of 7 is calculated by normalizing his/her schooling years according to methodology described in section 3.2.3.1. The schooling indices of all the individuals in a household are averaged out to obtain a household's schooling index (Sc_i). Schooling Indices with zero values are replaced by 0.02 for not to underestimate this index. This number involves no truncation of the distribution as the smallest non-zero observed household's schooling index equals 0.0253.

For adult literacy index, information is collected from the question, "Can this person read & write in any language with understanding?". There is no missing response for this question in case of individuals of age 15 years or above. Household literacy index (L_i) is derived by dividing number of adult literates in a household by its total number of adults and normalizing it by natural goal posts of 0 and 1. To avoid underestimation household's adult literacy indices with a value of 0 are replaced by 0.05. This does not truncate the distribution as smallest observed non-zero adult literacy index is 0.0625. The households' indices of adult literacy and schooling would be provided on request.

The arithmetic means of households' adult literacy indices and schooling indices are used to estimate these indices at national and sub-national levels. To obtain estimates of Inequality-Adjusted adult literacy index and schooling index at these levels, geometric mean of the relevant households' indices is calculated. The National and sub-national; adult literacy and schooling indices, along with Inequality-Adjusted indices; are cited and discussed in chapter 5.

4.2.1 Estimation of Education Index and Educational Inequalities

Education index of a household (E_i) is calculated as a weighted average of its schooling index and adult literacy index, assigning weights of 1/3 and 2 /3 respectively. Quintiles based on households' education indices are computed considering the sampling weights. Households' literacy indices, schooling indices, education indices and education quintiles would be provided on request. These education indices and quintiles are utilized for analysis of development in the dimension of education at National and sub-national levels.

To obtain National and sub-national education indices (I_E), households' education indices are aggregated by arithmetic mean, as given by equation (3.18). To obtain estimates of Inequality-Adjusted education index (I_{IE}) at national and sub-national levels the households' education indices are aggregated by geometric mean as given in equation (3.19). Inequality of education across households, is measured by Atkinson's inequality measure (A_E) given in equation (3.25). These education indices, Inequality-Adjusted education indices and educational inequality measures are cited and analyzed in chapter 5.

4.3 Construction of Health Index

In the process of health index construction, the first step is the estimation of child mortality rate for each household in the target survey. As discussed in section 3.2.3, in this study the data fusion technique with survival analysis is employed for the estimation and prediction of child mortality rates for households. In recipient survey, information about child mortality is not available, therefore, no personal information about child or his/her mother and father could be utilized for the prediction of mortality. This information is substituted by household's demographic features. Based on data limitation and literature review, the common variables initially considered to employ for data fusion and as covariates in survival analysis are household's demographic features and housing characteristics[61]. Demographic features include; a household's number of adults, number of under-five children, household's size, household's head's gender and his literacy status. Housing characteristics comprises of number of rooms in the dwelling; availability of electricity connection, gas connection, and telephone connection; type of drinking water facility, and toilet facility. Housing characteristics are used as a proxy for economic status and health environment of the household. These factors play a substantial role in determining chances of children's survival in their early days and years[62]. The covariates, drinking water facility and toilet facility has special significance as determinants of child mortality. The children along with other vulnerable groups are particularly affected by inadequate sanitation and water quality[63]. These are the second major cause of child mortality; it kills more young children than AIDS, malaria, and measles combined[64].

Some of the housing characteristics used as covariates are common in imputation of household mortality rate and in asset scores estimation. Household's head's literacy status is a common determinant of household's literacy index and household's child mortality rate. This can lead to an automatic correlation for health and SOL indices, and for health and education indices; however, given there is a strong correlation of the component indices in the standard HDI, it is undistinguishable whether method used in this work artificially increases this correlation[65]. To investigate this issue; the

[61] These variables are selected by consulting literature on child mortality and its estimation for reference see Getachew & Bekele (2016), Nasejje, Mwambi, & Achia (2015), UNICEF, WHO (2009), IRC; WaterAid; WSSCC (2008), The World Bank (2008), Sijbesma (2008), UNDP (2006), Koissi & Högnäs (2005).

[62] For detail see (Garin, et al., 2015).

[63] The World Bank (Environmental health and child survival : epidemiology, economics, experiences, 2008); UNDP (Human Development Report 2006: Beyond scarcity: Power, poverty and the global water crisis, 2006); Sijbesma (Sanitation and Hygiene in South Asia: Progress and Challenges, 2008); IRC; WaterAid; WSSCC (Beyond Construction Use by All, 2008).

[64] UNICEF (Diarrhoea: Why children are still dying and what can be done, 2009).

[65] For reference see (Harttgen & Klasen, 2012).

correlation coefficients between the imputed mortality rates, estimated asset scores, and calculated literacy index is calculated (see Table C.1, Appendix C). The correlation coefficient between indicators having common determinants is not very high, which leaves enough room for heterogeneity between the dimensions.

There are four stages of household's health index construction. At first stage the donor (PSLM-HIES 2013-14) and recipient (PSLM 2014-15) data sets are tested for coherence. Survival analysis is performed with donor data set and child mortality rates (survival rates) are predicted for both donor and recipient data sets at second stage. At third stage the validity of imputed mortality rates is tested. Health indices are constructed from child survival rates at fourth stage.

4.3.1 Testing the Coherence of Donor and Recipient Data Sets

The survey reports for PSLM-HIES 2013-14 and PSLM 2014-15 are consulted to check the harmony in definition of units, reference period, completion of population. Most of the conditions required for data fusion are fulfilled, the population is same, and the definitions and classifications of most of the common variables are also identical. To improve the similarity of the distributions of common variables some of the variables are recategorized. The reference period is not similar but is overlapping. For the sort of common variables included in this analysis, this variation in reference period is assumed to be too small to effect. The question, "does your household have electricity, and gas connections", asked in PSLM-HIES 2013-14 is not directly asked in PSLM 2014-15. The answer to this question is deduced from the answers to the questions about "main fuel used for cooking" and "main fuel used for lighting" in PSLM 2014-15. The household using gas as main cooking fuel must have a gas connection or equivalently resources to afford gas cylinder. Similarly, the household using electricity as main lighting fuel must have an electricity connection.

Common variables designated as matching variables are tested whether they have the same distribution in the two datasets. After making some adjustment in categorization of common variables and handling some missing data, the equality of distribution in two data sets is tested by comparing descriptive statistics for all variables which is cited in Table 4.5. There is no significance difference except for electricity connection in any pair of the descriptive statistics of the data sets.

Table 4.5 Descriptive Statistics of Household's Covariates for Survival Analysis

Variable	Sample	Mean	Standard Deviation	Skewness*	Kurtosis*
Number of under five children	PSLM 2013-14	0.8421	1.0567	1.4734	6.5052
	PSLM 2014-15	0.7912	1.0132	1.4129	5.7190
Number of adults	PSLM 2013-14	3.8314	2.0537	1.2802	7.1789
	PSLM 2014-15	3.7640	1.9761	1.1877	5.0075
Household's size	PSLM 2013-14	6.3461	3.0682	1.6344	10.4071
	PSLM 2014-15	6.2349	2.9455	1.4893	8.8141
Household's head Gender	PSLM 2013-14	0.8950	0.3065	-2.5773	7.6427
	PSLM 2014-15	0.9105	0.2854	-2.8766	9.2750
Household's head literacy	PSLM 2013-14	0.5590	0.4965	-0.2376	1.0565
	PSLM 2014-15	0.5800	0.4936	-0.3243	1.1051
Number of rooms	PSLM 2013-14	2.2878	1.3061	1.8583	9.5929
	PSLM 2014-15	2.3262	1.3011	1.8181	12.0271
Electricity connection	PSLM 2013-14	0.7944	0.4041	-1.4569	3.1227
	PSLM 2014-15	0.9345	0.2474	-3.5123	13.3365
Gas connection	PSLM 2013-14	0.3987	0.4896	0.4140	1.1714
	PSLM 2014-15	0.4134	0.4924	0.3518	1.1238
Telephone connection	PSLM 2013-14	0.0675	0.2509	3.4471	12.8827
	PSLM 2014-15	0.0479	0.2135	4.2355	18.9393
Drinking water facility	PSLM 2013-14	1.2393	0.5794	-0.0791	2.5654
	PSLM 2014-15	1.2637	0.5845	-0.1245	2.4855
Toilet facility	PSLM 2013-14	1.5780	0.7596	-1.4044	3.2021
	PSLM 2014-15	1.6016	0.7109	-1.4702	3.5629

*Pearson's moment coefficients of skewness and Kurtosis

For discrete variables weighted histogram and quantile-quantile plot are utilized to test the equality of distributions. Both the comparison of histograms and quantile-

quantile plots displayed in Figure 4.2, do not show significant difference in any discrete variable’s distribution in two data sets.

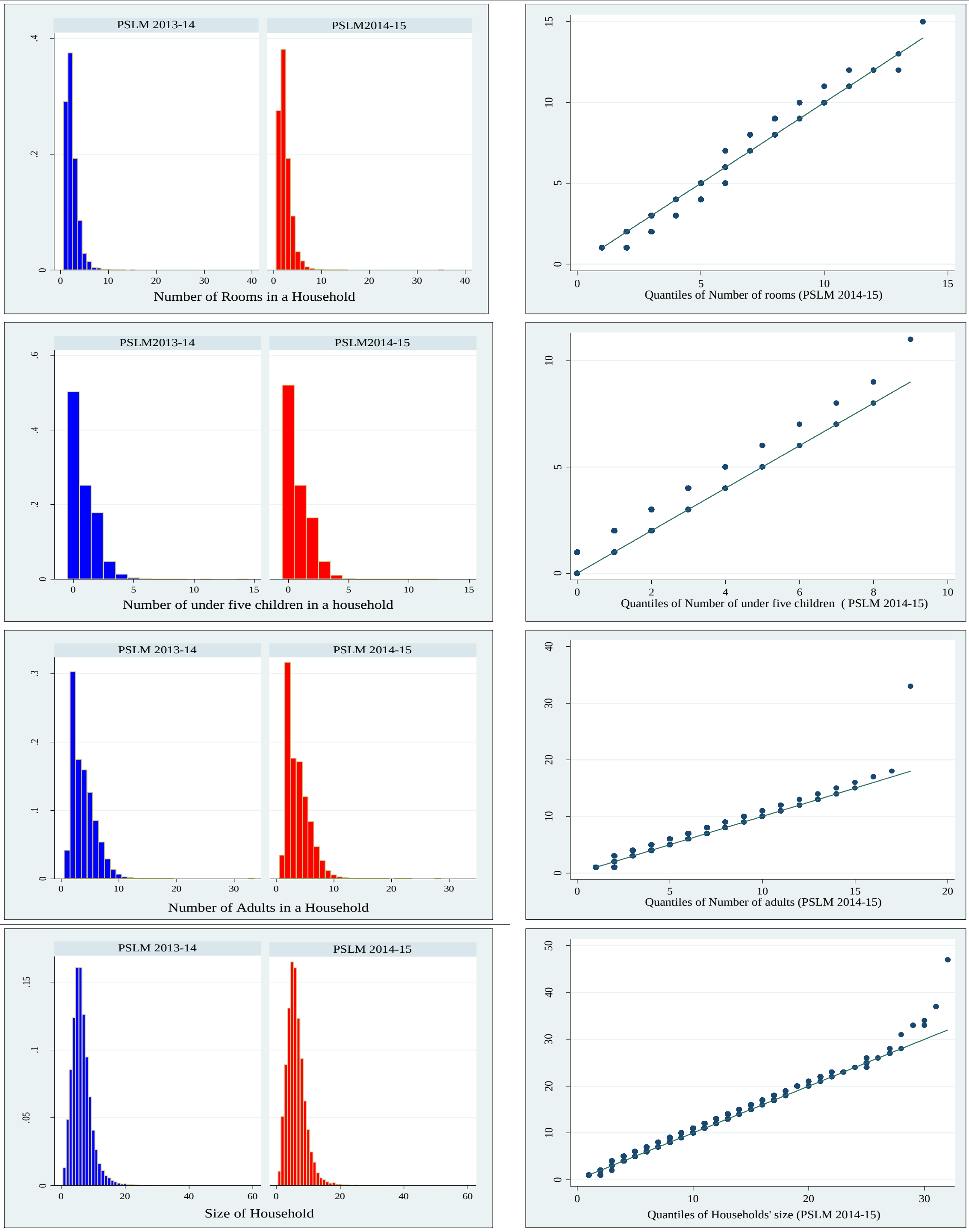


Figure 4.2 Histogram and Quantile-Quantile Plots for Discrete Covariates

The equality of distributions in case of categorical variables is tested by comparing their relative frequency distribution in two data sets. Multinomial Goodness of fit tests, including Pearson's chi square test and likelihood ratio test are also utilized for this purpose. The relative frequency distributions of categorical covariates in two data sets are given in Table 4.6. Relative frequencies of almost all variables except electricity connection, are comparable.

Table 4.6 Frequency Distribution of Categorical Covariates of Survival Analysis

Variable	Relative Frequency	
	PSLM 2013-14	PSLM 2014-15
Household's head gender		
Female	10.5	8.95
Male	89.5	91.05
Household's head literacy		
No	44.1	42
Yes	55.9	58
Electricity connection		
No	20.56	6.55
Yes	79.44	93.45
Gas connection		
No	60.13	58.66
Yes	39.87	41.34
Telephone connection		
No	93.25	95.21
Yes	6.75	4.79
Drinking water facility		
No facility at home	7.68	7.37
Hand pump/Tube well	60.71	58.89
Piped water/Motorized pumping/ Mineral water/ Filtration plant/Water tanker/Others	31.61	33.74
Toilet facility		
No facility at home	16.65	13.28
Dry raised latrine/Dry pit latrine	8.89	13.27
Flush connected to some type of sewerage	74.45	73.44

The test statistics along with their p-values of multinomial Goodness of fit tests are cited in Table 4.7 Based on both Pearson's chi square test and likelihood ratio test, null hypothesis of equality of distributions cannot be rejected for most of the categorical variables. Only for electricity connection both tests reject the hypothesis of equivalent distribution significantly. Therefore, electricity connection is dropped from the list of common covariates.

Table 4.7 Multinomial Goodness of Fit Tests for Equality of Distribution of Categorical Covariates in Data Fusion

Variable	Pearson's χ^2		Likelihood ratio	
	Coefficient	P-value	Coefficient	P-value
Gender of household's head	0.2948	0.5871	0.2807	0.5962
Literacy status of household's head	0.1810	0.6705	0.1803	0.6711
Electricity connection	32.0668	0.0000	21.2304	0.0000
Gas connection	0.0891	0.7653	0.0894	0.7649
Telephone	0.8424	0.3587	0.7513	0.3861
Drinking water facility	0.2038	0.9031	0.2059	0.9022
Toilet facility	2.3999	0.3012	2.4424	0.2949

4.3.2 Execution of Survival Analysis

The second stage of data integration is execution of survival analysis on donor data set i.e. PSLM-HIES 2013-14, by using common covariates approved after coherence test. A preliminary analysis of mortality data and covariates is conducted before proceeding to estimation of final complementary log-log hazard model. This analysis includes; descriptive analysis of mortality data and covariates, univariate survival analysis for choice of appropriate covariates for final model and testing covariates for proportional hazard assumption. The descriptive analysis of covariates is done in preceding section and is given in Table 4.5 and Table 4.6. There are no missing values in mortality data or in covariates.

4.3.2.1 Descriptive analysis of mortality data

Information on child mortality are collected from the birth history of women aged between 15‑49 years, from 17989 households in the PSLM 2013-14. Since the interest of this study is about children aged under-five, only children born in the period of five years preceding the date of the survey are considered. The period is from 1st September 2008 to 31st August 2013. Data set comprises of 15,622 children born live in the reference period, from 8987 households. The outcome variables in this study are the survival period of children aged less than five years from birth until death/censor, and their death status (dead/alive). Children alive in the reference period are considered censored cases, while, children died within the reference period are considered as un-censored cases. The child survival time used in this study is observed in months and years and for more than 50 percent of the cases month is missing, therefore, survival time is scaled in years. The descriptive analysis of children mortality data in the reference period is given in Table 4.8.

Table 4.8 Descriptive Statistics of Child Mortality Data

Number of Live births	15622		
Number of alive children	14579		
Number of children died	1043		
Frequency Distribution of survival time for children died			
Survival time (years)	Frequency	Relative Frequency	Cumulative Percentage
0	890	85.33	85.33
1	119	11.41	96.74
2	28	2.68	99.42
3	4	0.38	99.81
4	1	0.1	99.9
5	1	0.1	100
Total	1043	100	

4.3.2.2 Univariate survival analysis

In the univariate survival analysis, all common variables approved from data coherence are tested as potential covariates of final hazard model. Kaplan-Meier curves are analyzed for categorical variables, see Figure 4.3 This figure shows that the survival functions for all variables' categories are separate and almost parallel except for gender of household’s head and for two lower categories of toilet facility. These are further checked by using Cox test.

Figure 4.3 Kaplan-Meier Survival Estimates

Cox test is performed to test the potential candidature for both categorical variables and continuous variables for final model. The Wald χ^2 coefficients and p-values are cited in Table 4.9 The P-values for all variables are less than 0.2 except for gender of household’s head. Though univariate tests are not significant for head’s gender but from previous research this is known to be an important variable for child mortality.

Therefore, all variables are selected for the next step of survival analysis, as covariates. These covariates are assumed to be constant in the reference period.

Table 4.9 Cox Test for Equality of Survival Time for Different Categories of Covariates

Covariates for Survival Analysis	Cox Test	
	Wald $\chi 2$	P-value
Number of under five children	57800.57	0.0000
Number of adults	32.69	0.0181
Household's size	3125.66	0.0000
Household's head gender	0.08	0.7756
Household's head Literacy	15.66	0.0001
Number of rooms	1611.21	0.0000
Gas connection	49.98	0.0000
Telephone connection	5.25	0.0220
Drinking water facility	51.20	0.0000
Toilet facility	27.92	0.0000

4.3.2.3 Testing covariates for proportional hazard assumption

The basic assumption of proportional hazards for discrete-time cloglog model is verified by Schoenfeld residual test. The χ^2 statistics and P-values of this test; for all covariates including interaction terms, and for whole model; are reported in Table 4.10 After trial of many combinations these interactions are found to be significant and enhancing the overall fit of the model. The P-values of test for all covariates (including intersection terms) and for whole model are greater than 0.05 (highly insignificant). Thus, the hypothesis of proportionality assumption cannot be rejected for all covariates and for whole model and it is determined that proportional assumption is satisfied.

The graphs of the scaled Schoenfeld assumption for all covariates are given in Figure 4.4. A horizontal line can be seen in all graphs, which strengthens the finding that there is no violation of the proportionality assumption.

Table 4.10 Schoenfeld residual test for Proportional Hazards Assumption

Covariates for Survival Analysis	Schoenfeld Proportional Hazard Test	
	$\chi2$	P-value
Number of under five children	1.47	0.2259
Number of adults	2.96	0.0855
Household's size	0.80	0.3701
Household's head gender	1.03	0.3109
Household's head Literacy	1.09	0.2975
Number of rooms	0.00	0.9500
Gas connection	0.00	0.9819
Telephone connection	1.47	0.2249
Drinking water facility	0.19	0.6649
Toilet facility	1.46	0.2262
Household's head gender* Household's head Literacy	0.30	0.5846
Household's size* Number of rooms	2.79	0.0947
Global Test	15.63	0.2087

4.3.2.4 Estimation of proportional hazard models

The choice for estimation of household's child mortality rate in this work is complementary log-log (Cloglog) hazard model which approximates Cox proportional hazards model in discrete time. The coefficients of both model are analogous. For a comparison both models are estimated by using different combinations of selected co-variates and their interactions.

There are no built-in specific commands in Stata for estimating the discrete time proportional hazards models. Therefore, first data is reorganized for estimation of discrete time hazard model by utilizing user written commands. Then Stata command 'cloglog' with suitable options is applied on this reorganized data to estimate Complementary log-log hazard model[66]. For Cox hazard model, Stata built-in commands of

[66] Manual Stata 13, Stephen P. Jenkins (Essex Summer School course 'Survival Analysis', Lesson 6. Estimation: (ii) discrete time models (logistic and cloglog)), and Isabel Canette (Discrete-time survival analysis with Stata, 2016) is consulted for estimation of Cloglog hazard model.

'stset' and 'stcox' are used respectively for reorganization of data and for model estimation. As observations are from a survey data with probability weights and there are

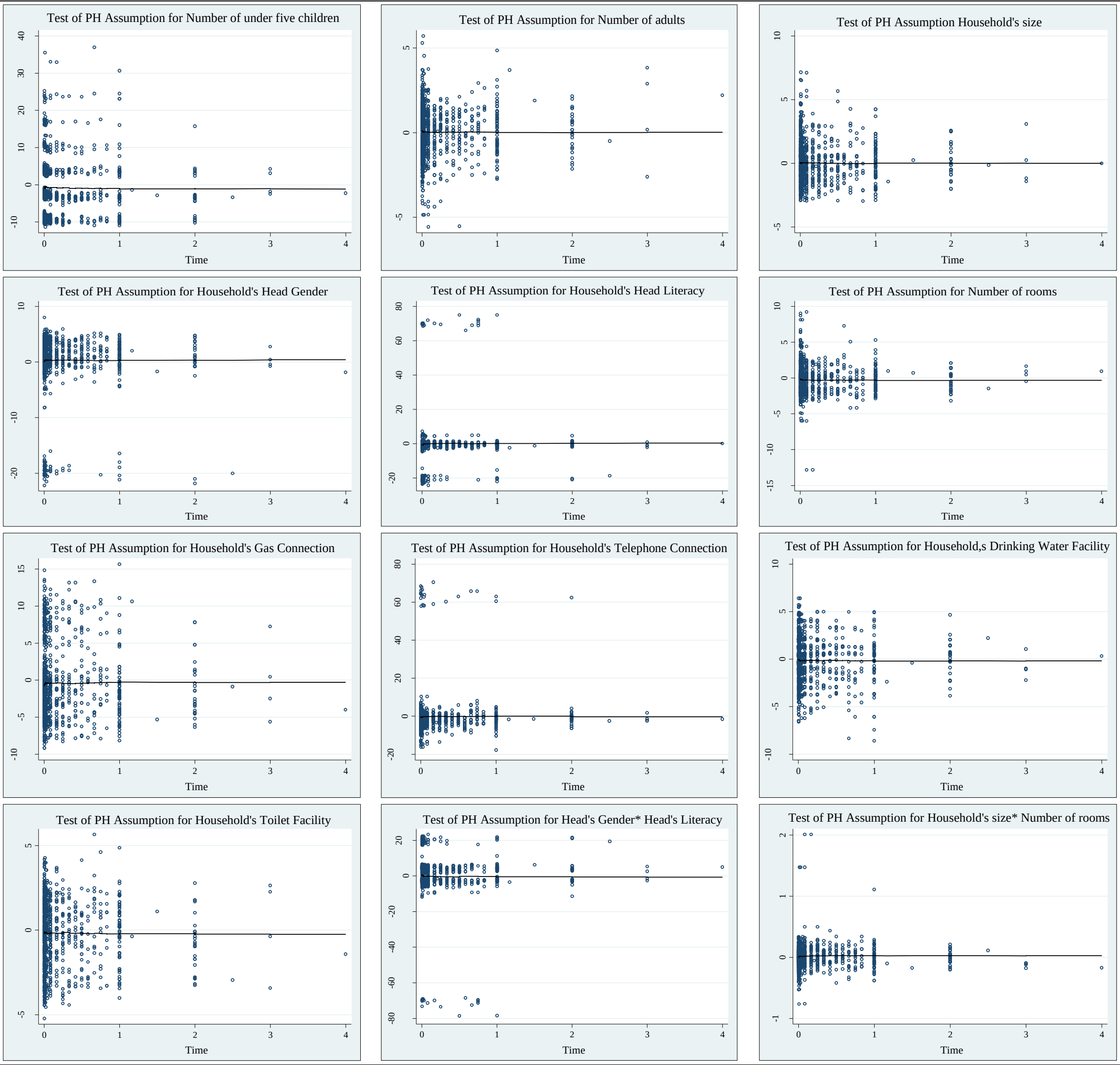


Figure 4.4 Graphs of the scaled Schoenfeld assumption for Covariates

households with more than one child and so observations are not independent. These hazard models are estimated with probability weights option and standard errors are estimated with a command 'vce (clusture hhcode)' which allow for intrahousehold correlation, relaxing the requirement that the observations be independent.

Both type of models is estimated with many different specifications and for reference four specifications for each model are selected and cited in appendix B. It should be noted that for all the models in this section, the likelihood ratios are not reported as likelihood-ratio test should not be used after probability weighted, and/or clustered maximum likelihood estimations[67]. The first specification includes all covariates chosen at preceding stage, see Cox PH model (1) in Table C.2 and Cloglog hazard model (1) in Table C.4. By comparing both models for coefficients and significance of covariates, it is obvious that in Cox model some of the coefficients are counter intuitive and more are insignificant as compared to Cloglog hazard model (1). In Cloglog hazard model (1) only telephone connection is found to be highly insignificant and most of the coefficients are intuitive. The second specification includes two interaction terms along with all covariates of first specification, see Cox PH model (2) in Table C.2 and Cloglog hazard model (2) in Table C.4. Although one of the interaction terms i.e. interaction of gender of household's head and literacy, is not significant in Cox model, but it is highly significant in Cloglog hazard model. The values of Wald test statistic, Akaike's information criterion show that over all fit of both types of models is better with second specification as compared to first specification. In third specification household size and telephone connection are dropped and there are no interaction terms. Telephone connection is dropped as it is highly insignificant in first two specifications and household size is dropped to avoid possible multicollinearity, as it includes both number of under five children and number of adults. Estimation results of Cox hazard model (3) and Cloglog hazard model (3) are given in Table C.3 and Table C.5 respectively. All coefficients are significant in Cloglog model and are mostly intuitive, whereas in Cox model some coefficients are insignificant, and some are counterintuitive. The fourth specification includes all covariates of third specification and interaction terms of second specification, for Cox hazard model (4) see Table C.3 and for Cloglog hazard

[67] For detail see https://www.stata.com/support/faqs/statistics/likelihood-ratio-test/.

model (4) see Table C.5. On the same grounds as in the comparison of previous specifications Cloglog model could be preferred over Cox model. Comparison of Cox hazard model with third and with forth specifications shows no obvious difference. While looking at Wald test statistic and AIC valued Cloglog hazard model (4) is with a better overall fit as compared to Cloglog hazard model (3). If individual coefficients and their level of significance is compared in two models, although the level of significance of a few covariates dropped in model (4), but most coefficients including interaction terms are still intuitive with high significance. Keeping in view the individual coefficients, their significance, possible multicollinearity issue with household size, and overall goodness of fit, Cloglog hazard model (4) is selected as final model for estimation of households' child mortality rates.

4.3.2.5 Analysis of final cloglog hazard model

The estimation results including all necessary details are reported in Table 4.11. Small standard errors in this model depict that sample data is a good representative of the population. The highly significant Wald test statistic shows that estimated model is a good fit for empirical distribution of the data. For number of under-five children estimated hazard ratio is significant with a value of 0.26, which states that with an increase of one in number of under-five children the child mortality declines by approximately 74 percent (1-0.26), keeping all other covariates constant[68]. The hazard ratio for number of adults is not very significant, and its value shows that an increase of one adult in a household results in 3 percent increase in child mortality rate. For gender of household's head, hazard ratio is significant; and its value 0.47, shows that child mortality

[68] The phrase "keeping all other covariate constant" is a part of interpretation for all hazard ratios or coefficients.

rate of a household with male head is about 53 percent lower than that of a household with female head. The hazard ratio is 0.34 for Literacy status of a household's head and

Table 4.11 Complementary log-log Hazard Model (Final Model)

Covariates	Hazard Ratio	Robust S.E.	P-value
Number of under-five children	0.2617	0.0215	0.0000
Number of adults	1.0346	0.0300	0.2410
Household's head gender			
Female	Reference	—	—
Male	0.4673	0.0522	0.0000
Household's head literacy			
No	Reference	—	—
Yes	0.3352	0.1019	0.0000
Number of rooms	0.6783	0.0362	0.0000
Gas connection			
No	Reference	—	—
Yes	0.6010	0.0756	0.0000
Drinking water facility			
No facility at home	Reference	—	—
Hand pump/Tube well	0.9173	0.0887	0.3720
Piped water/Motorized pumping/ Mineral water/ Filtration plant/ Water tanker/Others	0.6204	0.0873	0.0010
Toilet facility			
No facility at home	Reference	—	—
Dry raised latrine/Dry pit latrine	0.8638	0.0926	0.1720
Flush connected to some type of sewerage	0.7534	0.0727	0.0030
Household's head gender* Household's head literacy	2.8816	0.9087	0.0010
Household's size* Number of rooms	1.0192	0.0037	0.0000
Wald $\chi 2$ (12 df)	6227.86		
P-value	0.0000		
Akaike's information criterion	11700000 (12 df)		

is highly significant. It could be interpreted as a household's child mortality rate is almost 66 percent lower than that of a household with illiterate head. The effect of number of rooms of a household, on child mortality rate is also significant statistically. With increase of one room, child mortality rate falls by 32 percent. If a household has a gas connection its child mortality rate declines by 40 percent and it is statistically significant. The availability of a drinking water facility at home reduces the risk of child mortality. The effect of hand pump/tube well is not significant; however, it is highly significant for other kinds of facilities including piped water, motorized pumping, etc. A household's child mortality rate; with hand pump/tube well is 8 percent lower, with piped water/ motorized pumping/ etc. is 38 percent lower, as compared to a household with no drinking water facility at home. The child mortality rate for a household with toilet facility at home is lower as compared to a household with no toilet facility at home. The hazard ratio is statistically significant for third category of toilet facility. A household's child mortality rate; with dry raised latrine/dry pit latrine at home is 14 percent lesser, and with flush connected to some type of sewerage is 25 percent lesser; as compared to a household with no toilet facility at home. The mortality ratios of both interaction terms are statistically significant. The value of mortality ratio is 2.88 for interaction between gender and literacy of a household's head. It could be interpreted as, the effect of head's literacy on child mortality rate of a household is almost 3 times higher for a male head as compared to a female head[69]. For interaction term between household's size and number of rooms of a household, the mortality ratio is 1.02. It shows that if all other covariates are same, the effect of increase in number of rooms on child mortality rate is 1.02 times higher for a household with one additional member.

[69] For interpretation of interaction term; Stata tip 87: Interpretation of interactions in nonlinear models (Buis, 2010); is consulted.

4.3.2.6 Prediction of households' child mortality rates

The estimated regression coefficients (natural logarithms of hazard ratios) could be substituted in equation 3.10 to predict child mortality rates for each household. However, in Stata there is a built-in command to predict hazard rates for both within-sample and out-of-sample predictions. This command is utilized to predict mortality rates from Cloglog hazard model for all households (including having no child) in PSLM 2013-14 and in PSLM 2014-15. The overall and region wise predicted mortality rates at national and provincial level from both surveys in this work are given in Table 4.12. For a reference child mortality rates cited in final report of Pakistan demographic and health Survey (PDHS) 2012-13 in also given in this table. The child births considered in this study (2008-2013) and by PDHS 2012-13 (2007-12) are almost overlapping. Except for

Table 4.12 Child Mortality Rates at National and Provincial Levels

Child Mortality Rate		Estimated* (PSLM 2014-15)	Estimated* (PSLM 2013-14)	Pakistan DHS Report (2012-13)
Pakistan	Overall	85	96	89
	Urban	58	66	74
	Rural	101	113	106
KPK	Overall	87	99	70
	Urban	55	65	58
	Rural	95	107	72
Punjab	Overall	85	101	105
	Urban	59	70	78
	Rural	99	116	115
Sindh	Overall	84	86	93
	Urban	58	60	68
	Rural	114	115	109
Balochistan	Overall	82	83	111
	Urban	53	51	102
	Rural	93	93	112

*Weighted arithmetic means of household child mortality rates estimated in this study.

Balochistan the remaining mortality rates are comparable. One of the reasons for overall variations in results is the use of different estimation methodologies. A probable reason in case of Balochistan might be that due to security reasons in PSLM 2013-14, 61 areas of Balochistan province could not be covered[70].

4.3.3 Testing the Validity of Imputed Child Mortality Rates

The validity of imputed mortality rates is tested by equality of its distribution in donor and recipient data sets. An overall and quintile-wise comparison of descriptive statistics from two data sets is given in Table 4.13. It shows that the distribution of mortality rates in both data sets is similar.

Table 4.13 Comparison of Descriptive Statistics of Imputed Child Mortality Rates

Child Mortality Rate	Sample (PSLM)	G. M.*	A.M.*	Median	Min.	Max.	S.D.*	Sk.*	Kr.*
Overall	2013-14	0.05	0.10	0.07	0.00	0.56	0.09	1.33	4.69
	2014-15	0.04	0.08	0.06	0.00	0.79	0.08	1.51	5.56
1st Quintile	2013-14	0.01	0.01	0.01	0.00	0.02	0.00	0.26	1.91
	2014-15	0.01	0.01	0.01	0.00	0.02	0.00	0.26	1.97
2nd Quintile	2013-14	0.03	0.03	0.03	0.02	0.05	0.01	0.56	2.00
	2014-15	0.03	0.03	0.03	0.02	0.04	0.01	0.55	2.10
3rd Quintile	2013-14	0.07	0.07	0.07	0.05	0.09	0.01	-0.06	1.93
	2014-15	0.06	0.06	0.06	0.04	0.08	0.01	-0.20	1.81
4th Quintile	2013-14	0.12	0.12	0.12	0.09	0.17	0.03	0.28	1.82
	2014-15	0.10	0.10	0.10	0.08	0.14	0.02	0.54	2.11
5th Quintile	2013-14	0.24	0.25	0.23	0.17	0.56	0.07	1.68	6.53
	2014-15	0.22	0.23	0.21	0.14	0.79	0.07	1.59	7.05

*Geometric Mean (G.M.), Arithmetic Mean (A.M.), Standard Deviation (S.D.), Coefficient of Skewness (Sk.), Measure of Kurtosis (Kr.)

The weighted quantile-quantile graph of households' child mortality rates in donor and recipient data sets is portrayed in Figure 4.5. The departure of quantile-quantile plot from 45^{o} line is not quite significant, most of the plot is showing equivalence of two distributions.

[70] See Pakistan Social and Living Standard Survey report (2013-14), National/Provincial Report (Pakistan Bureau of Statistics, 2015).

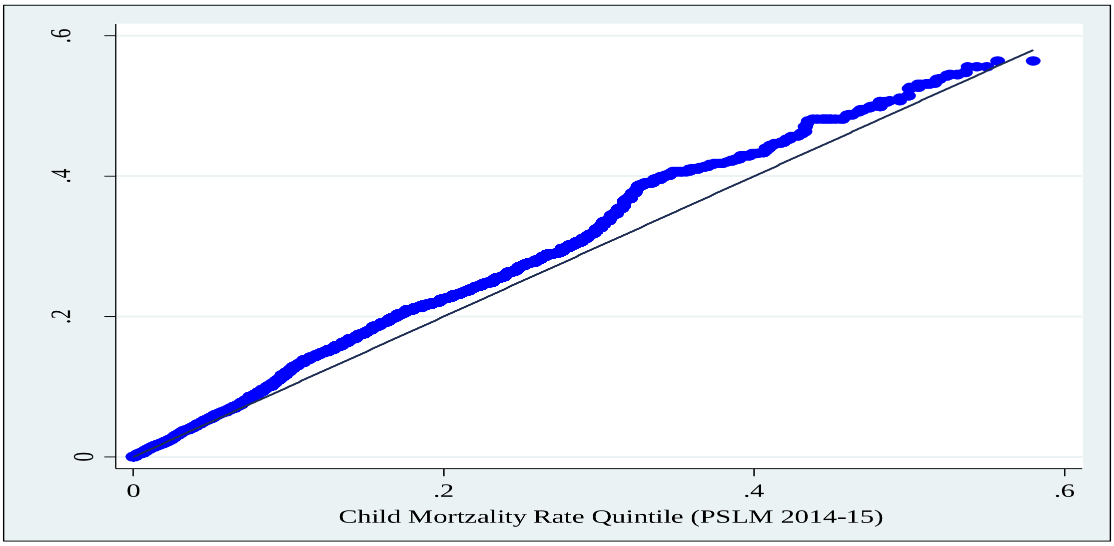


Figure 4.5 Quantile-Quantile Plot for Household's Child Mortality Rates

The weighted kernel density plots of imputed mortality rates for donor and recipient data sets are given in Figure 4.6. The likeness of two Kernel density plots reinforces that the distribution of imputed child mortality rates is similar in two data sets. Thus, finding of all three techniques are coherent.

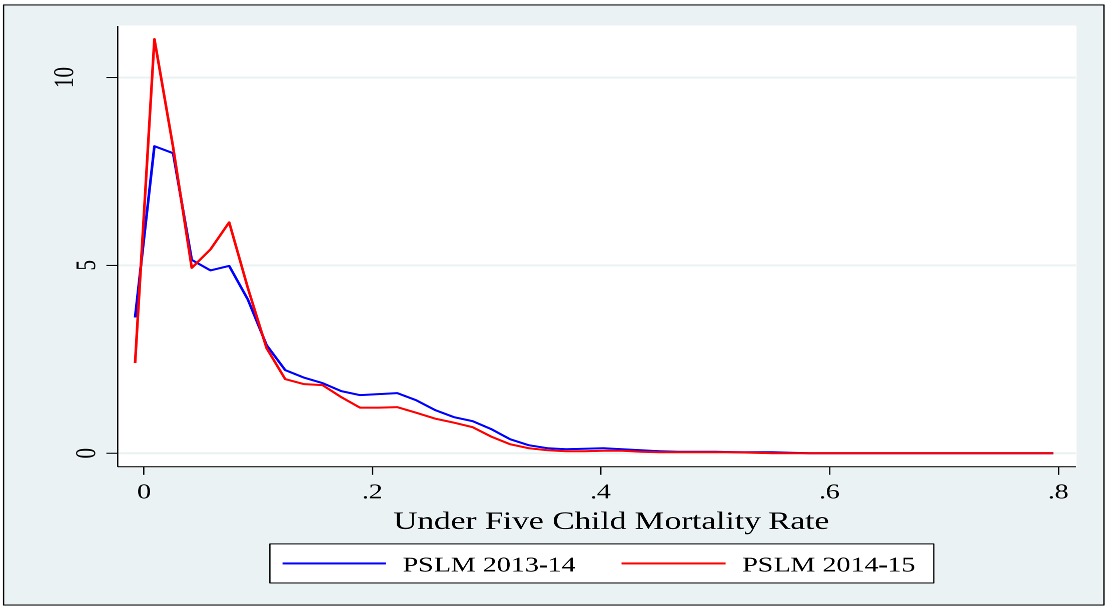


Figure 4.6 Weighted Kernel Density Estimates for Households' Child Mortality Rate

4.3.4 Estimation of Health Indices and Health Inequalities

The households' imputed child mortality rates are utilized to estimate child survival rates for households in the focus survey (PSLM 2014-15), by using equation 3.6.

These survival rates are utilized to calculate a household's health index as given in equation 3.7. In this equation the value of maximum survival rate (csr_{max}) is substituted by the highest estimated survival rate in the target data i.e. 1. The minimum survival rate (csr_{min}) is calculated from equation 3.8, by substituting national child survival rate and national life expectancy index for year 2014. Households' Inequality-Adjusted mean survival rate (weighted geometric mean) in the target data is 0.911. This value is taken as nation child survival rate. The national life expectancy index for year 2014 is 0.711(66.18years).[71]. Solving equation 3.8 for csr_{min}, the minimum value for child survival rate (0.692) is obtained. A household's health index is accordingly estimated by normalizing its child survival rate with estimated minimum and maximum survival rates. The negative health indices are substituted by 0.00001, that is the minimum positive value of estimated health indices. Household's weighted health index quintile are calculated by using distribution of estimated health indices. These health indices and health quintiles are utilized for the analysis of development, inequality in the development, and its inclusiveness; at national and various sub-national levels. On request these indices and quintiles would be provided.

To obtain national and sub-national health indices (I_H), households' health indices are aggregated by arithmetic mean, as given by equation 3.18. To obtain estimates of Inequality-Adjusted health index (I_{IH}) at national and sub-national levels the households' health indices are aggregated by geometric mean as given in equation 3.19. Health inequalities across households is measured by using Atkinson's inequality measure (A_H), given in equation 3.25. The health indices, Inequality-Adjusted health indices, and health inequality measures are reported and analyzed in chapter 5.

[71] The value is taken from Human Development Data (1990-2015), (UNDP, 2016).

4.4 Estimation of Human Development Indices and Human Development Inequalities

The human development index of a household is calculated by aggregating its indices in three dimensions of development, estimated at earlier stages of this study. The standard of living, education, and health indices of a household are employed with equal weights to obtain its human development index as given by equations (3.16) and (3.17). Standard HDI for a household (HDI_i) is obtained by arithmetic mean of three dimensions' indices. To estimate a household's Inequality-Adjusted human development index ($IHDI_i$), geometric mean of its dimensional indices is calculated. Households' HDI quintile and quintiles of its Inequality-Adjusted HDI are calculated taking in to account the sampling weights. The households' human development indices and quintiles would be provided on request.

The indices of development and its dimensions for households are used to estimate development indices and inequality measures for national and sub-national levels. The national, provincial, and district level estimates of standard HDI (HDI), across dimensions Inequality-Adjusted HDI (HDI*), and overall Inequality-Adjusted HDI (IHDI) are estimated; as given by equations (3.20) to (3.24). From equation (3.26) the percentage loss resulting from overall inequalities is estimated for national and sub-national levels. The percentage loss incurred from within dimensions inequalities is calculated from equation (3.27). From Equation (3.28) coefficient of human inequality is calculated. All these statistics of human development and inequalities in its distribution are reported and analyzed in chapter 5.

CHAPTER 5

Analysis of Human Development and Its Inequalities

The HDI is extensively used as a policy development instrument to identify the low development sections in a country[72]. In this research the human development achievements and its inequalities are analyzed in two perspectives, aggregated and disaggregated. Aggregated approach includes the analysis of HDI and its distribution across households at the national (urban/rural), provincial (urban/rural) and district levels. For disaggregated assessment at the national and subnational levels; the dimensional indices of HDI including standard of living, education, and health; and their distributions across households are analyzed. The two perspectives complement each other to find out if human development progress is benefiting households in various regions in a balanced way. This investigation is helpful to indicate the regions that are lagging the others regarding the HDI or any of its dimensions and to direct resources towards the identified dimensions in low developed areas.

5.1 Human Development Index and Its Inequalities

For aggregated analysis of human development, overall achievements are classified in to five categories of human development. These categories/classes of human development are very low, low, medium, high, and very high. The cut-off values[73] for five categories of human development are determined by the range of potential human

[72] Pakistan National Human Development Report (2017)

[73] The human development report 2014 introduced the cutoff points of HDI for the four classes of human development achievements. Below 0.550 refers to low human development, 0.550‑0.699 means to medium human development, 0.700‑0.799 denotes high human development, and above 0.800 refers to very high human development. These cut-off values are derived from the quartiles of the component indicators distributions. In this study human development indicators are not same as used in human development report, therefore, cutoff values of HDR 2014 cannot be utilized. Therefore, domestic cutoff points are used to contextualize the analysis.

development of households (HDI_i) in its five quintiles at national level. The human development categories along with cutoff values are given in Table 5.1.

Table 5.1 Categories of Human Development Achievements with Cutoff Values

Categories of Human Development	Cutoff values (Based on Quintiles of HDIi)
Very low Human Development	Less than 0.37
Low Human Development	0.37 to 0.49
Medium Human Development	0.50 to 0.62
High Human Development	0.63 to 0.75
Very High Human Development	greater than 0.75

5.1.1 Distribution of Household's Human Development Index

A household's human development is measured in this study by human development index (HDI_i) and Inequality-Adjusted human development index ($IHDI_i$). At national level; overall, and quintile-wise descriptive statistics of HDI_i and $IHDI_i$ are given in Table 5.2 and Table 5.3 respectively.

Table 5.2 Descriptive Statistics of Household's HDI

HDI_i	Overall	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile
Arithmetic Mean	0.5517	0.2447	0.4358	0.5643	0.6932	0.8208
Geometric Mean	0.4963	0.2171	0.4340	0.5631	0.6922	0.8197
Median	0.5644	0.2711	0.4366	0.5644	0.6944	0.8143
Minimum	0.0140	0.0140	0.3668	0.5010	0.6285	0.7573
Maximum	0.9673	0.3668	0.5010	0.6284	0.7573	0.9673
Standard Deviation	0.2076	0.0954	0.0389	0.0369	0.0366	0.0433
Skewness*	-0.3459	-0.6196	-0.0614	0.0129	-0.0322	0.6846
Kurtosis*	2.3566	2.2022	1.7833	1.7883	1.8496	2.8595

*Pearson's moment coefficients of skewness and Kurtosis

The households' average HDI, which represents national human development index (HDI) is 0.552. It shows that households HDI_i statistics reveal that households' average potential human development falls in medium level category. Despite the use of different indicators this result confirms the findings of HDR 2014 (Human

Development Data (1990-2015)) and Pakistan NHDIR (2017). In the first report HDI of Pakistan for year 2014 is 0.557 and in second report for year 2014-15 it is 0.681. In both reports it is placed in medium human development category. The geometric mean of HDI_i is 0.4963. This HDI accounts only for across households' inequalities and suppress within households' inequalities. Comparing this geometric mean with HDI depicts that households' average human development index faces a loss of 3.7 percent due to within households' inequalities. A quintile-wise analysis of HDI_i reveals high disparities in average level of human development. The average HDI of households in 5th quintile is more than thrice the HDI of households in first quintile. It shows that the potential human development for top 20 percent households is more than three times high than that of bottom 20 percent households.

Table 5.3 Descriptive Statistics of Household's IHDI

$IHDI_i$	Overall	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile
Arithmetic Mean	0.4927	0.1485	0.3421	0.5100	0.6577	0.8053
Geometric Mean	0.4007	0.1140	0.3380	0.5080	0.6564	0.8038
Median	0.5111	0.1581	0.3433	0.5111	0.6585	0.7976
Minimum	0.0003	0.0003	0.2494	0.4293	0.5864	0.7296
Maximum	0.9667	0.2494	0.4293	0.5864	0.7296	0.9667
Standard Deviation	0.2366	0.0680	0.0519	0.0452	0.0409	0.0498
Skewness*	-0.1816	-0.5859	-0.0657	-0.0527	-0.0254	0.6493
Kurtosis*	1.9580	2.4707	1.8125	1.7965	1.8145	2.7943

*Pearson's moment coefficients of skewness and Kurtosis

The households $IHDI_i$ statistics show that households on average are experiencing a low level of actual human development with high across households' inequalities. The arithmetic mean of households' Inequality-Adjusted human development indices is 0.4927. It accounts for within household's (across dimensions) inequalities and suppress the across households' inequalities. Its comparison with HDI shows almost 11 percent loss in households' average human development is due to across households' inequalities. The geometric mean of $IHDI_i$ 0.4007 represents the estimated national Inequality-Adjusted human development index (IHDI). This index accounts for both within households' inequalities and across households' inequalities. Thus, after adjusting for inequalities (across and within) households' actual human development level falls in to the low human development category. Thus, the overall loss in households' average human development index due to inequalities at national level is 27 percent. The across quintiles differences in average level of human development increases when HDI is discounted for inequalities. The average IHDI of households in 5th quintile is more than five times the IHDI of households in first quintile, depicting that actual human development level of poorest 20 percent of the households is five time less than that of the richest 20 percent.

The plots of weighted Kernel density estimate for household's HDI_i and $IHDI_i$ are given in Figure 5.1. Inspection of these plots suggests that distribution of both potential and actual HDI are asymmetric and might be multimodal. Low density at extreme ends show that quite small proportion of households are with very high or very low level of human development. These plots show that with inequality adjustment, proportion of households reduces in all categories of human development except in very

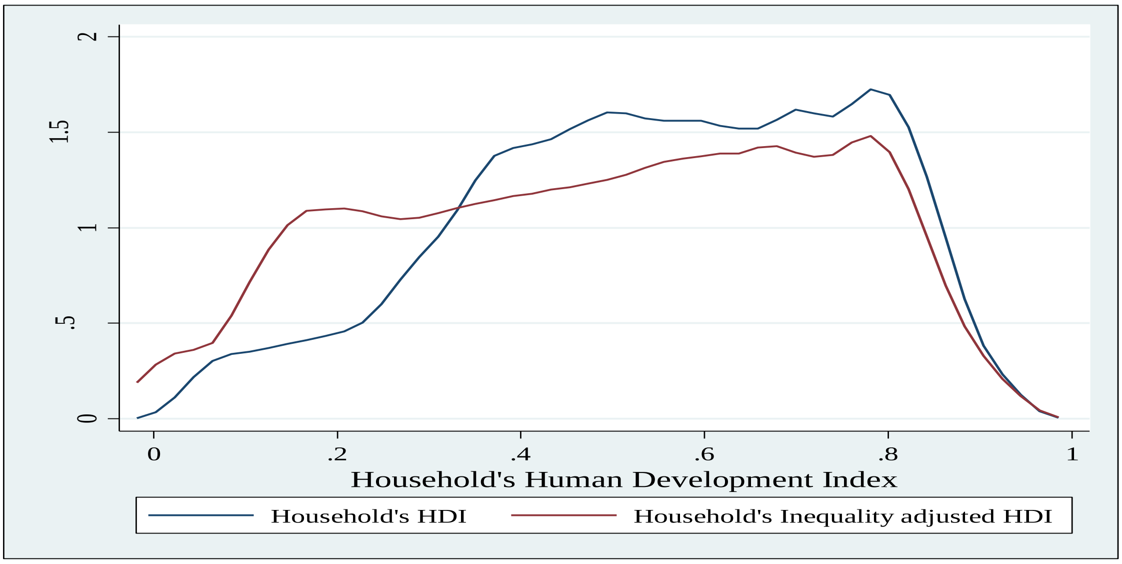


Figure 5.1 Kernel Density Estimates of Household's HDI

low category. The percentage of households rises markedly in very low class of human development. However, this percentage remains unaffected by inequality adjustment, at high end of very high category of human development. It could be asserted that most of the households suffers from losses arising due to inequalities except the households with highest level of human development (may be referred to as roughly top 1 percent of Pakistani households). A future research endeavor must investigate for how much percentage of wealth this 1 percent own[74].

5.1.2 National and Provincial Analysis of Human Development Index and Its Inequalities

Three indices of the human development are analyzed in this study at national and provincial levels. These are standard HDI (HDI), base HDI (HDI*), and Inequality-Adjusted HDI (IHDI). The estimates of these HDIs, the estimated percentage losses due to inequalities A_{HD} and $A_{HD}*$, and coefficients of human inequality (C_{HI}); for Pakistan, its four provinces, and federal capital are cited in Table 5.4. The estimates confirm the prevalence of high human development disparities across provinces and across rural urban regions as established by previous studies[75]. The estimates reveal that HDI[76] values range from the highest 0.75 for Islamabad to lowest 0.39 for Sindh rural. It tells that none of these regions could be placed in a class of very high human development. The standard HDI 0.552 shows that Pakistan's overall potential human development is at medium level. Pakistan's urban households are experiencing a high poten-

[74] Nobel Laureate Joseph Stiglitz highlighted that 40 percent of the nation's wealth is owned by the richest 1 percent of Americans; and research by Atkinson, Piketty, & Saez (Top Incomes in the Long Run of History, 2011) also confirms this concentration of wealth.
[75] The study by Jamal (2016) and Pakistan NHDR (2003) established the presence of these disparities.
[76] Remind that in this analysis HDI represents the potential level of human development, whereas, IHDI represents the actual level of human development.

tial human development in contrast to rural households which have a low level of potential human development. The urban HDI is 1.5 times the rural HD. At subnational level, Islamabad

Table 5.4 National and Provincial HDIs and Inequality Measures

Human Development		HDI	HDI*	IHDI	A_{HD}	A_{HD}*	C_{HI}
Capital	Islamabad	0.7500	0.7420	0.7016	0.0646	0.0544	0.0541
National	Overall	0.5517	0.5313	0.4007	0.2738	0.2458	0.2448
	Urban	0.6899	0.6796	0.6144	0.1094	0.0959	0.0944
	Rural	0.4707	0.4400	0.3118	0.3375	0.2912	0.2889
KPK	Overall	0.5247	0.5063	0.3808	0.2743	0.2480	0.2440
	Urban	0.6578	0.6477	0.5733	0.1285	0.1150	0.1131
	Rural	0.4944	0.4734	0.3469	0.2983	0.2671	0.2612
Punjab	Overall	0.5613	0.5408	0.4152	0.2603	0.2323	0.2312
	Urban	0.6931	0.6825	0.6200	0.1055	0.0915	0.0905
	Rural	0.4952	0.4666	0.3395	0.3143	0.2724	0.2692
Sindh	Overall	0.5575	0.5371	0.3956	0.2903	0.2634	0.2610
	Urban	0.6976	0.6879	0.6223	0.1079	0.0954	0.0934
	Rural	0.3903	0.3397	0.2304	0.4096	0.3216	0.3184
Balochistan	Overall	0.4626	0.4220	0.3102	0.3294	0.2648	0.2605
	Urban	0.5994	0.5760	0.5132	0.1439	0.1090	0.1057
	Rural	0.4115	0.3609	0.2570	0.3754	0.2877	0.2830

is at top of the list and falls in category of high human development. At overall provincial level; Punjab ranks first followed by Sindh, KPK, and Balochistan; respectively. The first three provinces are at medium level whereas Balochistan is at low level of potential human development. The regional (urban-rural) analysis of provinces show wide disparities across urban and rural regions. This difference is highest in the Sindh province. Region-wise comparison of provinces reveals that Sindh urban has highest HDI, thereafter comes Punjab urban and KPK urban. These three regions have potential human development at high level category. Balochistan urban is forth and it falls in medium class. Punjab rural is at fifth, followed by KPK rural, Balochistan rural, and

Sindh rural respectively. Except the rural area of Punjab which marginally lies in medium category all other provincial rural areas fall in low category with respect to potential human development. The national and provincial ranking (urban, rural, and overall) values of HDI in this study closely resembles the corresponding estimates reported by Pakistan NHDR (Hussain D. A., 2003), although the indicators of HDI dimensions are not same. It also indicates that across provinces there is neither any considerable improvement in relative level of human development, nor any change in ranking with respect to human development in sixteen years (1998-2014)[77]. These findings are also comparable to the findings of Pakistan NHDIR (2017), Jamal (2016), and Jamal & Jahan (2007).

The Inequality-Adjusted analysis reveals that in most regions actual level of human development is significantly below the potential human development level. The HDI* accounts for across dimensions inequalities. Its values do not change the human development level significantly from that of HDI. This phenomenon depicts that across dimension inequalities at provincial and national levels are not too high. Most of the IHDI values are significantly lower than HDI, as it accounts for both across dimensions and within dimension inequalities. According to the IHDI measure the actual level of human development for Pakistan is 0.4 that falls in range of low human development. According to this measure only Islamabad falls in the category of high human development. The value of IHDI for all provinces is below 0.4, except for Punjab. Thus, levels of households' actual human development in KPK, Punjab and Sindh are categorized as low human development, and in Balochistan as very low. The urban-rural divide gets more severe according to this measure. The urban- rural ratio of actual human development (after adjusting for inequalities) is; 1.97, 1.65, 1.83,2.7, and 2; respectively for

[77] Mostly data used in Pakistan NHDR 2003 is for year 1998.

Pakistan, KPK, Punjab, Sindh, and Balochistan. The highest contrast is observed in Sindh; where, urban IHDI (0.6223) is highest, and rural IHDI (0.23) is lowest; amongst all provincial urban and rural IHDIs.

The results confirm that there are substantial losses in human development due to high prevailing inequalities across and within regions. The three measures of inequality, showing percentage losses due to distributional inequalities, are given in last three columns of Table 5.4. The 'A_H' is the Atkinson's measure of inequality, showing percentage loss arising due to both within dimensions and across dimensions inequalities. This loss varies from the lowest of 6 percent for Islamabad to the highest of 41 percent for rural Sindh. At national level the loss of human development is estimated at 27 percent. The loss for national rural population is more than three times higher than that for national urban population. At overall provincial level the highest loss is experienced by Balochistan followed by Sindh, KPK, and Punjab respectively. The loss is low for urban households of provinces as compared to rural households. In rural areas, the loss in KPK is lowest preceded by Punjab and Balochistan, in Sindh it is highest.

The second measure of inequality, A_H^* is also an Atkinson measure of inequality and it estimates the percentage loss due to within dimensions inequalities only. The third measure is coefficient of human inequality (C_{HI}), it is an arithmetic mean of dimensional inequalities, it also captures within dimension inequalities. The percentage loss measured by A_H^* is almost equal to coefficient of human inequality at all levels. It reveals that inequalities in individual dimensions i.e. standard of living, education, and health; are almost of equal magnitude. The values of A_H^* are lower than A_H at each level, because A_H also accounts for across dimension inequalities along with within dimension inequalities. The difference of these two, measures the loss in human development index due to inequalities across the dimensions. The A_H and A_H^* are highly correlated, showing that the areas with high within dimensions inequalities also experience high across dimension inequalities at national and provincial levels. The estimated percentage loss measured by A_H* is lowest for Islamabad, and the highest is for Sindh rural. Accordingly, the loss arising due to across dimension inequalities (A_H - A_H*) is the lowest for Islamabad 1 percent; and the highest for both Sindh rural and Balochistan rural almost 9 percent.

5.1.3 District-Wise Analysis of Human Development Index and Its Inequalities

At district level, the two measures of human development are focused, the standard human development index (HDI) and Inequality-Adjusted human development index (IHDI). The district-wise estimates of these indices along with ranks are given in Table D.1, Appendix D. These statistics for national level top twenty and bottom twenty districts in terms of IHDI ranking are given in Table 5.5 and Table 5.6 respectively.

The estimates show a radical contrast of human development level across districts. While a few districts are experiencing high average level of human development, there are some districts with extremely low level of average human development. None of the districts could be considered in very high human development category with respect to HDI or IHDI. Inequality adjustment depicts a significant reduction in potential human development indices for most of the districts. At national level across districts the estimated indices of human development (HDI) varies from the lowest value of 0.28 (very low human development) to the highest value of 0.75 (high level of human development). Federal capital Islamabad is at top of the list with HDI 0.750; followed by Karachi 0.745, Lahore 0.736, Rawalpindi 0.712 and so on. The KPK's capital, Peshawar is ranked 11th with HDI 0.625; and Balochistan's capital Quetta is ranked 9th with

HDI of 0.634. The district with at the lowest end of human development are; Kohistan from KPK with HDI 0.326, Sujawal from Sindh with HDI 0.330, Chagai and Sheerani

Table 5.5 HDIs and Inequality Measures for Top Ranked Twenty Districts

Human Development		HDI	IHDI	A_{HD}	C_{HI}	Rank HDI	Rank IHDI
Province	District						
Capital	Islamabad	0.7500	0.7016	0.0646	0.0541	1	1
Sindh	Karachi	0.7454	0.6989	0.0624	0.0535	2	2
Punjab	Lahore	0.7364	0.6884	0.0653	0.0558	3	3
Punjab	Rawalpindi	0.7119	0.6476	0.0903	0.0764	4	4
Punjab	Sialkot	0.6780	0.5979	0.1181	0.0958	5	5
Punjab	Jhelum	0.6532	0.5751	0.1196	0.0979	6	6
Punjab	Gujranwala	0.6470	0.5561	0.1404	0.1191	7	7
Balochistan	Quetta	0.6339	0.5545	0.1253	0.0910	9	8
Punjab	Gujrat	0.6444	0.5527	0.1424	0.1228	8	9
KPK	Haripur	0.6320	0.5322	0.1579	0.1373	10	10
KPK	Peshawar	0.6250	0.5212	0.1660	0.1454	11	11
Punjab	Attock	0.6114	0.5180	0.1526	0.1338	12	12
Punjab	Chakwal	0.6067	0.4904	0.1917	0.1607	13	13
Punjab	Faisalabad	0.6054	0.4849	0.1990	0.1764	14	14
KPK	Karak	0.5634	0.4762	0.1547	0.1130	19	15
Punjab	Sheikhupura	0.5837	0.4607	0.2107	0.1792	17	16
Sindh	Hyderabad	0.5881	0.4593	0.2191	0.1905	16	17
KPK	Malakand	0.5597	0.4522	0.1921	0.1634	20	18
KPK	Abbottabad	0.5902	0.4504	0.2368	0.2193	15	19
KPK	Lakki Marwat	0.5369	0.4422	0.1764	0.1278	30	20

from Balochistan with HDI of 0.331 and 0.28 respectively. The findings of this study in terms of HDI ranking are quite analogous to the results of Jamal (2016). Though the rest is similar, the top most and bottom most ranking of districts in this study diverges from that of Pakistan NHDIR (2017). This could be due to the utilization of household-based indices and different indicators for HDI dimensions in this study. Analysis of human development with Inequality adjustment reveals a significant reduction in human development indices for most of the districts, although top most and bottom most ranking remains the same with respect to HDI and IHDI. Last column in Table D.3 shows how drastically the ranking of some districts improves and of some districts

Table 5.6 HDIs and Inequality Measures for Bottom Ranked Twenty Districts

Human Development Province	District	HDI	IHDI	A_{HD}	C_{HI}	Rank HDI	Rank IHDI
Balochistan	Bolan/ Kachhi	0.4053	0.2359	0.4179	0.3388	91	95
Sindh	Kashmore	0.3857	0.2319	0.3988	0.2819	100	96
Sindh	Jacobabad	0.3928	0.2233	0.4315	0.3380	94	97
Punjab	Muzaffargarh	0.3971	0.2214	0.4425	0.3653	93	98
KPK	Tor Ghar	0.3712	0.2184	0.4116	0.3121	102	99
Sindh	Tharparkar	0.3698	0.2180	0.4104	0.2732	103	100
Balochistan	Lasbela	0.3890	0.2168	0.4428	0.4052	95	101
Balochistan	Washuk	0.3673	0.2156	0.4130	0.2653	104	102
Sindh	Badin	0.3748	0.2105	0.4385	0.3525	101	103
Balochistan	Harnai	0.3605	0.2055	0.4298	0.3037	107	104
Sindh	Thatta	0.3641	0.2010	0.4480	0.3952	105	105
Balochistan	Jhal Magsi	0.3635	0.2005	0.4484	0.3068	106	106
Sindh	Tando Mohammad khan	0.3555	0.1916	0.4609	0.3568	109	107
Balochistan	Dera Bugti	0.3873	0.1877	0.5155	0.3896	97	108
Sindh	Umer Kot	0.3582	0.1858	0.4811	0.3839	108	109
Balochistan	Kohlu	0.3330	0.1791	0.4620	0.3407	110	110
KPK	Kohistan	0.3255	0.1742	0.4649	0.3495	113	111
Balochistan	Chagai	0.3314	0.1699	0.4874	0.3823	111	112
Sindh	Sujawal	0.3298	0.1519	0.5395	0.4655	112	113
Balochistan	Sheerani	0.2803	0.1389	0.5047	0.4415	114	114

deteriorates after accounting for inequality. Some of the big improvements are; Kila Saifullah which improves by 22 places, Loralai by 16, Gwadar by 12, both Shaheed Benazir Abad and Pishin by 11, Lakki Marwat by 10, both Layyah and Musakhel by 9. The noticeable deteriorations include; Mansehra by -18, Kohat by -15, Sahiwal by -12, Dera Bugti by -11, both Jhang and Nankana Sahib by -9.

To analyze the magnitude of loss due to inequality at district level, two measures are utilized, the Atkinson's measure of inequality (A_{HD}), and the coefficient of human inequality (C_{HI}). The district-wise estimates of these measures are reported in Table D.1, appendix D. For national level top twenty and bottom twenty districts in terms of IHDI ranking, these statistics are given in Table 5.5 and Table 5.6 respectively. The estimated losses and their variation across district establish the prevalence of high inequalities within and across districts in Pakistan. The percentage loss measured by A_{HD} varies from the lowest of 6.2 percent for Karachi to the highest of 54 percent for Sujawal. Islamabad is at second lowest, followed by Lahore, Rawalpindi. Districts at highest end of A_{HD} includes; Dera Bugti, Sheerani, Chagai, and Umer Kot. The coefficient of human inequality is lowest at 5.35 percent for Karachi, followed by Islamabad and Lahore. Sujawal exhibits the highest estimated value of 47 percent for coefficient of inequality, the second highest is Sheerani, the next is Dera Bugti. The loss in human development index due to across dimension inequality could be observed by the difference between A_{HD} and C_{HI}. It varies from the lowest of 0.9 percent for Karachi to highest of 18 percent for Barkhan. These measures are analyzed in detail in the following sections.

5.1.3.1 Inter provincial disparities

Figure 5.2 illustrates the inter provincial disparities regarding the potential (HDI), and actual (IHDI) human development level in their districts. It represents the province-wise percentage in Pakistan's top ranked thirty districts (excluding Islamabad), middle ranked thirty districts, and bottom ranked thirty districts. In top thirty districts ranked in terms of HDI; Punjab is leading with 50 percent share, KPK is second, third is Sindh, and Balochistan has the least share. The ranking of provincial shares for Sindh and Balochistan changes when index is adjusted for inequality (in terms of IHDI). Balochistan rises to third with a share of 13 percent and Sindh falls to fourth with same share of 10 percent. The shares of Punjab and KPK reduces with same ranking. In thirty middle ranked districts of Pakistan in terms of their HDIs, Punjab has the largest dominant share followed by KPK, Balochistan, and Sindh respectively. The ranking in terms of IHDI alters the size of provincial shares in the group of thirty middle ranked districts of Pakistan, however, the order of shares remains the same. The shares of Punjab and

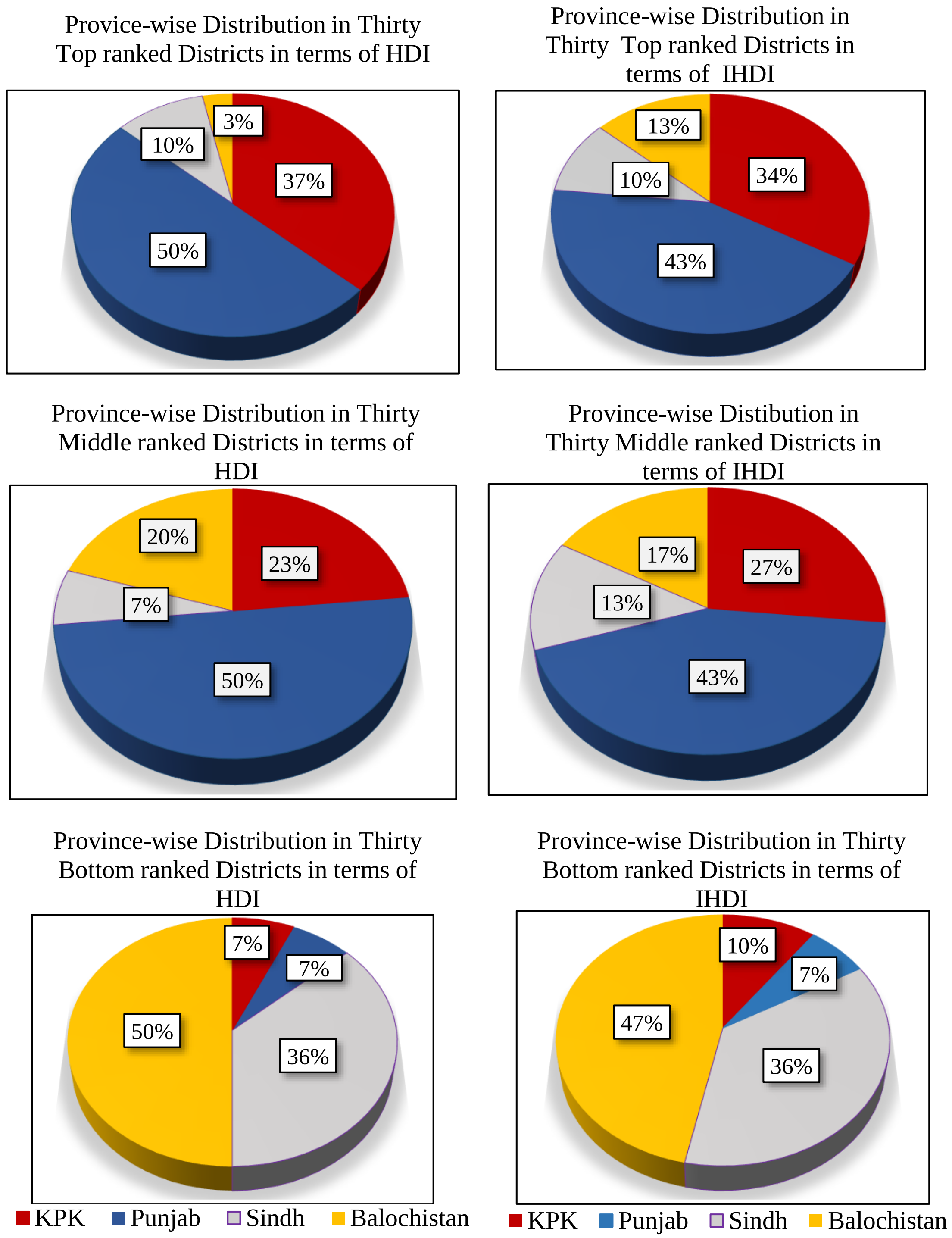


Figure 5.2 Province-wise Distribution in Top, Middle and Bottom Ranked Districts in terms of HDI and IHDI

Balochistan reduces by 7 percent, and 3 percent respectively; and that of KPK and Sindh rises by 4 percent, and 5 percent respectively. In contrast to high and middle ranked districts, in thirty bottom ranked districts in term of both HDI and IHDI; Balochistan and Sindh take dominant shares. In this group a very small proportion of districts includes from Punjab and KPK. A comparison of provincial-wise percentage of districts (in terms of HDI) estimated in this study to that reported by Pakistan NHDR 2003 reveals some noticeable findings. The percentage of Punjab is still highest in top ranked and middle ranked districts; however, this percentage reduced by 9 in top ranked thirty districts and increased by 18 in middle ranked thirty districts. Share of its districts increased from zero to 7 percent in thirty bottom ranked districts. The KPK demonstrated an improvement by a substantial increase of 18 percent in share of top ranked, 2 percent increase in middle ranked and 27 percent decrease in bottom ranked thirty districts. The province of Sindh exhibited an evident deterioration. The share of Sindh reduced by 3 percent and 22 percent in thirty top ranked, and thirty middle ranked districts respectively; and increased by 17 percent in thirty bottom ranked districts. Balochistan's share decreased by 6 percent in top ranked, increased by 2 percent and 3 percent respectively in middle ranked and bottom ranked thirty districts.

The national and province-wise distribution of districts in categories of human development, according to their HDI and IHDI values is given in Table 5.7. At national level out of 114 districts; 11 are in high, 36 are in medium, 57 are in low, and 10 are in very low categories of human development according to their HDI values. High human development category includes 2 districts from KPK, 6 from Punjab, and 1 each from Sindh and Balochistan. According to HDI values the highest proportion of districts in KPK and Punjab is with medium level of human development. Whereas in Sindh and Balochistan most of the districts are in low human development category. The very low human development group includes one district from KPK, none from Punjab, four districts from Sindh, and five districts from Balochistan. This distribution changes significantly when human development levels of the districts are adjusted for inequality.

Table 5.7 National and Provincial Distribution of Districts in Categories of HDI

Human Development		Districts (According to HDI)		Districts (According to IHDI)	
		Number	Percentage	Number	Percentage
Pakistan	Very High	0.0	0.0	0.0	0.0
	High	11.0	9.6	4.0	3.5
	Medium	36.0	31.6	8.0	7.0
	Low	57.0	50.0	34.0	29.8
	Very Low	10.0	8.8	68.0	59.6
KPK	Very High	0.0	0.0	0.0	0.0
	High	2.0	8.0	0.0	0.0
	Medium	13.0	52.0	2.0	8.0
	Low	9.0	36.0	10.0	40.0
	Very Low	1.0	4.0	13.0	52.0
Punjab	Very High	0.0	0.0	0.0	0.0
	High	6.0	16.7	2.0	5.6
	Medium	16.0	44.4	5.0	13.9
	Low	14.0	38.9	14.0	38.9
	Very Low	0.0	0.0	15.0	41.7
Sindh	Very High	0.0	0.0	0.0	0.0
	High	1.0	4.2	1.0	4.2
	Medium	4.0	16.7	0.0	0.0
	Low	15.0	62.5	4.0	16.7
	Very Low	4.0	16.7	19.0	79.2
Balochistan	Very High	0.0	0.0	0.0	0.0
	High	1.0	3.6	0.0	0.0
	Medium	3.0	10.7	1.0	3.6
	Low	19.0	67.9	6.0	21.4
	Very Low	5.0	17.9	21.0	75.0

According to actual level of human development (IHDI); overall concentration of districts shifts to low and very low categories of human development from its medium and low categories. According to IHDI, at national level majority of the districts (60 percent) are in very low human development category. Almost thirty percent of the districts are in low human development category. There are a few districts that falls in high class or in medium class of human development. In KPK and Punjab the concentration is high in both low and very low categories, whereas in Sindh and Balochistan most of the districts fall in very low category.

5.1.3.2 Province-wise inter and intra district disparities

Province-wise inter and intra district analysis is presented graphically in Figures 5.3-5.6. The visual inspection of figure 5.3 part (a) shows a considerable variation in both potential and actual level of human development across and within KPK districts. In KPK, Haripur district is at the top in terms of both HDI and IHDI ranking. Peshawar, Karak, and Malakand are respectively second, third and fourth highest in terms of IHDI. Out of these districts only Haripur and Peshawar are in high category of human development, the rest of them lies in medium human development. Adjustment for inequality brings down the high human development districts to medium level, and districts in medium category falls in to the low human development category. At the lowest is Kohistan; preceded by Tor Ghar, Buner, and Shangla; in terms of both HDI and IHDI. Kohistan and Tor Ghar lie in very low category in term of both HDI and IHDI. Buner and Shangla are in the category of low human development and with adjustment for inequality they fall in to very low category. It is important to highlight some districts, where human development level affected significantly due to distributional inequalities. Inequality reduces the level of human development substantially in the districts of Abbottabad, Mansehra, Kohat and Buner. Due to lower level of inequality the IHDI ranks of Karak, Lakki Marwat, Bannu, and Chitral are significantly higher than their HDI ranks. Part (b) of Figure 5.3 shows the percentage loss incurred due to both within dimension and across dimension inequalities (A_{HD}) in each district by black bars. It ranges from the lowest value of 16 percent for Haripur to the highest of 46 percent for

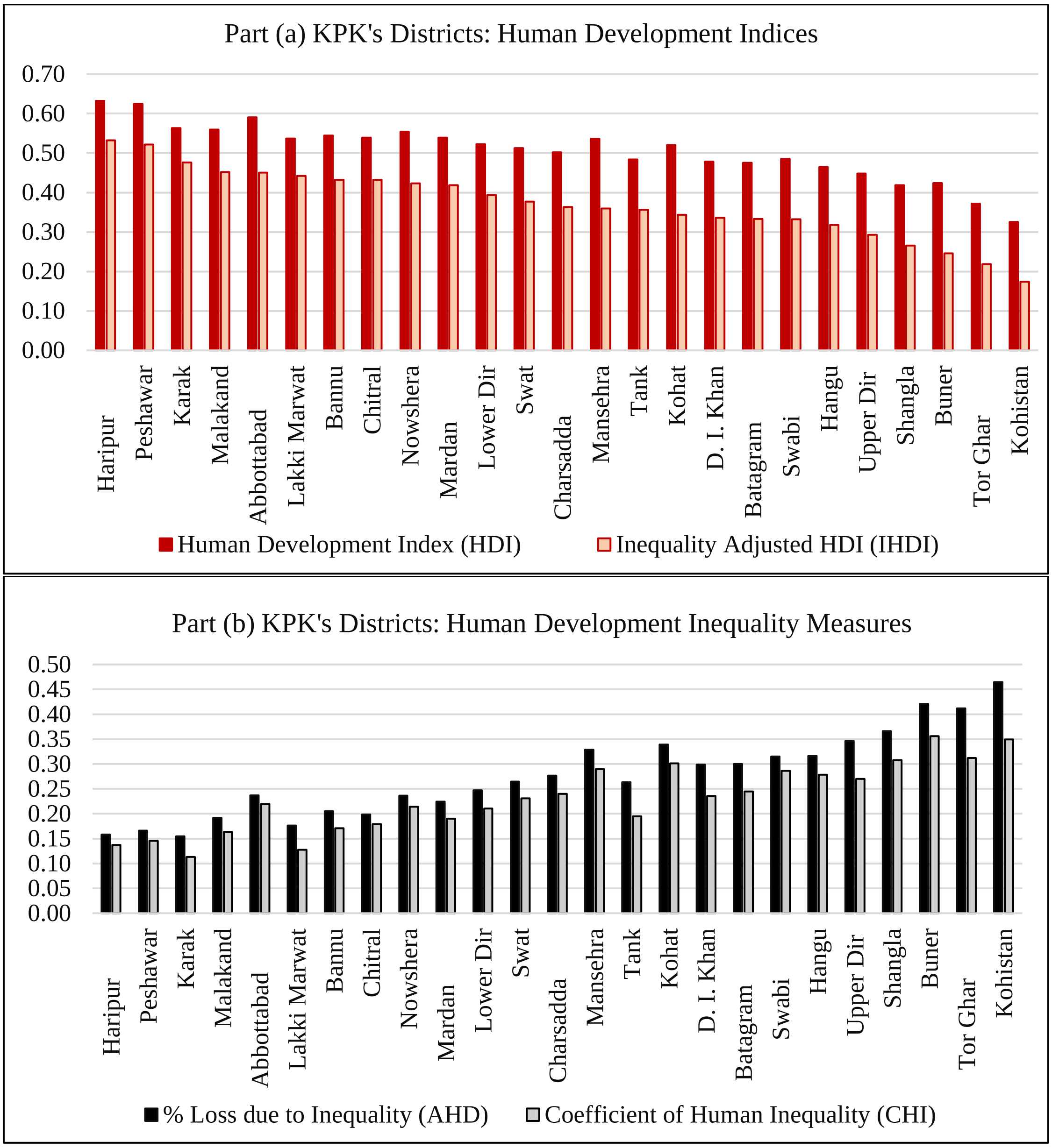


Figure 5.3 HDIs and Inequalities Measures for KPK Districts

Kohistan. The grey bars show the coefficient of inequality (loss due to within dimension inequalities) for each district. The lowest C_{HI} is 11 percent for Karak and the highest is for Buner at 35.6 percent. The bars showing percentage losses for Abbottabad, Mansehra, Kohat, and Buner are prominently high as compared to their adjacent bars, reveals the larger prevailing inequalities in those districts. The difference between A_{HD} and C_{HI} represents the percentage loss in human development due to across dimension inequalities. It is portrayed by difference in the height of black bar and grey bar for each district. There is a noticeable variation in the magnitude of these inequalities across districts of KPK. The percentage loss caused by across dimensions inequalities varies from 2 percent in Haripur to 11.5 percent for Kohistan. It shows that across dimensions inequalities play a significant role in raising human development disparities in KPK. Figure 5.4 depicts the estimates of human development indices and percentage losses incurred due to inequalities for districts of Punjab. It reveals high intra provincial disparities in terms of human development and its distributional inequalities within districts. Specifically, the high differences between districts of central Punjab and southern Punjab are in accordance to the priori expectations. The districts with highest human development and lower inequalities are from central or northern Punjab. Lahore is leading district with HDI and IHDI values of 0.74 and 0.65. The next highest are Rawalpindi at 0.68 HDI, Sialkot at 0.68 HDI, Jhelum and Gujranwala at 0.65 HDI, and Gujrat at 0.64 HDI. These all districts fall in high category of human development in terms of HDI. Adjustment for inequality pull down these districts in the medium human development category, except the district of Lahore that remains in high human development category with a loss of 6.5% in HDI due to inequality. Most of the south-eastern and western districts of Punjab are with low human development indices accompanied with high distributional inequalities. Muzaffargarh with lowest HDI of 0.40, lies in low category of human development, preceded by Rajanpur at 0.41, Rahim Yar Khan at 0.45, Bahawalpur at 0.46 and so on. Inequality adjustment brings these districts down in to very low class of human development. In case of Punjab, district wise ranking in terms of HDI has a considerable change for top ranked districts of Punjab as compared to that reported by Pakistan NHDR (2003). Lahore raised up from 8th to 1st rank, Sialkot from 9th to 3rd

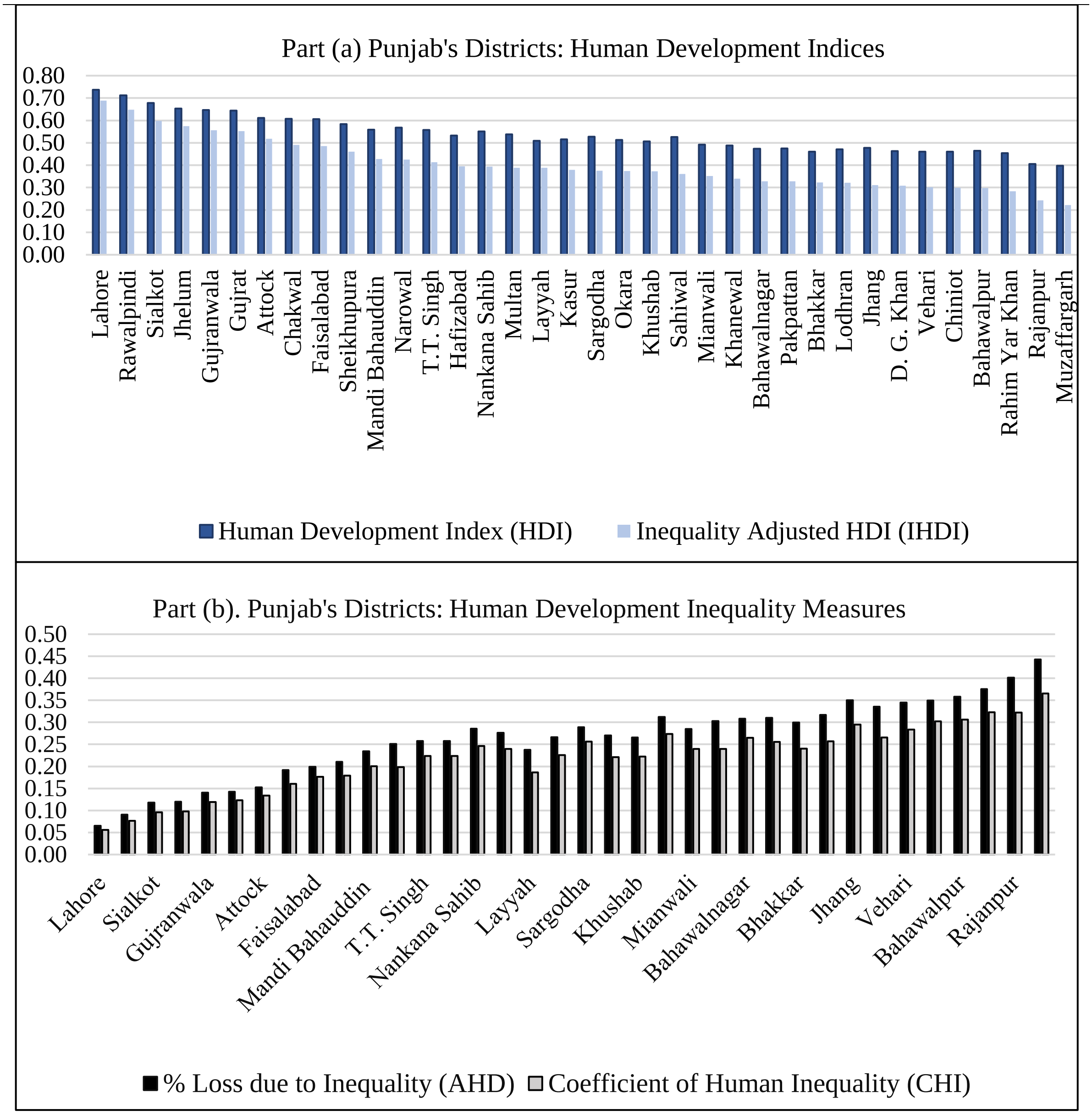


Figure 5.4 HDIs and Inequalities Measures for Punjab Districts

rank, and Bhakkar worsened from 3rd to 27th position; in districts of Punjab. Figure 5.4 part(b) depicts the percentage loss experienced due to inequalities (A_{HD}), and coefficients of human inequality (C_{HI}), for districts of Punjab. The value of A_{HD} in the districts of Punjab ranges from 6.5 percent of lowest for Lahore to the highest of 44 percent for Muzaffargarh. The value of C_{HI} is lowest at 5.6 percent for Lahore and is highest at 37 percent for Muzaffargarh. In the districts of Sahiwal, Jhang, Nankana Sahib, T.T. Singh, Sargodha, and Multan, high inequality pulls down the level of human development markedly. The bars of percentage loss are obviously high for these districts as compared to the surrounding bars. The IHDI ranks of Layyah and Bhakkar are significantly higher than their HDI ranks due to lower distributional inequalities of human development. It could also be observed from relatively lower bars of A_{HD} and C_{HI} for these two districts as compared to their adjacent bars. The percentage loss due to across dimensions inequalities (measured by the difference of A_{HD} and C_{HI}) is at lowest of 0.95 percent for Lahore and is highest for Rajanpur at 8 percent. Therefore, across dimensions inequalities are also a potential cause of human development disparities within and across districts in Punjab.

Figure 5.5 provides with a pictorial analysis of human development and its distributional inequalities across the districts of Sindh. Part (a) exhibits that the distribution of development indices across districts of Sindh is more skewed as compared to other provinces. Karachi at the top end of distribution, is characterized with markedly high HDI (0.745) and IHDI (0.699), and significantly low inequality coefficient (0.05); as compared to the other districts of Sindh. It is the only district of Sindh that falls in category of high human development in terms of both HDI and IHDI. Hyderabad with HDI of 0.59 and IHDI of 0.46 is the second highest, followed by Sukkur, Dadu, and Naushahro Feroze. All these districts fall in medium human development category and with inequality adjustment pulled down in low category. The rest of the districts in Sindh are in either low or very low class of human development. At the bottom end of distribution is Sujawal with lowest values of HDI (0.33) and IHDI (0.15), preceded by

Umer Kot, Tando Muhammad Khan, Thatta and so on. Inequality lessens the level of human development substantially in most of the districts of Sindh. The IHDI ranks of

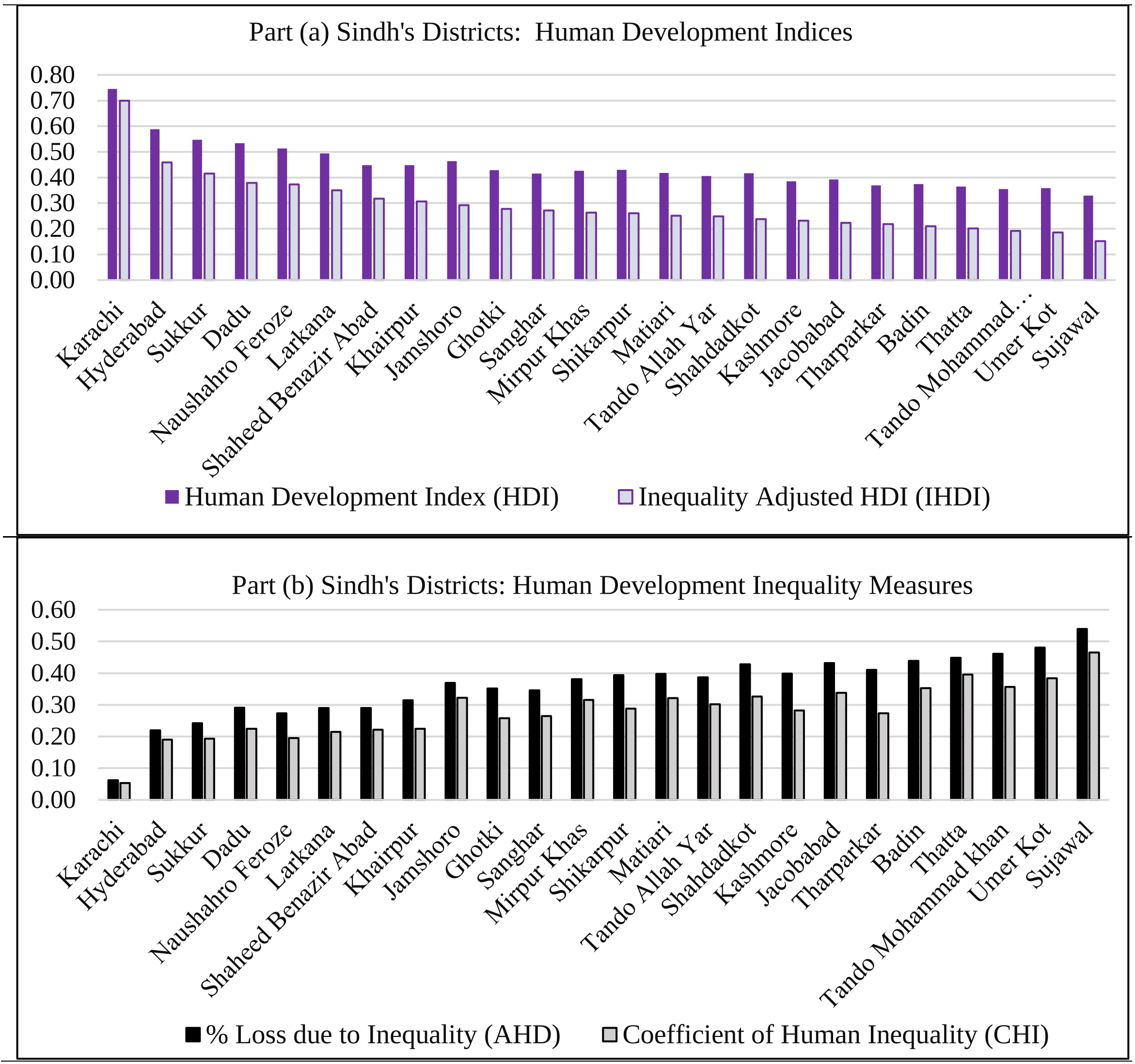


Figure 5.5 HDIs and Inequalities Measures for Sindh Districts

Shahdadkot, Jamshoro, and Dadu are quite lower than HDI ranks due to higher inequalities. Relatively low level of inequality raises the ranks of Shaheed Benazir Abad, Khairpur, and Sanghar in terms of IHDI at noticeably higher level than their HDI ranks. Part (b) of Figure 5.5 shows the percentage loss incurred due to within dimension and across dimension inequalities (A_{HD}) and coefficient of human inequality (C_{HI}) in each district. The A_{HD} ranges from the lowest values of 6 percent for Karachi to the highest of 54 percent for Sujawal. The lowest C_{HI} is 5 percent for Karachi and the highest is for Sujawal at 47 percent. The bars showing percentage losses for Shahdadkot, Jamshoro, and Dadu are prominently high as compared to their adjacent bars, showing the larger prevailing inequalities in those districts. The difference between A_{HD} and C_{HI} is portrayed by the difference in the heights of black bar and grey bar for each district. There is a noticeable variation in the magnitude of these inequalities across districts of Sindh. The percentage loss caused by across dimension inequalities varies from 0.9 percent for Karachi to 14 percent for Tharparkar. Thus, a potential source of human development disparities across and within districts of Sindh is across dimensions inequalities.

A review of Figure 5.6 reveals that Balochistan is characterized by high intra provincial disparities in terms of human development and its distributional inequalities within and across districts. Most of the districts in Balochistan are in low category of human development and with inequality adjustment falls in very low category. The top ranked district of Balochistan is Quetta at HDI of 0.63, followed by Mastung at 0.54, Gwadar at 0.52, and Pishin at 0.51. In terms of HDI Quetta is in category of high HDI, and the rest of two are in medium HDI category. Adjustment for inequality pulls down these districts in lower human development categories, and Mastung slides down from second to fourth position. Quetta with IHDI of 0.55 is in medium category; Gwadar with 0.42 IHDI, Pishin with 0.398 IHDI, and Mastung with 0.397 IHDI, fall in low category. The lowest in districts of Balochistan is Sheerani with HDI of 0.28 preceded by Chagai and Kohlu, both at HDI of 0.33. All the three districts fall in very low human development class. The Inequality adjustment further pulls down their human development indices. Figure 5.6 part(b) displays the percentage loss experienced due to inequalities (A_{HD}), and coefficients of human inequality (C_{HI}). The value of A_{HD} is lowest for Quetta at 12.5 percent and it is highest for Sheerani at 50 percent. The value of C_{HI}

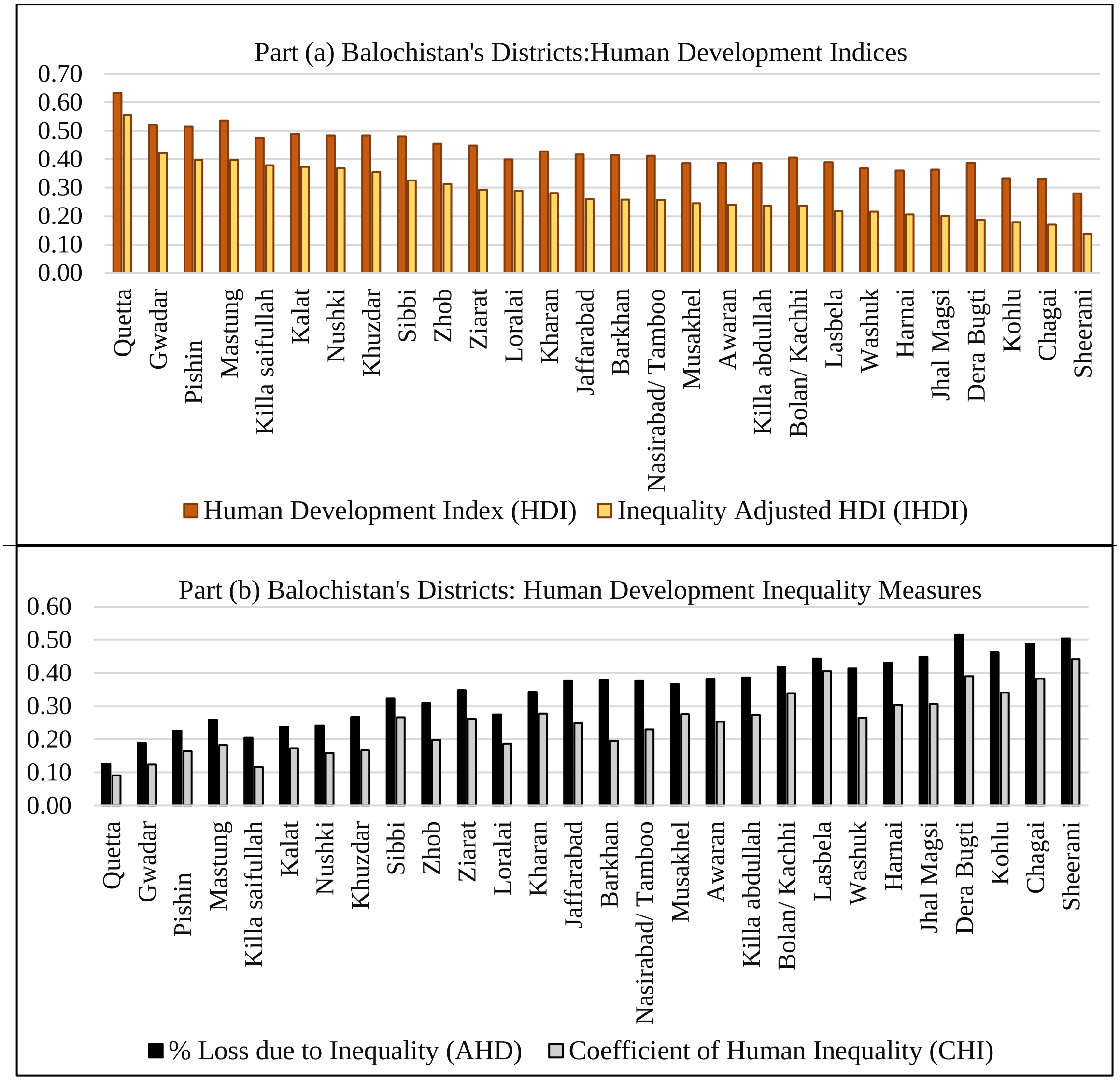


Figure 5.6 HDIs and Inequalities Measures for Balochistan Districts

ranges from the lowest of 9 percent for Quetta to the highest of 52 percent for Dera Bugti. In the districts of Mastung, Sibbi, Lasbela, and Dera Bugti; high inequality pulls down the level of human development markedly. The bars of percentage loss are obviously high for these districts as compared to the surrounding bars. The IHDI ranks of Killa Saifullah, Pishin and Loralai are significantly higher than their HDI ranks due to lower distribution inequalities of human development. It could also be observed from relatively lower bars of A_{HD} and C_{HI} for these two districts as compared to their adjacent bars. The percentage loss due to across dimensions inequalities (measured by the difference of A_{HD} and C_{HI}) is represented by the difference in heights of black and grey bars for each district. The difference is sizeable for most districts and its magnitude varies across districts. It is at lowest for Quetta at 3 percent and is highest for Barkhan at 18 percent. It shows that the across dimensions inequalities are also significant in raising intra district and intra provincial human development disparities in Balochistan.

5.2 Dimensional Indices of Human Development and Their Inequalities

The disaggregated analysis of human development is carried out in three dimensions of HDI, namely standard of living, health, and education. To evaluate the dimensional performance, households' indices in each direction are classified in to five categories. The cut-off values for five categories of a dimension are determined by five national quintiles of corresponding households' indices. The categories of dimensional achievement level along with their cutoff values are given in Table 5.8.

Table 5.8 Categories of Dimensional Achievements with Cutoff Values

Categories	Cutoff Values		
	Standard of Living	Education	Health
Very low	Less than 0.16	Less than 0.19	Less than 0.53
Low	0.16 to 0.29	0.19 to 0.50	0.53 to 0.75
Medium	0.30 to 0.42	0.51 to 0.69	0.76 to 0.86
High	0.43 to 0.57	0.70 to 0.93	0.87 to 0.95
Very High	greater than 0.57	greater than 0.93	greater than 0.95

A simple comparison of lowest and highest cutoff values reveals that highest disparities are in education indices of households. The gap between maximum and minimum cutoff values of SOL index is 0.41, of health index is 0.42, whereas for education index it is 0.74.

5.2.1 Standard of Living Index and Its Inequalities

The national level summary statistics of estimated household's standard of living index (S_i) are cited in Table 5.9. The arithmetic mean (national I_s) tells that in Pakistan households on average has a medium potential standard of living. The wide differences in quintiles' average SOL indices show the prevalence of high disparities across households. The potential SOL index (I_S) of top 20 percent of households is almost seven times higher than that of lowest 20 percent. The geometric mean of S_i (national I_{is}) shows that Pakistani households' actual SOL lies in low category. The disparities get louder after adjustment for inequality, the ratio of Inequality-Adjusted SOL index (I_{iS}) of lowest 20 percent to that of highest 20 percent is 1:8. The weighted estimates of Kernel density for households' SOL indices are given in Figure 5.7. The

Table 5.9 Descriptive Statistics of Household's SOL Index at National Level

Household's SOL Index (S_i)	Overall	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile
Arithmetic Mean	0.3690	0.0969	0.2251	0.3538	0.4959	0.6732
Geometric Mean	0.2945	0.0859	0.2220	0.3519	0.4939	0.6682
Median	0.3534	0.0997	0.2258	0.3534	0.4961	0.6447
Minimum	0.0000	0.0000	0.1586	0.2890	0.4210	0.5734
Maximum	1.0000	0.1586	0.2890	0.4210	0.5732	1.0000
Standard Deviation	0.2083	0.0377	0.0370	0.0375	0.0443	0.0853
Skewness	0.2938	-0.3701	-0.0528	0.0551	0.0068	1.0827
Kurtosis	2.2067	2.3354	1.8418	1.8327	1.7406	3.2211

plot suggests that distribution of SOL is asymmetric and is highly skewed. The density of households in very low category of SOL index is highest and is lowest in very high category, and gradually reduces from low to high categories of SOL index.

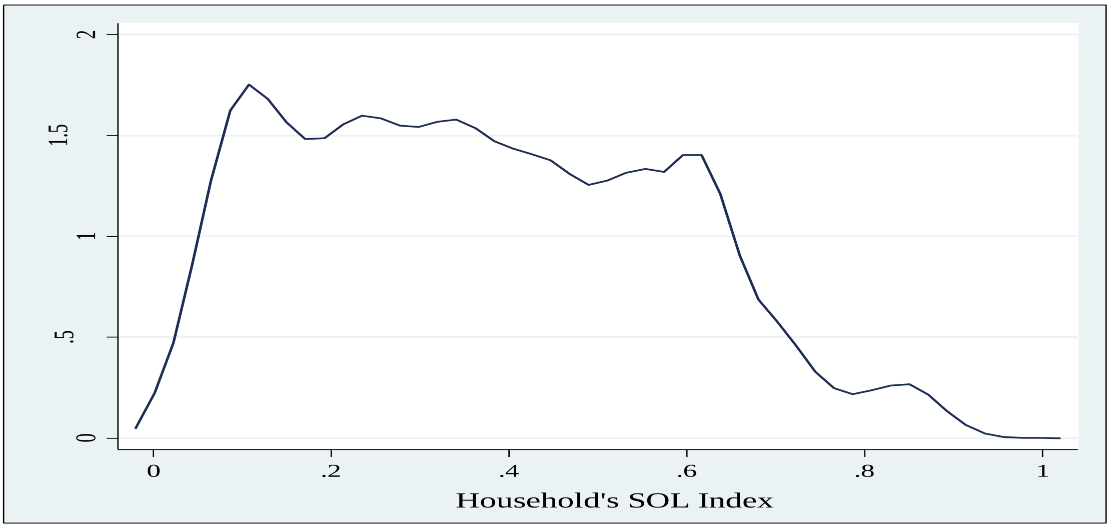


Figure 5.7 Kernel Density Estimates of Household's SOL Index

The estimates of SOL index (I_S), Inequality-Adjusted SOL index (I_{iS}), and the estimated percentage losses due to inequalities in standard of living (A_S); for Pakistan, its four provinces, and federal capital; are cited in Table 5.10. After adjustment for inequality Pakistan's average SOL falls in to low category. The estimates confirm the incidence of high disparities in SOL across provinces and across rural urban regions as established by previous studies[78]. At sub-national level the SOL index ranges from the highest 0.60 for Islamabad to lowest 0.17 for Sindh rural. For Pakistan's urban households SOL index is double the SOL index of rural households. At overall provincial level KPK ranked first followed by Punjab and Sindh tied at second, and Balochistan at fourth. The first three provinces are at medium level, whereas Balochistan is at low level; of potential SOL. The inter-regional analysis of provinces shows wide disparities across urban and rural regions. This disparity is highest in the Sindh province. Region-wise comparison of provinces reveals that SOL index is highest for KPK urban, followed by Sindh urban and Punjab urban. These three regions fall in high category of SOL index. Balochistan urban is forth and it falls in medium class. KPK rural is at fifth,

[78] Jamal (2016), Jamal & Jahan (2007), and Hussain D. A. (2003).

next are Punjab rural, Balochistan rural, and Sindh rural respectively. Rural households of KPK lies in medium category, all other provincial rural areas fall in low category in terms of potential SOL. However, Punjab rural is at highest end of SOL's low category and Sindh rural is almost at its lower end.

Table 5.10 National and Provincial SOL indices and Inequality Measures

Standard of Living		SOL Index (I_S)	Inequality-Adjusted SOL Index (I_{IS})	Percentage Loss due to Inequality (As)
Capital	Islamabad	0.6010	0.5802	0.0347
National	Overall	0.3690	0.2945	0.2019
	Urban	0.5344	0.4989	0.0665
	Rural	0.2719	0.2162	0.2051
KPK	Overall	0.3841	0.3325	0.1343
	Urban	0.5453	0.5136	0.0581
	Rural	0.3474	0.3012	0.1330
Punjab	Overall	0.3722	0.3080	0.1724
	Urban	0.5326	0.5005	0.0602
	Rural	0.2918	0.2415	0.1724
Sindh	Overall	0.3722	0.2689	0.2777
	Urban	0.5443	0.5040	0.0740
	Rural	0.1670	0.1271	0.2391
Balochistan	Overall	0.2605	0.2011	0.2280
	Urban	0.4182	0.3925	0.0614
	Rural	0.2015	0.1566	0.2228

Statistics of Inequality-Adjusted SOL index demonstrate that standard of living falls in each region due to inequalities. Islamabad with a minimum loss of 3 percent remains in the high category of SOL. Similarly, despite of considerable losses KPK and Punjab remain in medium category. Sindh's SOL deteriorates to low category, while Balochistan further falls in the same category of SOL. The loss due to inequality is very high in rural areas as compared to their urban counter parts. Inter provincial comparison reveals that in Sindh inequality coefficient is highest for both urban and rural regions. Its urban region maintains its high SOL category with a loss of 6 percent, whereas its rural SOL falls to very low category. In comparison the least reduction is in SOL indices of KPK's urban and rural regions followed by Punjab. In Balochistan Urban region remains in medium SOL class, while its rural SOL deteriorates to very low category.

The district-wise SOL indices (I_S), Inequality-Adjusted SOL indices (I_{iS}), and coefficients of inequality (A_S) are reported in Table A.5, appendix A. It reveals that potential standard of living in most of the districts is in medium or low categories. Inequality adjustment drags down majority of districts' SOL to low or very categories. The estimated inequality statistics establish the prevalence of wide disparities within districts and across district. The SOL indices and inequality coefficients for ten top ranked and ten bottom ranked districts are given in Table 5.11. In ranking of both SOL indices I_s and I_{is}; Karachi is at the top followed by Lahore, and Islamabad. These are the only three districts in Pakistan that are in very high category of SOL index and remain in this category after adjusting for inequality. The next comes Rawalpindi, Peshawar, Sialkot respectively with consistent ranking with respect to I_S and I_{iS}. These districts fall in high SOL category. The Balochistan's capital Quetta lies in high category of SOL, it is at 10th place in SOL index ranking and after adjusting for inequality it rises to 7th. Tharparkar is at lowest rank of SOL index and Sujawal is at lowest rank after adjusting for inequality. Both are in very low category of SOL preceded by Washuk, Jhal Magsi, and Dera Bugti.

Analysis of inequality coefficients reveals that loss due to inequality ranges from the nominal loss of almost 1 percent in Karachi to the substantial loss of 34 percent in Sujawal. In top ten districts maximum loss due to inequality is around 7 percent, in contrast the minimum loss in bottom ten districts is around 18 percent. It shows that magnitude of disparities within districts and across districts rises with deterioration of SOL in general.

Table 5.11 District-wise SOL Indices and Inequality Measures

Standard of Living Province	 District	Is	Iis	(As)	Rank I_S	Rank I_{iS}	Change in rank due to inequality
Top Ranked Districts							
Sindh	Karachi	0.6218	0.6128	0.0145	1	1	0
Punjab	Lahore	0.6069	0.5891	0.0293	2	2	0
Capital	Islamabad	0.6010	0.5802	0.0347	3	3	0
Punjab	Rawalpindi	0.5465	0.5151	0.0574	4	4	0
KPK	Peshawar	0.5114	0.4504	0.1193	5	5	0
Punjab	Sialkot	0.4800	0.4462	0.0703	6	6	0
Balochistan	Quetta	0.4657	0.4448	0.0448	10	7	3
Punjab	Gujranwala	0.4720	0.4376	0.0728	7	8	-1
Punjab	Gujrat	0.4679	0.4348	0.0707	8	9	-1
KPK	Haripur	0.4652	0.4345	0.0660	11	10	1
Bottom Ranked Districts							
Sindh	Badin	0.1565	0.1086	0.3060	104	105	-1
Balochistan	Chagai	0.1346	0.1059	0.2129	110	106	4
Sindh	Tando Mohammad khan	0.1512	0.1040	0.3124	106	107	-1
Balochistan	Awaran	0.1280	0.1035	0.1916	112	108	4
Sindh	Umer Kot	0.1394	0.1024	0.2658	109	109	0
Balochistan	Dera Bugti	0.1528	0.1023	0.3306	105	110	-5
Sindh	Tharparkar	0.1223	0.1009	0.1750	114	111	3
Balochistan	Jhal Magsi	0.1313	0.1002	0.2370	111	112	-1
Balochistan	Washuk	0.1266	0.0951	0.2487	113	113	0
Sindh	Sujawal	0.1421	0.0944	0.3361	107	114	-7

An inter provincial comparison is given in Figure 5.8, depicting the percentage of districts from each of the four provinces in thirty top ranked and thirty bottom ranked districts in terms of Inequality-Adjusted SOL index (I_{iS}). The largest percentage in top thirty ranked districts is that of Punjab, followed by a considerable percentage of KPK and very small percentages of Sindh and Balochistan. Main and equal sized proportions in bottom thirty districts are acquired by Sindh and Balochistan. KPK and Punjab hold very small, same proportions; in bottom thirty districts.

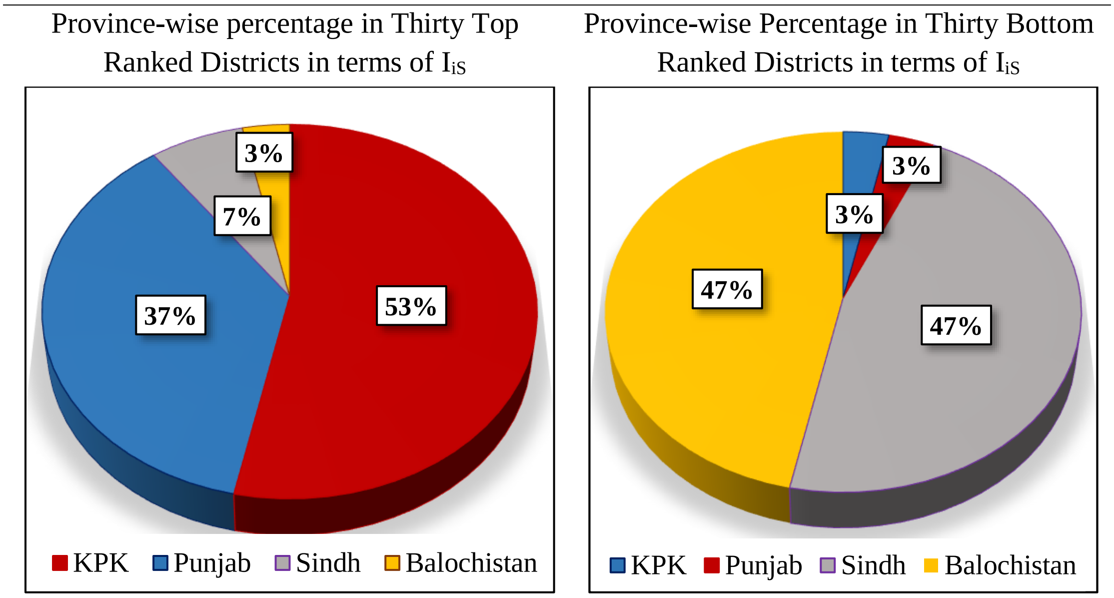


Figure 5.8 Province-wise Distribution in Top, and Bottom Ranked Districts in Terms of Inequality-Adjusted SOL Index

The national and province-wise distribution of districts in categories of SOL, according to their SOL index and Inequality-Adjusted SOL index is given in Table 5.12.

At national level highest proportion of districts lies in low category of SOL and the second large proportion is in medium SOL. With inequality adjustment the highest proportion of districts persists in low SOL with a reduction in size, however, the very Low SOL becomes the second largest category. In inter provincial comparison KPK is at top with majority districts in medium SOL category, according to both SOL indices I_S and I_{iS}. Punjab is at second with major proportion of districts shared equally by medium and low categories of SOL, and with inequality adjustment low SOL becomes the single major category. In Sindh and Balochistan majority districts are in low category in terms of I_S and this majority switches to very low category in terms of I_{iS}. However, fewer districts of Balochistan deteriorates from low to very low category of SOL, as compared to Sindh.

Table 5.12 National and Provincial Distribution of Districts in Categories of SOL Index

Standard of Living		Districts (According to I_S) Number	Districts (According to I_S) Percentage	Districts (According to I_{iS}) Number	Districts (According to I_{iS}) Percentage
Pakistan	Very High	3	2.6	3	2.6
	High	13	11.4	9	7.9
	Medium	34	29.8	24	21.1
	Low	51	44.7	47	41.2
	Very Low	13	11.4	31	27.2
KPK	Very High	0	0.0	0	0.0
	High	4	16.0	3	12.0
	Medium	17	68.0	15	60.0
	Low	3	12.0	6	24.0
	Very Low	1	4.0	1	4.0
Punjab	Very High	1	2.8	1	2.8
	High	7	19.4	5	13.9
	Medium	14	38.9	7	19.4
	Low	14	38.9	22	61.1
	Very Low	0	0.0	1	2.8
Sindh	Very High	1	4.2	1	4.2
	High	1	4.2	0	0.0
	Medium	1	4.2	1	4.2
	Low	16	66.7	7	29.2
	Very Low	5	20.8	15	62.5
Balochistan	Very High	0	0.0	0	0.0
	High	1	3.6	1	3.6
	Medium	2	7.1	1	3.6
	Low	18	64.3	12	42.9
	Very Low	7	25.0	14	50.0

Intra provincial analysis of district-wise SOL indices is presented graphically in Figures 5.9. The visual inspection reveals that among provinces, disparities in SOL across districts are lowest in KPK and are highest in Sindh. The difference between

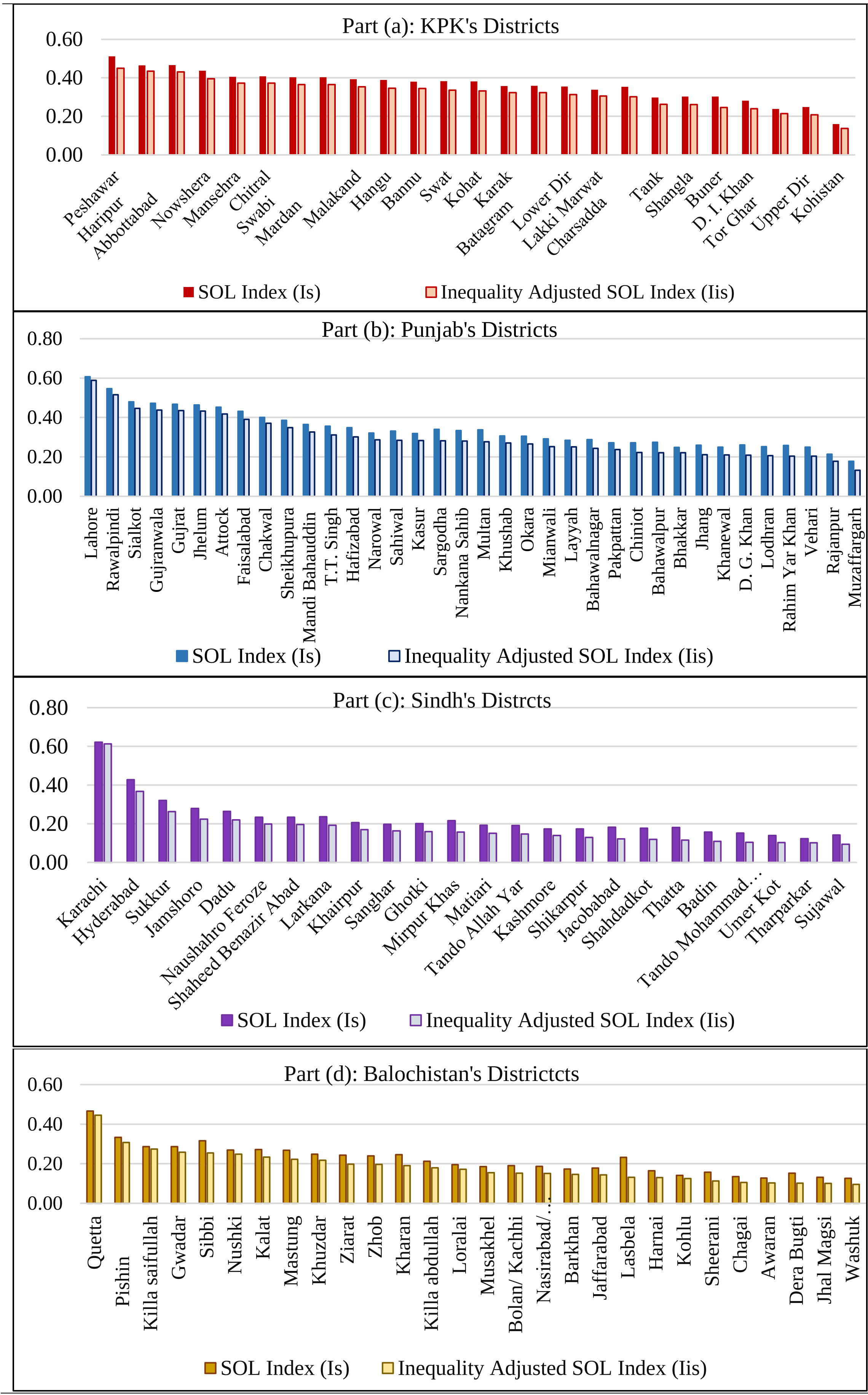


Figure 5.9 District-wise SOL Indices with and without Inequality Adjustment

bars representing I_s and I_{iS} represents the percentage loss due to inequality within districts. The comparison of graphs for four provinces reveals that intra district disparities are low in most districts of KPK and are highest in most districts of Sindh. In Punjab standard of living is better as compared to Sind and Balochistan. However, there are wide disparities across districts and within districts, specifically western and south-eastern districts of Punjab have markedly low SOL and high disparities. The SOL indices in most districts are low in Balochistan as compared to other provinces, however in terms of disparities it is better than Sindh.

5.2.2 Education Index and Its Inequalities

The household's education index (E_i) is estimated as a weighted average of two component indices, the schooling index (Sc_i) and adult literacy index (L_i). These indices also provide a useful insight in to status and distribution of educational achievements. The national and Provincial adult literacy indices and schooling indices (overall and region-wise) are given in Table B.1, appendix B. These indices at District level are reported in Table B.2, appendix B.

The adult literacy rate at national level is 55.7, with inequality adjustment it falls to 36.8 percent. It shows that even under perfect equality 44.3 percent of adult population in Pakistan is illiterate, with prevailing inequalities it rises to 63.2 percent. These estimates are comparable to UNDP estimate of 58.7 percent as Pakistan's adult literacy rate for year 2014. At provincial level literacy rates for Sindh and Punjab are almost same at 58 percent. The estimated literacy rates for KPK and Balochistan are respectively 45 percent and 39 percent. With inequality adjustment literacy rate falls substantially for all provinces. There are vast disparities among urban and rural regions at national and provincial levels. National urban literacy rate is more than double the rural literacy rate with inequality adjustment. Urban-rural gap is highest in Sindh, the same as noticed for HDI and SOL index. District-wise estimates of literacy index show that Islamabad has the highest literacy rate of 83 percent, followed by Karachi at 81 percent, Rawalpindi at 80.7 percent, Lahore at 78 percent. Literacy rates in Quetta and Peshawar are at 58 percent and 54 percent respectively. The bottom most districts are from KPK and Balochistan. The lowest literacy rate is 20 percent in Tor Ghar from KPK, and it drops to 11 percent with inequality adjustment. Tor Ghar is preceded by Kohistan, Barkhan, and Killa Abdullah. It is observed that in general intra district inequality rises with a reduction in literacy rate. Estimates establish the prevalence of wide intra district disparities regarding households' literacy rates.

The Schooling indices with a slight variation go side by side the literacy indices. For overall Pakistan schooling index is 0.56, with inequality adjustment it drops to 0.38. At provincial level Punjab is with highest schooling index of 0.59; the next are Sindh 0.54, KPK 0.50, and Balochistan 0.40. At district level same ranking order is observed as for literacy index. Among districts highest schooling index is 0.76 for Islamabad and lowest is 0.23 for Kohistan, with inequality adjustment these drops respectively to 0.69 and 0.11. Rural-urban differences are high and follow the same order as in literacy index.

The national level summary statistics for households' estimated education indices are cited in Table 5.13. The arithmetic mean (national I_E) states that in Pakistan average education level of households falls in medium category of educational achievements. The wide differences in education indices across and within quintiles show the prevalence of high educational disparities across households. Specifically, in second and fourth quintiles the difference between maximum and minimum E_i is markedly high. The potential education index (I_E) of top 20 percent of households is almost thirteen times higher than that of lowest 20 percent. The geometric mean of E_i (national

I_{iE}) displays that Pakistani households' actual education level lies in low category. The disparities get more prominent after adjustment for inequality, the Inequality-Adjusted education index (I_{iE}) of lowest 20 percent households is almost sixteen times greater than that of highest 20 percent.

Table 5.13 Descriptive Statistics of Household's Education Index at the National Level

Household's Education Index (E_i)	Overall	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile
Arithmetic Mean	0.5581	0.0750	0.3455	0.5761	0.8131	0.9814
Geometric Mean	0.3942	0.0628	0.3334	0.5727	0.8101	0.9811
Median	0.5714	0.0400	0.3400	0.5714	0.8111	0.9959
Minimum	0.0400	0.0400	0.1943	0.4981	0.6872	0.9263
Maximum	1.0000	0.1941	0.4978	0.6869	0.9259	1.0000
Standard Deviation	0.3293	0.0475	0.0880	0.0632	0.0696	0.0236
Skewness	-0.1886	0.9301	-0.1645	0.2175	-0.0355	-0.9192
Kurtosis	1.7110	2.3372	1.7760	1.6243	1.7882	2.3248

The plot of weighted estimates of Kernel density for household's education index is given in Figure 5.10. It depicts that household's education index has a multimodal distribution. The distribution has three peaks at very low level, at middle and at very high level. Thus, most of the households' education indices are clustered around 0.1, 0.5, and 1. It shows positive association in educational achievements of a household's members. This plot also displays the high educational disparities across households.

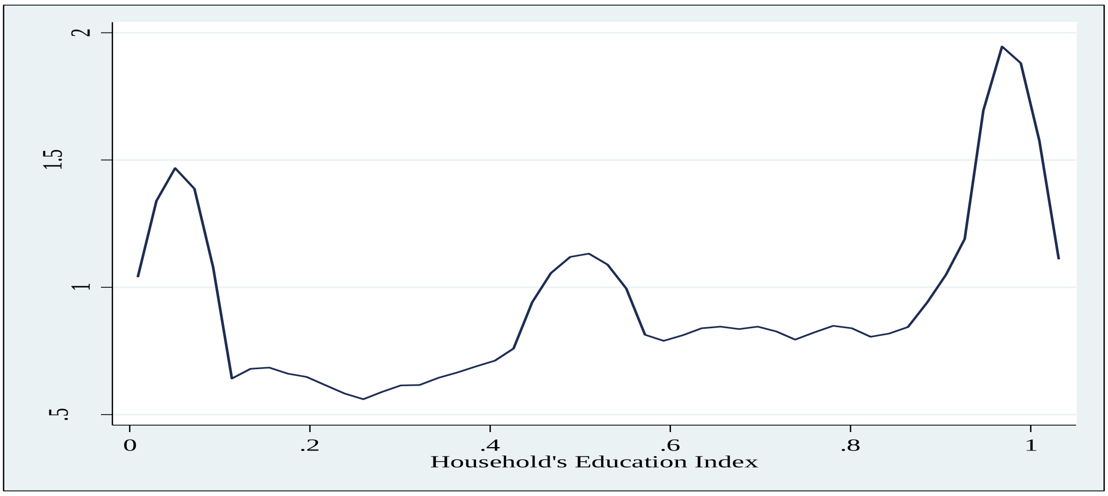


Figure 5.10 Kernel Density Estimates of Household's Education Index

The estimates of education index (I_E), Inequality-Adjusted education index (I_{iE}), and the estimated percentage losses due to inequalities in educational achievements across households (A_E); for Pakistan, its four provinces, and federal capital; are cited in Table 5.14.

Table 5.14 National and Provincial Education indices and Inequality Measures

Education		Education Index (I_E)	Inequality-Adjusted Education Index (I_{iE})	% Loss due to Inequality (A_E)
Capital	Islamabad	0.8101	0.7373	0.0899
Pakistan	Overall	0.5581	0.3942	0.2936
	Urban	0.7232	0.6038	0.1652
	Rural	0.4613	0.3071	0.3344
KPK	Overall	0.4681	0.3372	0.2796
	Urban	0.6068	0.4903	0.1920
	Rural	0.4366	0.3097	0.2906
Punjab	Overall	0.5836	0.4263	0.2695
	Urban	0.7362	0.6262	0.1495
	Rural	0.5070	0.3515	0.3067
Sindh	Overall	0.5703	0.3849	0.3250
	Urban	0.7375	0.6098	0.1733
	Rural	0.3707	0.2223	0.4002
Balochistan	Overall	0.3925	0.2481	0.3678
	Urban	0.5512	0.4348	0.2110
	Rural	0.3332	0.2012	0.3962

These estimates establish the incidence of low actual educational achievements in most regions and of high disparities across regions. At sub-national level the education index ranges from the highest 0.81 for Islamabad to lowest 0.33 for Balochistan rural. At national level urban education index lies in high category, while rural index falls in low category of educational achievements. The urban households' education index is 1.6 times higher than that of rural households. At overall provincial level Punjab ranked first followed by Sindh, KPK, and Balochistan respectively. The Punjab and Sindh are in medium category, whereas KPK and Balochistan are in low category; of potential educational achievements. The inter-regional analysis of provinces reveals substantial disparities across urban and rural regions. Sindh province shows the highest regional disparities in the educational achievements. Region-wise comparison of provinces reveals that education index is highest for Sindh urban, Punjab urban is next with a slight difference. Both regions are in high category of education index. With education indices of medium category KPK urban and Balochistan urban are at third and fourth positions respectively. Punjab rural is at fifth, next are KPK rural, Sindh rural, and Balochistan rural respectively. Rural households of Punjab lie in medium category, all other provincial rural areas fall in low category in terms of potential education indices (I_E).

Inequality-Adjusted education index demonstrate that achievement level in education is affected considerably in each region due to inequalities. The loss is substantial with a varied magnitude in different regions. At national level this loss is estimated around 29 percent. Islamabad with a minimum loss of 9 percent remains in the high category of education. All provinces with inequality adjustment deteriorate to low category of education index. The loss due to inequality is markedly high in rural areas as compared to their urban counter parts. Inter provincial regional comparison reveals that inequality coefficient of education is highest for Sindh rural and is lowest for Punjab urban. Balochistan rural is approximately suffering same percentage loss as Sindh rural.

The district-wise Education indices (I_E), Inequality-Adjusted Education indices (I_{iE}), and coefficients of inequality (A_E) are reported in Table B.3, appendix B. There is no district in Pakistan with very high category education index. The data reveals that potential education index in most of the districts is in medium or low categories, a very few are in high category. Inequality adjustment pulls down majority of districts' education indices to low or very categories. The estimated inequality coefficients validate the prevalence of wide disparities within districts. The education indices and inequality coefficients for ten top ranked and ten bottom ranked districts are given in Table 5.15.

Table 5.15 District-wise Education Indices and Inequality Measures

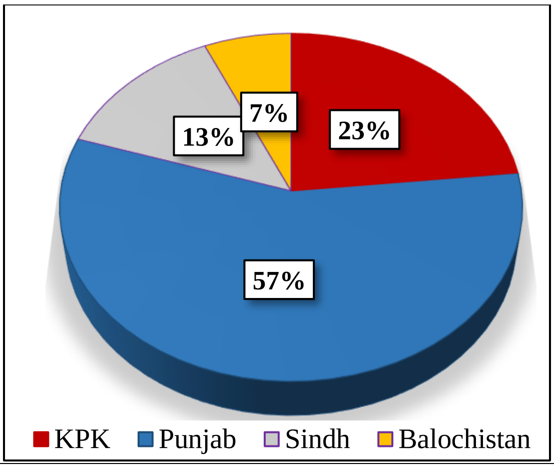
Education							
Province	District	I_E	I_{iE}	A_E	Rank I_E	Rank I_{iE}	Change in rank due to inequality
			Top Ranked Districts				
Capital	Islamabad	0.8101	0.7373	0.0899	1	1	0
Punjab	Rawalpindi	0.7904	0.7030	0.1106	2	2	0
Sindh	Karachi	0.7892	0.6828	0.1349	3	3	0
Punjab	Sialkot	0.7497	0.6809	0.0919	5	4	1
Punjab	Lahore	0.7664	0.6744	0.1200	4	5	-1
Punjab	Jhelum	0.7361	0.6436	0.1257	6	6	0
Punjab	Gujrat	0.7039	0.6027	0.1437	7	7	0
Punjab	Chakwal	0.6822	0.5726	0.1607	8	8	0
KPK	Haripur	0.6552	0.5660	0.1362	10	9	1
Punjab	Narowal	0.6534	0.5564	0.1485	11	10	1
			Bottom Ranked Districts				
Balochistan	Nasirabad/ Tamboo	0.2696	0.1564	0.4198	107	105	2
Balochistan	Chagai	0.2822	0.1533	0.4567	105	106	-1
Balochistan	Barkhan	0.2385	0.1491	0.3750	111	107	4
Sindh	Tando Mohammad khan	0.2905	0.1478	0.4913	104	108	-4
Balochistan	Dera Bugti	0.2534	0.1463	0.4224	109	109	0
Balochistan	Kohlu	0.2573	0.1453	0.4352	108	110	-2
KPK	Tor Ghar	0.2211	0.1395	0.3694	113	111	2
Balochistan	Killa Abdullah	0.2378	0.1389	0.4156	112	112	0
Balochistan	Harnai	0.2446	0.1291	0.4720	110	113	-3
KPK	Kohistan	0.2152	0.1270	0.4099	114	114	0

In ranking of both education indices with and without Inequality adjustment; Islamabad is at the top followed by Rawalpindi, and Karachi. Islamabad and Rawalpindi are the two districts in Pakistan that are in high category of education index and remain in this category after adjusting for inequality. The next comes Sialkot, Lahore, Jhelum respectively. These districts lie in high category according to their education index (I_E); however, with inequality adjustment; drives down to medium category. The Balochistan's capital Quetta is at 22nd place in education Index ranking in terms of both I_E and I_{iE}. KPK's capital Peshawar is ranked at 30th place in terms of I_E and with inequality adjustment it ranks at 26th place. Both districts lie in medium category of education and fall in low category with inequality adjustment. Kohistan is at lowest rank of education in terms of both education indices I_E and I_{iE}. It is preceded by Harnai, Killa Abdullah, Tor Ghar and Kohlu. All these bottom ranked districts are in low category of education and come down to very low category after accounting for inequality.

Analysis of inequality coefficients reveals that loss due to inequality ranges from the loss of almost 9 percent in Islamabad to the substantial loss of 49 percent in Tando Mohammad Khan. In top ten districts maximum loss due to in equality is around 16 percent, in contrast the minimum loss in bottom ten districts is around 37 percent. It shows that magnitude of disparities within districts and across districts rises with deterioration of education index in general.

An inter provincial comparison is given in Figure 5.11, depicting the percentage of districts from each of the four provinces in thirty top ranked and thirty bottom ranked districts in terms of actual education achievement (I_{iE}). In top thirty ranked districts dominant share is acquired by Punjab, followed by a considerable share of KPK. Sindh and Balochistan holds small shares in these districts. Balochistan and Sindh are dominant in bottom thirty districts, capturing more than half and more than quarter shares respectively. KPK's share is small and Punjab's share is nominal, in bottom thirty districts.

Province-wise Percentage in Thirty Top Ranked Districts in terms of I_{iE}



Province-wise Percentage in Thirty Bottom Ranked Districts in terms of I_{iE}

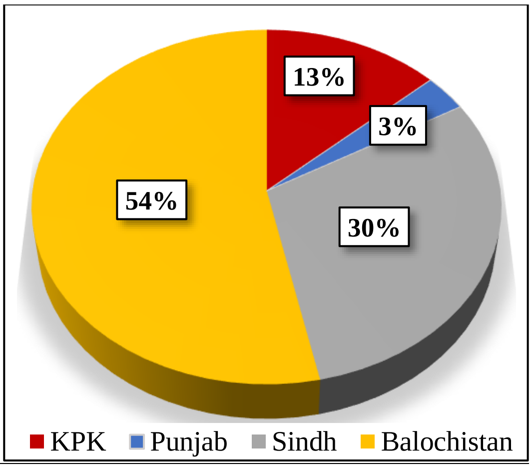


Figure 5.11 Province-wise Distribution in Top, and Bottom Ranked Districts in Terms of Inequality-Adjusted Education Index

The national and province-wise distribution of districts in categories of education, according to their education index (I_E) and Inequality-Adjusted education index (I_{iE}) is given in Table 5.16. The data portray quite unsatisfactory picture of educational achievements. At national level highest proportion of districts lies in low category of education and the second largest proportion in medium category. There is no district with education index that falls in very high category of education. With inequality adjustment the proportion of districts increases in low category and reduces markedly in medium category. Due to inequality, education index (I_{iE}) of several districts drives down in to very low category. In inter provincial comparison Punjab is demonstrating relatively better performance with majority districts in medium category, and a few in low and high categories. However, with inequality adjustment the concentration of districts in Punjab shifts to low category and only one district remains in high category. KPK is with majority of districts in low category followed by medium category. The concentration of KPK districts rises in low category with inequality adjustment. The number of districts in medium category reduces and some districts deteriorates to very

Table 5.16 National and Provincial Distribution of Districts in Categories of Education Index

Education		Districts (According to I_E)		Districts (According to I_{iE})	
		Number	Percentage	Number	Percentage
Pakistan	Very High	0	0.0	0	0.0
	High	7	6.1	2	1.8
	Medium	36	31.6	11	9.6
	Low	71	62.3	87	76.3
	Very Low	0	0.0	14	12.3
KPK	Very High	0	0.0	0	0.0
	High	0	0.0	0	0.0
	Medium	9	36.0	1	4.0
	Low	16	64.0	22	88.0
	Very Low	0	0.0	2	8.0
Punjab	Very High	0	0.0	0	0.0
	High	5	13.9	1	2.8
	Medium	19	52.8	8	22.2
	Low	12	33.3	27	75.0
	Very Low	0	0.0	0	0.0
Sindh	Very High	0	0.0	0	0.0
	High	1	4.2	0	0.0
	Medium	5	20.8	2	8.3
	Low	18	75.0	19	79.2
	Very Low	0	0.0	3	12.5
Balochistan	Very High	0	0.0	0	0.0
	High	0	0.0	0	0.0
	Medium	3	10.7	0	0.0
	Low	25	89.3	19	67.9
	Very Low	0	0.0	9	32.1

low category. In Sindh majority districts are in low category, a considerable number is in medium category in terms of I_E. With inequality adjustment many districts drive down to very low category. Balochistan's districts mostly fall in low category and with inequality adjustment a substantial proportion of districts deteriorates to very low category of education.

Figure 5.12 presents an Intra provincial analysis of district-wise education indices. Part (a) shows that disparities in educational achievements across districts are

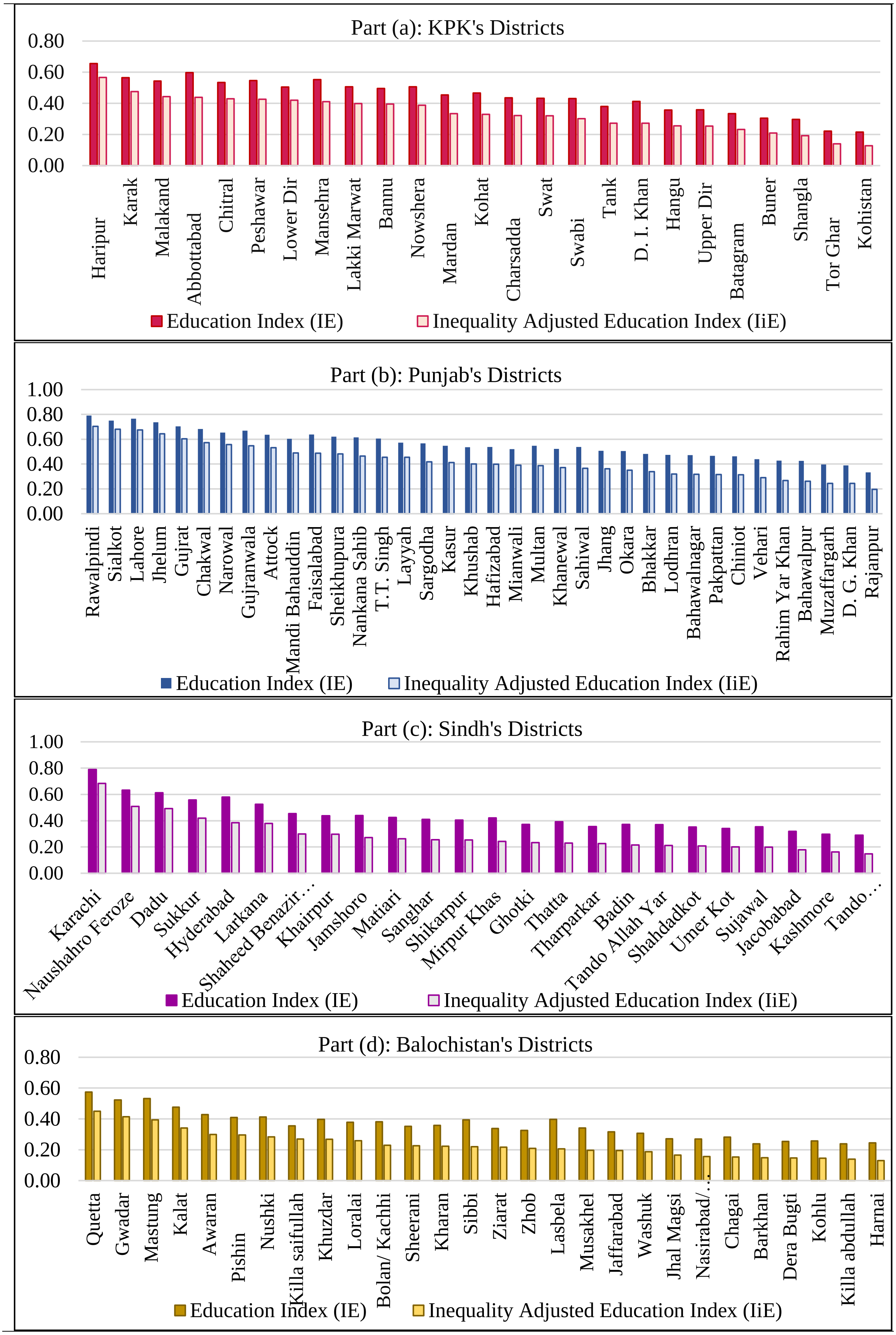


Figure 5.12 District-wise Education Indices with and without Inequality Adjustment

relatively low in KPK, however, in most of the districts within districts inequalities are high and education indices are low. Part (b) exhibits educational achievements are relatively better in many districts of Punjab, however within districts inequalities are high. A specific feature of Punjab is lower education indices and higher disparities in western and south-eastern districts as compared to districts of eastern and northern Punjab. Part (c) and Part (d) reveals that in both Sindh and Balochistan, there is a prevalence of high across districts inequality and majority districts are characterized with low education index and high educational inequalities.

5.2.3 Health Index and its Inequalities

The household's health index summary statistics at national level are given in Table 5.17. The statistics reveals that households in Pakistan has average potential health index (national I_H) laying in low category. The wide differences in average health indices across and within quintiles demonstrate the prevalence of high disparities across households. The wide range and high standard deviation in first quintile reveal that disparities are highest across households in this quintile. The range and standard deviation of health index gradually lessens in each successive higher quintile. The potential health index (I_H) ratio of lowest 20 percent households to highest 20 percent is 1: 3.4. The geometric mean of H_i (national Inequality-Adjusted health index) displays that with inequality adjustment households' health index remain in low category with a loss of 24 percent. Across quintiles disparities get worse after adjustment for inequality. The ratio of the Inequality-Adjusted health index (I_{iH}) of lowest 20 percent households to highest 20 percent is 1: 9.

Table 5.17 Descriptive Statistics of Households' Health Index Quintiles

Household's Health Index (Hi)	Overall	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile
Arithmetic Mean	0.7281	0.2876	0.6641	0.8004	0.9138	0.9771
Geometric Mean	0.5541	0.1111	0.6611	0.7997	0.9134	0.9770
Median	0.7963	0.3070	0.6795	0.7970	0.9182	0.9785
Minimum	0.0000	0.0000	0.5296	0.7478	0.8599	0.9497
Maximum	1.0000	0.5296	0.7478	0.8599	0.9497	1.0000
Standard Deviation	0.2579	0.1644	0.0624	0.0325	0.0256	0.0139
Skewness	-1.1765	-0.3114	-0.5421	0.1970	-0.5486	-0.2633
Kurtosis	3.5459	1.8806	2.1238	1.8015	2.1136	1.9761

The household's health index weighted estimates of kernel density are given in Figure 5.13. It depicts that household's health index is highly left skewed. A reason for this skewness is the indicator of household's health, child survival rate that clusters around high values. A consequence of this asymmetry is that the lowest cutoff value for health index in this study is quite high. This plot depicts the high health disparities across households.

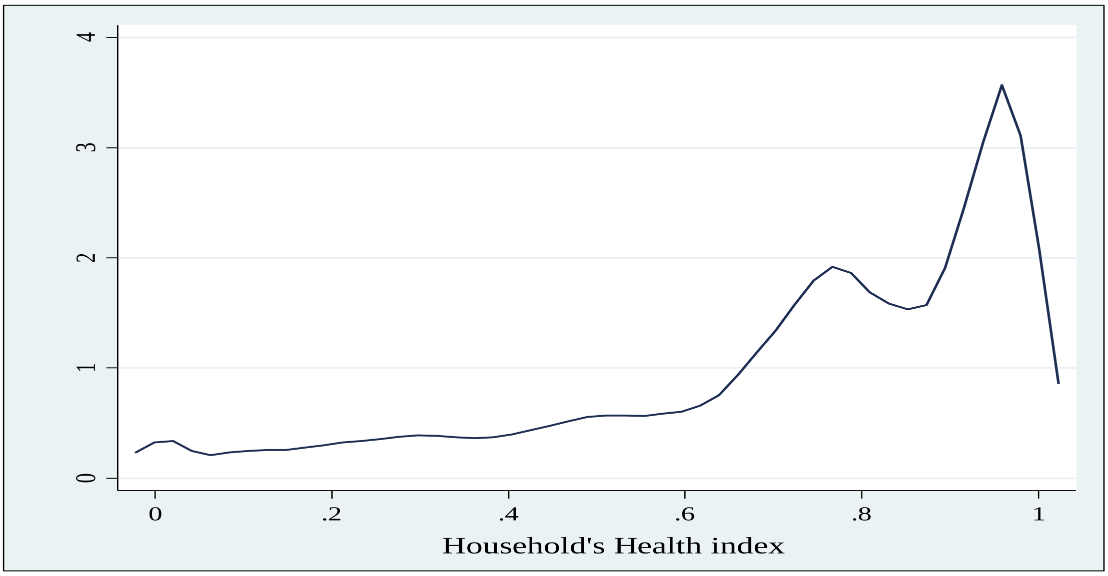


Figure 5.13 Kernel Density Estimates of Household's Health Index

The estimates of health index (I_H), Inequality-Adjusted health index (I_{iH}), and the estimated percentage losses due to inequalities in health achievements across households (A_H); for Pakistan, its four provinces, and federal capital; are given in Table 5.18. These estimates reveal that potential health achievements in most regions are in low category. Islamabad is at the top of the list with health index that is markedly higher than provincial health indices and fall in medium health category. The statistics demonstrate that there are no significant inter provincial disparities in health dimension, however, inter regional disparities and regional (urban-rural) differences are evidently high. National urban health index lies in medium category, while rural index falls in low category of health achievements. The urban households' health index is 1.2 times

Table 5.18 National and Provincial Health indices and Inequality Measures

Health		Health Index (I_H)	Inequality-Adjusted Health Index (I_{iH})	% Loss due to Inequality (A_H)
Capital	Islamabad	0.8390	0.8073	0.0377
Pakistan	Overall	0.7281	0.5541	0.2390
	Urban	0.8120	0.7700	0.0517
	Rural	0.6789	0.4569	0.3271
KPK	Overall	0.7219	0.4923	0.3181
	Urban	0.8214	0.7482	0.0891
	Rural	0.6993	0.4475	0.3600
Punjab	Overall	0.7281	0.5450	0.2515
	Urban	0.8106	0.7606	0.0618
	Rural	0.6867	0.4611	0.3286
Sindh	Overall	0.7299	0.5983	0.1803
	Urban	0.8110	0.7843	0.0329
	Rural	0.6332	0.4332	0.3159
Balochistan	Overall	0.7349	0.5983	0.1858
	Urban	0.8289	0.7918	0.0447
	Rural	0.6998	0.5388	0.2300

higher than that of rural households. For all provinces potential health indices are almost equal and lie in low category of health. The inter-regional analysis of provinces reveals substantial disparities across urban and rural regions. Like other dimensions of

HDI, Sindh province shows the highest regional disparity in health dimension as well. Region-wise comparison of provinces reveals that health index is highest for Balochistan urban, for KPK urban it is second highest, Sindh urban and Punjab urban are next with a slight difference. These urban regions are in medium category of health index. The health indices of all provincial rural regions are substantially low than their urban counter parts and fall in low category of health achievements. Sindh rural has a lower health index as compared to the rural regions of other three provinces, that have almost similar health indices. These findings do not match to that of Pakistan NHDIR (2017) according to which health index for Punjab is highest followed by KPK, Sindh, and Balochistan. The health indicators in the report are different from the current study and are based on average data available at district level. In current study National and sub-national health Indices are calculated as average of households' health indices.

Estimates of Inequality-Adjusted health index demonstrate that health achievements are affected significantly in each region due to inequalities. The loss is substantial with a varied magnitude in different regions. Islamabad with a minimum loss of 4 percent remains in the medium health category. With inequality adjustment the provincial health indices decline noticeably, three provinces remain in the same category while KPK drives down in very low health category. The loss due to inequality is substantially high in rural areas as compared to their urban counter parts. The health indices for three of the provincial urban regions remain in the same medium class of health while KPK urban drags down in to lower category. All provincial rural health indices deteriorate to very low health category, except Balochistan rural that still falls in low class of health. Inter provincial regional comparison reveals that inequality coefficient of health is highest for KPK rural and is lowest for Sindh urban. Balochistan rural is unexpectedly suffering with lowest loss as compared to other provincial rural regions. One possible justification for this finding might be that the 61 areas of Balochistan could not be covered due to security reasons in PSLM Survey (2013-14)[79].

The district-wise Health indices (I_H), Inequality-Adjusted Health indices (I_{iH}), and coefficients of inequality (A_H) are reported in Table C.6, appendix C. The statistics demonstrate that majority of the districts are characterized with low category health index and high inequalities in health achievements across households. Accounting for Inequality pulls down most of the districts' indices to very low category of health. The inequality statistics establish the prevalence of wide disparities within districts household's health achievements.

The estimates of health indices and inequality coefficients for ten top ranked and ten bottom ranked districts are given in Table 5.19. Quetta is at the top of the list in ranking of health indices with and without Inequality adjustment. According to potential health index (I_H) ranking Islamabad is second followed by Lahore, Barkhan, and Karachi. In terms of actual health index (I_{iH}) Lahore holds second rank followed by Karachi, Islamabad, and Barkhan. These districts lie in medium category according to both I_E and I_{iE}. KPK's capital Peshawar lies in medium category of health and falls in low category with inequality adjustment. Sheerani is at lowest rank of health followed by Sujawal in terms of both health indices I_H and I_{iH} and lie in very low category of health. Buner, and Chagai are next in bottom ranks and fall in low category of health. After inequality accounting these districts drive down to very low category of health index. The loss due to inequality in health achievements ranges from the loss of almost

[79] See Pakistan Social and Living Standard measurement Survey report (2013-14), National/Provincial Report (Pakistan Bureau of Statistics, 2015).

1 percent in Quetta to the huge loss of 68 percent in Sheerani. In top ten districts maximum loss due to in equality is around 10 percent, in contrast the minimum loss in bottom ten districts is around 41 percent. In general extent of disparities within districts and across districts increases with worsening of health index.

Table 5.19 District-wise Health Indices and Inequality Measures

Health		I_H	I_{iH}	A_H	Rank I_H	Rank I_{iH}	Change in rank due to inequality
Province	District						
Top Ranked Districts							
Balochistan	Quetta	0.8619	0.8522	0.0112	1	1	0
Punjab	Lahore	0.8361	0.8210	0.0180	3	2	1
Sindh	Karachi	0.8253	0.8160	0.0112	5	3	2
Capital	Islamabad	0.8390	0.8073	0.0377	2	4	-2
Balochistan	Barkhan	0.8320	0.7823	0.0597	4	5	-1
Balochistan	Khuzdar	0.8072	0.7657	0.0514	7	6	1
Balochistan	Zhob	0.7997	0.7545	0.0565	10	7	3
Punjab	Rawalpindi	0.7987	0.7499	0.0611	13	8	5
KPK	Peshawar	0.8173	0.7383	0.0966	6	9	-3
Balochistan	Killa Saifullah	0.7882	0.7344	0.0683	14	10	4
Bottom Ranked Districts							
Punjab	Muzaffargarh	0.6167	0.3339	0.4585	104	104	0
KPK	Swabi	0.6216	0.3339	0.4629	103	105	-2
Balochistan	Kohlu	0.6003	0.3150	0.4753	107	106	1
Sindh	Umer Kot	0.5940	0.3141	0.4712	109	107	2
Sindh	Thatta	0.5202	0.3053	0.4132	112	108	4
KPK	Kohistan	0.6015	0.3043	0.4941	106	109	-3
KPK	Mansehra	0.6489	0.3024	0.5340	92	110	-18
Balochistan	Chagai	0.5773	0.3017	0.4774	110	111	-1
KPK	Buner	0.6650	0.2876	0.5675	84	112	-28
Sindh	Sujawal	0.4934	0.1875	0.6201	113	113	0
Balochistan	Sheerani	0.3316	0.1051	0.6829	114	114	0

Figure 5.13 displays an inter provincial comparison, showing the percentage of districts from each of the four provinces in thirty top ranked and thirty bottom ranked

districts in terms of actual health achievement (I_{iH}). Balochistan obtains largest dominant share in thirty top ranked districts, followed by Punjab, KPK, and Sindh respectively. In thirty bottom ranked districts Punjab has the largest share followed by KPK,

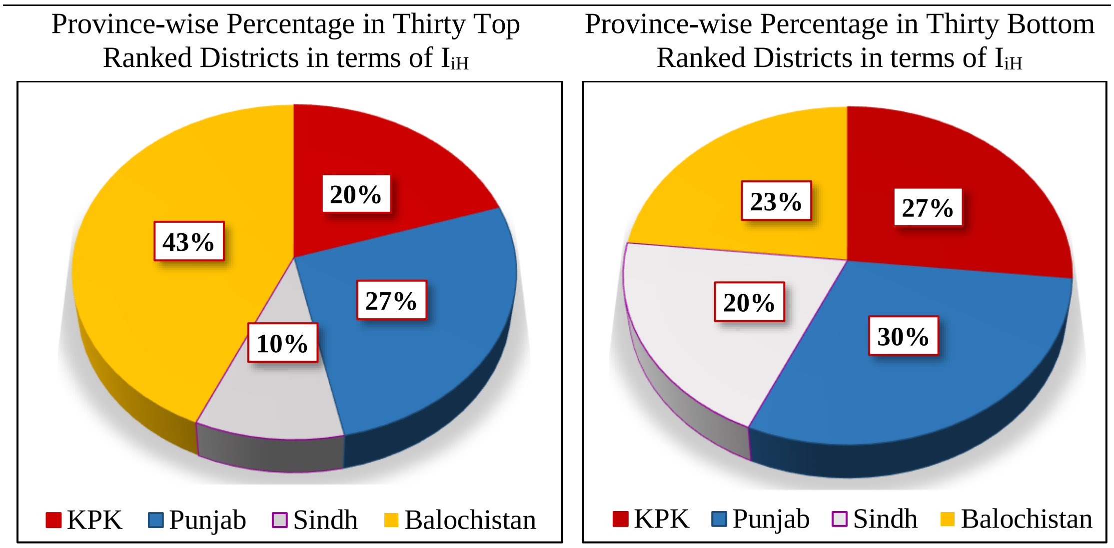


Figure 5.14 Province-wise Distribution in Top, and Bottom Ranked Districts in Terms of Inequality-Adjusted Health Index

Balochistan and Sindh. The layout of provincial shares in top and bottom of health index ranking is markedly different from other indices. The relatively better achievement level of Balochistan in health dimension is not in accordance to the priori expectations.

The national and province-wise distribution of districts in categories of health, according to their health index (I_H) and Inequality-Adjusted health index (I_{iH}) is given in Table 5.20. The health data depicts that level of achievements are worst in health dimension in comparison to SOL and education. Concentration of the districts is highest in low category of health that switches to very low category with inequality accounting. The second highest proportion of districts lies in medium category, however with inequality adjustment the proportion of districts reduces markedly in medium category. Neither potential nor actual health achievements level in any of the districts fall in very high or even in high category. In inter provincial comparison Balochistan is demonstrating relatively better performance with majority districts in medium followed by low category districts. Accounting for inequality shifts the concentration of districts to low and very low category and a very few falls in medium category.

Table 5.20 National and Provincial Distribution of Districts in Categories of Health Index

Health		Districts (According to I_H)		Districts (According to I_{iH})	
		Number	Percentage	Number	Percentage
Pakistan	Very High	0	0.0	0	0.0
	High	0	0.0	0	0.0
	Medium	32	28.1	6	5.3
	Low	79	69.3	44	38.6
	Very Low	3	2.6	64	56.1
KPK	Very High	0	0.0	0	0.0
	High	0	0.0	0	0.0
	Medium	7	28.0	0	0.0
	Low	18	72.0	9	36.0
	Very Low	0	0.0	16	64.0
Punjab	Very High	0	0.0	0	0.0
	High	0	0.0	0	0.0
	Medium	6	16.7	1	2.8
	Low	30	83.3	12	33.3
	Very Low	0	0.0	23	63.9
Sindh	Very High	0	0.0	0	0.0
	High	0	0.0	0	0.0
	Medium	3	12.5	1	4.2
	Low	19	79.2	9	37.5
	Very Low	2	8.3	14	58.3
Balochistan	Very High	0	0.0	0	0.0
	High	0	0.0	0	0.0
	Medium	15	53.6	3	10.7
	Low	12	42.9	14	50.0
	Very Low	1	3.6	11	39.3

Intra provincial analysis of district-wise health indices is represented in Figure 5.15. A visual analysis of Part (a) shows that in KPK across district disparities are not

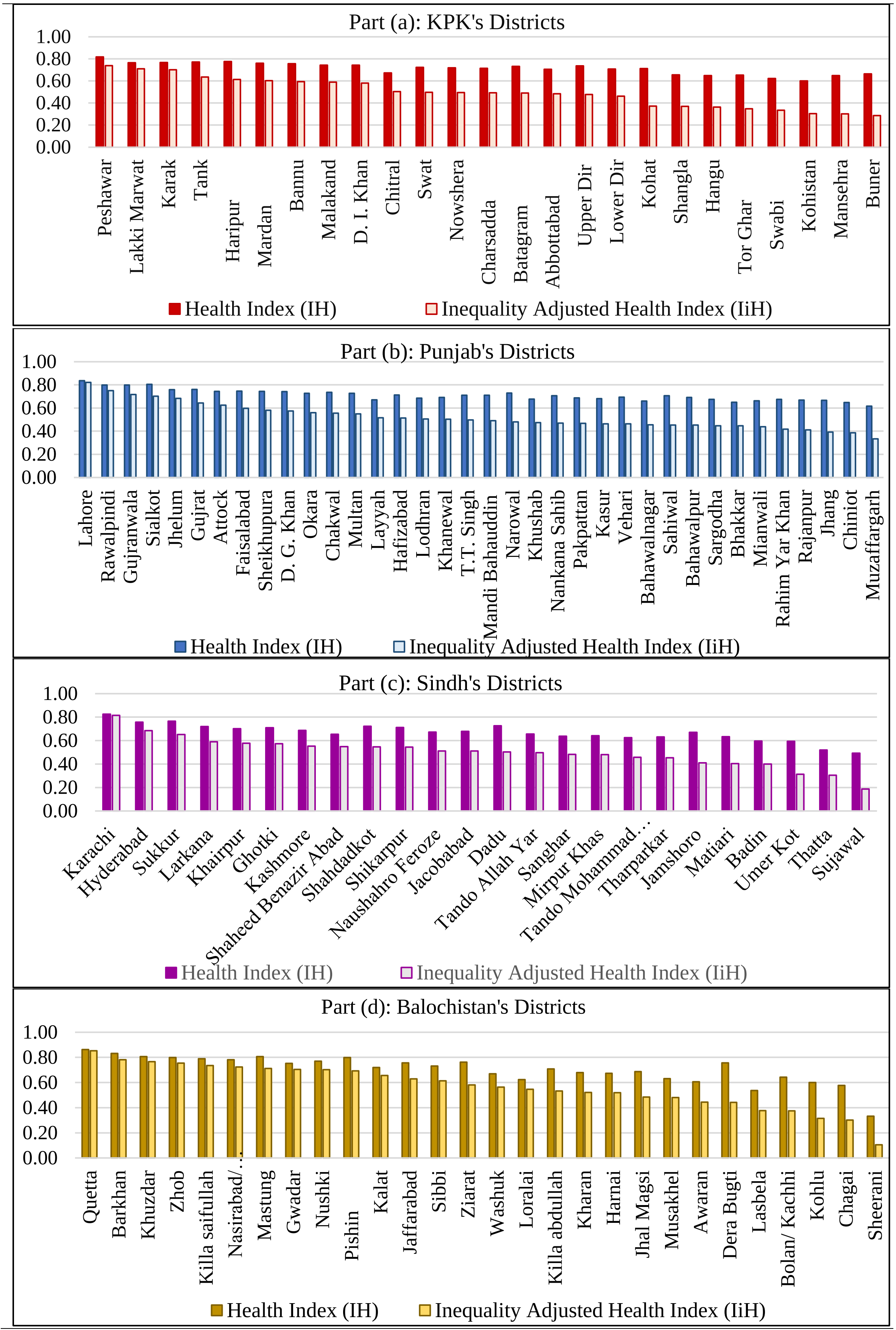


Figure 5.15 District-wise Health Indices with and without Inequality Adjustment

too high for potential health indices, whereas within district inequality are substantial. That's why with inequality adjustment across district inequalities rises markedly and there is a considerable difference between I_H and I_{iH} for most of the districts in KPK. Part (b) gives the comparative analysis of Punjab districts. General trend of inequality in districts of Punjab is similar as described for KPK. At high end of health index most of the districts are from north and east of Punjab and at lower end mostly belong to western and south-eastern Punjab. The level of health indices in districts of Sindh is almost same as in Punjab. However, the distribution of health achievements is more unequal across and within districts of Sindh, as depicted by part (c). Analysis of Part (d) reveals that health index in most of the districts of Balochistan are in better categories as compared to the other dimensional indices, however there is a prevalence of high within districts inequalities. Consequently, with inequality accounting health indices for majority districts drive down to lower categories with substantial losses.

5.3 The Findings Summed Up

The analysis at national level demonstrates that Pakistani households reside in low category of actual human development with high across households' disparities. These findings are common for overall development as well as the development in the dimensions of SOL, education, and health. Households' potential level of aggregated human development, SOL, and education belongs to medium category; whereas, potential level of health belongs to low category. The top twenty percent of the households are enjoying a five times higher level of human development than the bottom twenty percent. At national level a loss of 27 percent is incurred in overall human development due to inequalities. A major proportion of this loss, 24.6 percent is attributed to within dimensions (HDI's dimensions) inequalities. The highest contribution to this disparity is of education dimension, though the shares of SOL and health are also substantial.

The across dimensions inequality is responsible for remaining 2.4 percent loss of human development. It shows that the dimensions of HDI are not perfect substitutes of each other and it calls for considerable attention to ensure balanced development in all the dimensions.

Inter-provincial analysis demonstrates that the performance of Punjab is better as compared to other provinces with respect to aggregated human development and education dimension. KPK performs better in SOL dimension and Balochistan is marginally better in health dimension. The inter provincial disparities in health are not too significant. Intra-provincial analysis reveals that among provinces the loss in HDI due to disparities ranges from lowest of 26 percent in Punjab to the highest of 31 percent in Balochistan.

The regional (urban-rural) analysis at national and provincial level demonstrates that rural regions are far behind the urban regions with respect to human development and all its dimensions. The four provincial rural regions reside in very low or low category of human development with substantially higher inequalities as compared to their urban counterparts that mostly resides in medium or low categories. The rural-urban disparity is highest in Sindh and lowest in KPK.

It is unveiled by district-wise investigation that majority of districts (60 percent) in Pakistan belongs to very low category of human development. Almost the same scenario is observed in district-wise analysis of four province. None of the districts exhibits a very high level of human development. The archipelago of high and medium developed districts is surrounded by districts with low and very low level of actual human development. The districts at the top ranking of human development includes Islamabad, Karachi, Lahore, Rawalpindi. At the bottom end reside the districts of Kohlu, Kohistan, Chagai, Sujawal, and Sheerani.

In general, the magnitude of disparities within districts and across districts rises with deterioration of human development situation. However, considerable disparities are observed in some top ranked districts too. Based on percentage of districts in various categories of human development the performance of Punjab is marginally better than KPK and substantially higher than that of Sindh and Balochistan. Balochistan except Quetta and Sindh excluding Karachi and Hyderabad, are largely underdeveloped. The poorly developed districts in Punjab are concentrated in its west and southeast regions. The KPK districts exhibiting very low level of human development are situated in its north and south. It is observed that mostly districts that have natural resource endowment are in low or very low category of human development. In contrast the majority districts with better status of human development and low disparities are either centers of administration, or are home to small industries, or are hub of commerce and trade. It indicates the skewed utilization of public and private funds, underutilization and wastage of natural resources, and the ignored agriculture sector. There are some obvious socio-political factors that could be responsible for adverse human development status in certain regions of Pakistan. The landlordism in rural Sindh, and in west and south-east of Punjab is one of the main reasons for adverse human development in these regions[80]. In KPK the terrorist activities, Afghan refugees, and armed conflict specifically in southern districts are some of the probable reasons for poor human development situation[81]. In Balochistan multiple factors including ethnic conflicts, terrorist activities, unstable politics, the tribal culture, and the local sardari system; are

[80] For reference see Hisam (Tenants in Sindh, 2015), Shahid (Feudalism in Pakistan, 2015).
[81] See Yousaf (Kyber Pukhtunkhawa's Sad South, 2013), Khattak (Reviewing Pakistan's Anti-Terror Fight, 3 Years After the Peshawar School Attack, 2017), Akbar (Over 600,000 Afghan Refugees in KP, 2015).

responsible for its backwardness[82]. To address these issues further research at regional levels is required.

[82] Shaukat (Balochistan: Disparity and Derpivation, 2012), and Asghar R. (Anatomy of Balochistan Conflict, 2009) highlights these issues in detail.

CHAPTER 6

Analysis of Human Development Inclusiveness

The third important aspect of inclusive development in a society i.e. inclusion of marginalized, is examined in terms of human development index and three of its dimensions. For inter-region inclusiveness analysis regional median achievements of human development and its dimensions are compared to corresponding national medians. Intra-region investigation of inclusiveness is performed by computing incidence of deprived (ID) and inclusion coefficients (IC) for each region according to the methodology discussed in section 3.3, Chapter 3. In standard format, incidence of deprived is defined in the range of 0-0.5, however, to harmonize the analysis of deprivation and inclusion, the measure is normalized to the range of 0-1. The evidence of inclusive or exclusive development in various regions is established based on its inclusion coefficients.

6.1 Inclusion in Terms of Human Development Index

To assess the inter-regional and intra-regional inclusion, distribution of household's Inequality-Adjusted human development index ($IHDI_i$) is utilized instead of HDI_i distribution, as it represents actual level of human development.

6.1.1 Inter-regional Inclusion in terms of Human Development

The median $IHDI_i$ values at national and provincial levels, and for federal capital Islamabad are reported in Table 6.1. The comparison of regional median IHDI to sixty percent of national median IHDI (national inclusion threshold for human development) reveals that except Sindh rural and Balochistan rural all other provincial regions and Islamabad could be considered as inclusive in the mainstream (national) stream of human development. Inclusion could be interpreted as, at least some proportion of the region's households in bottom half (with IHDI below the median IHDI) have actual human development level that lie in inclusion zone. Whereas exclusion of rural regions of Sindh and Balochistan reveals that actual human development level of all households in bottom half is too low to fall in inclusion zone. It is noteworthy that as compared to other regions these two regions are also suffering from considerably higher inequalities of human development.

Table 6.1 National and Provincial Estimates of Inter-Regional Inclusion/Exclusion in Terms of IHDI

Human Development		Median IHDIi	Inter-regional Inclusion/Exclusion*
Pakistan	Overall	0.5111	—
	Urban	0.7013	Inclusion
	Rural	0.3921	Inclusion
KPK	Overall	0.4719	Inclusion
	Urban	0.6461	Inclusion
	Rural	0.4358	Inclusion
Punjab	Overall	0.5318	Inclusion
	Urban	0.7006	Inclusion
	Rural	0.4368	Inclusion
Sindh	Overall	0.5124	Inclusion
	Urban	0.7237	Inclusion
	Rural	0.2677	Exclusion
Balochistan	Overall	0.3655	Inclusion
	Urban	0.5657	Inclusion
	Rural	0.2959	Exclusion
Capital	Islamabad	0.7647	Inclusion

*Criterion for inter-regional inclusion is, regional median>= (0.6*national median).

Figure 6.1 shows the distribution of districts with inter-region inclusion/exclusion in terms of IHDI at national and provincial levels. A substantial percentage of districts are excluded from main stream of human development at national level. This phenomenon could be explained as 29 percent of the districts in Pakistan do not have a single household in bottom half with actual human development index above the threshold of inclusive human development. The remaining 71 percent of the districts has at least some of its households below median with human development index that falls in inclusive development zone.

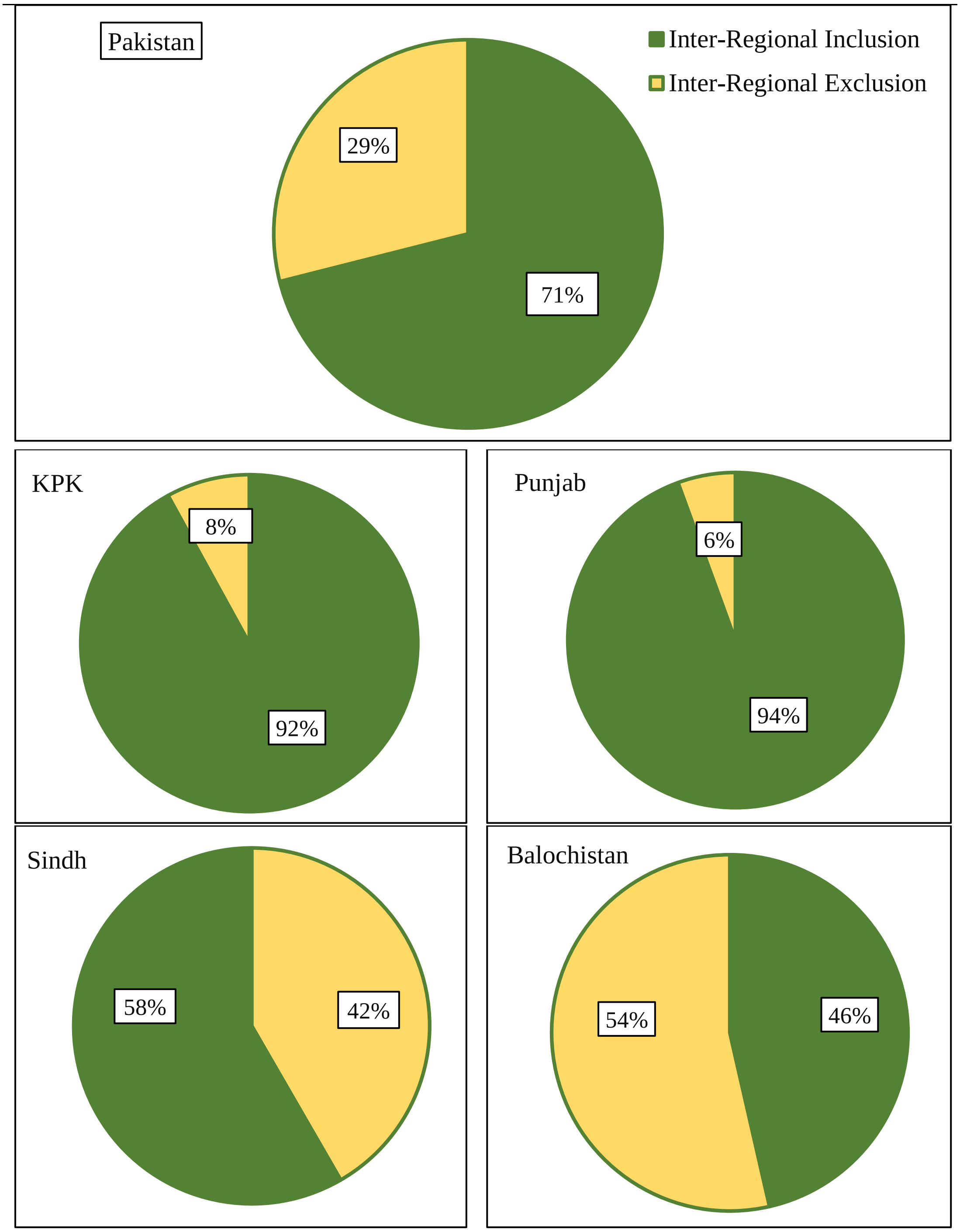


Figure 6.1 National and Provincial Distribution of districts Exhibiting inclusive/Exclusive Human Development

Inter provincial comparison reveals that the Balochistan has the highest percentage of districts that are excluded from the main stream of human development. Proportion of excluded districts is also quite high in Sindh, whereas, for Punjab and KPK it is very low. However, it just portrays the aggregative picture of the districts' inclusion or exclusion.

Inter-regional inclusion analysis for districts of KPK, Punjab, Sindh, and Balochistan is given in Tables D.2-D.5, Appendix D respectively. Majority of districts in KPK are characterized with inclusion except the Tor Ghar and Kohistan with very low median $IHDI_i$. These two districts are excluded from the main stream of human development. In Punjab the two districts Rajanpur and Muzaffargarh are with inter-region exclusion, the rest of the districts have median $IHDI_i$ above the inclusion threshold. Most of the districts in the provinces of Sindh and Balochistan are considered as excluded from main stream in terms of their human development level. In Sindh 14 out of 24 districts and in Balochistan 15 out of 28 districts are reported with inter-region exclusion.

6.1.2 Intra-Regional Inclusion in terms of Human Development

Two measures of intra-region inclusion are the regional inclusion coefficient (IC) and the mainstream inclusion coefficient. Their counterparts are mainstream Incidence of deprived (ID) and regional incidence of deprived. For the regions with average human development level higher than national average, the regional inclusion would be lower than the mainstream (national) inclusion, and vice versa.

The National and provincial level estimates of regional and mainstream ID and IC in terms of human development are exhibited in figure 6.2, these statistics are also cited in Table D.6, Appendix D. The estimates of national IC demonstrate that more than half of the lower fifty percent of households in Pakistan falls in exclusion zone of human development; consequently, the percentage of inclusion is markedly low. The extent of inclusion in urban region is substantially higher than rural region, in regional

Figure 6.2 Comparison of IHDI's Regional and Mainstream IC and ID at National and Provincial Levels

as well as in mainstream development process. The statistics reveals that only 26 per-cent of rural households in bottom half falls in mainstream inclusion zone and it is about 3.3 times lower than that of urban households. The rural regional IC for households shows that only 46 percent of bottom half of households is included in regional process of development. For urban region, 85 percent of the bottom half of households falls in mainstream inclusion zone and 75 percent of bottom half of households fall in regional inclusion zone. It shows that one fourth of urban households are in regional exclusion zone of development. The part (a) describes that mainstream inclusion is higher than regional inclusion for Islamabad, overall Punjab, and all urban regions. It shows that average levels of human development in these regions are higher than national level. For rest of the regions including all provincial and national rural, and overall KPK and Balochistan the regional inclusion is higher than mainstream inclusion. In Sindh and Balochistan rural areas are experiencing so low level of human development as compared to main stream that their IC mainstream are negative. It implies a scenario that virtually the entire population lies in the exclusion zone. Part (b) shows that mainstream inclusion is highest in Islamabad followed by Punjab urban, Sindh urban, KPK urban, and Balochistan urban respectively. The region depicting the lowest level of inclusion in main stream human development is Sindh rural preceded by Balochistan rural, Punjab rural, and KPK rural respectively. KPK rural region is with highest mainstream inclusion relative to all other provincial rural regions. In part (c) IC regional are compared, it exhibits the same ranking of inclusion as that of mainstream, however, magnitude of regional inclusion is quite higher for some regions as compared to main stream inclusion. The rationale is obvious that human development in these regions lagged much behind the main stream of human development.

The district-wise estimates of ID and IC ordered in terms of their IC mainstream ranks are reported in Table D.6, Appendix D. Analysis of district wise IC of human development reveals that 33 districts in Pakistan are virtually in a state of perfect exclusion from mainstream development. Majority of these districts are from Sindh and

Balochistan. The federal capital Islamabad is the district with highest inclusion wherein about 87 percent of the households in bottom half of the population lies in the inclusive zone of regional and 93.6 falls in the inclusion zone of mainstream human development. The Lahore district is ranked 2nd in terms of both regional and mainstream levels of human development inclusion, followed by Karachi, Sialkot, Rawalpindi, Jhelum, Quetta and so on. The provincial capital of KPK, Peshawar is ranked at 16th position. Sheerani district in Balochistan is characterized with lowest level of inclusion with respect to both regional and mainstream ICs. In this district IHDI of only 36 percent of bottom half of households falls in regional inclusion zone and there is no household in bottom half with IHDI that lies in the mainstream inclusion zone of development. The second lowest inclusion level in mainstream development is experienced by Kohistan district of KPK, however its inclusion in regional development is pretty much high. Kohistan is preceded by Sujawal, Tando Muhammad Khan, and Kohlu districts.

Figure 6.3 exhibits the inter-provincial analysis of IHDI's mainstream ICs of districts. It represents the province-wise percentage in Pakistan's top ranked thirty districts (excluding Islamabad), middle ranked thirty districts, and bottom ranked thirty districts in terms of households' IHDI inclusiveness in mainstream. In top thirty districts ranked in terms of mainstream IC most of the districts are from Punjab and KPK. Punjab is leading with 46 percentage, KPK is second with 43 percentage. Sindh and Balochistan are with very low percentages of 7 and 4 respectively. In thirty middle ranked districts of Pakistan in terms of their mainstream IC, Punjab has the largest dominant share followed by KPK, Balochistan, and Sindh respectively. In contrast to high and middle ranked districts, in thirty bottom ranked districts in term of mainstream IC; Balochistan and Sindh are with high proportions. A very small percentage of districts includes from Punjab and KPK in bottom ranked districts.

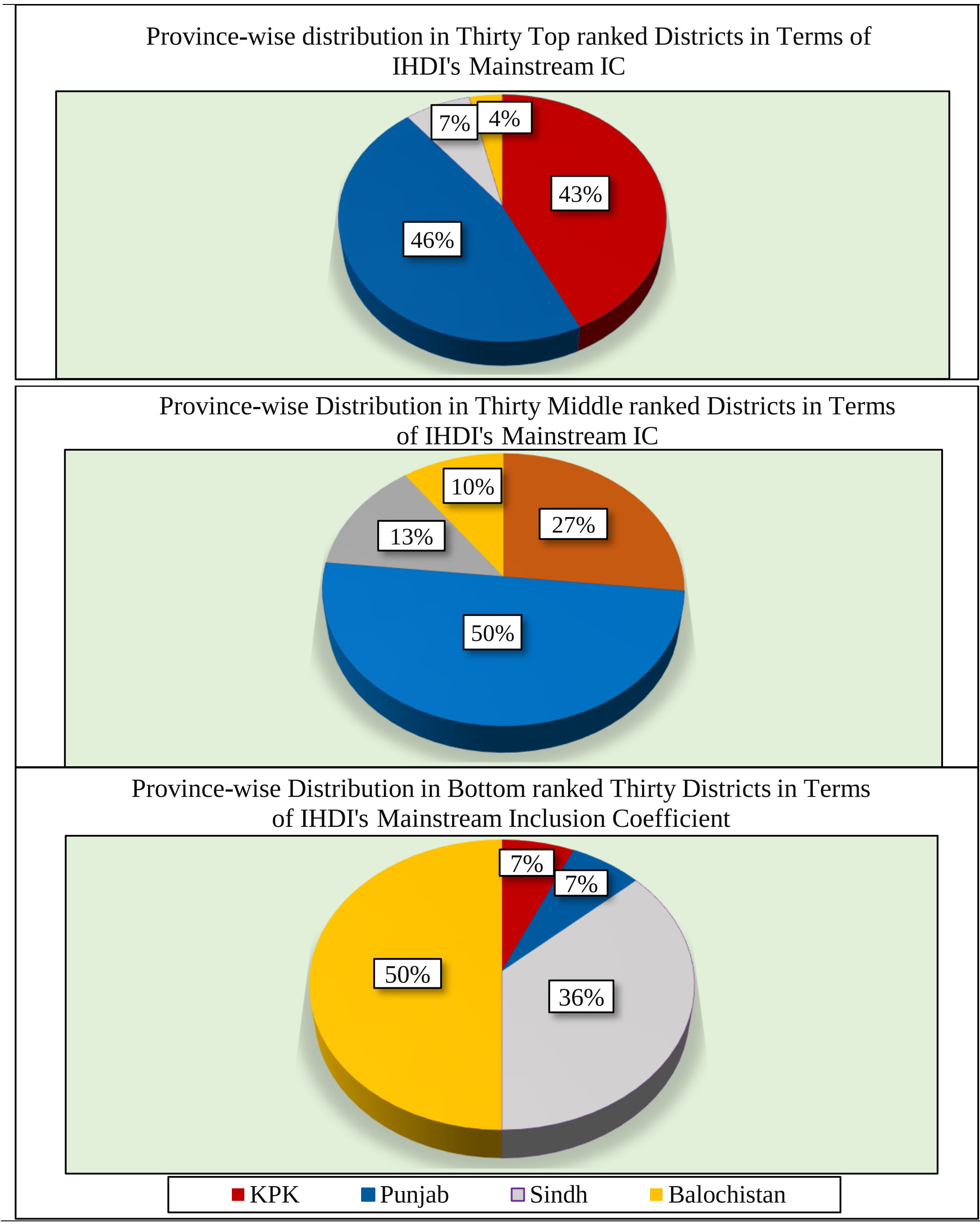


Figure 6.3 Province-wise Distribution in Top, Middle, and Bottom Ranked Districts in terms of IHDI's IC Mainstream

The province-wise analysis of intra district inclusion is illustrated graphically in Figure 6.4. The visual inspection reveals that among provinces, disparities in regional inclusion coefficients across districts are lowest in KPK and are highest in Sindh. The disparities regarding mainstream inclusion coefficient across districts are lowest in Punjab and are highest in Sindh. Part (a) exhibits that majority districts in KPK portray a

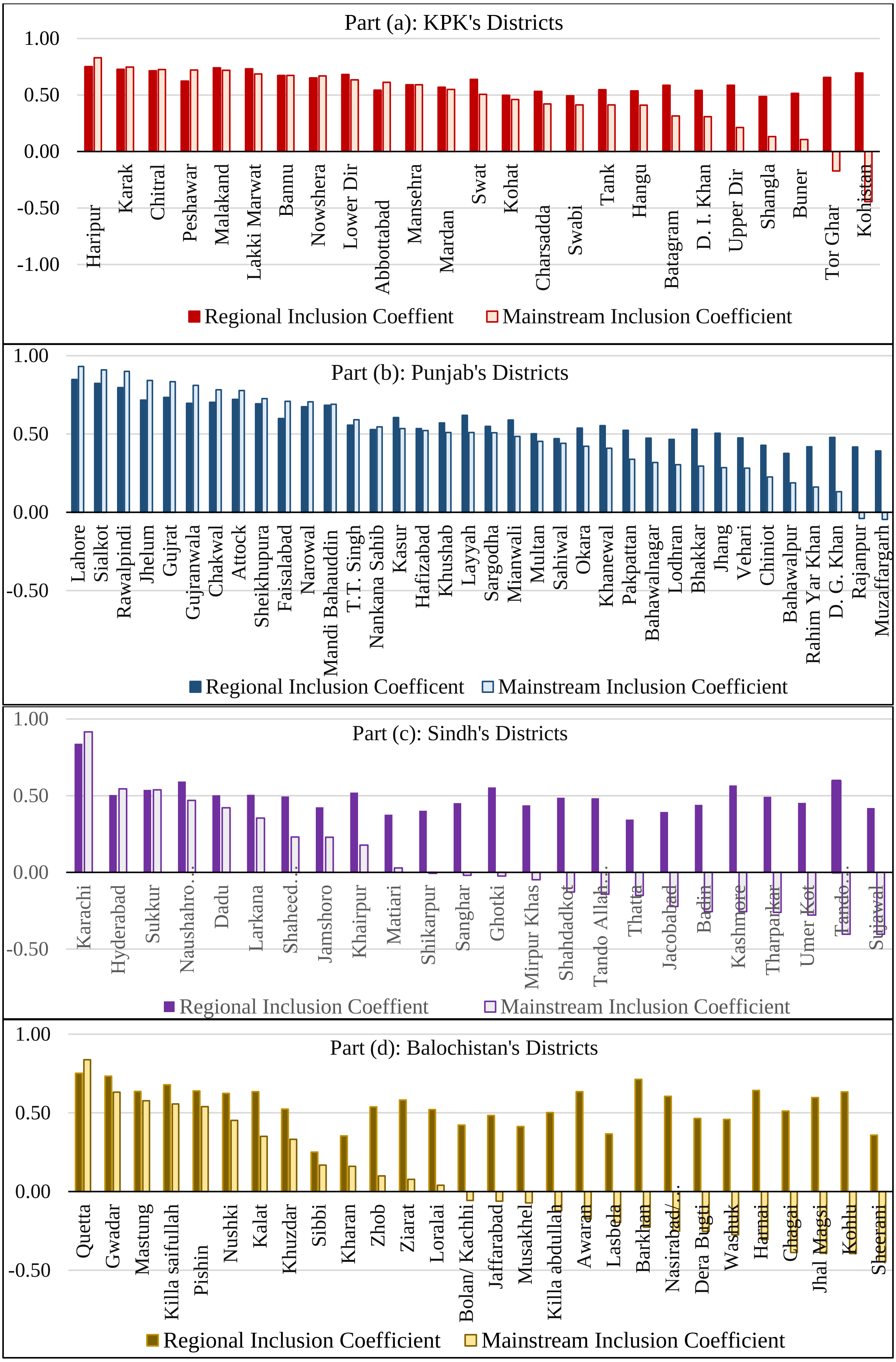


Figure 6.4 District-wise IHDI's Regional and Mainstream Inclusion Coefficients

state of inclusion in terms of regional inclusion as their regional inclusion index is above 0.5. It shows its bottom half of the households concentrates in the regional inclusion zone. Kohat, Swabi and Shangla exhibits the state of regional exclusion. It is important to highlight that despite its relatively better scenario of regional inclusion, in each district of KPK at least one fourth of the households in bottom half are excluded from regional development stream. In KPK nearly half of the district is in state of inclusion with respect to mainstream development as their mainstream ICs are greater than 0.5. The state of mainstream inclusion is quite alarming in some of KPK districts. The districts of Kohistan and Tor Ghar with negative mainstream IC, are leading towards perfect exclusion. The district with highest level of inclusive human development in KPK is Haripur. Almost 75 percent of households in lower half of the population falls in regional inclusion zone of development and 85 percent of bottom half of households lie in mainstream inclusion zone. The districts with the lowest level of inclusion with respect to mainstream human development is Kohistan. None of its households in bottom half falls in mainstream inclusion zone. Shangla is the district with lowest regional inclusion in KPK whereby 49 percent of households in bottom half of the population lies in regional inclusion zone. Like the human development status, most of the districts at lowest end of inclusion in KPK belong to the north of KPK. A review of Part (b) reveals that out of 36 districts of Punjab 26 districts depicts the regionally inclusive development and 19 districts are characterized with inclusion in mainstream of development. Most western and southeastern districts of Punjab are lagged in terms of both regional and mainstream inclusion as compared to districts of northern and eastern Punjab. The regional inclusion ranges from 85 percent in Lahore to 39 percent in Muzaffargarh. In terms of mainstream inclusion too Lahore is at the top of the list with 93 percent of inclusion. At the lowest end of mainstream inclusion coefficients, the districts of Rajanpur and Muzaffargarh with -4 percent and percent inclusion are showing virtually the perfect exclusion. Part(c) shows that Karachi stands out of the all districts of Sindh in terms of both regional and mainstream inclusion. From bottom half of households in Karachi, 84 percent and 92 percent lies in regional inclusion and main stream inclusion zones respectively. The district with second highest level of regional inclusion is Naushahro Feroze with 49 percent inclusion. In terms of mainstream inclusion Hyderabad stands at second place with 55 percent of inclusion. In Sindh at the lowest end of inclusion are district Sujawal with -41 percent of mainstream inclusion and district Thatta with 37 percent of regional exclusion. Out of 24 districts in Sindh 10 could be considered with regionally inclusive development and only 3 could be placed in the category of mainstream inclusive development. The fourteen districts of Sindh with negative mainstream inclusion coefficients represent the state of perfect exclusion. In some districts almost, whole population is out of mainstream inclusion zone. The analysis of part(d) exhibits that in Balochistan most of the districts are showing a disappointing level of mainstream inclusion. A very few districts are at relatively higher level of mainstream inclusion including Quetta, Gwadar, Mastung, Killa Saifullah, and Pishin. Quetta stands out with 84 percent and 75 percent of mainstream and regional inclusion coefficients respectively. The rest of districts are with less than 64 percent and 74 percent of mainstream and regional inclusion coefficients respectively. At the lowest level of mainstream inclusion is Sheerani preceded by Kohlu and Jhal Magsi. Fifteen districts of Balochistan are portraying a state of perfect exclusion. Relative to mainstream inclusion the level of regional inclusion in most of the districts of Balochistan is high. However, independent analysis of regional inclusion reveals that for majority of the districts it is less than 60 percent. For Sibbi, Kharan, Sheerani and Lasbela it is 25 percent, 35 percent, 36 percent and 37 percent respectively.

6.2 Inclusion in Terms of Standard of Living Index

The distribution of household's standard of living index (S_i) is utilized to assess the inter-regional and intra-regional inclusion of development in the dimension of economic wellbeing.

6.2.1 Inter-Regional Inclusion in terms of Standard of Living

The median values of SOL index at national and provincial levels, and for federal capital Islamabad are cited in Table 6.2. The comparison of regional median value

Table 6.2 National and Provincial Estimates of Inter-Regional Inclusion/Exclusion in Terms of SOL index

Standard of Living		Median SOL Index	Inter-regional Inclusion/Exclusion*
Pakistan	Overall	0.3534	—
	Urban	0.5549	Inclusion
	Rural	0.2494	Inclusion
KPK	Overall	0.3799	Inclusion
	Urban	0.5615	Inclusion
	Rural	0.3441	Inclusion
Punjab	Overall	0.3547	Inclusion
	Urban	0.5414	Inclusion
	Rural	0.2768	Inclusion
Sindh	Overall	0.3602	Inclusion
	Urban	0.5792	Inclusion
	Rural	0.1309	Exclusion
Balochistan	Overall	0.2260	Inclusion
	Urban	0.4098	Inclusion
	Rural	0.1669	Exclusion
Capital	Islamabad	0.5956	Inclusion

*Criterion for inter-regional inclusion is, regional median>= (0.6*national median).

of SOL index to sixty percent of national median SOL index (national inclusion threshold for economic wellbeing) reveals that except Sindh rural and Balochistan rural all other provincial regions and Islamabad exhibit inclusion in the mainstream stream SOL (national SOL). Inclusiveness describes that at least some proportion of households in bottom half (below median SOL index) of these regions have SOL that fall in inclusion zone. Based on this description it could be asserted from present analysis that SOL of all households in bottom half of rural Sindh and rural Balochistan fall in exclusion zone.

Figure 6.5 shows the distribution of districts with inter-region inclusion/exclusion in terms of SOL at national and provincial levels. A considerable percentage of

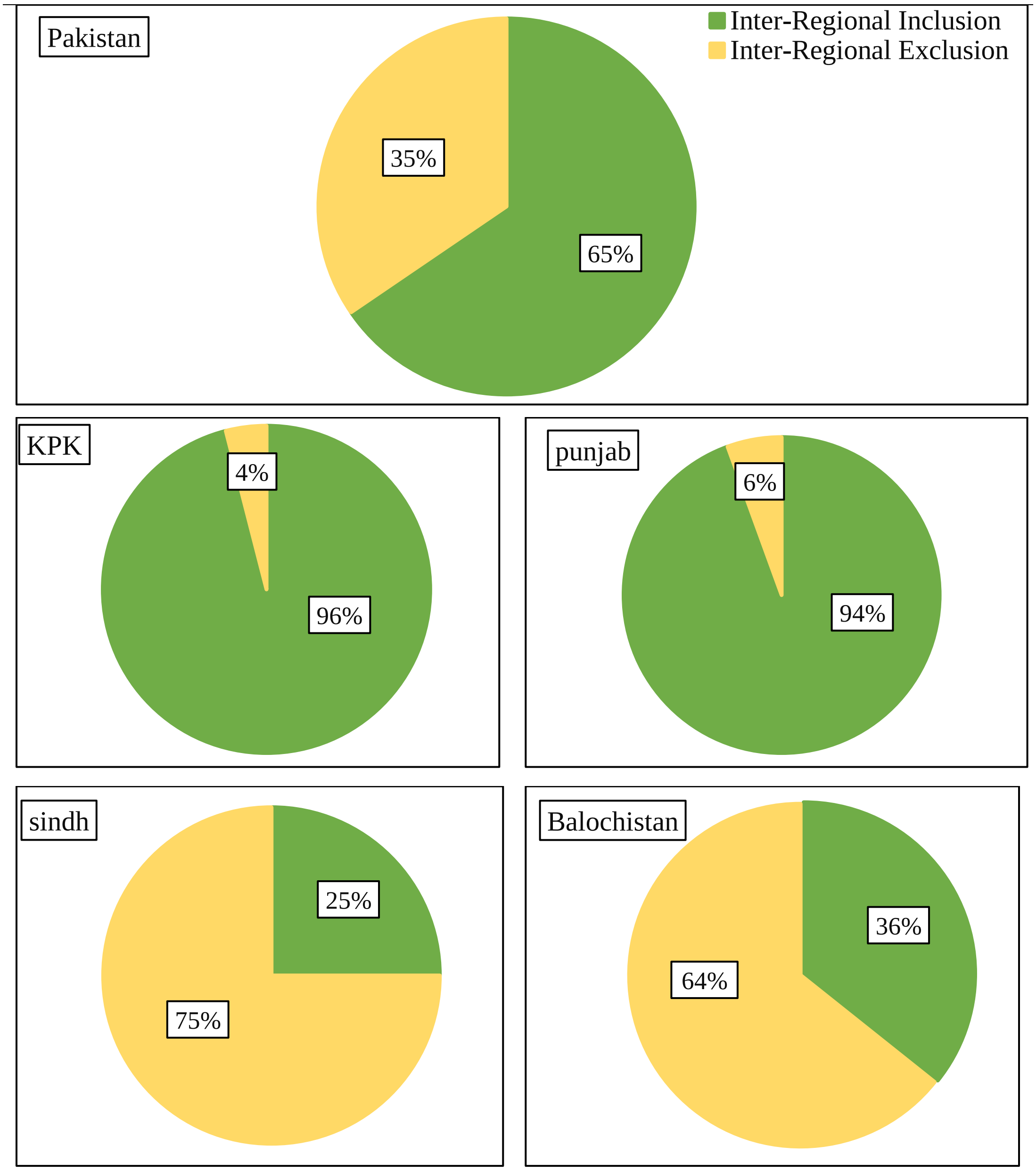


Figure 6.5 National and Provincial Distribution of Districts Exhibiting Inclusive/Exclusive Standard of Living

districts are excluded from main stream of SOL at national level. It reveals 35 percent of the districts in Pakistan do not have a single household in lower half with SOL above the threshold of inclusive SOL. The remaining 65 percent of the districts has at least some households in lower half with SOL index that falls in inclusive SOL zone. Inter provincial evaluation tells that in Sindh the percentage of districts that are excluded from the main stream of SOL is the highest. Percentage of excluded districts is also quite high in Balochistan, whereas, for Punjab and KPK it is low.

Province-wise statistics exhibiting inter-district inclusion/exclusion in terms of SOL index are reported in Tables A.6-A.9, appendix A. Except Kohistan all districts in KPK are exhibiting inter-regional inclusion. The district Kohistan with very low median SOL index is excluded from the main stream. In Punjab most of the districts could be placed in the category of SOL inclusion except two districts. Rajanpur and Muzaffargarh in Punjab are with inter-regional exclusion. Majority districts in the provinces of Sindh and Balochistan are considered as excluded from main stream in terms of their SOL index. In Sindh 18 out of 24 districts and in Balochistan 18 out of 28 districts are reported with inter-region exclusion. In these two provinces the higher percentage of districts is excluded in terms of SOL as compared to this percentage in terms of IHDI.

6.2.2 Intra-Region Inclusion in Terms of Standard of Living

The National and provincial estimates of regional and mainstream ID and IC in terms of SOL are depicted in figure 6.6, for details in numbers see Table A.10, Appendix A. The estimate of national IC demonstrates that 56 percent of the lower half (below median SOL index) of households in Pakistan falls in exclusion zone of SOL, consequently the percentage of inclusion is markedly low. There is an evidence of immense rural-urban disparities in SOL mainstream inclusiveness at national level. Extent of inclusion in mainstream SOL for urban region is six times higher than that of rural

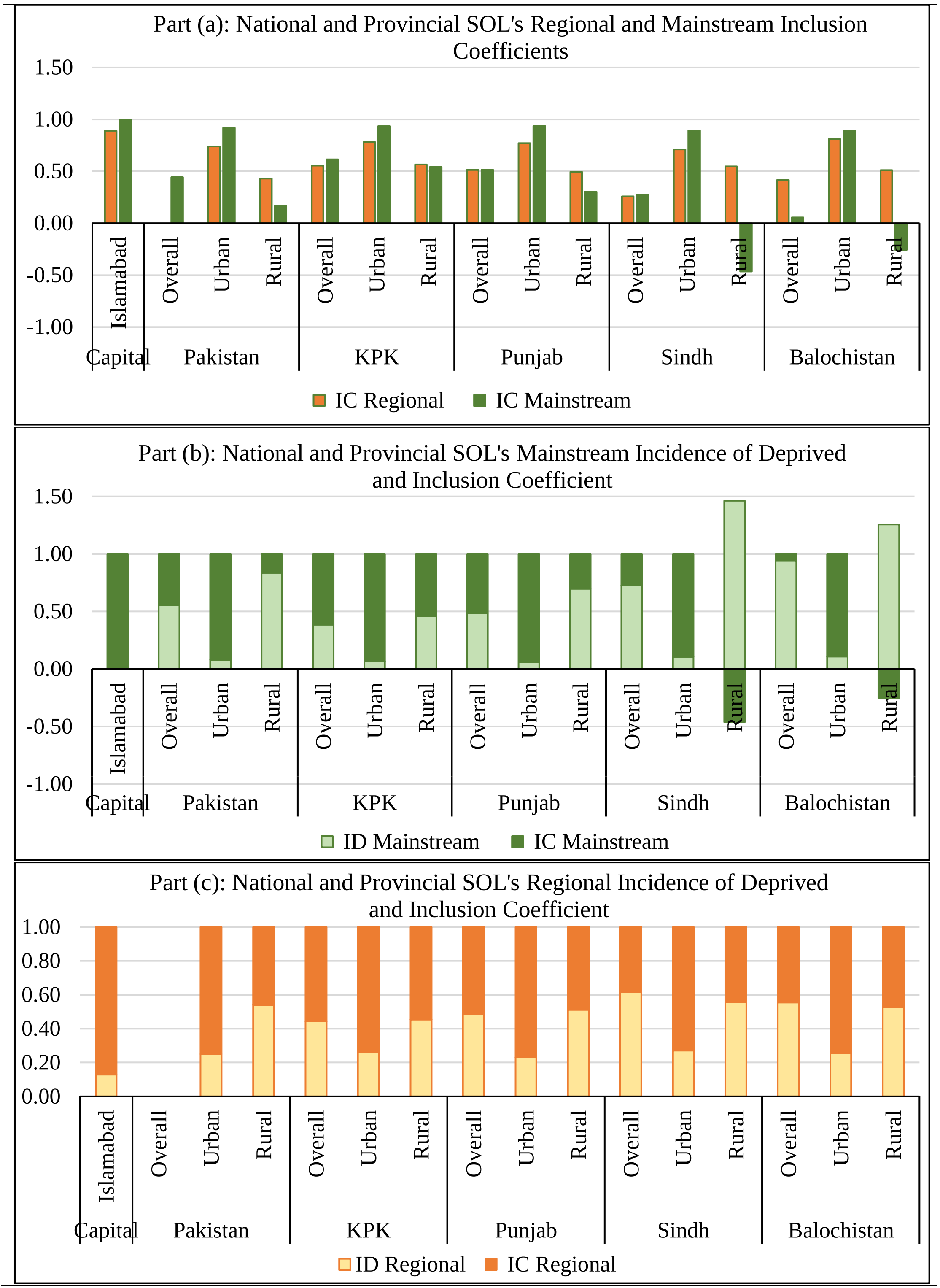


Figure 6.6 National and Provincial Level Estimates of SOL's Regional and Mainstream IDs and ICs

region. The mainstream IC for urban households and rural households is 92 percent and 16 percent respectively. In urban region and rural regions respectively, 74 percent and

43 percent of the bottom half of households lie in regional inclusion zone. The part (a) describes that mainstream inclusion is higher than regional inclusion for Islamabad; overall KPK, Sindh, and Punjab; and all national and provincial urban regions. It shows that median SOL in these regions is higher than national level. However, for overall Sindh and Punjab this difference is marginal. For rest of the regions including all provincial and national rural regions, and overall Balochistan the regional inclusion is higher than mainstream inclusion. In Sindh and Balochistan rural areas are experiencing so low SOL as compared to main stream that their main stream IC are negative. It implies that virtually the entire population in these regions lies in the exclusion zone. Part (b) depicts that SOL's mainstream inclusion is highest in Islamabad followed by Punjab urban, KPK urban, Sindh urban, and Balochistan urban respectively. The region depicting the lowest level of inclusion in main stream human development is Sindh rural preceded by Balochistan rural, Punjab rural, and KPK rural respectively. The KPK rural region is with markedly high mainstream inclusion relative to all other provincial rural regions. In part (c) SOL's regional ICs are compared, it exhibits almost the same ranking as that of mainstream inclusion except that Balochistan is ahead of Sindh in urban inclusion. The scale of regional inclusion is quite high for all rural regions as compared to main stream inclusion. It also depicts that SOL in these regions is quite low than the mainstream SOL.

The district-wise estimates of SOL's ID and IC ordered in terms of their IC mainstream are reported in Table A.11, appendix A. A comparison of districts reveals that inclusion is highest in Karachi. The statistics exhibits that all households in bottom half of the population in Karachi lies in the mainstream inclusion zone of SOL and 97 percent of these households falls in regional inclusion zone. The other districts with mainstream inclusion greater than 90 percent include Islamabad, Lahore, Quetta, Rawalpindi, Sialkot, Haripur. The SOL inclusiveness of provincial capital of KPK, Peshawar is ranked at 19th position. Tharparkar district in Sindh is characterized with lowest level of inclusion with respect to mainstream IC. In this district no household in bottom half lies in the SOL's mainstream inclusion zone, a scenario of perfect exclusion. The lowest SOL's regional inclusion is experienced by Nasirabad district of Balochistan where by only 13 percent of households in lower half exhibits SOL inclusion.

The inter-provincial analysis mainstream ICs of districts in terms of SOL is depicted in figure 6.7. It represents the province-wise percentage in Pakistan's top

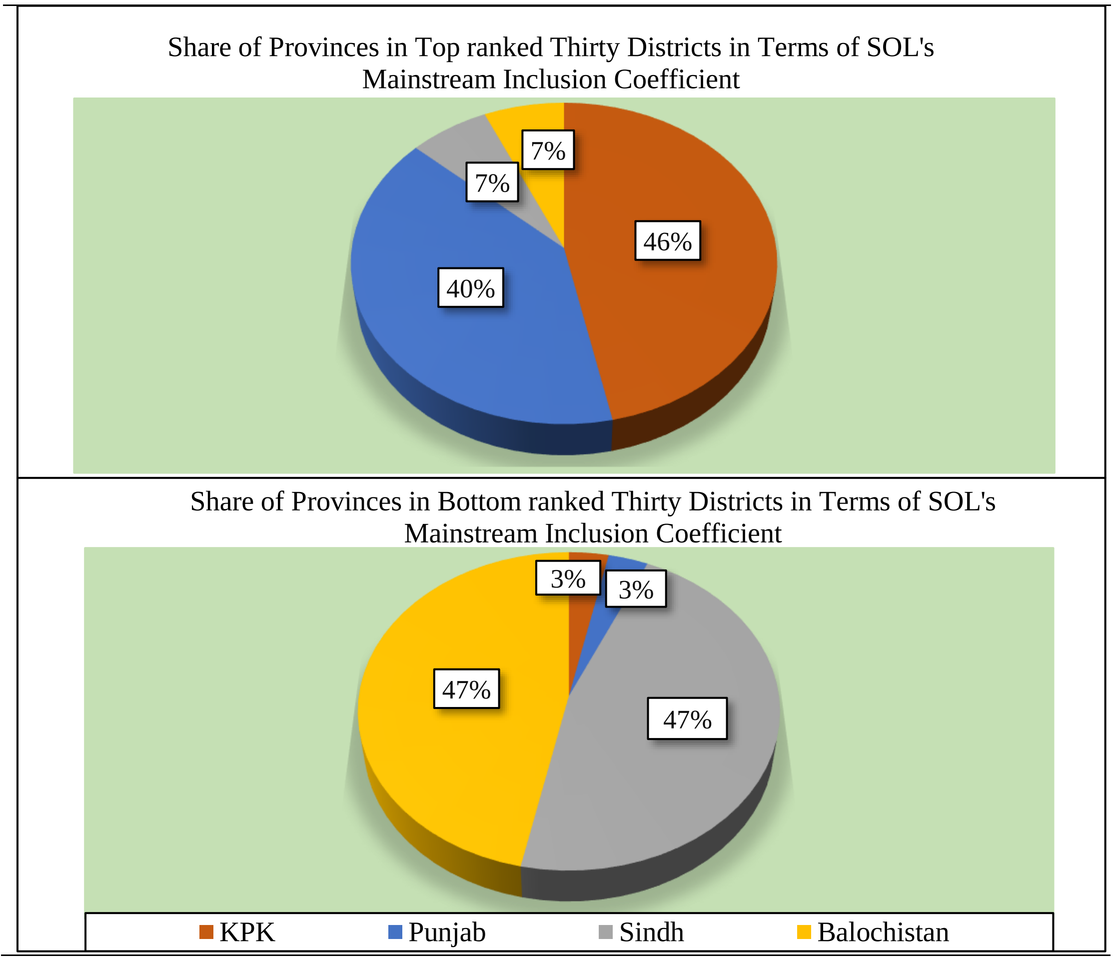


Figure 6.7 Province-wise distribution in Top and Bottom Ranked Districts in terms of SOL's IC Mainstream

ranked thirty districts (excluding Islamabad) and bottom ranked thirty districts in terms of households' SOL inclusiveness in mainstream. In top thirty districts ranked in terms of mainstream IC majority are from KPK and Punjab. KPK is leading with percentage of 46 and Punjab is second with a percentage of 40. Sindh and Balochistan are with very low percentage of 7 percent each. In thirty bottom ranked districts in term of SOL's mainstream IC majority is from Balochistan and Sindh. A very small percentage of districts is from Punjab and KPK in bottom ranked thirty districts.

The province-wise analysis of intra district inclusion in terms of SOL is illustrated graphically in Figure 6.8. It depicts that among provinces, disparities in both regional and mainstream inclusion coefficients across districts are lowest in KPK and are highest in Sindh. Part (a) exhibits that majority districts in KPK portray a state of inclusion in terms of regional inclusion as their regional ICs are above 0.5. It shows its bottom half of the households concentrates in the regional inclusion zone. Shangla and Buner exhibit the state of regional exclusion. It is worth noticing that despite of its relatively better situation of regional inclusion, in each district of KPK at least 24 percent of the households in bottom half are excluded from regional development stream. In KPK 18 out of 25 districts are in state of inclusion with respect to mainstream SOL. The mainstream IC for districts of Kohistan is negative that exhibits perfect exclusion. In KPK the district with highest level of mainstream inclusion and regional inclusion of SOL are Haripur and Chitral respectively. Almost 91 percent of the households in bottom half Haripur's population falls in regional inclusion zone of SOL. In Chitral the percentage of households exhibiting regional inclusion is 76. The districts with the lowest level of inclusion with respect to mainstream SOL is Kohistan leading towards perfect exclusion with negative IC. Buner is the district with lowest regional inclusion

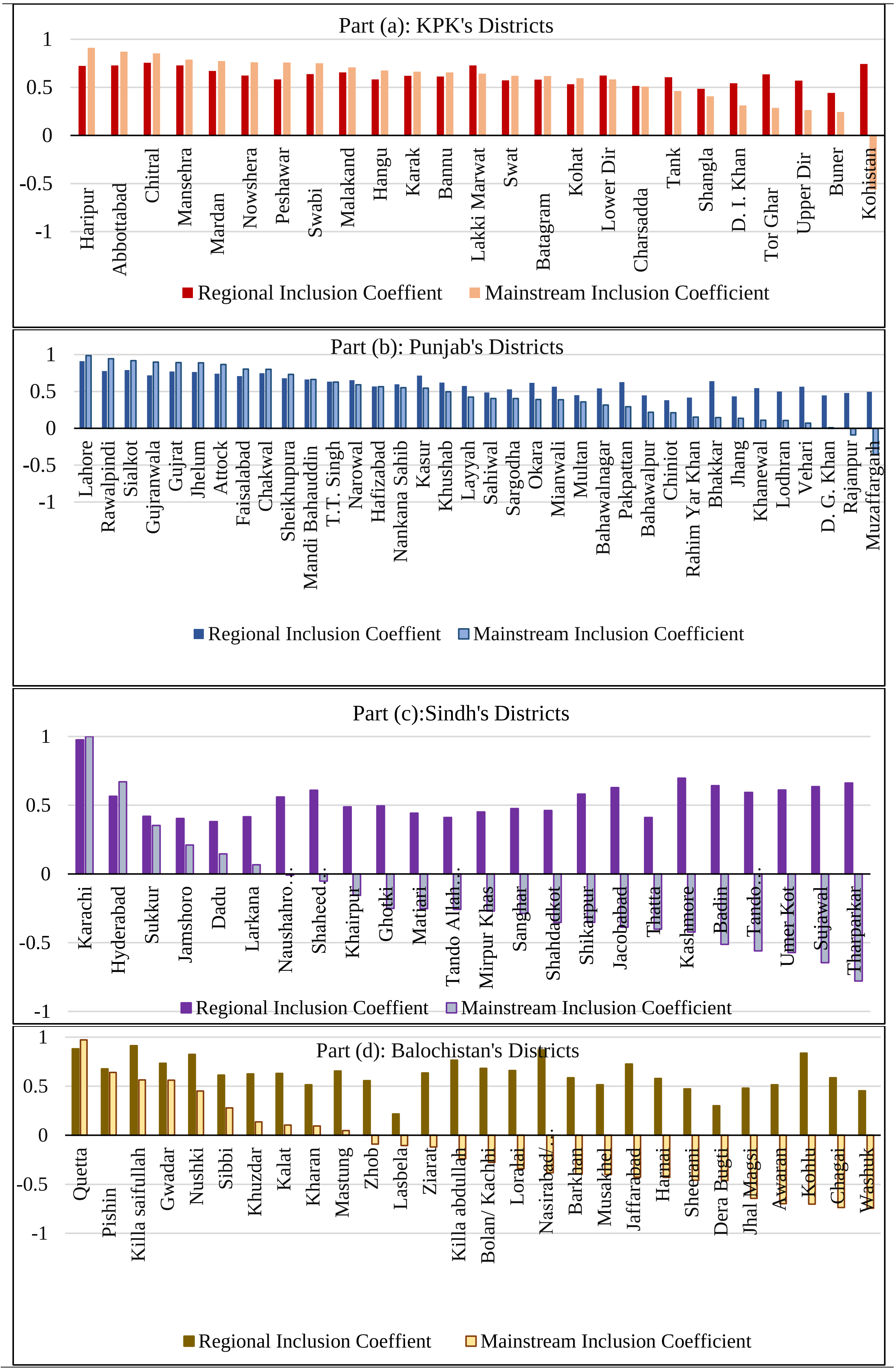


Figure 6.8 District-wise SOL's Regional and Mainstream Inclusion Coefficients

in KPK whereby 44 percent of households in bottom half of the population lies in regional inclusion zone. A review of Part (b) reveals that out of 36 districts of Punjab, 35 districts depict the regionally inclusive SOL and 17 districts are exhibiting inclusion in mainstream SOL. Like IHDI inclusion majority of the western and southeastern districts of Punjab are far below in terms of both regional and mainstream inclusion as compared to districts of northern and eastern Punjab. The regional inclusion varies from 91 percent in Lahore to 50 percent in Muzaffargarh. In terms of mainstream inclusion too Lahore is at the top of the list with 98.5 percent of inclusion. At the lowest end of mainstream inclusion coefficients, the districts of Rajanpur and Muzaffargarh with -9 percent and -36 percent IC respectively, are showing virtually the perfect exclusion. Part(c) shows that Karachi stands out of the all districts of Sindh in terms of both regional and mainstream inclusion. The district with second highest level of regional inclusion is Kashmore with 70 percent inclusion. In terms of mainstream inclusion Hyderabad with IC of 67 percent exhibits second highest level of inclusion. In Sindh at the lowest end of inclusion are district Tharparkar with -78 percent of mainstream inclusion and district Dadu with 38 percent of regional inclusion. Out of 24 districts in Sindh 13 could be considered with regionally inclusive SOL and only 2 could be placed in the category of mainstream inclusive SOL. The eighteen districts of Sindh with negative mainstream inclusion coefficients exhibits the worst state of inclusion. In some districts almost, whole population is out of mainstream inclusion zone. The analysis of part(d) exhibits that in Balochistan situation of district-wise inclusiveness of SOL is like that of Sindh. A very few districts including Quetta, Pishin, Killa Saifullah, and Gwadar exhibit mainstream inclusion. Quetta stands out with 97 percent and 88 percent of mainstream and regional inclusion coefficients respectively. In rest of the districts the mainstream IC and regional IC are below 65 percent and 68 percent respectively. At the lowest level of mainstream inclusion is Washuk preceded by Chagai, Kohlu, and Awaran. Balochistan's eighteen districts are portraying a state of perfect SOL exclusion. The level of regional inclusion in majority districts of Balochistan is high relative to mainstream inclusion. However, independent analysis of regional inclusion discloses that for most of the districts it is below 70 percent. The districts of Lasbela, Dera Bugti, Washuk, Sheerani, and Jhal Magsi with 21 percent, 30 percent, 45 percent, 47 percent and 48 percent of regional ICs respectively, exhibits the regional exclusion.

6.3 Inclusion in terms Of Education Index

To evaluate the inter-regional and intra-regional inclusion of development in the dimension of education, the distribution of household's education index (E_i) is employed.

6.3.1 Inter-Regional Inclusion in Terms of Education

To determine the inter-regional inclusion status the median education index for each region is compared to sixty percent of national median education index. The values of median education index at national and provincial levels, and for federal capital Islamabad are reported in Table 6.4. It shows that all provincial regions and Islamabad exhibit inclusion in the mainstream of educational achievement except Balochistan rural. Inclusiveness describes that at least some proportion of households in bottom half (below median education index) of these regions have education index that fall in inclusion zone. Inter-regional inclusion analysis exhibits that education index of all households in lower half of rural Balochistan falls in exclusion zone.

The distribution of districts with inter-region inclusion/exclusion in terms of education at national and provincial levels is presented in figure 6.9. A considerable percentage of districts are excluded from mainstream of educational achievement at national level. It is exhibited that 28 percent of the districts in Pakistan do not have a single household in lower half with education index above the threshold of educational inclusiveness. The remaining 72 percent of the districts have at least some households in lower half with education index lying in inclusive education zone. Inter provincial assessment shows that the percentage of districts that are excluded from the main stream of education is the highest in Balochistan. In Sindh and KPK the percentage of districts excluded from mainstream of educational achievement is also noticeably high, however, in Punjab the percentage is relatively low.

Table 6.3 National and Provincial Estimates of Inter-Regional Inclusion/Exclusion in Terms of Education index

Education		Median Education Index	Inter-regional Inclusion/Exclusion*
Pakistan	Overall	0.5714	—
	Urban	0.8296	Inclusion
	Rural	0.4667	Inclusion
KPK	Overall	0.4707	Inclusion
	Urban	0.6143	Inclusion
	Rural	0.4306	Inclusion
Punjab	Overall	0.6111	Inclusion
	Urban	0.8333	Inclusion
	Rural	0.5000	Inclusion
Sindh	Overall	0.6000	Inclusion
	Urban	0.8677	Inclusion
	Rural	0.3556	Inclusion
Balochistan	Overall	0.3889	Inclusion
	Urban	0.5556	Inclusion
	Rural	0.2963	Exclusion
Capital	Islamabad	0.8981	Inclusion

*Criterion for inter-regional inclusion is, regional median>= (0.6*national overall median).

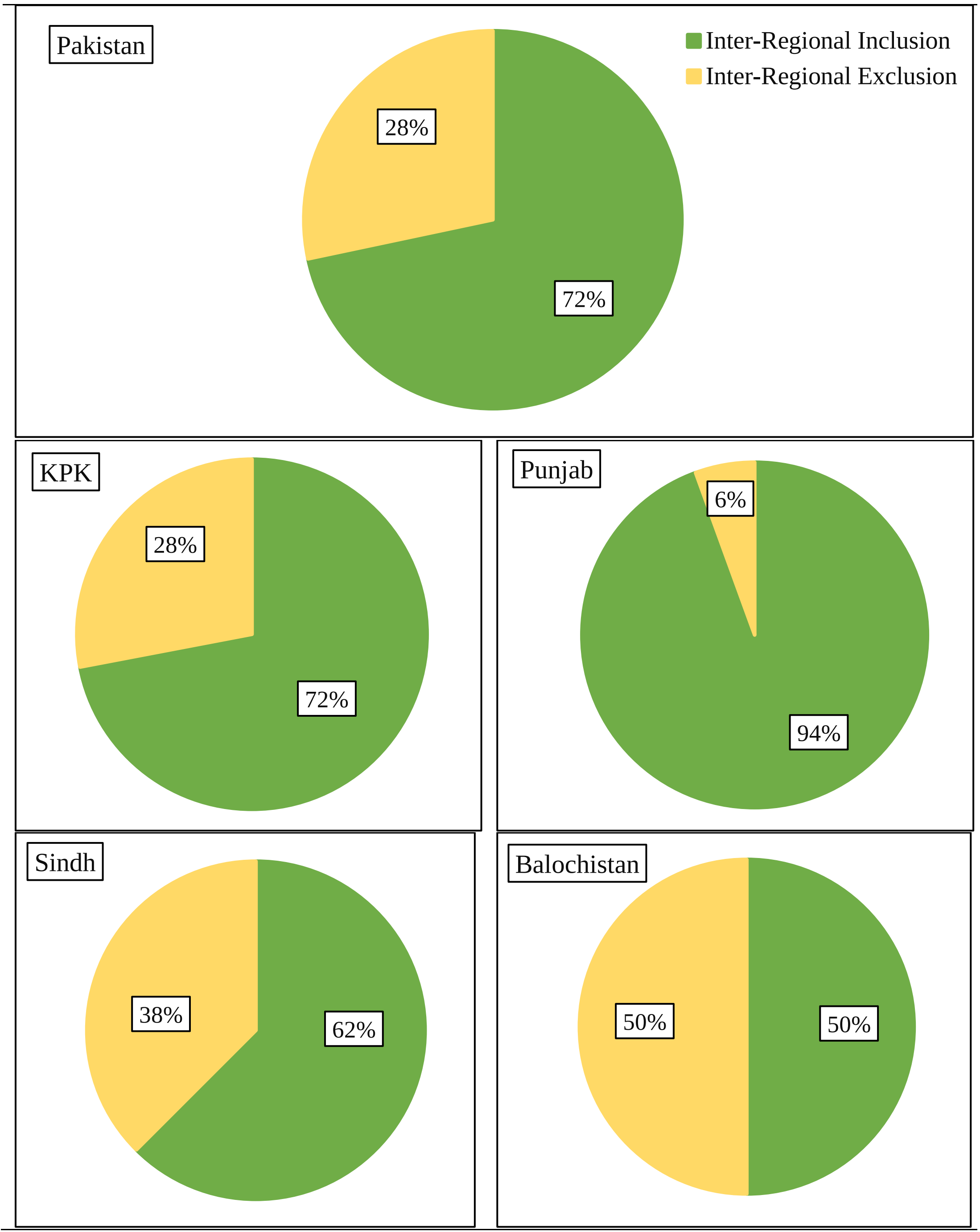


Figure 6.9 National and Provincial Distribution of Districts Exhibiting inclusive/Exclusive Education Index

Tables B.4-B.7 in Appendix A display province-wise statistics for inter-district inclusion/exclusion in terms of education index. Out of 25 districts of KPK 18 are exhibiting inter-regional inclusion. The districts with very low median education indices showing exclusion include Hangu, Upper Dir, Batagram, Buner, Shangla, Tor Ghar, and Kohistan. In Punjab most of the districts are showing inclusive education except two districts. The districts of D.G. Khan and Rajanpur could be placed in the category of inter-regional exclusion. Majority districts in the provinces of Sindh and Balochistan are considered as excluded from main stream in terms of their Education index. In Sindh and Balochistan there are 9 out of 24 districts and 14 out of 28 districts respectively that are reported with inter-regional exclusion. In these two provinces majority of the districts have median education index less than 0.45.

6.3.2 Intra-Region Inclusion in Terms of Education

The estimates of regional and mainstream ID and IC in terms of Education at national and provincial levels are portrayed in figure 6.6, the statics are also reported in Table B.7, appendix B. The estimate of national IC establishes that 60 percent of the lower half of households (with education index below median) in Pakistan falls in exclusion zone of education, consequently the percentage of inclusion is markedly low. The substantial rural-urban disparities are evident in inclusiveness of education at national level. In urban region mainstream inclusion is 3.5 times higher than that of rural region. In urban region and rural regions respectively, 72 percent and 21 percent of the bottom half of households lie in mainstream inclusion zone. The regional inclusion in national rural is almost half of the national urban. The IC-regional for rural households and urban households is 60 percent and 32 percent respectively. The part (a) depicts that in Islamabad, national urban and all provincial urban except Balochistan; mainstream inclusion is higher than regional inclusion. It shows that median education index in these regions is higher than national median. For rest of the regions including all provincial and national regions (overall and rural), and Balochistan urban the regional inclusion is higher than mainstream inclusion. The mainstream inclusion is extremely low in rural Sindh and rural Balochistan rural areas. The negative mainstream inclusion in rural Balochistan implies that almost the entire population in this regions falls in the exclusion zone of education development. Part (b) depicts that education's mainstream inclusion is highest in Islamabad followed by Punjab urban, Sindh urban, KPK urban, and Balochistan urban respectively. The region depicting the lowest level

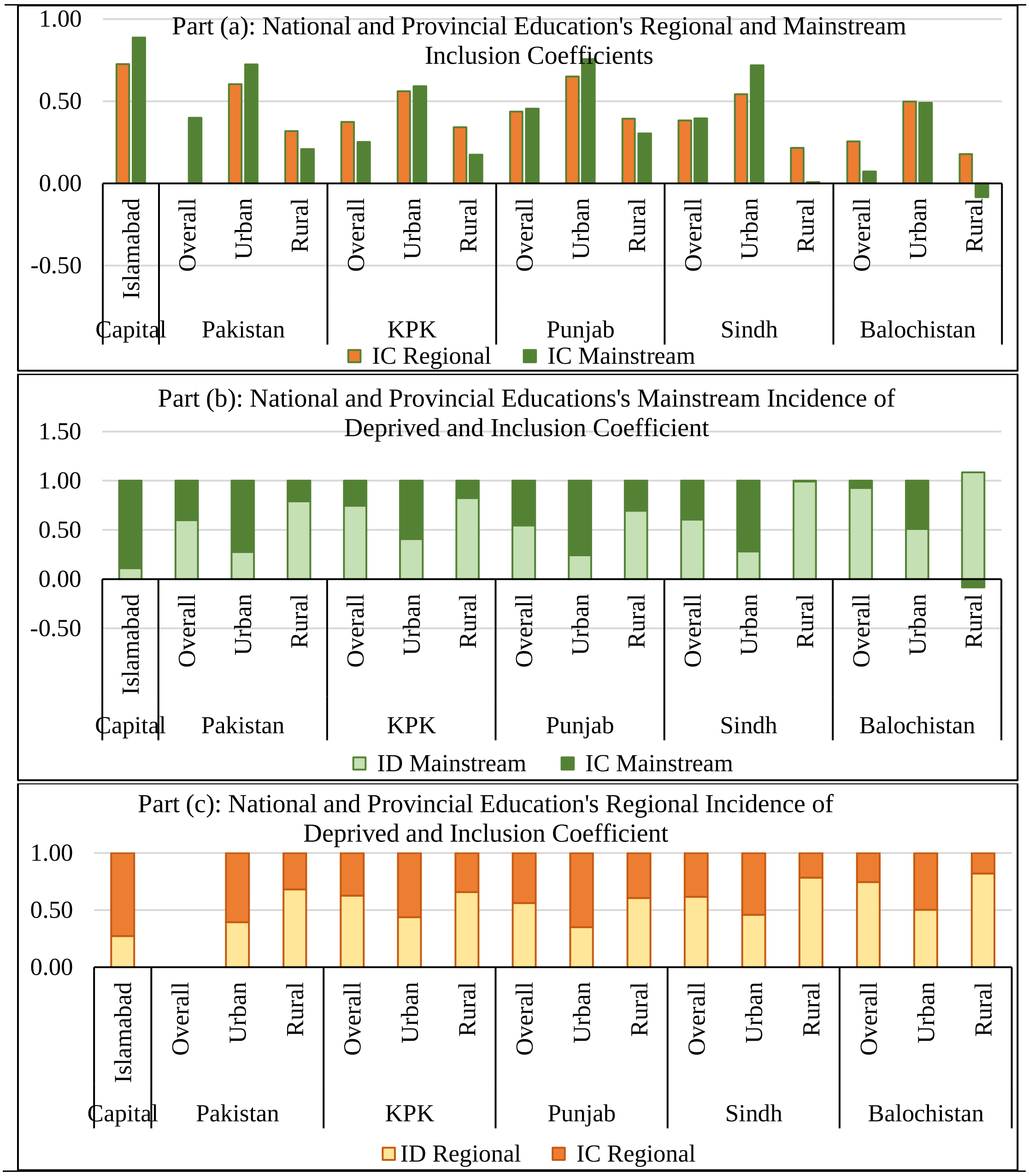


Figure 6.10 National and Provincial Level Estimates of Education's Regional and Mainstream IDs and ICs

of inclusion in mainstream education is Balochistan rural preceded by Sindh rural, KPK rural, and Punjab rural respectively. The mainstream inclusion in both urban and rural Punjab is considerably higher than their respective counter parts in other provinces. The part (c) exhibits almost the same ranking as that of mainstream inclusion except that regional inclusion with respect to education in urban KPK is higher than Sindh. The scale of regional inclusion is quite high for all rural regions as compared to their mainstream inclusion. It also depicts that median education index in these regions is quite low than the national median.

The estimates of IC-regional and IC-mainstream for households education in districts ordered in terms of their IC-mainstream are cited in Table B.8, appendix B. A comparison shows that Islamabad leads in terms of both mainstream and regional inclusion of education index. In Islamabad almost, 89 percent and 73 percent of households are respectively in mainstream and regional inclusion zones. In mainstream as well in regional inclusion Islamabad is followed by Sialkot, Rawalpindi, and Karachi. In IC-mainstream order next is Lahore followed by Jhelum and this order is reversed for IC-regional. Peshawar the provincial capital of KPK is ranked quite low at 31st with respect to IC-mainstream, however in regional inclusion its position is relatively better. At the lowest rank of mainstream inclusion is Tor Ghar a KPK district with -0.47 IC-mainstream exhibiting a perfect exclusion virtually. The lowest regional inclusion is experienced by Harnai district of Balochistan where by only 8.9 percent of households in lower half exhibits inclusion in regional educational achievement.

Figure 6.11 reveals the inter-provincial analysis of districts' mainstream ICs in terms of education. It shows the percentage share of provinces in Pakistan's top ranked thirty districts (excluding Islamabad) and bottom ranked thirty districts. The districts are ranked according to their education's IC-mainstream. In top ranked thirty districts

Punjab districts are with a dominant share of 54%. KPK's share of 23 percent is substantially lower than Punjab's. Sindh and Balochistan have small shares of 13 and 10 percent respectively. In bottom thirty districts a large share of 46 percentage is of Balochistan districts and a small share of 7 percent is of Punjab districts. Sindh and KPK districts contribute with a share of 23 percent and 20 percent respectively. Thus, Punjab outperforms the other provinces with highest share in top ranked and lowest share in low ranked districts, whereas, Balochistan is at the lowest end of performance.

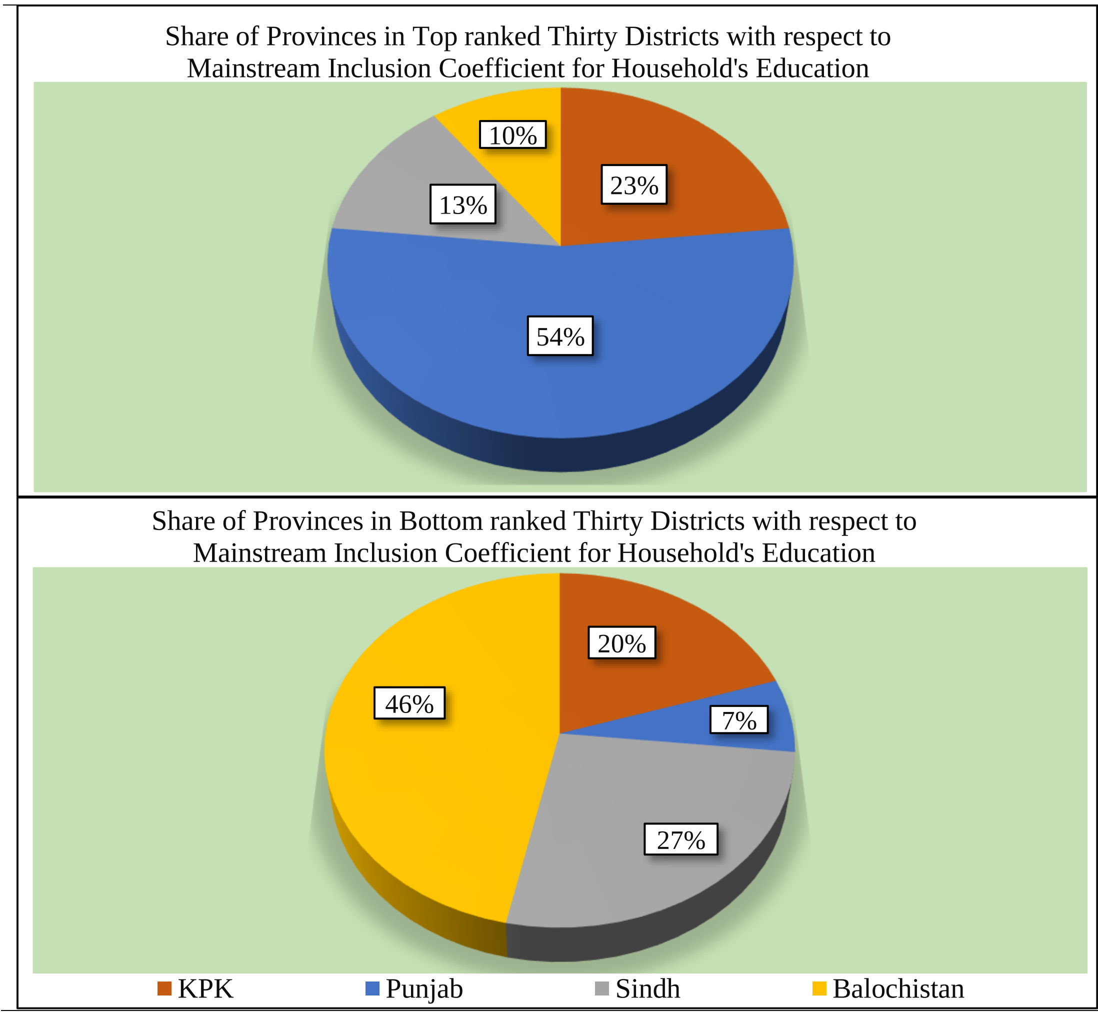


Figure 6.11 Province-Wise Distribution in Top and Bottom Ranked Districts in terms of IC Mainstream of Education

The province-wise analysis of intra district inclusion in terms of Education is exhibited graphically in Figure 6.12. There is a prevalence of wide inter district disparities in all four provinces. Among provinces, disparities in both regional and mainstream inclusion coefficients across districts are lowest in Punjab and are highest in Sindh. Intra district analysis reveals that majority districts in all provinces exhibit a state of exclusion. As their IC-regional and IC-mainstream are less than 0.5, more than fifty percent of households in these districts resides in regional and mainstream exclusion zones of education. Part (a) reveals that in KPK only 2 out of 25 districts are in state of inclusion with respect to IC-mainstream and seven districts with negative IC-mainstream exhibit nearly perfect exclusion. In KPK Haripur district has highest level of mainstream inclusion and regional inclusion of 73 percent and 66 percent respectively. The second highest level of mainstream and regional inclusion is exhibited by district Karak for which both measures have the same value of 0.58. Provincial capital Peshawar also exhibit mainstream exclusion with IC-mainstream 0.43 and its IC-regional is 0.50. The districts with the lowest level of inclusion with respect to mainstream education and regional education are Tor Ghar (-47 %) and Kohistan (21 %) respectively. Examination of Part (b) reveals that out of 36 districts of Punjab only 15 and 11 districts exhibit mainstream inclusion and regional inclusion respectively. In Punjab the education inclusion is highest in Sialkot followed by Rawalpindi and Lahore. The percentage of household in these districts included in mainstream education is 86, 83, and 79 respectively; and in regional education is 75, 66, and 64 respectively. The district with lowest inclusion in mainstream education as well as in regional education is Rajanpur that has IC-mainstream -0.14 and IC-regional 0.20. Along with Rajanpur another district in Punjab is D.G. Khan that demonstrate a state of virtual exclusion with -0.02 IC-mainstream. Like human development and SOL majority of the

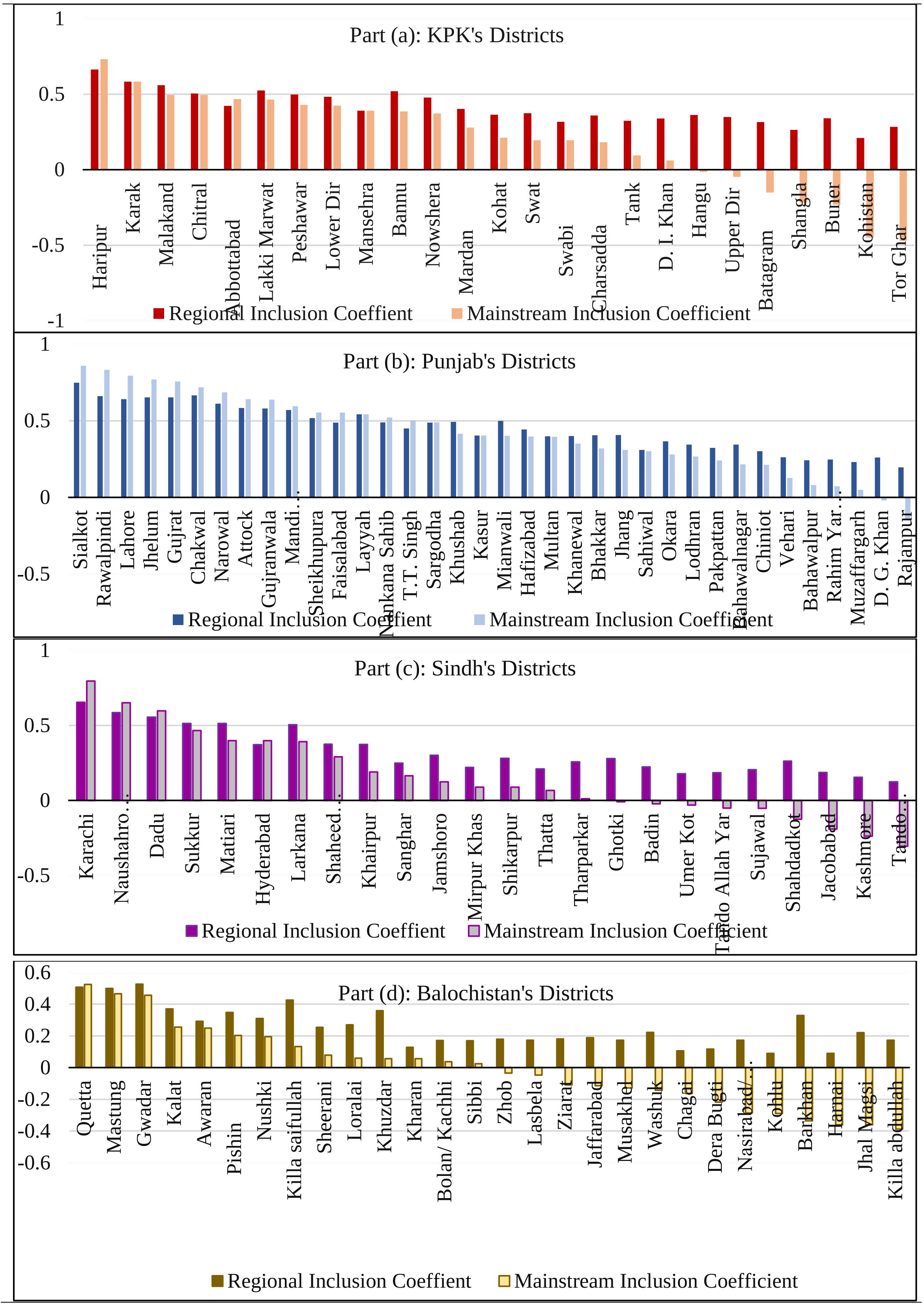


Figure 6.12 District-wise Regional and Mainstream Inclusion Coefficients of Education

districts in southeast and west of Punjab are far below in terms of both regional and mainstream inclusion in education as compared to most districts of north and east Punjab. A visual inspection of Part(c) shows that out of 24 districts of Sindh 21 and 18 are characterized respectively with mainstream and regional exclusion in terms of educational development. Only three districts including Karachi, Naushahro Feroze, and Dadu are exhibiting mainstream inclusive development. In regional inclusive development category along with these three Sukkur, Matiari, and Larkana are also included. The nine districts of Sindh with negative IC-mainstream are exhibiting nearly perfect exclusion. The mainstream inclusion varies across Sindh districts from the lowest of -31 percent in Tando Mohammad Khan to the highest of 78 percent in Karachi. The range of regional inclusion in Sindh districts is from 12 percent in Tando Muhamad Khan to 65 percent in Karachi. An analysis of Part (d) reveals that the fourteen districts of Balochistan out of 28 are exhibiting the worst state of inclusion (almost perfect exclusion) with negative IC-mainstream. In some districts almost, whole population is out of mainstream inclusion zone. Quetta is the only district in Balochistan that exhibits mainstream as well as regional inclusion. Almost 53 percent and 51 percent of households in Quetta falls correspondingly in mainstream and regional inclusion zones of education. At the lowest end of mainstream inclusion is Killa Abdullah with -39 percent of inclusion preceded by Jhal Magsi and Harnai both with -36 percent of inclusion. The state of regional inclusion in majority districts of Balochistan is relatively better than mainstream inclusion. The lowest regional inclusion of 9 percent is commonly shared by Harnai and Kohlu preceded by Chagai at 11 percent, and Dera Bugti at 12 percent.

6.4 Inclusion in Terms of Health Index

The distribution of household's health index (H_i) at national and sub-national levels is employed to evaluate inter-regional and intra-regional inclusion of development in health dimension.

6.4.1 Inter-Regional Inclusion in Terms of Health

Table 6.5 repots the median values of household's health index for national and provincial regions, and for federal capital Islamabad. The regional median health index

Table 6.4 National and Provincial Estimates of Inter-Regional Inclusion/Exclusion in Terms of Health index

Health		Median Health Index	Inter-regional Inclusion/Exclusion*
Pakistan	Overall	0.7963	—
	Urban	0.8346	Inclusion
	Rural	0.7704	Inclusion
KPK	Overall	0.8037	Inclusion
	Urban	0.8099	Inclusion
	Rural	0.7879	Inclusion
Punjab	Overall	0.7989	Inclusion
	Urban	0.8423	Inclusion
	Rural	0.7727	Inclusion
Sindh	Overall	0.7884	Inclusion
	Urban	0.8099	Inclusion
	Rural	0.7559	Inclusion
Balochistan	Overall	0.8220	Inclusion
	Urban	0.8828	Inclusion
	Rural	0.8012	Inclusion
Capital	Islamabad	0.8624	Inclusion

*Criterion for inter-regional inclusion is, regional median>= (0.6*national overall median).

are compared to sixty percent of national median health index (national inclusion threshold for health). Based on the inter-regional inclusion criteria all national and provincial regions, and Islamabad exhibit inclusion in the mainstream stream (national) health development. A region is Inclusive in health development if at least some percentage of household households in bottom half (below median Health index) of this region falls in inclusion zone of health index. However, it does not show the extent of inclusion.

Figure 6.13 exhibits the distribution of districts with inter-region inclusion/exclusion in terms of health at national and provincial levels. The picture of inter-regional

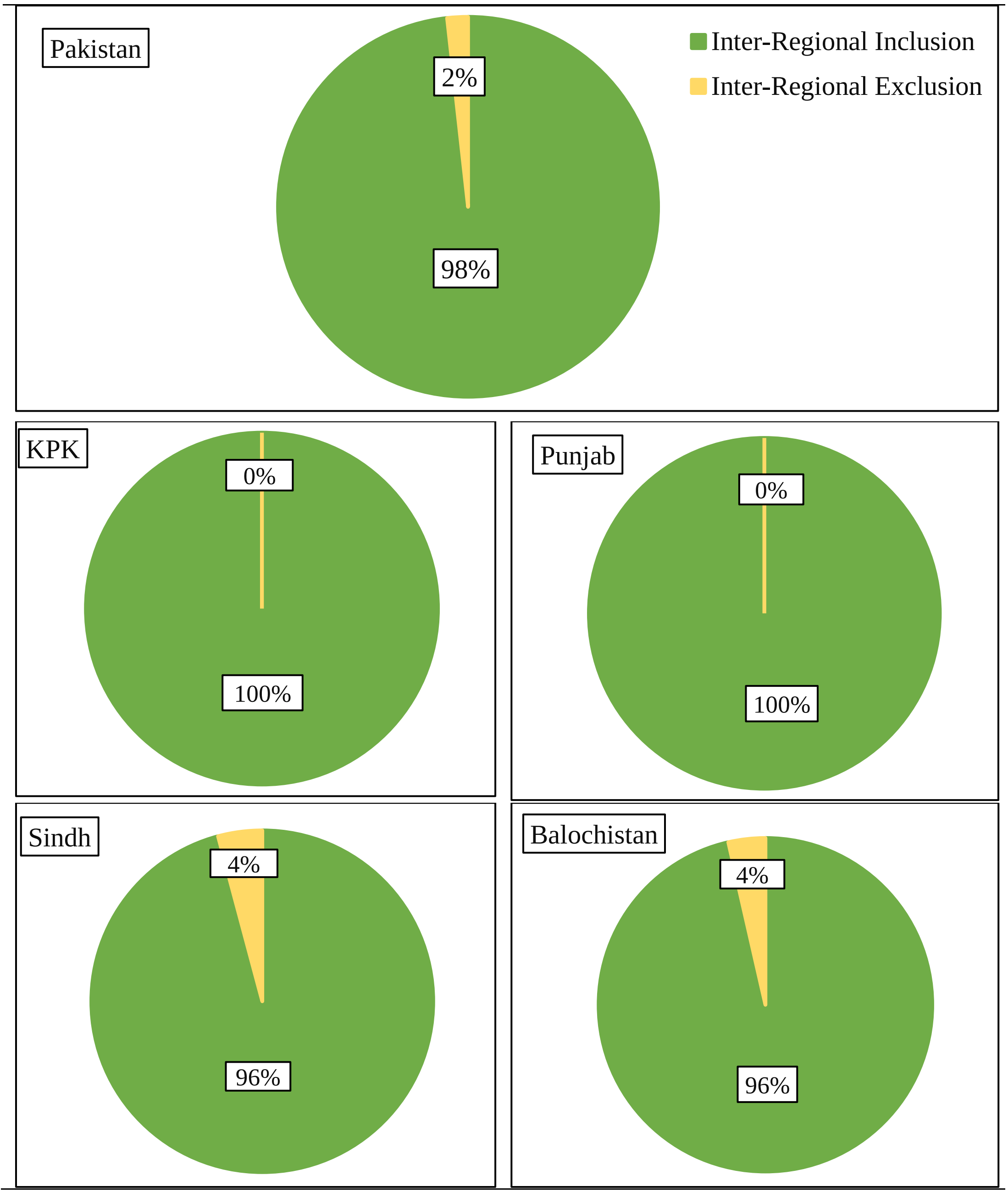


Figure 6.13 National and Provincial Distribution of districts Exhibiting inclusive/Exclusive Health Index

inclusiveness in terms of health is markedly different from overall inclusiveness of human development and its other dimensions. At national level only, 2 percent of districts represent inter regional exclusion. It depicts that most of the districts could be considered inter-regionally inclusive in terms of health. No district in Punjab or KPK is exhibiting inter-regional exclusion. The percentage of districts excluded from mainstream health development in Sindh and Balochistan is 4 percent each.

Province-wise statistics exhibiting inter-district inclusion/exclusion in terms of health index are reported in Tables C.7-C.10, appendix C. Only the district Sujawal and Sheerani respectively from Sindh and Balochistan exhibit inter-regional exclusion. The rest of the districts from all four provinces could be considered inter-regionally inclusive in terms of health. If this inter-regional heath analysis is combined with the health index analysis it could be asserted that the status of inclusive health development is not different from other dimensions except for Balochistan where health indices for most of the districts could be placed in relatively better categories. Since health indices of majority of the districts in Pakistan falls in low or very low heath achievements categories, the percentage of inter regionally inclusive districts is high. It indicates towards the fact that health conditions in all regions are poor in general.

6.4.2 Intra-Region Inclusion in Terms of Health

Figure 6.14 presents the National and provincial estimates of regional and mainstream ID and IC in terms of health, for numerical details see Table C.11, appendix C. It is evident that like inter-regional inclusion, intra-regional inclusion of health exhibit higher inclusion as compared to other dimensions of human development. The estimate of national IC demonstrates that 34 percent of the households with heath index below median, falls in exclusion zone of Health. The mainstream as well as regional statistics reveals considerable rural-urban disparities in health inclusiveness at national and provincial levels. Extent of inclusion in mainstream health development for urban region is 1.8 times higher than that of rural region. The mainstream IC for urban households

Figure 6.14 National and provincial level estimates of regional and mainstream IDs and ICs of Health

and rural households is 92 percent and 51 percent respectively. In urban region and rural regions respectively, 90 percent and 53 percent of the bottom half of households fall in regional inclusion zone. The part (a) shows that the difference between mainstream and regional inclusion is marginal for most of the regions. The mainstream inclusion is higher than regional inclusion for Islamabad; overall KPK, Punjab, and Balochistan; and all national and provincial urban regions. It shows that median health index in these regions is higher than national median. However, for overall Punjab this difference is marginal. For rest of the regions including all provincial and national rural regions, and overall Sindh the regional inclusion is higher than mainstream inclusion. Part (b) reveals that Health's mainstream inclusion is highest in Islamabad followed by Sindh urban, Balochistan urban, Punjab urban, and KPK urban respectively. The region depicting the lowest level of inclusion in main stream human development is Sindh rural preceded by Balochistan rural, Punjab rural, and KPK rural respectively. The Sindh rural region is with noticeably low mainstream inclusion relative to all other provincial rural regions. Part (c) exhibits a comparison of health's regional ICs. It shows almost the same order as that of mainstream inclusion except that Punjab urban is ahead of Balochistan urban. Unlike SOL and education, the level of regional inclusion of health is fairly like its mainstream inclusion in each region.

The district-wise estimates of Health IDs and ICs ordered in terms of IC mainstream are cited in Table C.12, appendix C. Quetta is at the top of the list with almost same mainstream and regional inclusion level of 0.98. Karachi follows Quetta with a negligible difference in mainstream inclusion and a slight difference in regional inclusion. Lahore and Islamabad are ranked respectively at 3rd and 4th positions with virtually same level mainstream inclusion of 96 percent. The level and ranking of mainstream inclusion for majority districts is not very different from their regional inclusion level and ranking. At the lowest end of mainstream inclusion is Sheerani a district of Balochistan with an inclusion coefficient -0.46 exhibiting a case of nearly perfect exclusion. The other district with nearly perfect exclusion is Sujawal with -0.0072 IC mainstream. In these two districts no household in bottom half lies in health's mainstream inclusion zone. The lowest regional inclusion is experienced by Sujawal district of Sindh wherein only 16.6 percent of households in lower half exhibits health index inclusion.

The inter-provincial analysis of districts' mainstream ICs is presented in figure 6.15. It depicts the province-wise percentage in Pakistan's top ranked thirty districts (excluding Islamabad) and bottom ranked thirty districts in terms of households' health

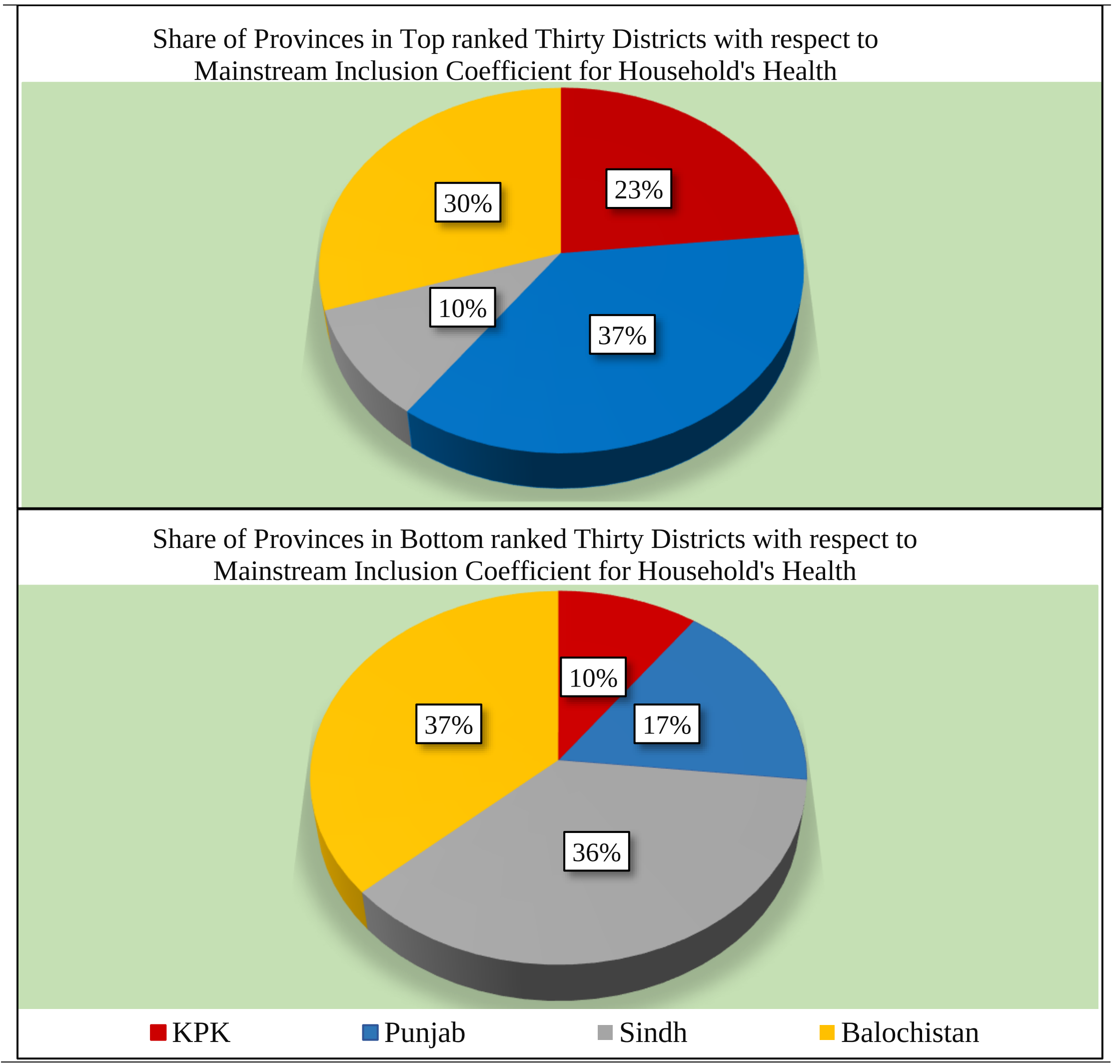


Figure 6.15 Province-wise distribution in Top and Bottom Ranked Districts in terms of Health's IC Mainstream

index mainstream inclusiveness. In top thirty districts Punjab is leading with a share of 37 percent followed by Balochistan, KPK, and Sindh with respective shares of 30, 23, and 10 percent. In thirty bottom ranked districts majority is from Balochistan and Sindh, and a small percentage is from Punjab and KPK.

The province-wise analysis of intra district inclusion in terms of health is illustrated graphically in Figure 6.16. It reveals that among provinces, disparities in both regional and mainstream inclusion coefficients across districts are highest in Balochistan and lowest in KPK. A review of Part (a) exhibits that majority districts in KPK depict a state of inclusion in terms of both regional and mainstream inclusion as their ICs are above 0.5. It shows their bottom half of the households concentrates in the regional and mainstream inclusion zones. The two districts of KPK Kohistan and Shangla exhibit the state of regional exclusion. Including these two, seven districts in KPK show exclusion from mainstream. It is worth noticing that despite of its relatively better situation of inclusion, in each district of KPK at least 21 percent and 17 of the households in bottom half are excluded respectively from regional and mainstream development.
In KPK districts, Peshawar has the highest level of both mainstream and regional inclusion followed by Haripur. The districts with the lowest level of inclusion with respect to mainstream is Kohistan with IC 0.28. Shangla is the district with lowest regional inclusion in KPK whereby 47 percent of households in bottom half of the population lies in regional inclusion zone. Part (b) depicts that out of 36 districts of Punjab 32 and 28 exhibit correspondingly regional and mainstream inclusion in terms of health. Like other dimensions majority of the districts at highest end of inclusion are from eastern and northern Punjab, whereas, at the lowest end of inclusion most of the districts are from southeast and western Punjab. The maximum regional inclusion of 95 percent in Punjab is exhibited by Lahore and lowermost of 35 percent by Muzaffargarh.

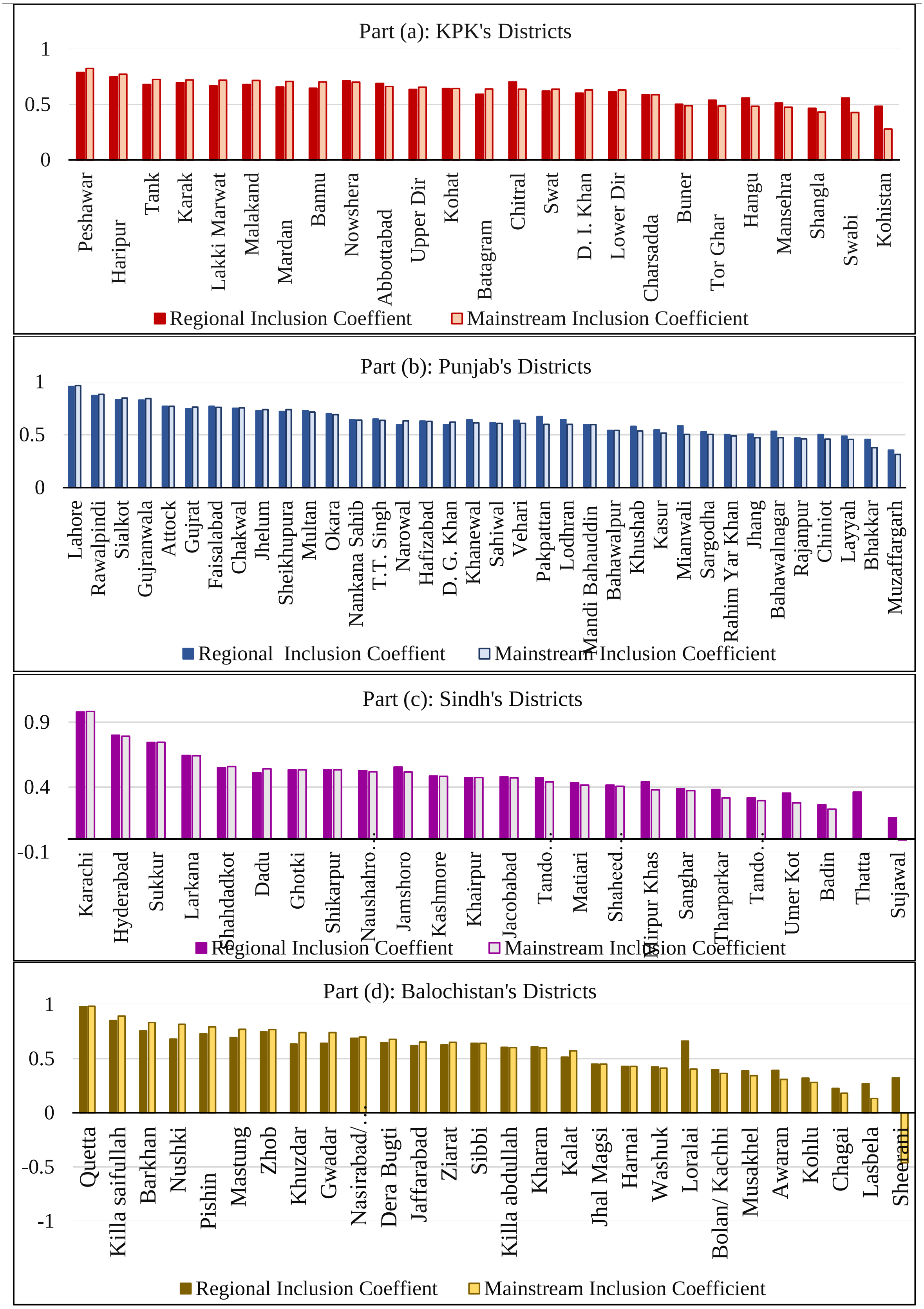


Figure 6.16 District-wise Regional and Mainstream Inclusion Coefficients of Health

Mainstream inclusion in Punjab varies from highest of 96 percent in Lahore to the lowest of 31 percent in Muzaffargarh. Lahore is followed by Rawalpindi, Sialkot, and Gujranwala in terms of regional as well as mainstream health inclusion, whereas, Muzaffargarh is preceded by Bhakkar, Layyah, Chiniot, and Rajanpur. An inspection of part(c) reveals that 14 districts 0ut of 24 districts of Sindh demonstrate a state of mainstream exclusion and the same number of districts exhibit regional exclusion. Karachi stands out of the all districts of Sindh in terms of both regional and mainstream inclusion with IC of 0.98 for each. The district with second highest level of inclusion is Hyderabad with almost 80 percent of regional and 79 percent of mainstream inclusion. Hyderabad is followed by Sukkur, Larkana, and Shahdadkot in terms of both regional and mainstream inclusion. In Sindh at the lowest end of inclusion is district Sujawal with 17 percent of regional inclusion and -0.7 percent of mainstream inclusion. The analysis of part(d) exhibits that in Balochistan situation of district-wise inclusiveness of health is relatively better than that of Sindh. Out of 28 districts of Balochistan 18 and 17 districts exhibit respectively regional and mainstream inclusion. Quetta stands out with 98 percentage of both mainstream and regional inclusions. In rest of the districts the mainstream IC and regional IC are below 90 percent and 86 percent respectively. At the lowest level of mainstream inclusion is Sheerani exhibiting virtually a state of perfect exclusion preceded by Lasbela and Chagai. At the lowest end of regional inclusion; the districts of Chagai, Lasbela, Kohlu, and Sheerani with 22, 27, 32, and 32.2 percent of regional inclusion respectively; exhibit the state of exclusion.

6.5 Findings Reviewed

The inter-regional inclusiveness analysis at provincial level demonstrates that except Sindh rural and Balochistan rural which are excluded all other provincial regions are included in the mainstream of overall human development and SOL development.

The Balochistan rural is the only region that could be considered excluded from mainstream of development in the dimension of education. The examination of health index distribution exhibits that all provincial regions are included in the mainstream of health attainments. This result does not depict a positive picture when combined with low classification of health status in almost all provincial regions. District-wise inter-regional analysis of HDI reveals that 29 percent of the districts in Pakistan are in the state of exclusion from the mainstream of development and majority of these districts belongs to Sindh and Balochistan. More than 50 percent of the districts in Sindh and Balochistan are excluded, whereas in KPK and Punjab the scenario is markedly better as only two districts from each province are found to be excluded. As compared to HDI the inter-district inclusiveness analysis for SOL index reveals considerably high percentage of excluded districts at national level as well as for Sindh and Balochistan, whereas, for Punjab and KPK districts the percentage is slightly higher. This analysis for education exhibits almost the same picture as for HDI at national level and for Balochistan, however the percentage of excluded districts for Sindh is markedly low, for Punjab is marginally high, and for KPK is substantially high. It is found that a very low percentage of districts are excluded from the mainstream of health achievements. Only two districts Sujawal from Sindh and Sheerani from Balochistan are excluded. This result is again attributed to low or very low performance in health dimensions by all provincial regions.

The intra-regional inclusion analysis reveals that in Pakistan more than 50 percent of the households in lower half falls in exclusion zone of human development, SOL, and education. In health dimension the exclusion is markedly low as compared to other dimensions, however, this does not portray a satisfactory situation as it is accompanied with low category of health achievement. A comparison at overall provincial level shows that the inclusion in terms of overall human development (IHDI) is highest in Punjab followed by KPK, Sindh, and Balochistan respectively, in mainstream as well as in regional development process. The ranking is same in education dimension; however, the performance of Punjab is significantly higher than other three provinces and the Balochistan exhibits adverse situation of inclusion. In SOL dimension KPK is ahead of Punjab and level of inclusion in Sindh and Balochistan is significantly low. In the dimension of health, the ranking is almost same as for human development except that Sindh is ahead of KPK and the differences in the inclusion level of four provinces and between mainstream and regional inclusion of each province are marginal. In all rural regions at national and provincial levels the percentage of exclusion is considerably high as compared to that of their urban counterparts. At national level the rural mainstream inclusion (26 %) is 3.3 times lower and the rural regional inclusion (46 %) is 1.6 percent lower than that of corresponding urban inclusion statistics. The urban-rural disparity is highest in Sindh and lowest in KPK. It is lowest in the dimension of heath and highest in SOL dimension. In the Sindh and Balochistan rural regions virtually the entire population is excluded from the mainstream of human development and SOL. In education dimension Balochistan rural exhibits perfect exclusion. Analysis of district wise IC-mainstream of human development reveals that 33 districts in Pakistan are virtually in a state of perfect exclusion. Majority of these districts are from Sindh and Balochistan. The situation of regional inclusion is considerably better in majority districts. But again, it is not an optimistic situation when coupled with very low level of human development. Punjab is ranked first in district-wise inclusiveness of human development and its dimensions of education and health followed by KPK, Sindh, and Balochistan. In SOL dimension KPK is ranked ahead of Punjab. The percentage of inclusive households across districts varies from the highest of about 94 percent in Islamabad to the lowest of -45 percent in Sheerani. The districts at the highest end of regional and mainstream intra district inclusion includes Islamabad, Lahore, Karachi, Sialkot, Rawalpindi, Jhelum, Quetta. The districts of Sheerani, Kohistan, Sujawal, Tando Mohammad Khan, Kohlu, Jhal Magsi, and Tharparkar resides at the lowest end of mainstream inclusion.

Generally, the regions with high exclusion are also found to be characterized with low level of achievement and high inequalities in terms of human development or any of its dimensions. However, several regions could be observed with different pattern of three aspects of inclusive development. It is analyzed that the probable features of districts with higher/lower inclusive development are same as of the districts with higher /lower development level and inequalities (discussed in section 5.3).

CHAPTER 7

Analysis of Determinants of Inclusive Development

Analyzing the determining factors of inclusive development is a prerequisite to identify critical areas for optimal utilization of available resources (Oluseye & Gabriel, 2017). Measurement of multidimensional inclusive development is the first step towards providing policy analysis and guidance for Inclusive development. The next step is to seek out factors that influence the various aspects of inclusive development. There is a broad agreement on the basic policies that are important for development and reducing poverty and inequality, little is known about what may foster inclusive development (Anand, Mishra, & Peiris, 2013).

One of the objectives of this study is to identify the factors that could ensure and enhance the inclusive development across districts in Pakistan. The district level diagnosis recognizes the most significant local factors that boost or hampers the inclusive development. This analysis provides a base to suggest contextually appropriate policies. It is tried to utilize the limited available information at district level in best possible way to explore the most influential determinants of inclusive development. The analysis is augmented with a review of previous studies about the general contribution and prevailing state of these determinants in Pakistan to draw appropriate policy implications. The methodology for the analysis is discussed in section 3.4, chapter 3. The preceding sections presents a review of potential determinants, descriptive analysis and correlation analysis of variables (regressands and regressors of regression analysis), and regression analysis.

7.1 Review of Potential Determinants of Inclusive Development

The variables that are considered in this study as potential determinants of inclusive development belong to four broad categories of factors: economic, social, demographic, and locational. Validity of these variables as determinants of different indicators of inclusive development is established in numerous studies.

7.1.1 Socio-Economic Factors

Most of the variables in categories of social and economic factors considered in this study are included in social infrastructure that is an important driver of inclusive development[83]. A number of studies including Sapkota (2014), Pillai (2008), and Sachs (2004) recognize its significant positive role in various dimensions of inclusive development. Sachs (2004) provides strong argument for importance of equitable access to public services of education and health to raise the level of inclusive development. Raheem, et al. (2018) found government expenditure on education to be significant for making growth process inclusive. It is concluded by Raheem et al., (2018), and Tella & Alimi (2016) that adequate public financing of the health sector is fundamental to accelerate inclusive growth. The findings of Sherwani, Kamal, & Abbas (2017) suggest that public health expenditures, and public expenditures on education are positively associated with HDI. According to Berg C. (2015) roads are the arteries through which the economy rhythms. The paper considers roads vital to any development agenda because it connects producers to markets, workforces to jobs, students to educational institutions, and the sick to hospitals. The findings of Sapkota (2014) suggests that a positive correlation exists between income index of countries and road density. Berg &

[83]Cohen (2017) defines social infrastructure generally as building and maintenance of facilities that support social services. Forms of social infrastructure include healthcare institutions (hospitals), education facilities (schools and universities), public facilities (community housing and prisons) and transportation (railways and roads).

Desai (2013) present the evidence for significance of rule of law to attain higher levels of sustainable development. The public infrastructure in Pakistan has upgraded in the last 50 years but at a sluggish rate as compared to similar countries such as Malaysia, Sri Lanka and Egypt. Pakistan has a relatively low density of paved roads, a miserable quality of railroads and airports and only an acceptable quality of seaports (Loayza & Wada, 2012). The public spending on education in Pakistan has so far fallen far short the longstanding target of spending 4 percent of GDP and only reached 2 percent of GDP in 2013-14 (Malik & Rose, 2015). In Pakistan the public sector health spending is miserably low at less than 0.8 percent of GDP. The availability of health services (health care institutions and health personnel) per head is also very low (Khaliq & Ahmad, 2018). The components of social infrastructure utilized in this research includes number of government schools, colleges, government hospitals, doctors, paramedics, police stations; student-teacher ratios in government schools and colleges; and road density.

The advanced industrial sector is a prerequisite for economic and social development (UNIDO, 2014). There is a strong evidence from the developed countries of the world that industrialization is an effective poverty reduction strategy. The industrial sector in Pakistan has been either stagnating or deteriorating which lead to the low growth of per capita income. The share of industrial sector in GDP reduced from 25 percent in early 2000 to around 20.50 percent (Rehman F. , 2016). Present study initially planned to analyze the effect of industrialization (number of registered factories) on inclusive development at district level but could not work on it due to data constraints.

Two other economic factors included in current analysis are forest density and agricultural development (cultivated land, number of tube wells, tractors, threshers &

harvesters). Forests could play critical role in green growth and could help to satisfy the growing demands of rising world population for food, fiber, biofuel, housing, and other bio-products (The World Bank, 2013). Pakistan is a forest-poor country, mainly due to dry and semi-dry weather in large parts of the country. According to a study by FAO in 2015 the percentage of forest area in Pakistan deteriorated from 3.3 in 1990 to 1.9 in 2015 at an alarming rate of 2.1 percent (Shafqat, 2016)[84, 85]. In Pakistan forests provide survival to a very large number of poor people in the form of timber, fuelwood, livestock grazing, remedies, sweet-smelling and other profitable plants, honey, hunting of wild animals, fishing etc. Forests have great potential for reducing poverty if used intelligently (Office of the Inspector General of Forests, Ministry of Environment, Government of Pakistan, 2009).

Agricultural development is an important prerequisite for inclusive development (Behera, 2015). Agriculture is vital for sustainable development and poverty reduction. Its growth could be an influential source for inclusive growth (Zorya, et al.). The World Development Report (2008) concludes that growth initiating in the agricultural sector is two to four times as effective as growth initiating in the nonagricultural sector in raising incomes of the bottom third of the income distribution. According the report agricultural growth has been the main tool of rural poverty reduction in the most developing countries. In the agriculture-based economies, agriculture and its associated industries are essential to inclusive growth and food insecurity (The World Bank,

[84] The percentage of forest area is taken from WDI (2018).
[85] Several human and natural factors are responsible for rapid forest degradation besides the dry climate. It includes fast population growth, economic growth (construction of infrastructure through the forests), withdrawal of waters from three rivers by India, inefficient irrigation system, worsening energy crisis, climate change, to name but a few (Office of the Inspector General of Forests, Ministry of Environment, Government of Pakistan, 2009).

2008). Pakistan's economy is semi-industrialized with a well-integrated sector of agriculture (FAO, 2018). Agriculture sector is the mainstay of Pakistan's economy. It is the largest sector of the economy as majority population, directly or indirectly, dependent on this sector. The share of agriculture sector in GDP is 24 percent, 50 percent of employed labor force is works in this sector, and it is the largest source of foreign exchange earnings (Pakistan Bureaue of Statistics, 2018). Even though agriculture sector is backbone of the economy in Pakistan, it is not receiving the required consideration (Malik S. J., 2015).

7.1.2 Demographic and Locational Factors

Demographic factors play a significant role in determining the level and pace of inclusive development (Herrmann, 2015). Current study investigates the effect of demographic factors including population density, sex ratio, and urbanization (percentage of urban population).

Population density is a basic demographic feature of a region/country. Different studies during different periods of time recommend that population growth and ensuing higher population density either restricts, promotes, or is independent of economic growth (Keskinen, 2008). Thomas Malthus's Pessimistic theory postulates that higher population density restricts economic and social growth by exerting pressure on natural resources. In last few decades this theory is largely replaced by optimistic theory which suggests population growth and subsequent higher population density fuels economic development. This shift of view is largely based on the empirical findings that during the last 30 years the world's population has doubled and population densities increased dramatically and so far, also the average per capita incomes have increased by two-thirds approximately (Bloom, Canning, & Sevilla, 2003). Neutralist theory proposes that higher population density do not affect development significantly. Pakistan has the world's 6th largest population and its population density is 260 per Km^2 (Department of Economic and Social Affairs, Population Division, United Nations, 2017).

An important structural feature of populations is the comparative numbers of males and females who compose it (Encyclopaedia Britannica, 2018). Sex ratio is innovatively used by Sen (1992; 1990) to assess the collective effect of gender bias in mortality by assessing the additional number of females of all ages who would be alive if there had been equal handling of the sexes. It is observed by Sen that the demographic deficit of women affecting mainly Asia and North Africa went against biological trends which indicate the prevalence of sex ratio less than one (Hassan, 2014). Phenomenon of 'missing women' is the result of gender discrimination in the allocation of survival-related goods such as nutrition, economic opportunities, health care, medical attention. According to a US study, the ratio of men to women in Pakistan is 1.11 which is one of the most unequal and uncommon sex ratios in the world. In the other countries of the world only India and China have similar inverse sex ratios. Pakistan's own data states that the overall sex ratio is 1.02, which is attributed to a tendency to under-report women (Dawn , 2011). In Pakistan Census 2017 it is reported that there are 105 men for 100 women in.

Herrmann (2015) highlights that urbanization plays a dual role. While it is considered responsible for increasing disparities and social and environmental pressures, it also offers a great opportunity for accelerating progress to more sustainable development. According to this report benefits of urbanization could be realized by designing progressive policies and plan for urban growth and making targeted investments. The policies that restrict urbanization would not just be costly and fruitless but would also offset sustainable development. In Pakistan urbanization rate is the fastest in South Asia- over 3 percent annually. The percentage population living in urban areas is about

39 percent in the country. On average, in big cities of Pakistan per capita income is 33 percent higher than small cities (SPDC , 2016).

The locational factors of province and divisional headquarters are introduced in present regression analysis as control variables. The inclusion of these variables in equation filter the effects of provincial difference and of being divisional headquarter.

7.2 Descriptive Analysis

In this regression analysis dependent variables are the indicators of inclusive development and the independent variables are factors that influence inclusive development. The individual regression models are estimated in this study for indicators of inclusive development HDI, inequality coefficient, and inclusiveness coefficients (mainstream & regional) representing its three aspects. These indicators embody the output side of inclusive development. A set of 26 variables mentioned in section 3.4 is initially selected to include in regression analysis. These variables represent the input (opportunity) side of inclusive development.

Non-availability of data restricted this analysis seriously. The variables of number of tube wells, tractors, threshers & harvesters, registered factories, and reported crimes has been dropped from the analysis as these variables' data for most of the districts of Balochistan and for some districts of Sindh is not available. The district of Islamabad is also dropped from this segment of analysis due to non-availability of data for most of public education and health facility indicators. Hence, the regression data includes the information on 3 dependent variables (estimated in this study) and 21 independent variables for 113 districts of Pakistan. The descriptive statistics of all continuous regressands and regressors is reported in Table 7.1. The frequency distributions for categorical regressors are cited in Table 7.2. There is no missing value in the data.

Table 7.1 Descriptive Statistics

Variable	Mean	Minimum	Maximum	S.D.
HDI	0.4832	0.2803	0.7454	0.0921
Inequality coefficient (AH)	0.3071	0.0624	0.5395	0.1028
IC-Mainstream	0.2809	-0.4470	0.9319	0.3806
IC-Regional	0.5592	0.2516	0.8475	0.1184
Forest density (percentage)	13.4677	0.0000	163.9238	24.0450
Population density (per sq. km)	508.5227	4.1233	6278.942	813.7808
Urban Population (percentage)	24.111	0.0000	100	17.1228
Sex ratio (male to female)	105.5206	92.6900	124.7800	5.5617
No. of Primary schools	91.8844	5.7072	399.0500	64.7966
No. of Middle schools	9.3230	1.9503	22.3719	4.2818
No. of High schools	6.8550	1.9437	22.1285	3.6327
No. of Colleges	1.0282	0.0000	2.8317	0.7185
Schools' Student-Teacher ratio	29.0089	10.0499	50.7789	9.1822
Colleges' Student-Teacher ratio	31.0875	0.0000	92.8800	18.8004
No. of Doctors	1.2973	0.2676	6.0198	1.0435
No. of Paramedics	1.9690	0.5834	8.1875	1.1546
No. of Hospitals	0.4511	0.0000	1.7503	0.2742
Cultivated area (percentage)	3.8330	0.0000	88.9358	12.6770
No. of Factories	7.3668	0.0000	138.8889	17.0025
Road density (km/per sq. km)	30.1519	2.7530	74.5793	20.6441
No. of Police stations	2.4179	0.3892	17.7253	2.7186
No. of observations	113			

Table 7.2 Frequency Distribution of Categorical Determinants of Inclusive Development

Variable	Frequency	Relative Frequency
Province		
Balochistan	28	24.78
Sindh	24	21.24
KPK	25	22.12
Punjab	36	31.86
Divisional Headquarter		
No	86	76.11
Yes	27	23.89
Railway Station		
No	27	23.89
Yes	86	76.11
Airport		
No	87	76.99
Yes	26	23.01

The independent variables' descriptive statistics has been discussed in previous chapters. Analysis of descriptive statistics of continuous independent variables shows substantial variation in their values across districts. A high variability in the regressors allows to more confidently pin down the relationship between independent and dependent variables in the regression analysis. It improves the precision with which the parameters are estimated[86]. The frequency distributions of categorical variables also exhibit enough variability to include them in the regression analysis.

7.3 Correlation Analysis

A correlation analysis between independent and dependent variables offer a base for regression analysis. The correlation between independent variables provide with a preliminary check for prevalence of multicollinearity in regression analysis (Daoud, 2017). The Pearson's correlation coefficients for all continuous variables involved in present regression analysis are reported in Table E.1, Appendix E. The correlation matrix reveals that unconditional linear association is present between almost all regressors (determinants) and all regressands (indicators). However, magnitude and direction of this association varies markedly. The three indicators of inclusive development HDI, IC-mainstream, and IC-regional are positively correlated with each other and are negatively correlated with inequality coefficient. It depicts that level of human development and its inclusiveness support each other and are accompanied with lower inequality of development in general. The magnitude of individual correlation is very high (the least is above 93) between HDI, inequality coefficient, and IC-mainstream. In comparison the association of IC-regional is quite low with each of these three indicators of inclusive development. Its implication is discussed in the next section combined

[86] For reference see "Is high variation in Independent Variable Desirable?", (2016).

with regression results. The correlation of population density, urbanization, sex ratio, number of primary schools, number of colleges, and road density is sufficiently high with all regressands individually. The magnitude of linear correlation between rest of the determinants and indicators of inclusive development is quite low. However, none of the variables is dropped from regression analysis solely based on correlation analysis as drastic difference might exist between the outcomes of these two techniques[87].

7.4 Regression Analysis

To inspect the determinants of inclusive development CLRMs are estimated by utilizing Stata 13. The assumptions of CLRM vital for cross-sectional data are identified and are taken care of to generate robust estimates of regression coefficients. The robust standard errors are used to address the probable prevalence of heteroscedasticity (Williams, 2015). CLRMs for the HDI, inequality coefficient, IC-mainstream, IC-regional are estimated with full specification that include all independent variables that are considered as determinant of inclusive development in this study. These regression results are reported in Table E.2, Appendix E. The diagnostic analysis of these models is given in Table E.3, Appendix E. The results of Shapiro-Wilk W test and White's Chi-square test shows that residuals are normal and homokcedastic. The analysis of the Variance-Inflating Factors (VIF) for multicollinearity reveals that models' mean VIF and VIF for most of the variables is quite higher than 2.5[88]. The high VIF is considered specifically for continuous variables as for categorical variables (with three or more categories) it could be safely ignored (Allison P. , 2012). The multicollinearity makes some variables statistically insignificant when they would be significant by raising the

[87] For detail consult "Can Independent Variables with Low Correlation with Dependent Variable be Significant Predictors?", (2014).
[88] A rule of thumb given by Allison P. D. (1998) is multicollinearity might be a real concern if VIF is above 2.5 or the tolerance (1/VIF) below .40.

standard errors (Daoud, 2017). This is evident from the regression results of models with full specification. To control for high multicollinearity various models with different specifications are estimated and the final specifications are selected. In these final models individual and mean VIFs are lower than 2.5 and residuals are approximately normal and homoskedastic. The estimated regression models and results of diagnostic tests are given in Table 7.3 and Table E.4, Appendix E respectively.

Table 7.3 Regression Models for Determinants of Inclusive Development (Final Specification)

Regressor \ Regressand	HDI	Inequality Coefficient	IC-Mainstream	IC-Regional
District HQ	0.0251** (0.0120)	-0.0260 (0.0178)	0.1285** (0.0591)	-0.0295 (0.0235)
Forest density	—	0.0002 (0.0003)	0.0002 (0.0010)	-0.0009 (0.0006)
Population density	0.00003*** (0.0000)	-0.00003*** (0.0000)	0.0001** (0.0001)	0.00006*** (0.0000)
Urbanization	0.0016*** (0.0004)	-0.0013** (0.0006)	0.0058** (0.0024)	-0.0004 (0.0009)
Sex ratio	-0.0059*** (0.0011)	0.0050*** (0.0015)	-0.0255*** (0.0052)	-0.0028 (0.0031)
High schools	0.0066*** (0.0021)	-0.0091*** (0.0025)	0.0318*** (0.0104)	0.0081*** (0.0030)
Hospitals	0.0006 (0.0254)	-0.0106 (0.0300)	0.0198 (0.1193)	0.0660* (0.0391)
Cultivated area	-0.0008** (0.0004)	0.0007 (0.0005)	-0.0052** (0.0022)	-0.0006 (0.0008)
Airport	0.0291** (0.0148)	-0.0397** (0.0197)	—	0.0399 (0.0255)
Road Density	0.0008*** (0.0003)	-0.0009* (0.0005)	0.0030** (0.0015)	0.0013** (0.0007)
Police Stations	-0.0019 (0.0025)	0.0026 (0.0032)	-0.0183 (0.0139)	0.0019 (0.0038)
Constant	0.9747*** (0.1204)	-0.0794 (0.1706)	2.4936*** (0.5969)	0.7121** (0.3336)
R-Squared	0.692	0.5433	0.5745	0.3839
F value	19.63***	11.57***	16.16***	7.83***
RMSE	0.0536	0.0732	0.2601	0.0979

Note: ***, **, * indicate 1%, 5% and 10% significance level. Robust standard errors are cited in parenthesis.

The regression results demonstrate that being divisional headquarter, population density, urbanization, sex ratio, public expenditure on education and on health, airport, and road density are the significant determinants of one or more aspects of inclusive development in districts of Pakistan. The impact of forest density and police stations on inclusive development is found to be statistically insignificant for all aspects of inclusive development. The inclusive development is positively influenced by population density, public expenditure on education and on health, airport, and road density and is related inversely with sex ratio. The rest of determinants have mixed effect on various indicators of inclusive development.

The findings of analysis show that the districts which are divisional headquarters on average have a higher human development level and mainstream inclusion as compared to other districts. These effects are statistically significant. The inequality coefficients and IC-regional are lower for divisional headquarters as compared to other districts. However, this negative impact is statistically insignificant. While controlling all other factors, as compared to other districts on average a divisional headquarter's HDI and IC-mainstream are higher by 0.03 and 0.13 respectively. It represents a probable bias towards administrative centers in allocation of resources and leads to suggest the policy that aims at devolution of power and resources to local governments.

The regression results suggest that the impact of forest density is statistically insignificant on all aspects of inclusive development. The trivial role of forest density in determining any of the indicators of inclusive development is in accordance to the finding that restoration of forest reserves is neglected by authorities and are inefficiently utilized by poor people and timber mafia in Pakistan[89]. To conserve remaining forest

[89] For detail see Shahbaz, Ali, & Suleri (2006), a study by Office of the Inspector General of Forests, Ministry of Environment, Government of Pakistan (2009), and Khan M. A. (2017).

resources and their efficient utilization for sustainable development require an urgent consideration of policy makers.

It is depicted by regression results that population density has a highly significant impact on all indicators of inclusive development. As population density rises by 10 persons per square-km the HDI increases and inequality decreases by 0.0003 points, IC-mainstream and IC-regional increases by 0.001 and 0.0006 points respectively. The findings about population density are in accordance to the Optimistic theory that believe as population density increases, the stock of human inventiveness also rises to solve various sorts of problems (Keskinen, 2008). A rationale for this evidence could also be the Pakistan's demographic advantage of having a dominant ratio of youth that makes its population an asset despite of its raw form[90]. It leads to the policy implication that investment in human capital for effective utilization of population must be at the top priority in inclusive development agenda.

The regression results describe that the impact of urbanization is significant on human development level, inequality, and mainstream inclusion; however, its effect is insignificant on regional inclusion. A one present increase in urban population results in to 0.0016 and 0.0058 points increase in HDI and IC-mainstream respectively, and 0.0013 points decrease in inequality coefficient. It shows that rapid urbanization in Pakistan is helping districts to catch up with mainstream development, however, it does not exert any significant impact on inclusion in regional development. This result also demonstrates that in districts with high proportion of urbanization the inequalities are

[90] UNDP Pakistan's NHDR (2017) reports Pakistan presently has the largest percentage of young population ever documented in its history. The percentage of its population below the age of 30 is 64 percent and between the ages of 15 and 29 years is 29 percent. It makes it one of the youngest countries of the world and in South Asia it is second youngest succeeding Afghanistan.

relatively low. These findings indicate to the complex role of urbanization in the development process. It is required to formulate policies keeping in view all aspects of urban saga so that its fruits could be enjoyed without sourness.

A very clear picture of relationship between inclusive development and sex ratio (gender discrimination) is portrayed from present analysis. The impact of high sex ratio on all indicators unanimously leads to lower inclusive development. A higher sex ratio leads to lower level of development, higher inequalities, and lower inclusiveness of both mainstream and regional development. The impact of sex ratio is highly significant on all indicators of inclusive development except the IC-regional. One percent increase in male to female population would result in to a decrease of 0.0059 and 0.0255 points in HDI and IC-mainstream respectively; and 0.005 points increase in inequality coefficient. These findings provide the empirical evidence for significant negative impact of gender bias on the human development as indicated in section 7.1.2. It signifies that female inclusiveness is a key prerequisite for inclusive development.

It is asserted by regression results that number of high schools (an indicator of public education facilities) has a substantial and statistically significant effect on all indicators of inclusive development. It depicts that an addition of one high school per hundred thousand population leads to a rise in HDI, IC-mainstream, and IC-regional respectively by 0.0066, 0.0318, 0.0081points; and a fall in inequality coefficient by 0.0091 points. The substantial effect of public spending on education provide an empirical evidence for multiplicity of benefits that investment in education yields (Mitra, 2011). The significance positive role of secondary schools in attaining higher level of development are in accordance to the findings of Barro (1999). This finding leads to the policy recommendation of keeping education at the highest priority in development agenda.

The regression results revealed that impact of number of hospitals (an indicator of public health facilities) is statistically significant only for IC-regional. One additional hospital per hundred thousand population yields an increase of 0.066 points in IC-regional. The positive significant role of public health facility is beyond doubt (James, 2016). Its triviality in determining some of the indicators of inclusive development in this study witness the poor access of deprived to public hospitals and miserable conditions of majority public hospitals in Pakistan[91]. The insignificance also indicates towards miserably low percentage of public health expenditure in Pakistan (Khaliq & Ahmad, 2018).

It is depicted by regression results that cultivated area (indicator of agricultural development) has a statistically significant and negative impact on HDI and IC-mainstream. A larger percentage of cultivated area leads to lower human development and lower inclusiveness of development. A one percent increase in cultivated area brings down the HDI, IC-mainstream by 0.0008 and 0.0052 points respectively. These findings are in accordance to the analysis that agriculture sector is a neglected sector in Pakistan (Malik S. J., 2015). It also confirms the assertion that in developing countries like Pakistan majority of poor people reside in agriculture sector (Jan, Chishti, & Eberle, 2008). These findings are a wakeup call for an agricultural country like Pakistan where development in all other sectors directly or indirectly hinges on the development of agriculture sector.

The findings of analysis show that the impact of airport is statistically significant on HDI and inequality coefficient and is insignificant on inclusion coefficients. On average as compared to the districts with no airport, a district with airport have

[91] For detail see Khaliq & Ahmad (2018), Pakistan Observer (Rida-i-Zainab, 2016), and Naz, et al. (2012).

higher HDI by 0.0291 and inequality coefficient lower by 0.0397 points. It provides empirical evidence for the importance of infrastructure in raising some indicators of the inclusiveness of development that is reviewed in section 7.1.1 of this study. However, its insignificance in raising inclusion of marginalized could be rationalized as its direct impact on inclusion of marginalized could not be achieved at the present stage of development in Pakistan.

The regression results provide with empirical evidence for vital role of roads to achieve higher level of inclusiveness in development process asserted by several studies including Sapkota (2014) and Berg C. (2015) . A higher road density leads to higher level of development, lower inequalities, and higher inclusiveness of both mainstream and regional development. The impact of road density is found to be statistically significant on all indicators of inclusive development. An increase in road density by 1 km per 100 square km would result in to an increase of 0.0008, 0.0030, and 0.0013 points in HDI, IC-mainstream, and IC-regional respectively; and 0.0009 points decrease in inequality coefficient.

According to the regression outcomes number of police stations (indicator of public facility to maintain law and order) is found to be insignificant in determining inclusive development. Although the results and their insignificance are counter intuitive, it provides evidence for the assertion that police are one of the public institutions in Pakistan that lacks transparent accountability and beset by corruption at the highest levels. At district level it is mostly controlled by politicians, rich landowners, and other powerful members of society (Human Rights Watch, 2016).

The present analysis could be concluded as the appropriate management of human resources including population density, sex ratio, and urbanization; investment in human capital by public financing of education and health; and the development of infrastructure like road network and airports; are the key drivers of inclusive development in Pakistan. It is a worth noting that these factors affect the three aspects of inclusive development with almost equal significance except the two of these factors sex ratio and urbanization that are not too significant in determining intra district inclusion. Thus, appropriate policies designed to harness these factors would be equally effective to achieve higher development, reduce inequalities, and enhance inclusion of deprived. Findings of this analysis indicates the skewed utilization of public resources towards divisional headquarters. The results strengthen the already established assertions about neglected sectors of public health and agriculture, inefficient utilization and deterioration of forest density, and corrupt institution of police in Pakistan. It is recommended to collect and investigate information on additional factors including institutions, economy, local customs and traditions, and geography etc. to strengthen the analysis. So that more appropriate policy recommendations could be suggested in accordance to each specific region and administration level.

CHAPTER 8

Conclusions and Recommendations

The existing literature asserts that masses in Pakistan are excluded from the mainstream of development process resulting in social unrest and adversity. However, it is unable to provide adequate information required for effective planning and its successful implementation for inclusive development. To shape an inclusive society in Pakistan the present study contributes by providing statistically sound estimates of present status of all aspects of inclusive development at three administrative levels, national, provincial and district. The national and provincial level analyses are further elaborated at the urban and rural regions as well. In addition, this study offers an analysis of the potential factors of inclusive development at the district level. To capture the distributional aspects (inequality and inclusion) of human development the HDI and its dimensional indices are estimated at the household level. The statistical techniques such as PPCA, survival analysis, and data fusion are utilized to estimate the household SOL index and health index, respectively. The household's education index is constructed on the lines proposed by Lopez-Calva & Ortiz-Juarez (2011). The HDI, IHDI and inequality coefficients are estimated by standard techniques utilized in UNDP (2010), though indicators of human development employed in present work are different. The coefficients of deprivation and inclusion coefficients are estimated based on the threshold of sixty percent of median achievement level as suggested by Suryanarayana & Das (2014) . The determinants of inclusive development are scrutinized by cross-sectional regression analysis of district level data.

The findings of present research provide evidence that Pakistani households are experiencing a medium level of potential human development accompanied with high inter-regional and intra-regional disparities and substantial exclusion at national, provincial, and district levels. After discounting for inequalities, the actual level of average household's human development falls in low category. The estimates reveal that at the national level loss in human development due to inequality is around 27 percent and more than 50 percent of the households are excluded from the mainstream of human development. The urban-rural analyses for all aspects of inclusive development at the national and provincial levels demonstrate that rural regions are far behind the urban regions. These findings are common for overall human development as well as the development in the dimensions of SOL and education. However, in the health dimension the situation is worse as both the potential and actual level of development falls to low category. When the focus of analysis is narrowed down to provincial and district levels, the inequalities in human development and disparities in its inclusiveness become more pronounced, indicating that analyses at aggregated levels suppress the intra-regional inequalities. There is an important point to highlight that the findings of this study are based on conventional coarse-grained measures of development, inequality, and exclusion such as child mortality rate, number of literate individuals, number of schooling years. More adverse findings of inclusive development may result if fine-grained quantitate measures and /or qualitative measures are utilized in the analysis.

The district-wise investigation unveils that the majority of districts (60 percent) in Pakistan belongs to very low category of human development. Almost the same scenario is observed in district-wise analysis of four province. None of the districts exhibits a very high level of human development. It is estimated that 29 percent of the districts are excluded from the mainstream of the human development. The archipelago of districts with high and medium level of inclusive development are surrounded by districts with low and very low level of inclusive development. The districts at the top ranking of human development includes Islamabad, Karachi, Lahore, Rawalpindi. At the bottom end reside the districts of Kohlu, Kohistan, Chagai, Sujawal, and Sheerani. The overall and district-wise inter-provincial analysis reveals that in general the status of inclusive development in Punjab is higher than that of the other three provinces and Balochistan exhibits adverse situation. However, in SOL dimension KPK is ahead of Punjab. The rural-urban disparity is highest in Sindh and lowest in KPK. Balochistan except Quetta and Sindh excluding Karachi and Hyderabad, are largely underdeveloped with high disparities and exclusions. The poorly developed districts in Punjab are concentrated in its west and southeast regions. The KPK districts exhibiting very low level of inclusive development are situated in its north and south.

In general, the magnitude of disparities and exclusion within districts and across districts rises with deterioration of human development situation. However, considerable disparities and/or exclusion are observed in some top ranked districts too. It is observed that mostly districts that are in low or very low category of human development are rich in any one or more than one natural resource endowment including minerals, forests, and cultivable lands. In contrast the majority districts with better status of human development, low disparities, and high inclusion are either centers of administration, or home to small industries, or hub of commerce and trade. It points out to the skewed utilization of public and private funds, underutilization and wastage of natural resources, and the ignored agriculture sector.

The findings of this study suggest demolishing the centralization of authority and designing and implementing isomorphic policies. To achieve the higher level of inclusive development the region with different status of development and different hindering factors require different strategies. The policies must be formulated keeping in view all the three aspects of inclusive development. The status of inclusive development of a region must be one of the criteria of allocating public funds. In the regions that are at a very low level of development, it is more important to get development acceleration, as the inclusivity of development may have to come later. For the regions with higher level of development accompanied with high disparities and exclusions a progressive taxation policy would be more effective. For the regions exhibiting high level of development and lower inclusion, it is vital to facilitate the emergence of inclusive institutions.

In decision making, a mixture of bottom up and top down approaches is recommended. Major policy decisions must be formulated at national or provincial level and must be implemented at all lower administration levels. The local authorities with the consultation of local communities must design projects and plans keeping in view the indigenous factors, existing status of all aspects of inclusive development, and broader policy perspectives. This is in accordance to the approach of contextualizing the strategies presented by Ricardo Hausman, Dani Rodrik, and Andres Valesco[92]. The excluded segments of the population and regions must be given attention and special projects must be formulated to bring them in the mainstream. For transparency and future learning, it is suggested rigorous performance metrics be incorporated in the execution of these projects. It must be monitored that these are being utilized by the poor and the disadvantaged. These project and plans must be focused on developing the capabilities of marginalized groups rather than providing them mere financial assistance. It is a strategy based on the concept of "development from within" elaborated in detail by Sachs (2004).

[92] It is discussed by James Michel in "Economic Reform Feature Service Article: Linking Growth and Governance for Inclusive Development and Effective International Cooperation" (2014).

The inter-dimension comparison reveals that the existing status of development is lowest in health; the disparities are highest in educational achievements, and SOL is characterized with highest level of exclusion. The considerable inter-dimensional inequalities suggest that the dimensions of HDI are not perfect substitutes of each other. These conclusions suggest formulating public policies that focus on balanced development in all the three dimensions of human development.

The analysis of determinants implies that inclusive development in Pakistan could be enhanced by raising the investment in human capital especially in the form of public financing of education, and in infrastructure development particularly the road network. It is worth noting that these factors affect the three aspects of inclusive development with almost equal significance. The significance of education and road network in raising the inclusiveness of development is also firmly asserted in literature. Thus, appropriate policies designed to organize and raise the investment in education and road network development would be equally effective to achieve higher development, reduce inequalities, and enhance inclusion of deprived.

It is implied by the findings that the appropriate management of demographic factors including population density, sex ratio, and urbanization could lead towards higher level of inclusive development. Based on highly significant negative impact of sex ratio (utilized as an indicator of gender discrimination) on inclusive development it is recommended to formulate effective policies for elimination of gender bias at all levels. The rapidly increasing trends of urbanization and population density in Pakistan and the empirical evidence of their positive significant impact on inclusive development in this study imply that policies must be formulated to control these factors so that their negative effect could be avoided in the long run as well.

The findings of these analyses highlight the skewed utilization of public resources towards divisional headquarters that could be addressed by adopting the devolution policies. The results strengthen the established assertions about neglected sectors of public health and agriculture, inefficient utilization and deterioration of forest density, and corrupt institution of police in Pakistan. As a large proportion of population is dependent on agriculture sector, its development must be at top priority in inclusive development agenda. A policy framework must be designed for uplifting and mechanizing agriculture sector. It is suggested to formulate policies for efficient utilization of natural resources and to preserve and increase forest area. Special policies must be designed to improve the health facilities and to make it accessible for the marginalized group of population and regions. To reform the police department is also one of the important implications of the present analysis.

There are some major limitations of this study which are acknowledged here. Firstly, the household's health index is based on a single indicator, child survival rate. Because at household level the data for most of the other indicators of health is unavailable or is largely missing. Secondly, some important economic factors of inclusive development could not be included in the analysis due to unavailability of data at the district level. For many indicators the available data is not standardized across provinces. Based on the problem faced during the research process, it is recommended to execute HIES at district level which presently is a national and provincial representative survey. In PSLM survey more elaborated questions about household's health must be included. It is recommended to collect the basic data on individuals' economic wellbeing, health, and education in the Census of Pakistan. It is suggested to formulate policy for collection and standardization of data about macroeconomic indicators at provincial, districts, and sub-district level.

This study provides an empirical analysis of the existing status of inclusive development and its determinants in Pakistan in the best possible way. However, a great deal of additional research is required in this direction. Some recommendations for future research are the natural extensions of this study. First is the dynamic and comparative static analysis of inclusive development in Pakistan utilizing different rounds of PSLM-HIES. The second is to estimate the inequality coefficient and coefficient of inclusion by utilizing various non-conventional values of risk aversion parameter and threshold for deprivation and compare its findings with that obtained by conventional measures utilized in the present study. Third is to estimate and utilize HDI with some other dimensions including environment and gender equity in addition to the three traditional dimensions of SOL, health, and education. Another modification in HDI could be to include the qualitative measures of its dimensions. The fourth is to utilize various measures of inequality such as Gini coefficient in addition to the Atkinson's inequality index to measure the inequalities and compare the results. To recommend policies in accordance to each specific region and administration level it is suggested for future studies to investigate the factors of inclusive development that could not be covered adequately in the present research specifically the institutions, economy, local customs and traditions, and geography (spatial analysis). The literature highlights some socio-political factors that could be responsible for adverse inclusive development status in certain regions (as indicated by the present study) of Pakistan. It is recommended for further research to execute case studies for specific regions to explore the impact of these factors on inclusive development.

TECHNICAL APPENDIX

T.1 Polychoric Principal Component Analysis

In PPCA discrete data are assumed to be the observed values of an underlying continuous variable. This technique uses maximum likelihood to calculate how that continuous variable would have to be split up to produce the observed data. The variables used with polychoric may be binary, ordinal, or continuous, but cannot be nominal. The correlations in the matrix generated by the polychoric command are not all polychoric correlations. In the multivariate case with more than two variables, the estimated overall correlation matrix is constructed by combining the pairwise estimates of the polychoric, polyserial, or Pearson correlations. A polychoric correlation is calculated when both variables are ordinal, a polyserial correlation is calculated when one variable is ordinal and the other continuous, and a Pearson's correlation is calculated if both variables are continuous. Polychoric and polyserial correlations vary from correlation coefficients for continuous variables as these are assumed to be the maximum likelihood estimates of the correlation between the unobserved normally distributed continuous variables underlying the discrete variables (Kolenikov & Angeles, 2009). Once a polychoric correlation matrix is generated, standard PCA is performed using the matrix as input, rather than raw variables (UCLA Institue for Digital Research and Education). First step: the thresholds are estimated from the marginal distribution of observed asset indicator. Consider an asset category a_k that takes discrete values $j = \underline{j}_k, \ldots\ldots\ldots\ldots, \bar{j}_k$ then it is assumed that they are obtained by discretizing the underlying continuous variable a_k^* according to the set of thresholds, $\{\alpha_{k1}, \ldots\ldots\ldots, \alpha_{k,\bar{j}_{k-1}}\}$:

$$a_k = r \quad if \quad \alpha_{k,r-1} < a_k^* < \alpha_{k,r} \quad \text{where } \alpha_{k,\underline{j}_k} = -\infty \text{ and } \alpha_{k,\bar{j}_k} = \infty \text{ -------(T.1)}$$

Thresholds α_{kj} are estimated from the marginal distributions of the observed discretized variables α_k:

$$\hat{\alpha}_{kj} = \phi^{-1}\left\{\frac{-\frac{1}{2}+\#(a_k \le j)}{N}\right\} \text{---(T.2)}$$

The α_{kj} term has the appealing characteristic that it permits for different coefficient scores for different discrete values of ordinal, count, or binary variables. In this case, the factor weight difference between two consecutive units of ownership would not be constant. This is captured by the additional subscript j in α_{kj}, which signifies that, in general, $\alpha_{k,\underline{J}_k} \neq \alpha_{k1} \neq \cdots \neq \alpha_{k,\bar{J}_k}$. This allows wealthier analysis and comparisons that may more correctly mirror the relative wellbeing or deprivation of households based on whether they own or not own the asset (Ward, 2014).

Second step: the polychoric correlation coefficient ρ is estimated for each pair of discrete asset variables e.g. by maximizing likelihood function conditional on $\hat{\alpha}$:

$$L(\rho\alpha) = \prod_{i=1}^{N}\left[\pi\left(a_{1j}, a_{2j}, \rho , \alpha \right)\right] \text{-------------------------------(T.3)}$$

$$ln(L) = \sum_{i=1}^{N} ln\pi\left(a_{1j}, a_{2j}, \rho , \alpha\right) \text{------------------------------(T.4)}$$

where N is the sample size and π is the probability that an observation falls in the cell (a_{1j}, a_{2j}). For a pair of a discrete and a continuous variable (assumed to have the standard normal distribution), thresholds for discrete variables are estimated and a polyserial correlation is obtained, that works in the similar manner as the polychoric correlation (Kolenikov & Angeles, 2004; 2009). Pearson correlation is computed for a pair of continuous variables. The estimates of polychoric, polyserial, and Pearson correlation coefficients are combined to generate an estimate of the correlation matrix.

Third step: after having estimated the polychoric correlations matrix, standard PCA is executed to compute asset scores (Kolenikov & Angeles, 2004). Asset scores (AS_i) are obtained by utilizing estimated scoring coefficients/ weights:

$$AS_i = \sum_{k=1}^{K} \sum_{j=\underline{J}_k}^{\bar{J}_k} \alpha_{kj} I(a_{ikj}) \text{------------------------------------(T.5)}$$

where $I(a_{ikj})$ is an indicator function for household i's ownership of category j of asset k (Kolenikov & Angeles, 2004; 2009; Ward, 2014).

T.2 Survival Analysis

Survival analysis refers to a set of statistical techniques used for analysis of timing and duration until the event of interest occurs (Mills, 2010; Kalbfleisch & Prentice, 2011). These techniques are also generally known as duration analysis, event history analysis or hazard modelling. An event of interest can be birth, death, occurrence of a disease, marriage, divorce, political revolution, bank merger, etc. The measuring units for time to event can be days, weeks, years, etc. The time to event is generally referred as survival time. Three characteristic features of survival analysis distinguish it from other types of methods (see Allison (1982) for advantages of survival analysis over other regression techniques in event history data analysis). First, the dependent variable consists of two components i.e. occurrence of an event and the waiting time until it occurs. Its focus is not only the outcome but also the analysis of the time to an event. Second, survival analysis adds information about timing that makes it possible to account for censored observations which is not conceivable in OLS or logistic regression. Third, survival analysis can include time varying predictors or explanatory variables whose effect on the waiting time is to be measured or controlled, which cannot be included in OLS or logistic regression (Rodríguez, 2010; Mills, 2010).

The observations (subjects) with incomplete information about their survival time are called censored. For these observations, some information about event time is available, but the exact event time is not known. An observation is right censored, if it does not experience the event of interest before observation period ends. Left censoring means that subject is exposed to the risk of experiencing the event before the start of the observation period. This definition of left censoring is generally used by social scientists; however, according to biostatisticians, left censored observation are those for which the event has occurred at some time before the start of the observation period, but it is not known exactly when (Jenkins, 2005). An observation is interval censored if the event occurred between two known time points, but exact timing of the event is not known. The most commonly encountered form of incomplete information is right censoring; however, it is easier to accommodate (Steele, 2005; Jenkins, 2005).

The dependent variable in survival analysis consists of two parts: one is the event status, which records if the event of interest occurred or not and the other is the time to event (survival time) or time to censor (Steele, 2005). The event times are supposed to be measured in continuous or discrete scale. Let T_i and C_i represent the non-negative random variables for survival time and censoring time respectively, and δ_i represents event status; for subject i (i=1, 2, …., n). Specific value for T_i is represented by t. For each subject the Y_i, minimum of T_i and C_i and a censoring indicator or event status (δ_i) is observed, which is given as:

$$Y_i = min(T_i , C_i) \text{--(T.6)}$$

$$\delta_i = \begin{cases} 1 & if\ the\ event\ was\ observed \quad i.e.\ T_i \leq C_i \\ 0 & if\ \ time\ was\ cencored \quad i.e.\ \ T_i > C_i \end{cases} \text{------(T.7)}$$

Random variable T_i is featured by a cumulative distribution function (CDF), F(t); and probability density function (PDF), f(t). The CDFs for survival time measure the probability that the event occurs at or before time t (continuous) or before the close of time t (for discrete time) and is defined in a standard way as (Berglund, 2011):

$$F(t) = P(T \leq t) = \begin{cases} \int_0^t f(t)dt & for\ continuous\ t \\ \sum_{k \leq t} f(k) & for\ discrete\ t \end{cases} \text{--------(T.8)}$$

The probability density function is defined as the probability of the event at time t (for continuous time), or by, denoting the probability of event in the interval (t, t + 1) for discrete time. Technically PDF is the slope of CDF and is stated as:

$$f(t) = \frac{dF(t)}{dt} = F\acute{(t)} \text{ --(T.9)}$$

This indicates:

$$f(t) = \lim_{\Delta t \to 0} \frac{F(t+\Delta t)-F(t)}{\Delta t} \text{---(T.10)}$$

The PDF, f(t) represents the unconditional instantaneous probability that an event occurs in the time interval (t, Δt) and is formally stated as:

$$f(t) = \lim_{\Delta t \to 0} \frac{Pr(t \leq T \leq t+\Delta t)}{\Delta t} \text{ ---(T.11)}$$

Thus, the density function is an unconditional failure rate. In other words, it defines the unconditional instantaneous failure rate at any given instant t.

The distribution of event time in survival analysis is generally expressed in terms of core concepts of survival and hazard functions. The survival function is the probability that a subject survives (or not experienced the event) from the 'o' time (considered as origin) to a specified future time t. Thus, the proportion of subjects surviving beyond t is represented by S(t) (Clark, Bradburn, Love, & Altman, 2003; Mills, 2010). Survival function is specified as:

$$S(t) = 1 – F(t) = Pr (T \geq t) \text{ --------------------------------------(T.12)}$$

The hazard function is the probability that an individual has an event at time 't', given that he has survived up to that specified time. More precisely, hazard function is the instantaneous failure rate for an individual who has already survived to time t (Clark, Bradburn, Love, & Altman, 2003; Mills, 2010). It is a conditional instantaneous failure rate (probability) and is specified as:

$$h(t) = \lim_{\Delta t \to 0} \frac{Pr(t \leq T \leq t+\Delta t)|T \geq t)}{\Delta t} \text{--------------------------------(T.13)}$$

Hazard rate may can be expressed in terms of unconditional failure rate (PDF) and survival function as-

$$h(t) = \frac{f(t)}{S(t)} \quad \text{---(T.14)}$$

In words, the rate of occurrence of the event at period t, without experiencing the event equals the probability density of events at t, divided by the probability of surviving to that period. For deeper understanding of the concepts of probability density, cumulative density, survival, and hazard functions; and their interrelationship see Jenkins (2005) and Mills (2010).

The event times are modelled or measured in continuous or discrete time scale. Theoretically most of the events may occur at any point of time; therefore, can be measured on a continuous scale. Since durations are usually measured in discrete time units such as days, months or years, particularly when collected retrospectively, it is considered more appropriate to use a model for discrete time scale (Steele, 2005; Mills, 2010). The discrete-time approach has several advantages over continuous-time methods. One potential problem with continuous-time models is the assumption that only one event can occur at any given point in time, particularly when durations are measured in broad time intervals. Estimation procedures for continuous-time models need to be adapted if there are tied event times. Finally, discrete-time models are basically logistic regression models which are accustomed to most social scientists. For detail see Steele (2005), Jenkins (2005), and Mills (2010).

Another important objective of survival analysis is to analyze the relationship of survival rate or hazard rate to explanatory variables. The explanatory variables or covariates may be fixed or time-varying. Fixed variables do not change across time or are assumed to be so, time varying variables have values that change over time (Steele, 2005; Mills, 2010).

In survival analysis hazard rates are modeled in a variety of ways keeping in view the assumptions about the shape of the hazard function, whether time is continuous or discrete, the effects of covariates are assumed constant over time (proportional hazards) or are time varying. A general form of hazard rate model in survival analysis incorporating the effects of time and other covariates is:

$$h_i\big(t, x_i(t)\big) = h_0(t)\, exp\big[x_i(t)'\beta(t)\big] \text{-------------------------------(T.15)}$$

where $x_i(t)$ is a vector of time-varying covariates, $\beta(t)$ is a vector of time-dependent coefficients, and $h_0(t)$ is a baseline hazard function that describes the risk for individuals with x_i= 0. Time varying covariates represent the characteristics of individual i at time t and their coefficients represent the effect that those characteristics have at hazard rate.

Three main approaches to model baseline hazard function are: non-parametric, semi-parametric, and parametric (Rodríguez, 2010). A non-parametric approach focuses on estimation of the regression coefficients, no assumption is made about the shape of the hazard function or about how covariates may affect that shape. It includes life table and Kaplan-Meier estimates. These are excellent techniques for introductory descriptive data analysis; however, these are unable to incorporate the effects of multiple covariates. Semi-parametric models make no assumption about the shape of the hazard and may include multiple covariates, such as the Cox proportional hazards and the piecewise constant hazard models. Being proportional hazards models, these make stringent assumption about how the covariates affect the shape of the hazard function between groups over time. The parametric approach assumes a specific functional form for the baseline hazard. These functional forms are generally based on exponential, Weibull, gamma, Gompertz and generalized F distributions. In this approach it is decided in advance that what would be the shape of the hazard function and how covariates might affect the function (Mills, 2010).

T.2.1 Cox Proportional Hazards Model

Proportional hazards model is introduced by Cox (1972). It is the simplest model of semi-parametric family. Cox model is non-parametric to the degree that it makes no assumptions about the shape of the baseline hazard (i.e., the hazard can have any shape). There are two important assumptions of Cox model. First is the assumption of non-informative censoring i.e. the design of the data survey must guarantee that the mechanisms giving rise to censoring of individual subjects are not related to the probability of an event occurring. Proportional hazard assumption implies that two groups of individuals (determined by the specific values for the *x*-variables) must have hazard functions that are proportional over time i.e. relative hazard is constant. The Cox proportional hazards model can be written as (Steele & Washbrook, 2013):

$$h_i(t) = h_0(t)\ exp[\beta x_i] \text{------------------------------(T.16)}$$

or in log form can be written as:

$$log\ h_i(t) = logh_0(t) + \beta x_i \text{------------------------(T.17)}$$

where $h_i(t)$ is the hazard of failure for individual i at time t, x_i is a vector of covariates (assumed fixed over time), β is a row vector of regression coefficients, $h_0(t)$ is the baseline hazard, i.e. the hazard when x_i = 0.

In Cox model covariates have a multiplicative effect on the hazard. For each one unit increase in x_i the hazard is multiplied by $\exp(\beta)$. The term $\exp(\beta)$ is called the relative risk or hazard ratio. In present study child mortality is the hazard, therefore, $\exp(\beta)$ in this case is the mortality ratio. If $\exp(\beta)$ is equal to 1 it implies that there is no effect of *x* on the mortality. If $\exp(\beta)$ is greater than 1 it implies a positive effect of x on the mortality, i.e. higher values of x are related with higher mortality rates and hence shorter survival periods. If $\exp(\beta)$ is less than 1 it implies a negative effect of x on the mortality, i.e. lower values of x are related with lower mortality rates and hence longer survival periods.

APPENDIX A

Table A.1 Variables of Standard of Living Index

Variables' Group	SOL Variables
Housing Quality Indicators	No. of rooms in dwelling Roof material Wall material Source of drinking Water Toilet facility Main Cooking fuel Main Lighting fuel Telephone
Consumer durables	Iron Fan Sewing machine Radio Table Clock TV/ LED/ LCD VCR Fridge/ Freezer Air cooler Air conditioner Computer/ Laptop/ Tab Bicycle Motorcycle Car Tractor/ Truck Cooking range Stove Washer/Spinner Heater Chingchi/ Riksha Microwave Oven UPS/Generator/Solar panel

Table A.2 Relative frequency distribution and Polychoric PCA scoring coefficients for variables in Full SOL index

Asset Variable	Percentage of Households	Scoring Coefficient
Number of rooms in dwelling	—	0.13
Roof material		
Wood/ Bamboo/ others	42.01	-0.23
Garder/ T-Iron	40.75	-0.02
RCC/ RBC/ Sheet/ Iron/ Cement	17.24	0.20
Wall material		
Wood/ Bamboo/others	2.97	-0.44
Mud bricks/ Mud	28.25	-0.24
Burnt bricks/ Blocks/ Stones	68.78	0.06
Source of drinking Water		
No facility at home	15.59	-0.29
Hand pump	33.58	-0.13
Motorized pumping	29.41	0.00
Piped water/Mineral water/Filtration plant/ Water tanker/others	21.43	0.16
Toilet facility		
No facility at home	19.59	-0.29
Dry raised latrine/Dry pit latrine/others	23.76	-0.15
Flush connected to open drains	16.15	-0.07
Flush connected to covered sewerage	40.5	0.12
Main Cooking fuel		
Dung cake/Crop residue/others	18.09	-0.25
Fire wood/ Kerosene oil/ Charcoal/ Coal	60.8	-0.06
Gas/ Electricity	21.11	0.16
Main Lighting fuel		
Fire wood/ Candle/others	4.61	-0.38
Gas/ Kerosene oil/ Petrol/ Diesel	6.82	-0.28
Electricity	88.57	0.02
Own Telephone		
No	11.98	-0.34
Cell phone	85.68	0.01
only landline/ Cell phone & Landline	2.34	0.39
Own Iron		
No	32.33	-0.32
Yes	67.67	0.08
Own Fan		
No	17.4	-0.37
Yes	82.6	0.04
Own Sewing machine		
No	48.49	-0.15
Yes	51.51	0.11

Table A.2 Continued		
Asset Variable	Percentage of Households	Scoring Coefficient
Own Ratio		
No	85.8	-0.02
Yes	14.2	0.16
Own Table		
No	45.62	-0.23
Yes	54.38	0.11
Own Clock		
No	30.54	-0.29
Yes	69.46	0.08
Own TV/ LED/ LCD		
No	53.14	-0.21
Yes	46.86	0.13
Own VCR		
No	95.13	-0.02
Yes	4.87	0.32
Own Fridge/ Freezer		
No	66.6	-0.18
Yes	33.4	0.20
Own Air cooler		
No	93.31	-0.03
Yes	6.69	0.33
Own Air conditioner		
No	96.67	-0.03
Yes	3.33	0.43
Own Computer/Laptop/Tab		
No	93.2	-0.05
Yes	6.8	0.36
Own Bicycle		
No	79.92	0.00
Yes	20.08	-0.01
Own Motorcycle		
No	63.07	-0.09
Yes	36.93	0.12
Own Car		
No	95.96	-0.02
Yes	4.04	0.37
Own Tractor/Truck		
No	96.07	0.00
Yes	3.93	0.11
Own Cooking range		
No	97.85	-0.02
Yes	2.15	0.39

Table A.2 Continued		
Asset Variable	Percentage of Households	Scoring Coefficient
Own Stove		
No	71.31	-0.13
Yes	28.69	0.15
Own Washer/Spinner		
No	66.3	-0.18
Yes	33.7	0.19
Own Heater		
No	92.72	-0.04
Yes	7.28	0.33
Own Chingchi/Rikshaw		
No	98.69	0.00
Yes	1.31	0.06
Own Microwave Oven		
No	97.12	-0.03
Yes	2.88	0.43
Own UPS/Generator/Solar panel		
No	89.82	-0.05
Yes	10.18	0.31

Table A.3 Polychoric Correlation Matrix

SOL Variables	Number of rooms	Roof material	Wall material	Drinking water source	Toilet facility	Cooking fuel
Number of rooms	1.0000					
Roof material	0.2847	1.0000				
Wall material	0.2872	0.7507	1.0000			
Drinking water source	0.1393	0.5426	0.4882	1.0000		
Toilet facility	0.2889	0.5765	0.6104	0.5157	1.0000	
Cooking fuel	0.1446	0.5435	0.4164	0.5002	0.4873	1.0000
Lighting Fuel	0.1840	0.4590	0.5543	0.4773	0.5478	0.3079
Telephone	0.3711	0.4450	0.4028	0.3452	0.4139	0.3823
Iron	0.4284	0.5917	0.6434	0.5213	0.6453	0.5116
Fan	0.2370	0.5375	0.5885	0.5044	0.5933	0.3780
Sewing machine	0.3766	0.3442	0.4706	0.2766	0.4437	0.2922
Radio	0.2031	0.2087	0.1143	0.1124	0.1536	0.2078
Table	0.4338	0.5144	0.6499	0.3796	0.5820	0.3797
Clock	0.4421	0.5244	0.5308	0.4476	0.5666	0.5237
TV/LED/LCD	0.2957	0.5518	0.5756	0.4764	0.5370	0.5147
VCR	0.2862	0.3793	0.2505	0.2839	0.2670	0.3194
Frig/Freezer	0.4986	0.6237	0.6234	0.4933	0.6042	0.5360
Aircooler	0.3469	0.4000	0.3821	0.2642	0.3739	0.3577

Table A.3 Continued

SOL Variables	Number of rooms	Roof material	Wall material	Drinking water source	Toilet facility	Cooking fuel
Aircondition	0.3906	0.6236	0.5597	0.4606	0.4288	0.5959
Computer/Lap-top/Tab	0.4065	0.5856	0.5262	0.4277	0.5114	0.5327
Bicycle	0.0425	-0.1276	0.0266	-0.0556	-0.0006	-0.1496
Motorcycle	0.3564	0.2949	0.2994	0.2069	0.2425	0.1668
Car	0.4184	0.4856	0.3750	0.3161	0.3806	0.3974
Tractor/Truck	0.2750	0.0332	0.1550	-0.0552	0.0526	-0.2071
Cookingrange	0.3372	0.5262	0.3937	0.4251	0.4383	0.5516
Stove	0.1810	0.6144	0.5938	0.5750	0.5678	0.8303
Washer/Spinner	0.4343	0.5920	0.6184	0.5005	0.6335	0.5859
Heater	0.3330	0.4626	0.3189	0.3582	0.3602	0.6117
Chingchi/Riksha	-0.0214	0.0634	0.1031	0.0939	0.1248	0.1185
Microwave	0.3663	0.6457	0.5714	0.4949	0.5306	0.6357
UPS/Generator/Solar	0.4203	0.4531	0.3227	0.3240	0.3869	0.4503

SOL Variables	Lighting Fuel	Telephone	Iron	Fan	Sewing machine	Radio
Lighting Fuel	1.0000					
Telephone	0.4508	1.0000				
Iron	0.7851	0.5693	1.0000			
Fan	0.9050	0.4648	0.8913	1.0000		
Sewing machine	0.4387	0.3741	0.6749	0.5483	1.0000	
Radio	0.1185	0.2937	0.3004	0.1037	0.3240	1.0000
Table	0.5507	0.5001	0.7665	0.6000	0.6165	0.3575
Clock	0.5042	0.5100	0.7582	0.5992	0.6471	0.4470
TV/LED/LCD	0.6578	0.5031	0.7557	0.7997	0.5539	0.2537
VCR	0.3725	0.5312	0.5002	0.4399	0.2848	0.5314
Frig/Freezer	0.5915	0.5636	0.8198	0.7706	0.6119	0.3325
Aircooler	0.2994	0.4031	0.6377	0.5524	0.4999	0.2750
Aircondition	0.3315	0.7177	0.6898	0.6540	0.3677	0.2991
Computer/Laptop/Tab	0.4024	0.6778	0.6928	0.5765	0.4199	0.3359
Bicycle	0.1072	-0.0134	0.0737	0.1752	0.1160	-0.0056
Motorcycle	0.2394	0.3483	0.4229	0.3462	0.4091	0.1930
Car	0.2693	0.6890	0.5104	0.3710	0.3143	0.3198
Tractor/Truck	0.0360	0.1213	0.1313	0.0427	0.2507	0.0880
Cookingrange	0.3236	0.7055	0.4971	0.4452	0.1572	0.2013
Stove	0.4449	0.3539	0.6647	0.6152	0.3979	0.1830
Washer/Spinner	0.6013	0.5542	0.8286	0.7627	0.6159	0.2675
Heater	0.3297	0.4575	0.5335	0.4992	0.5242	0.3304
Chingchi/Riksha	0.1244	0.0734	0.1373	0.1909	0.0801	0.0426
Microwave	0.3565	0.7007	0.5934	0.5877	0.4213	0.2558
UPS/Generator/Solar	0.1043	0.6159	0.4121	0.2249	0.4394	0.3281

Table A.3 Continued

SOL Variables	Table	Clock	TV/ LED/LCD	VCR	Frig/ Freezer	Air-cooler
Table	1.0000					
Clock	0.8190	1.0000				
TV/LED/LCD	0.5853	0.6468	1.0000			
VCR	0.4057	0.4757	0.6495	1.0000		
Frig/Freezer	0.6801	0.7291	0.7241	0.5048	1.0000	
Aircooler	0.5395	0.5542	0.4609	0.4022	0.6920	1.0000
Aircondition	0.6309	0.6745	0.6393	0.6042	0.7638	0.5580
Computer/Laptop/Tab	0.6225	0.6633	0.5851	0.6074	0.7644	0.5665
Bicycle	0.0544	-0.0187	0.0016	-0.0647	-0.0673	0.0812
Motorcycle	0.3773	0.3725	0.4454	0.3309	0.5609	0.4220
Car	0.4742	0.5115	0.4641	0.5580	0.6327	0.5138
Tractor/Truck	0.2199	0.1449	0.0977	0.1695	0.2691	0.2665
Cookingrange	0.4569	0.4595	0.5169	0.5338	0.5781	0.4319
Stove	0.4794	0.6092	0.6264	0.2450	0.6232	0.4507
Washer/Spinner	0.6684	0.7331	0.6942	0.4580	0.8192	0.6239
Heater	0.4281	0.5762	0.4966	0.4499	0.6383	0.6434
Chingchi/Riksha	0.0986	0.1099	0.1192	0.0889	-0.0022	0.0361
Microwave	0.6638	0.6199	0.6253	0.5732	0.7440	0.5981
UPS/Generator/ Solar	0.5232	0.5357	0.4575	0.5672	0.6753	0.6309

SOL Variables	Aircondi-tion	Computer /Laptop /Tab	Bicycle	Motor-cycle	Car	Tractor /Truck
Aircondition	1.0000					
Computer/Laptop /Tab	0.7870	1.0000				
Bicycle	-0.1361	-0.0818	1.0000			
Motorcycle	0.3627	0.4726	-0.0968	1.0000		
Car	0.8070	0.7154	-0.1301	0.2201	1.0000	
Tractor/Truck	0.1777	0.1145	0.1530	0.4029	0.3256	1.0000
Cookingrange	0.7748	0.7235	-0.1218	0.2625	0.7579	0.1387
Stove	0.3951	0.4714	-0.0356	0.2761	0.2314	-0.0933
Washer/Spinner	0.7192	0.7307	-0.0432	0.4708	0.5859	0.1147
Heater	0.6496	0.6102	0.0183	0.3207	0.5886	0.1086
Chingchi/Riksha	0.0157	0.0069	-0.0541	-0.0755	-0.0502	0.0227
Microwave	0.8515	0.7938	-0.1065	0.4080	0.7496	0.1522
UPS/Generator/Solar	0.7957	0.7413	-0.0846	0.4341	0.7393	0.2317

SOL Variables	Cooking-Range	Stove	Washer /Spinner	Heater	Chingchi /Riksha	Micro-wave
Tractor/Truck						
Cookingrange	1.0000					
Stove	0.1715	1.0000				
Washer/Spinner	0.5514	0.6885	1.0000			
Heater	0.4791	0.5805	0.6578	1.0000		
Chingchi/Riksha	-0.0249	0.1429	0.0873	0.0469	1.0000	
Microwave	0.7906	0.3892	0.6951	0.6862	0.0898	1.0000
UPS/Generator/Solar	0.6685	0.3913	0.6455	0.6596	0.0337	0.8294

Table A.4 Polychoric Principal Component Analysis for Full SOL Index

Principal Component	Eigenvalues	Proportion of explained variation	Cumulative Proportion of explained variation
1	14.8321	0.4785	0.4785
2	2.6050	0.0840	0.5625
3	1.9630	0.0633	0.6258
4	1.3060	0.0421	0.6679
5	1.2052	0.0389	0.7068
6	1.0453	0.0337	0.7405
7	0.9782	0.0316	0.7721
8	0.9170	0.0296	0.8017
9	0.7534	0.0243	0.8260
10	0.6409	0.0207	0.8466
11	0.5587	0.0180	0.8647
12	0.5388	0.0174	0.8821
13	0.4746	0.0153	0.8974
14	0.4509	0.0145	0.9119
15	0.4417	0.0143	0.9262
16	0.4223	0.0136	0.9398
17	0.3344	0.0108	0.9506
18	0.2875	0.0093	0.9598
19	0.2625	0.0085	0.9683
20	0.2156	0.0070	0.9753
21	0.2095	0.0068	0.9820
22	0.1746	0.0056	0.9877
23	0.1593	0.0051	0.9928
24	0.1489	0.0048	0.9976
25	0.1222	0.0039	1.0015
26	0.0901	0.0029	1.0044
27	0.0774	0.0025	1.0069
28	0.0249	0.0008	1.0077
29	0.0031	0.0001	1.0078
30	-0.0276	-0.0009	1.0070
31	-0.2155	-0.0070	1.0000

Table A.5 District-wise Estimates of Standard of Living Indices and Inequality Measure

Standard of Living		SOL Index (I_{is})	Inequality-Adjusted SOL Index (I_{is})	Coefficient of Inequality (A_S)	Rank I_s	Rank I_{is}
Province	District					
Sindh	Karachi	0.6218	0.6128	0.0145	1	1
Punjab	Lahore	0.6069	0.5891	0.0293	2	2
Capital	Islamabad	0.6010	0.5802	0.0347	3	3
Punjab	Rawalpindi	0.5465	0.5151	0.0574	4	4
KPK	Peshawar	0.5114	0.4504	0.1193	5	5
Punjab	Sialkot	0.4800	0.4462	0.0703	6	6
Balochistan	Quetta	0.4657	0.4448	0.0448	10	7
Punjab	Gujranwala	0.4720	0.4376	0.0728	7	8
Punjab	Gujrat	0.4679	0.4348	0.0707	8	9
KPK	Haripur	0.4652	0.4345	0.0660	11	10
Punjab	Jhelum	0.4640	0.4326	0.0677	12	11
KPK	Abbottabad	0.4667	0.4313	0.0758	9	12
Punjab	Attock	0.4525	0.4183	0.0757	13	13
KPK	Nowshera	0.4369	0.3951	0.0955	14	14
Punjab	Faisalabad	0.4318	0.3903	0.0960	15	15
KPK	Mansehra	0.4059	0.3733	0.0804	18	16
KPK	Chitral	0.4087	0.3730	0.0872	17	17
Punjab	Chakwal	0.4008	0.3705	0.0756	21	18
Sindh	Hyderabad	0.4270	0.3671	0.1403	16	19
KPK	Swabi	0.4033	0.3656	0.0936	19	20
KPK	Mardan	0.4025	0.3649	0.0935	20	21
KPK	Malakand	0.3934	0.3542	0.0997	22	22
Punjab	Sheikhupura	0.3855	0.3492	0.0942	24	23
KPK	Hangu	0.3897	0.3463	0.1115	23	24
KPK	Bannu	0.3803	0.3446	0.0940	27	25
KPK	Swat	0.3833	0.3363	0.1227	25	26
KPK	Kohat	0.3820	0.3321	0.1307	26	27
Punjab	Mandi Bahauddin	0.3643	0.3263	0.1045	28	28
KPK	Karak	0.3574	0.3239	0.0938	30	29
KPK	Batagram	0.3591	0.3234	0.0995	29	30
KPK	Lower Dir	0.3554	0.3134	0.1180	32	31
Punjab	T.T. Singh	0.3563	0.3118	0.1250	31	32
Balochistan	Pishin	0.3334	0.3069	0.0793	39	33
KPK	Lakki Marwat	0.3389	0.3055	0.0986	36	34
KPK	Charsadda	0.3543	0.3021	0.1475	33	35

Table A.5 Continued

Standard of Living		SOL Index (I_{is})	Inequality-Adjusted SOL Index (I_{is})	Coefficient of Inequality (A_S)	Rank I_s	Rank I_{is}
Province	District					
Punjab	Hafizabad	0.3481	0.3020	0.1325	34	36
Punjab	Narowal	0.3215	0.2872	0.1069	41	37
Punjab	Sahiwal	0.3318	0.2839	0.1442	40	38
Punjab	Kasur	0.3189	0.2836	0.1106	43	39
Punjab	Sargodha	0.3395	0.2824	0.1684	35	40
Punjab	Nankana Sahib	0.3340	0.2803	0.1606	38	41
Punjab	Multan	0.3377	0.2767	0.1806	37	42
Balochistan	Killa Saifullah	0.2861	0.2744	0.0408	53	43
Punjab	Khushab	0.3063	0.2712	0.1148	45	44
Punjab	Okara	0.3054	0.2660	0.1291	46	45
Sindh	Sukkur	0.3205	0.2621	0.1821	42	46
KPK	Tank	0.2985	0.2620	0.1222	49	47
KPK	Shangla	0.3029	0.2614	0.1367	47	48
Balochistan	Gwadar	0.2866	0.2584	0.0983	52	49
Balochistan	Sibbi	0.3166	0.2544	0.1965	44	50
Punjab	Mianwali	0.2919	0.2526	0.1347	50	51
Punjab	Layyah	0.2848	0.2504	0.1207	54	52
Balochistan	Nushki	0.2695	0.2484	0.0784	61	53
KPK	Buner	0.3027	0.2458	0.1881	48	54
Punjab	Bahawalnagar	0.2882	0.2436	0.1547	51	55
KPK	D. I. Khan	0.2813	0.2398	0.1476	55	56
Punjab	Pakpattan	0.2720	0.2377	0.1262	59	57
Balochistan	Kalat	0.2722	0.2331	0.1438	58	58
Sindh	Jamshoro	0.2794	0.2241	0.1979	56	59
Balochistan	Mastung	0.2685	0.2226	0.1711	62	60
Punjab	Chiniot	0.2713	0.2223	0.1807	60	61
Punjab	Bahawalpur	0.2743	0.2217	0.1918	57	62
Punjab	Bhakkar	0.2486	0.2211	0.1103	71	63
Sindh	Dadu	0.2639	0.2194	0.1684	63	64
Balochistan	Khuzdar	0.2483	0.2172	0.1253	72	65
KPK	Tor Ghar	0.2384	0.2150	0.0984	76	66
Punjab	Jhang	0.2596	0.2109	0.1875	65	67
Punjab	Khanewal	0.2501	0.2103	0.1592	68	68
Punjab	D. G. Khan	0.2604	0.2085	0.1994	64	69
KPK	Upper Dir	0.2490	0.2078	0.1655	70	70
Punjab	Lodhran	0.2518	0.2060	0.1822	67	71
Punjab	Rahim Yar Khan	0.2587	0.2040	0.2115	66	72
Punjab	Vehari	0.2492	0.2040	0.1814	69	73
Sindh	Naushahro Feroze	0.2337	0.1985	0.1508	78	74

Table A.5 Continued						
Standard of Living						
Province	District	SOL Index (I_{is})	Inequality-Adjusted SOL Index (I_{is})	Coefficient of Inequality (A_S)	Rank I_s	Rank I_{is}
Balochistan	Ziarat	0.2439	0.1982	0.1873	74	75
Balochistan	Zhob	0.2396	0.1965	0.1796	75	76
Sindh	Shaheed Benazir Abad	0.2334	0.1958	0.1612	79	77
Sindh	Larkana	0.2358	0.1921	0.1851	77	78
Balochistan	Kharan	0.2460	0.1910	0.2235	73	79
Balochistan	Killa Abdullah	0.2125	0.1796	0.1546	83	80
Punjab	Rajanpur	0.2138	0.1775	0.1698	82	81
Balochistan	Loralai	0.1951	0.1717	0.1199	87	82
Sindh	Khairpur	0.2053	0.1687	0.1781	84	83
Sindh	Sanghar	0.1965	0.1631	0.1699	86	84
Sindh	Ghotki	0.2012	0.1598	0.2061	85	85
Sindh	Mirpur Khas	0.2162	0.1572	0.2728	81	86
Balochistan	Musakhel	0.1855	0.1550	0.1642	92	87
Balochistan	Bolan/ Kachhi	0.1909	0.1525	0.2009	90	88
Balochistan	Nasirabad/ Tamboo	0.1872	0.1506	0.1957	91	89
Sindh	Matiari	0.1922	0.1504	0.2177	88	90
Balochistan	Barkhan	0.1730	0.1467	0.1522	99	91
Sindh	Tando Allah Yar	0.1910	0.1463	0.2343	89	92
Balochistan	Jaffarabad	0.1786	0.1432	0.1984	95	93
Sindh	Kashmore	0.1731	0.1391	0.1966	98	94
KPK	Kohistan	0.1598	0.1367	0.1445	102	95
Punjab	Muzaffargarh	0.1780	0.1325	0.2557	96	96
Balochistan	Lasbela	0.2321	0.1318	0.4323	80	97
Balochistan	Harnai	0.1641	0.1296	0.2102	101	98
Sindh	Shikarpur	0.1726	0.1287	0.2542	100	99
Balochistan	Kohlu	0.1413	0.1256	0.1116	108	100
Sindh	Jacobabad	0.1814	0.1217	0.3292	93	101
Sindh	Shahdadkot	0.1766	0.1189	0.3268	97	102
Sindh	Thatta	0.1806	0.1156	0.3597	94	103
Balochistan	Sheerani	0.1573	0.1126	0.2842	103	104
Sindh	Badin	0.1565	0.1086	0.3060	104	105
Balochistan	Chagai	0.1346	0.1059	0.2129	110	106
Sindh	Tando Mohammad khan	0.1512	0.1040	0.3124	106	107
Balochistan	Awaran	0.1280	0.1035	0.1916	112	108
Sindh	Umer Kot	0.1394	0.1024	0.2658	109	109
Balochistan	Dera Bugti	0.1528	0.1023	0.3306	105	110
Sindh	Tharparkar	0.1223	0.1009	0.1750	114	111

Table A.5 Continued						
Standard of Living						
Province	District	SOL Index (I_{is})	Inequality-Adjusted SOL Index (I_{is})	Coefficient of Inequality (A_S)	Rank I_s	Rank I_{is}
Balochistan	Jhal Magsi	0.1313	0.1002	0.2370	111	112
Balochistan	Washuk	0.1266	0.0951	0.2487	113	113
Sindh	Sujawal	0.1421	0.0944	0.3361	107	114

Table A.6 Analysis of Inter-Regional Inclusion/Exclusion in terms of SOL Index for Districts of KPK

Standard of Living		Median SOL Index	Inter-regional Inclusion/Exclusion*
Province	District		
KPK	Peshawar	0.5319	Inclusion
KPK	Abbottabad	0.4825	Inclusion
KPK	Haripur	0.4744	Inclusion
KPK	Nowshera	0.4534	Inclusion
KPK	Swabi	0.4209	Inclusion
KPK	Mansehra	0.4140	Inclusion
KPK	Hangu	0.4036	Inclusion
KPK	Mardan	0.3978	Inclusion
KPK	Malakand	0.3922	Inclusion
KPK	Kohat	0.3901	Inclusion
KPK	Bannu	0.3864	Inclusion
KPK	Chitral	0.3816	Inclusion
KPK	Swat	0.3704	Inclusion
KPK	Batagram	0.3659	Inclusion
KPK	Karak	0.3654	Inclusion
KPK	Charsadda	0.3492	Inclusion
KPK	Lower Dir	0.3400	Inclusion
KPK	Lakki Marwat	0.3301	Inclusion
KPK	Shangla	0.3053	Inclusion
KPK	Tank	0.2980	Inclusion
KPK	Buner	0.2754	Inclusion
KPK	D. I. Khan	0.2689	Inclusion
KPK	Upper Dir	0.2431	Inclusion
KPK	Tor Ghar	0.2349	Inclusion
KPK	Kohistan	0.1314	Exclusion

*Criterion for inter-regional inclusion: regional median>= 0.6*national median

Table A.7 Analysis of Inter-Regional Inclusion/Exclusion in terms of SOL Index for Districts of Punjab

Province	Standard of Living District	Median SOL Index	Inter-regional Inclusion/Exclusion*
Punjab	Lahore	0.6169	Inclusion
Punjab	Rawalpindi	0.5522	Inclusion
Punjab	Gujranwala	0.4881	Inclusion
Punjab	Sialkot	0.4750	Inclusion
Punjab	Gujrat	0.4695	Inclusion
Punjab	Jhelum	0.4509	Inclusion
Punjab	Attock	0.4437	Inclusion
Punjab	Faisalabad	0.4190	Inclusion
Punjab	Chakwal	0.3909	Inclusion
Punjab	Sheikhupura	0.3810	Inclusion
Punjab	Mandi Bahauddin	0.3528	Inclusion
Punjab	Hafizabad	0.3487	Inclusion
Punjab	T.T. Singh	0.3485	Inclusion
Punjab	Sahiwal	0.3265	Inclusion
Punjab	Nankana Sahib	0.3235	Inclusion
Punjab	Narowal	0.3214	Inclusion
Punjab	Multan	0.3211	Inclusion
Punjab	Sargodha	0.3044	Inclusion
Punjab	Kasur	0.3018	Inclusion
Punjab	Khushab	0.2953	Inclusion
Punjab	Mianwali	0.2884	Inclusion
Punjab	Bahawalnagar	0.2830	Inclusion
Punjab	Okara	0.2821	Inclusion
Punjab	Layyah	0.2768	Inclusion
Punjab	Chiniot	0.2664	Inclusion
Punjab	Bahawalpur	0.2617	Inclusion
Punjab	Pakpattan	0.2559	Inclusion
Punjab	Rahim Yar Khan	0.2434	Inclusion
Punjab	Jhang	0.2410	Inclusion
Punjab	Khanewal	0.2339	Inclusion
Punjab	Bhakkar	0.2325	Inclusion
Punjab	Lodhran	0.2298	Inclusion
Punjab	Vehari	0.2223	Inclusion
Punjab	D. G. Khan	0.2156	Inclusion
Punjab	Rajanpur	0.1878	Exclusion
Punjab	Muzaffargarh	0.1430	Exclusion

*Criterion for inter-regional inclusion: regional median>= 0.6*national median

Table A.8 Analysis of Inter-Regional Inclusion/Exclusion in terms of SOL Index for Districts of Sindh

Standard of Living		Median SOL Index	Inter-regional Inclusion/Exclusion*
Province	District		
Sindh	Karachi	0.6169	Inclusion
Sindh	Hyderabad	0.4564	Inclusion
Sindh	Sukkur	0.3128	Inclusion
Sindh	Jamshoro	0.2693	Inclusion
Sindh	Dadu	0.2595	Inclusion
Sindh	Larkana	0.2306	Inclusion
Sindh	Naushahro Feroze	0.2109	Exclusion
Sindh	Shaheed Benazir Abad	0.1979	Exclusion
Sindh	Khairpur	0.1829	Exclusion
Sindh	Ghotki	0.1715	Exclusion
Sindh	Sanghar	0.1694	Exclusion
Sindh	Mirpur Khas	0.1632	Exclusion
Sindh	Tando Allah Yar	0.1628	Exclusion
Sindh	Matiari	0.1627	Exclusion
Sindh	Shahdadkot	0.1352	Exclusion
Sindh	Shikarpur	0.1291	Exclusion
Sindh	Kashmore	0.1253	Exclusion
Sindh	Thatta	0.1235	Exclusion
Sindh	Umer Kot	0.1035	Exclusion
Sindh	Tharparkar	0.1030	Exclusion
Sindh	Jacobabad	0.1026	Exclusion
Sindh	Tando Mohammad khan	0.0999	Exclusion
Sindh	Badin	0.0987	Exclusion
Sindh	Sujawal	0.0906	Exclusion

*Criterion for inter-regional inclusion: regional median>= 0.6*national median

Table A.9 Analysis of Inter-Regional Inclusion/Exclusion in terms of SOL Index for Districts of Balochistan

Standard of Living		Median SOL Index	Inter-regional Inclusion/Exclusion*
Province	District		
Balochistan	Quetta	0.4526	Inclusion
Balochistan	Pishin	0.3403	Inclusion
Balochistan	Gwadar	0.2783	Inclusion
Balochistan	Killa Saifullah	0.2761	Inclusion
Balochistan	Nushki	0.2562	Inclusion
Balochistan	Sibbi	0.2560	Inclusion
Balochistan	Kharan	0.2379	Inclusion
Balochistan	Khuzdar	0.2347	Inclusion
Balochistan	Kalat	0.2329	Inclusion
Balochistan	Mastung	0.2246	Inclusion
Balochistan	Zhob	0.1966	Exclusion
Balochistan	Ziarat	0.1958	Exclusion
Balochistan	Killa Abdullah	0.1730	Exclusion
Balochistan	Loralai	0.1730	Exclusion
Balochistan	Lasbela	0.1705	Exclusion
Balochistan	Musakhel	0.1571	Exclusion
Balochistan	Barkhan	0.1480	Exclusion
Balochistan	Bolan/ Kachhi	0.1420	Exclusion
Balochistan	Harnai	0.1371	Exclusion
Balochistan	Jaffarabad	0.1263	Exclusion
Balochistan	Sheerani	0.1255	Exclusion
Balochistan	Nasirabad/ Tamboo	0.1223	Exclusion
Balochistan	Kohlu	0.1217	Exclusion
Balochistan	Washuk	0.1150	Exclusion
Balochistan	Dera Bugti	0.1126	Exclusion
Balochistan	Awaran	0.1125	Exclusion
Balochistan	Chagai	0.1040	Exclusion
Balochistan	Jhal Magsi	0.1019	Exclusion

*Criterion for inter-regional inclusion: regional median>= 0.6*national median

Table A.10 National and Provincial Estimates of Incidence of Deprived and Inclusion Coefficient for SOL

Standard of Living		ID Regional	IC Regional	ID Mainstream	IC Mainstream
Capital	Islamabad	0.1083	0.8917	0.0052	0.9948
Pakistan	Overall	—	—	0.5565	0.4435
	Urban	0.2611	0.7389	0.0812	0.9188
	Rural	0.5695	0.4305	0.8352	0.1648
KPK	Overall	0.4436	0.5564	0.3853	0.6147
	Urban	0.2191	0.7809	0.0651	0.9349
	Rural	0.4342	0.5658	0.4581	0.5419
Punjab	Overall	0.4868	0.5132	0.4853	0.5147
	Urban	0.2289	0.7711	0.0623	0.9377
	Rural	0.5033	0.4967	0.6974	0.3026
Sindh	Overall	0.7400	0.2600	0.7250	0.2750
	Urban	0.2880	0.7120	0.1064	0.8936
	Rural	0.4535	0.5465	1.4631	-0.4631
Balochistan	Overall	0.5814	0.4186	0.9430	0.0570
	Urban	0.1896	0.8104	0.1076	0.8924
	Rural	0.4881	0.5119	1.2553	-0.2553

Table A.11 District-Wise Estimates of Incidence of Deprived and Inclusion Coefficient for SOL

Standard of Living		Incidence of Deprived (ID) & Inclusion Coefficient (IC)				
Province	District	ID Regional	IC Regional	ID Main-stream	IC Main-stream	Rank IC Main-stream
Sindh	Karachi	0.0239	0.9761	0.0000	1.0000	1
Capital	Islamabad	0.1083	0.8917	0.0052	0.9948	2
Punjab	Lahore	0.0886	0.9114	0.0148	0.9852	3
Balochistan	Quetta	0.1187	0.8813	0.0289	0.9711	4
Punjab	Rawalpindi	0.2211	0.7789	0.0542	0.9458	5
Punjab	Sialkot	0.2108	0.7892	0.0803	0.9197	6
KPK	Haripur	0.2756	0.7244	0.0891	0.9109	7
Punjab	Gujranwala	0.2809	0.7191	0.1004	0.8996	8
Punjab	Gujrat	0.2295	0.7705	0.1067	0.8933	9
Punjab	Jhelum	0.2368	0.7632	0.1128	0.8872	10
KPK	Abbottabad	0.2723	0.7277	0.1280	0.8720	11
Punjab	Attock	0.2595	0.7405	0.1338	0.8662	12
KPK	Chitral	0.2436	0.7564	0.1472	0.8528	13
Punjab	Faisalabad	0.2926	0.7074	0.1954	0.8046	14
Punjab	Chakwal	0.2505	0.7495	0.1994	0.8006	15
KPK	Mansehra	0.2718	0.7282	0.2124	0.7876	16
KPK	Mardan	0.3300	0.6700	0.2257	0.7743	17
KPK	Nowshera	0.3770	0.6230	0.2383	0.7617	18

Table A.11 Continued						
Standard of Living		Incidence of Deprived (ID) & Inclusion Coefficient (IC)				
Province	District	ID Regional	IC Regional	ID Main-stream	IC Main-stream	Rank IC Main-stream
KPK	Peshawar	0.4162	0.5838	0.2422	0.7578	19
KPK	Swabi	0.3626	0.6374	0.2491	0.7509	20
Punjab	Sheikhupura	0.3213	0.6787	0.2698	0.7302	21
KPK	Malakand	0.3450	0.6550	0.2916	0.7084	22
KPK	Hangu	0.4174	0.5826	0.3236	0.6764	23
Sindh	Hyderabad	0.4351	0.5649	0.3300	0.6700	24
KPK	Karak	0.3789	0.6211	0.3364	0.6636	25
Punjab	Mandi Bahauddin	0.3383	0.6617	0.3383	0.6617	26
KPK	Bannu	0.3862	0.6138	0.3433	0.6567	27
KPK	Lakki Marwat	0.2706	0.7294	0.3564	0.6436	28
Balochistan	Pishin	0.3231	0.6769	0.3591	0.6409	29
Punjab	T.T. Singh	0.3655	0.6345	0.3741	0.6259	30
KPK	Swat	0.4266	0.5734	0.3792	0.6208	31
KPK	Batagram	0.4205	0.5795	0.3813	0.6187	32
KPK	Kohat	0.4667	0.5333	0.4035	0.5965	33
Punjab	Narowal	0.3466	0.6534	0.4104	0.5896	34
KPK	Lower Dir	0.3781	0.6219	0.4179	0.5821	35
Balochistan	Killa Saifullah	0.0865	0.9135	0.4362	0.5638	36
Punjab	Hafizabad	0.4314	0.5686	0.4365	0.5635	37
Balochistan	Gwadar	0.2671	0.7329	0.4385	0.5615	38
Punjab	Nankana Sahib	0.4023	0.5977	0.4469	0.5531	39
Punjab	Kasur	0.2850	0.7150	0.4546	0.5454	40
KPK	Charsadda	0.4855	0.5145	0.4924	0.5076	41
Punjab	Khushab	0.3797	0.6203	0.5048	0.4952	42
KPK	Tank	0.3949	0.6051	0.5369	0.4631	43
Balochistan	Nushki	0.1759	0.8241	0.5482	0.4518	44
Punjab	Layyah	0.4259	0.5741	0.5773	0.4227	45
KPK	Shangla	0.5152	0.4848	0.5929	0.4071	46
Punjab	Sahiwal	0.5150	0.4850	0.5965	0.4035	47
Punjab	Sargodha	0.4717	0.5283	0.5967	0.4033	48
Punjab	Okara	0.3819	0.6181	0.6079	0.3921	49
Punjab	Mianwali	0.4359	0.5641	0.6115	0.3885	50
Punjab	Multan	0.5498	0.4502	0.6425	0.3575	51
Sindh	Sukkur	0.5800	0.4200	0.6463	0.3537	52
Punjab	Bahawalnagar	0.4581	0.5419	0.6846	0.3154	53
KPK	D. I. Khan	0.4575	0.5425	0.6869	0.3131	54

Table A.11 Continued

Standard of Living		Incidence of Deprived (ID) & Inclusion Coefficient (IC)				
Province	District	ID Regional	IC Regional	ID Main-stream	IC Main-stream	Rank IC Main-stream
Punjab	Pakpattan	0.3740	0.6260	0.7057	0.2943	55
KPK	Tor Ghar	0.3639	0.6361	0.7132	0.2868	56
Balochistan	Sibbi	0.3864	0.6136	0.7212	0.2788	57
KPK	Upper Dir	0.4310	0.5690	0.7357	0.2643	58
KPK	Buner	0.5585	0.4415	0.7549	0.2451	59
Punjab	Bahawalpur	0.5544	0.4456	0.7821	0.2179	60
Sindh	Jamshoro	0.5962	0.4038	0.7883	0.2117	61
Punjab	Chiniot	0.6195	0.3805	0.7899	0.2101	62
Punjab	Rahim Yar Khan	0.5820	0.4180	0.8464	0.1536	63
Sindh	Dadu	0.6196	0.3804	0.8536	0.1464	64
Punjab	Bhakkar	0.3614	0.6386	0.8546	0.1454	65
Balochistan	Khuzdar	0.3755	0.6245	0.8637	0.1363	66
Punjab	Jhang	0.5651	0.4349	0.8656	0.1344	67
Punjab	Khanewal	0.4551	0.5449	0.8904	0.1096	68
Punjab	Lodhran	0.5010	0.4990	0.8947	0.1053	69
Balochistan	Kalat	0.3706	0.6294	0.8961	0.1039	70
Balochistan	Kharan	0.4863	0.5137	0.9062	0.0938	71
Punjab	Vehari	0.4360	0.5640	0.9279	0.0721	72
Sindh	Larkana	0.5845	0.4155	0.9327	0.0673	73
Balochistan	Mastung	0.3440	0.6560	0.9530	0.0470	74
Punjab	D. G. Khan	0.5532	0.4468	0.9903	0.0097	75
Sindh	Naushahro Feroze	0.4406	0.5594	1.0078	-0.0078	76
Sindh	Shaheed Benazir Abad	0.3917	0.6083	1.0518	-0.0518	77
Balochistan	Zhob	0.4435	0.5565	1.0901	-0.0901	78
Punjab	Rajanpur	0.5200	0.4800	1.0908	-0.0908	79
Balochistan	Lasbela	0.7818	0.2182	1.1056	-0.1056	80
Balochistan	Ziarat	0.3654	0.6346	1.1203	-0.1203	81
Sindh	Khairpur	0.5125	0.4875	1.1565	-0.1565	82
Balochistan	Killa Abdul-lah	0.2338	0.7662	1.2414	-0.2414	83
Sindh	Ghotki	0.5040	0.4960	1.2504	-0.2504	84
Sindh	Matiari	0.5572	0.4428	1.2518	-0.2518	85
Sindh	Tando Allah Yar	0.5891	0.4109	1.2584	-0.2584	86
Sindh	Mirpur Khas	0.5483	0.4517	1.2698	-0.2698	87
Balochistan	Bolan/ Kachhi	0.3184	0.6816	1.2766	-0.2766	88
Sindh	Sanghar	0.5246	0.4754	1.2871	-0.2871	89
Balochistan	Loralai	0.3398	0.6602	1.3413	-0.3413	90

Table A.11 Continued						
Standard of Living		Incidence of Deprived (ID) & Inclusion Coefficient (IC)				
Province	District	ID Regional	IC Regional	ID Main-stream	IC Main-stream	Rank IC Main-stream
Sindh	Shahdadkot	0.5379	0.4621	1.3521	-0.3521	91
Sindh	Shikarpur	0.4188	0.5812	1.3527	-0.3527	92
Punjab	Muzaffargarh	0.5042	0.4958	1.3587	-0.3587	93
Balochistan	Nasirabad/ Tamboo	0.1275	0.8725	1.3824	-0.3824	94
Sindh	Jacobabad	0.3709	0.6291	1.3882	-0.3882	95
Balochistan	Barkhan	0.4141	0.5859	1.3943	-0.3943	96
Balochistan	Musakhel	0.4859	0.5141	1.4007	-0.4007	97
Sindh	Thatta	0.5888	0.4112	1.4019	-0.4019	98
Sindh	Kashmore	0.3028	0.6972	1.4226	-0.4226	99
Balochistan	Jaffarabad	0.2725	0.7275	1.4272	-0.4272	100
Balochistan	Harnai	0.4210	0.5790	1.4289	-0.4289	101
Balochistan	Sheerani	0.5262	0.4738	1.4600	-0.4600	102
Balochistan	Dera Bugti	0.6994	0.3006	1.4605	-0.4605	103
Sindh	Badin	0.3574	0.6426	1.5112	-0.5112	104
Sindh	Tando Mohammad Khan	0.4073	0.5927	1.5595	-0.5595	105
KPK	Kohistan	0.2571	0.7429	1.5630	-0.5630	106
Sindh	Umer Kot	0.3886	0.6114	1.5724	-0.5724	107
Balochistan	Jhal Magsi	0.5196	0.4804	1.6436	-0.6436	108
Sindh	Sujawal	0.3650	0.6350	1.6452	-0.6452	109
Balochistan	Awaran	0.4854	0.5146	1.6984	-0.6984	110
Balochistan	Kohlu	0.1629	0.8371	1.7023	-0.7023	111
Balochistan	Chagai	0.4148	0.5852	1.7364	-0.7364	112
Balochistan	Washuk	0.5462	0.4538	1.7455	-0.7455	113
Sindh	Tharparkar	0.3388	0.6612	1.7785	-0.7785	114

APPENDIX B

Table B.1 National and Provincial Estimates of Adult Literacy Index and Schooling Index

Education		Adult Literacy Index	Inequality Adjusted Adult Literacy Index	Schooling Index	Inequality Adjusted Schooling Index
Pakistan	Overall	0.5571	0.3682	0.5602	0.3820
	Urban	0.7355	0.5893	0.6987	0.5778
	Rural	0.4525	0.2794	0.4789	0.2996
KPK	Overall	0.4519	0.2929	0.5006	0.3535
	Urban	0.6025	0.4532	0.6152	0.4995
	Rural	0.4176	0.2653	0.4745	0.3268
Punjab	Overall	0.5805	0.3946	0.5897	0.4212
	Urban	0.7468	0.6106	0.7150	0.6037
	Rural	0.4970	0.3170	0.5269	0.3516
Sindh	Overall	0.5807	0.3782	0.5494	0.3481
	Urban	0.7552	0.6027	0.7023	0.5714
	Rural	0.3725	0.2169	0.3670	0.1927
Balochistan	Overall	0.3901	0.2327	0.3972	0.2276
	Urban	0.5549	0.4080	0.5438	0.4247
	Rural	0.3285	0.1887	0.3425	0.1802

Table B.2 District-Wise Estimates of Adult Literacy Index and Schooling Index

Education		Adult Literacy Index	Inequality Adjusted Adult Literacy Index	Schooling Index	Inequality Adjusted Schooling Index
Province	District				
KPK	Chitral	0.5928	0.4805	0.5989	0.5311
KPK	Upper Dir	0.3300	0.1994	0.4151	0.2877
KPK	Lower Dir	0.4765	0.3498	0.5610	0.4816
KPK	Swat	0.3893	0.2438	0.5172	0.3776
KPK	Shangla	0.2845	0.1716	0.3234	0.1823
KPK	Buner	0.2663	0.1593	0.3806	0.2445
KPK	Malakand	0.5260	0.3770	0.5753	0.4864
KPK	Kohistan	0.2080	0.1176	0.2295	0.1087
KPK	Mansehra	0.5373	0.3488	0.5819	0.4424
KPK	Batagram	0.2973	0.1733	0.4079	0.2734
KPK	Abbottabad	0.5849	0.3950	0.6214	0.4382
KPK	Haripur	0.6532	0.5277	0.6592	0.5737
KPK	Tor Ghar	0.1979	0.1148	0.2675	0.1339
KPK	Mardan	0.4397	0.2937	0.4827	0.3491
KPK	Swabi	0.4079	0.2557	0.4761	0.3194

Education						
Province	District	Adult Literacy Index	Inequality Adjusted Adult Literacy Index	Schooling Index	Inequality Adjusted Schooling Index
KPK	Charsadda	0.4135	0.2705	0.4789	0.3496
KPK	Peshawar	0.5432	0.3923	0.5522	0.4365
KPK	Nowshera	0.4946	0.3517	0.5301	0.3983
KPK	Kohat	0.4570	0.3005	0.4867	0.3251
KPK	Hangu	0.3295	0.2114	0.4119	0.2772
KPK	Karak	0.5528	0.4284	0.5896	0.5079
KPK	Bannu	0.4900	0.3623	0.5075	0.4054
KPK	Lakki Marwat	0.5049	0.3725	0.5071	0.3953
KPK	D. I. Khan	0.4068	0.2501	0.4225	0.2613
KPK	Tank	0.3632	0.2394	0.4157	0.2875
Punjab	Attock	0.6357	0.5038	0.6401	0.5301
Punjab	Rawalpindi	0.8072	0.6997	0.7569	0.6682
Punjab	Jhelum	0.7416	0.6171	0.7253	0.6360
Punjab	Chakwal	0.6938	0.5603	0.6590	0.5369
Punjab	Sargodha	0.5643	0.3959	0.5700	0.4033
Punjab	Bhakkar	0.4737	0.3113	0.5003	0.3379
Punjab	Khushab	0.5291	0.3668	0.5505	0.4061
Punjab	Mianwali	0.5119	0.3587	0.5355	0.3930
Punjab	Faisalabad	0.6384	0.4579	0.6404	0.4822
Punjab	Chiniot	0.4490	0.2774	0.4894	0.3174
Punjab	Jhang	0.4965	0.3242	0.5271	0.3686
Punjab	T.T. Singh	0.6012	0.4194	0.6114	0.4551
Punjab	Gujranwala	0.6668	0.5018	0.6762	0.5560
Punjab	Hafizabad	0.5202	0.3410	0.5752	0.4249
Punjab	Gujrat	0.7027	0.5707	0.7062	0.6071
Punjab	Mandi Bahauddin	0.5978	0.4522	0.6148	0.4997
Punjab	Sialkot	0.7484	0.6525	0.7524	0.6885
Punjab	Narowal	0.6487	0.5048	0.6629	0.5736
Punjab	Lahore	0.7817	0.6654	0.7359	0.6474
Punjab	Kasur	0.5263	0.3500	0.5910	0.4425
Punjab	Sheikhupura	0.6155	0.4481	0.6302	0.4808
Punjab	Nankana Sahib	0.6129	0.4310	0.6171	0.4577
Punjab	Okara	0.4918	0.3049	0.5307	0.3646
Punjab	Sahiwal	0.5292	0.3314	0.5565	0.3636
Punjab	Pakpattan	0.4528	0.2776	0.4925	0.3209
Punjab	Vehari	0.4137	0.2422	0.4892	0.3086
Punjab	Multan	0.5489	0.3645	0.5459	0.3698
Punjab	Lodhran	0.4703	0.2975	0.4819	0.3053
Punjab	Khanewal	0.5125	0.3421	0.5411	0.3698
Punjab	D. G. Khan	0.3779	0.2153	0.4114	0.2466
Punjab	Rajanpur	0.3328	0.1879	0.3367	0.1712
Punjab	Layyah	0.5649	0.4178	0.5893	0.4630
Punjab	Muzaffargarh	0.3856	0.2196	0.4189	0.2348

Education					
Province	District	Adult Literacy Index	Inequality-Adjusted Adult Literacy Index	Schooling Index	Inequality-Adjusted Schooling Index
Punjab	Bahawalpur	0.4137	0.2338	0.4495	0.2534
Punjab	Bahawalnagar	0.4620	0.2878	0.4927	0.3116
Punjab	Rahim Yar Khan	0.4208	0.2446	0.4418	0.2580
Sindh	Jacobabad	0.3193	0.1760	0.3179	0.1509
Sindh	Kashmore	0.2988	0.1608	0.2927	0.1328
Sindh	Shikarpur	0.4093	0.2498	0.3980	0.2212
Sindh	Larkana	0.5291	0.3699	0.5147	0.3566
Sindh	Shahdadkot	0.3529	0.1945	0.3484	0.1874
Sindh	Sukkur	0.5681	0.4139	0.5375	0.3952
Sindh	Ghotki	0.3741	0.2274	0.3695	0.2084
Sindh	Khairpur	0.4392	0.2861	0.4320	0.2725
Sindh	Naushahro Feroze	0.6422	0.4989	0.6115	0.4883
Sindh	Shaheed Benazir Abad	0.4569	0.2885	0.4498	0.2709
Sindh	Dadu	0.6282	0.4699	0.5785	0.4671
Sindh	Jamshoro	0.4396	0.2644	0.4385	0.2411
Sindh	Hyderabad	0.5843	0.3732	0.5716	0.3569
Sindh	Tando Allah Yar	0.3693	0.2026	0.3736	0.1860
Sindh	Tando Mohammad khan	0.2927	0.1485	0.2861	0.1164
Sindh	Matiari	0.4273	0.2497	0.4220	0.2352
Sindh	Badin	0.3717	0.2089	0.3707	0.1836
Sindh	Thatta	0.3937	0.2271	0.3868	0.1930
Sindh	Sujawal	0.3624	0.2050	0.3369	0.1570
Sindh	Sanghar	0.4169	0.2536	0.3976	0.2167
Sindh	Mirpur Khas	0.4270	0.2416	0.4087	0.2050
Sindh	Umer Kot	0.3424	0.1957	0.3382	0.1698
Sindh	Tharparkar	0.3534	0.2163	0.3587	0.2015
Sindh	Karachi	0.8103	0.6794	0.7470	0.6373
Balochistan	Quetta	0.5769	0.4172	0.5686	0.4485
Balochistan	Pishin	0.4087	0.2791	0.4093	0.2758
Balochistan	Killa Abdullah	0.2337	0.1335	0.2460	0.1206
Balochistan	Chagai	0.2848	0.1577	0.2771	0.1154
Balochistan	Nushki	0.4060	0.2626	0.4258	0.2654
Balochistan	Loralai	0.3625	0.2236	0.4081	0.2627
Balochistan	Barkhan	0.2204	0.1221	0.2747	0.1505
Balochistan	Musakhel	0.3252	0.1752	0.3728	0.1843
Balochistan	Killa Saifullah	0.3513	0.2507	0.3616	0.2609
Balochistan	Zhob	0.3127	0.1811	0.3517	0.2061
Balochistan	Sheerani	0.3552	0.2186	0.3460	0.1909
Balochistan	Sibbi	0.4019	0.2269	0.3776	0.1673
Balochistan	Harnai	0.2462	0.1348	0.2414	0.0967

Table B.2 Continued

Table B.2 Continued					
Education					
Province	District	Adult Literacy Index	Inequality-Adjusted Adult Literacy Index	Schooling Index	Inequality-Adjusted Schooling Index
Balochistan	Ziarat	0.3261	0.1911	0.3624	0.2208
Balochistan	Kohlu	0.2488	0.1406	0.2742	0.1231
Balochistan	Dera Bugti	0.2681	0.1612	0.2239	0.1019
Balochistan	Bolan/ Kachhi	0.3827	0.2196	0.3798	0.1986
Balochistan	Jaffarabad	0.3151	0.1817	0.3177	0.1731
Balochistan	Nasirabad/ Tamboo	0.2624	0.1427	0.2839	0.1385
Balochistan	Jhal Magsi	0.2672	0.1446	0.2794	0.1579
Balochistan	Kalat	0.4825	0.3176	0.4644	0.3130
Balochistan	Mastung	0.5373	0.3888	0.5223	0.3695
Balochistan	Khuzdar	0.3936	0.2548	0.4025	0.2542
Balochistan	Awaran	0.4288	0.2885	0.4271	0.2844
Balochistan	Kharan	0.3433	0.1957	0.3886	0.2214
Balochistan	Washuk	0.2949	0.1764	0.3289	0.1707
Balochistan	Lasbela	0.3998	0.2097	0.3935	0.1567
Balochistan	Gwadar	0.5086	0.3451	0.5540	0.4542
Capital	Islamabad	0.8349	0.7435	0.7604	0.6870

Table B.3 District-wise Estimates of Education Indices and Inequality Measure

Education						
Province	District	Education Index (IE)	Inequality-Adjusted Education Index (I_{iE})	% Loss due to Inequality (AE)	Rank I_E	Rank I_{iE}
Capital	Islamabad	0.8101	0.7373	0.0899	1	1
Punjab	Rawalpindi	0.7904	0.7030	0.1106	2	2
Sindh	Karachi	0.7892	0.6828	0.1349	3	3
Punjab	Sialkot	0.7497	0.6809	0.0919	5	4
Punjab	Lahore	0.7664	0.6744	0.1200	4	5
Punjab	Jhelum	0.7361	0.6436	0.1257	6	6
Punjab	Gujrat	0.7039	0.6027	0.1437	7	7
Punjab	Chakwal	0.6822	0.5726	0.1607	8	8
KPK	Haripur	0.6552	0.5660	0.1362	10	9
Punjab	Narowal	0.6534	0.5564	0.1485	11	10
Punjab	Gujranwala	0.6699	0.5482	0.1818	9	11
Punjab	Attock	0.6371	0.5318	0.1654	13	12
Sindh	Naushahro Feroze	0.6320	0.5094	0.1940	14	13
Sindh	Dadu	0.6117	0.4918	0.1960	17	14
Punjab	Mandi Bahauddin	0.6035	0.4902	0.1877	19	15
Punjab	Faisalabad	0.6391	0.4883	0.2359	12	16
Punjab	Sheikhupura	0.6204	0.4821	0.2230	15	17

Table B.3 Continued						
Education		Education Index (IE)	Inequality-Adjusted Education Index (I_{iE})	% Loss due to Inequality (AE)	Rank I_E	Rank I_{iE}
Province	District					
KPK	Karak	0.5650	0.4758	0.1580	25	18
Punjab	Nankana Sahib	0.6143	0.4642	0.2444	16	19
Punjab	T.T. Singh	0.6046	0.4558	0.2461	18	20
Punjab	Layyah	0.5731	0.4542	0.2075	23	21
Balochistan	Quetta	0.5742	0.4496	0.2169	22	22
KPK	Malakand	0.5425	0.4429	0.1836	31	23
KPK	Abbottabad	0.5970	0.4381	0.2662	20	24
KPK	Chitral	0.5345	0.4292	0.1970	35	25
KPK	Peshawar	0.5462	0.4258	0.2204	30	26
KPK	Lower Dir	0.5047	0.4203	0.1672	45	27
Sindh	Sukkur	0.5579	0.4195	0.2480	26	28
Punjab	Sargodha	0.5662	0.4174	0.2628	24	29
Balochistan	Gwadar	0.5237	0.4138	0.2099	38	30
Punjab	Kasur	0.5479	0.4120	0.2480	29	31
KPK	Mansehra	0.5522	0.4113	0.2552	27	32
Punjab	Khushab	0.5362	0.4008	0.2526	34	33
KPK	Lakki Marwat	0.5057	0.3982	0.2124	43	34
Punjab	Hafizabad	0.5385	0.3979	0.2611	32	35
KPK	Bannu	0.4959	0.3948	0.2038	46	36
Balochistan	Mastung	0.5323	0.3943	0.2593	36	37
Punjab	Mianwali	0.5198	0.3913	0.2472	40	38
KPK	Nowshera	0.5064	0.3871	0.2356	42	39
Punjab	Multan	0.5479	0.3865	0.2946	28	40
Sindh	Hyderabad	0.5801	0.3847	0.3367	21	41
Sindh	Larkana	0.5243	0.3796	0.2760	37	42
Punjab	Khanewal	0.5220	0.3721	0.2872	39	43
Punjab	Sahiwal	0.5383	0.3658	0.3204	33	44
Punjab	Jhang	0.5067	0.3618	0.2860	41	45
Punjab	Okara	0.5048	0.3501	0.3064	44	46
Balochistan	Kalat	0.4764	0.3405	0.2854	48	47
Punjab	Bhakkar	0.4825	0.3397	0.2960	47	48
KPK	Mardan	0.4541	0.3331	0.2664	55	49
KPK	Kohat	0.4669	0.3295	0.2943	51	50
KPK	Charsadda	0.4353	0.3214	0.2617	59	51
KPK	Swat	0.4319	0.3197	0.2598	60	52
Punjab	Lodhran	0.4742	0.3197	0.3258	49	53
Punjab	Bahawalnagar	0.4723	0.3175	0.3278	50	54
Punjab	Pakpattan	0.4660	0.3166	0.3207	52	55
Punjab	Chiniot	0.4624	0.3131	0.3230	53	56
KPK	Swabi	0.4306	0.3009	0.3014	61	57
Balochistan	Awaran	0.4283	0.2995	0.3007	62	58

Table B.3 Continued						
Education						
Province	District	Education Index (IE)	Inequality-Adjusted Education Index (I_{iE})	% Loss due to Inequality (AE)	Rank I_E	Rank I_{iE}
Sindh	Shaheed Benazir Abad	0.4546	0.2990	0.3423	54	59
Sindh	Khairpur	0.4368	0.2974	0.3191	58	60
Balochistan	Pishin	0.4089	0.2954	0.2776	70	61
Punjab	Vehari	0.4389	0.2911	0.3368	57	62
Balochistan	Nushki	0.4126	0.2840	0.3116	67	63
KPK	Tank	0.3807	0.2725	0.2843	79	64
KPK	D. I. Khan	0.4121	0.2719	0.3401	68	65
Sindh	Jamshoro	0.4392	0.2712	0.3825	56	66
Balochistan	Killa Saifullah	0.3547	0.2696	0.2399	88	67
Balochistan	Khuzdar	0.3965	0.2680	0.3242	74	68
Punjab	Rahim Yar Khan	0.4278	0.2675	0.3747	63	69
Punjab	Bahawalpur	0.4256	0.2626	0.3830	64	70
Sindh	Matiari	0.4255	0.2614	0.3856	65	71
Balochistan	Loralai	0.3777	0.2581	0.3167	80	72
KPK	Hangu	0.3569	0.2557	0.2836	86	73
Sindh	Sanghar	0.4105	0.2549	0.3791	69	74
KPK	Upper Dir	0.3584	0.2537	0.2921	85	75
Sindh	Shikarpur	0.4055	0.2526	0.3770	71	76
Punjab	Muzaffargarh	0.3967	0.2453	0.3816	73	77
Punjab	D. G. Khan	0.3890	0.2442	0.3724	77	78
Sindh	Mirpur Khas	0.4209	0.2424	0.4242	66	79
Sindh	Ghotki	0.3726	0.2339	0.3722	81	80
KPK	Batagram	0.3341	0.2326	0.3039	95	81
Sindh	Thatta	0.3914	0.2299	0.4126	76	82
Balochistan	Bolan/ Kachhi	0.3818	0.2293	0.3994	78	83
Balochistan	Sheerani	0.3521	0.2263	0.3575	90	84
Sindh	Tharparkar	0.3552	0.2261	0.3634	87	85
Balochistan	Kharan	0.3584	0.2233	0.3770	84	86
Balochistan	Sibbi	0.3938	0.2203	0.4405	75	87
Balochistan	Ziarat	0.3382	0.2166	0.3594	94	88
Sindh	Badin	0.3713	0.2143	0.4228	82	89
Sindh	Tando Allah Yar	0.3707	0.2113	0.4300	83	90
KPK	Buner	0.3044	0.2096	0.3115	101	91
Balochistan	Zhob	0.3257	0.2086	0.3596	97	92
Sindh	Shahdadkot	0.3514	0.2084	0.4069	91	93
Balochistan	Lasbela	0.3977	0.2056	0.4830	72	94
Sindh	Umer Kot	0.3410	0.1996	0.4147	93	95
Sindh	Sujawal	0.3539	0.1980	0.4404	89	96
Balochistan	Musakhel	0.3411	0.1969	0.4227	92	97
Punjab	Rajanpur	0.3341	0.1965	0.4119	96	98
Balochistan	Jaffarabad	0.3160	0.1955	0.3813	99	99
KPK	Shangla	0.2975	0.1924	0.3533	102	100
Balochistan	Washuk	0.3063	0.1870	0.3894	100	101

Table B.3 Continued						
Education						
Province	District	Education Index (IE)	Inequality-Adjusted Education Index (I_{iE})	% Loss due to Inequality (AE)	Rank I_E	Rank I_{iE}
Sindh	Jacobabad	0.3189	0.1793	0.4377	98	102
Balochistan	Jhal Magsi	0.2713	0.1660	0.3882	106	103
Sindh	Kashmore	0.2968	0.1621	0.4537	103	104
Balochistan	Nasirabad/ Tamboo	0.2696	0.1564	0.4198	107	105
Balochistan	Chagai	0.2822	0.1533	0.4567	105	106
Balochistan	Barkhan	0.2385	0.1491	0.3750	111	107
Sindh	Tando Mohammad khan	0.2905	0.1478	0.4913	104	108
Balochistan	Dera Bugti	0.2534	0.1463	0.4224	109	109
Balochistan	Kohlu	0.2573	0.1453	0.4352	108	110
KPK	Tor Ghar	0.2211	0.1395	0.3694	113	111
Balochistan	Killa Abdullah	0.2378	0.1389	0.4156	112	112
Balochistan	Harnai	0.2446	0.1291	0.4720	110	113
KPK	Kohistan	0.2152	0.1270	0.4099	114	114

Table B.4 Inter-Regional Inclusion/Exclusion in terms of Education Index for Districts of KPK

Education			
Province	District	Median Education Index	Inter-regional Inclusion/Exclusion*
KPK	Haripur	0.6788	Inclusion
KPK	Abbottabad	0.6667	Inclusion
KPK	Mansehra	0.5714	Inclusion
KPK	Karak	0.5714	Inclusion
KPK	Chitral	0.5556	Inclusion
KPK	Malakand	0.5417	Inclusion
KPK	Lower Dir	0.5333	Inclusion
KPK	Peshawar	0.5333	Inclusion
KPK	Lakki Marwat	0.5238	Inclusion
KPK	Nowshera	0.5000	Inclusion
KPK	Bannu	0.5000	Inclusion
KPK	Mardan	0.4675	Inclusion
KPK	Kohat	0.4630	Inclusion
KPK	Swabi	0.4444	Inclusion
KPK	Charsadda	0.4287	Inclusion
KPK	Swat	0.4222	Inclusion
KPK	Tank	0.3968	Inclusion
KPK	D. I. Khan	0.3662	Inclusion
KPK	Hangu	0.3353	Exclusion
KPK	Upper Dir	0.3333	Exclusion

Table B.4 Continued			
Education			
Province	District	Median Education Index	Inter-regional Inclusion/Exclusion*
KPK	Batagram	0.2917	Exclusion
KPK	Buner	0.2540	Exclusion
KPK	Shangla	0.2500	Exclusion
KPK	Tor Ghar	0.1444	Exclusion
KPK	Kohistan	0.1167	Exclusion

*Criterion for inter-regional inclusion: regional median>=0.6*national overall median

Table B.5 Inter-Regional Inclusion/Exclusion in terms of Education Index for Districts of Punjab

Education			
Province	District	Median Education Index	Inter-regional Inclusion/Exclusion*
Punjab	Rawalpindi	0.8981	Inclusion
Punjab	Lahore	0.8709	Inclusion
Punjab	Jhelum	0.8000	Inclusion
Punjab	Sialkot	0.8000	Inclusion
Punjab	Gujrat	0.7500	Inclusion
Punjab	Gujranwala	0.7328	Inclusion
Punjab	Chakwal	0.7222	Inclusion
Punjab	Faisalabad	0.7000	Inclusion
Punjab	Narowal	0.6944	Inclusion
Punjab	Attock	0.6667	Inclusion
Punjab	Sheikhupura	0.6667	Inclusion
Punjab	Nankana Sahib	0.6667	Inclusion
Punjab	T.T. Singh	0.6543	Inclusion
Punjab	Mandi Bahauddin	0.6288	Inclusion
Punjab	Sargodha	0.5852	Inclusion
Punjab	Layyah	0.5714	Inclusion
Punjab	Kasur	0.5556	Inclusion
Punjab	Sahiwal	0.5556	Inclusion
Punjab	Multan	0.5556	Inclusion
Punjab	Hafizabad	0.5509	Inclusion
Punjab	Khushab	0.5429	Inclusion
Punjab	Khanewal	0.5333	Inclusion
Punjab	Bhakkar	0.5000	Inclusion
Punjab	Mianwali	0.5000	Inclusion
Punjab	Jhang	0.5000	Inclusion
Punjab	Okara	0.5000	Inclusion
Punjab	Pakpattan	0.5000	Inclusion

Table B.5 Continued			
Province	Education District	Median Education Index	Inter-regional Inclusion/Exclusion*
Punjab	Lodhran	0.5000	Inclusion
Punjab	Chiniot	0.4667	Inclusion
Punjab	Bahawalnagar	0.4667	Inclusion
Punjab	Vehari	0.4286	Inclusion
Punjab	Bahawalpur	0.4000	Inclusion
Punjab	Rahim Yar Khan	0.4000	Inclusion
Punjab	Muzaffargarh	0.3712	Inclusion
Punjab	D. G. Khan	0.3333	Exclusion
Punjab	Rajanpur	0.2639	Exclusion

*Criterion for inter-regional inclusion: regional median>= 0.6*national overall median

Table B.6 Inter-Regional Inclusion/Exclusion in terms of Education Index for Districts of Sindh

Province	Education District	Median Education Index	Inter-regional Inclusion/Exclusion*
Sindh	Karachi	0.9167	Inclusion
Sindh	Naushahro Feroze	0.6667	Inclusion
Sindh	Dadu	0.6543	Inclusion
Sindh	Hyderabad	0.6250	Inclusion
Sindh	Sukkur	0.5333	Inclusion
Sindh	Larkana	0.5000	Inclusion
Sindh	Shaheed Benazir Abad	0.4667	Inclusion
Sindh	Sanghar	0.4444	Inclusion
Sindh	Khairpur	0.4333	Inclusion
Sindh	Jamshoro	0.4321	Inclusion
Sindh	Matiari	0.4222	Inclusion
Sindh	Mirpur Khas	0.4167	Inclusion
Sindh	Thatta	0.4000	Inclusion
Sindh	Shikarpur	0.3889	Inclusion
Sindh	Tharparkar	0.3500	Inclusion
Sindh	Ghotki	0.3333	Exclusion
Sindh	Badin	0.3333	Exclusion
Sindh	Sujawal	0.3333	Exclusion
Sindh	Umer Kot	0.3333	Exclusion
Sindh	Tando Allah Yar	0.3056	Exclusion
Sindh	Shahdadkot	0.2619	Exclusion
Sindh	Jacobabad	0.2333	Exclusion
Sindh	Kashmore	0.1815	Exclusion
Sindh	Tando Mohammad khan	0.1444	Exclusion

*Criterion for inter-regional inclusion: regional median>= 0.6*national overall median

Table B.7 Inter-Regional Inclusion/Exclusion in terms of Education Index for Districts of Balochistan

Province	Education District	Median Education Index	Inter-regional Inclusion/Exclusion*
Balochistan	Quetta	0.6095	Inclusion
Balochistan	Mastung	0.5333	Inclusion
Balochistan	Gwadar	0.5185	Inclusion
Balochistan	Awaran	0.4762	Inclusion
Balochistan	Kalat	0.4630	Inclusion
Balochistan	Nushki	0.4444	Inclusion
Balochistan	Pishin	0.4198	Inclusion
Balochistan	Sheerani	0.4095	Inclusion
Balochistan	Killa Saifullah	0.3889	Inclusion
Balochistan	Sibbi	0.3889	Inclusion
Balochistan	Kharan	0.3796	Inclusion
Balochistan	Loralai	0.3778	Inclusion
Balochistan	Khuzdar	0.3768	Inclusion
Balochistan	Bolan/ Kachhi	0.3766	Inclusion
Balochistan	Lasbela	0.3333	Exclusion
Balochistan	Zhob	0.3148	Exclusion
Balochistan	Ziarat	0.2889	Exclusion
Balochistan	Musakhel	0.2778	Exclusion
Balochistan	Jaffarabad	0.2778	Exclusion
Balochistan	Washuk	0.2481	Exclusion
Balochistan	Dera Bugti	0.2222	Exclusion
Balochistan	Chagai	0.2167	Exclusion
Balochistan	Kohlu	0.1667	Exclusion
Balochistan	Nasirabad/ Tamboo	0.1667	Exclusion
Balochistan	Jhal Magsi	0.1667	Exclusion
Balochistan	Barkhan	0.1444	Exclusion
Balochistan	Killa Abdullah	0.1333	Exclusion
Balochistan	Harnai	0.1167	Exclusion

*Criterion for inter-regional inclusion: regional median>= 0.6*national overall median

Table B.8 National and Provincial Estimates of Index Incidence of Deprived and Inclusion Coefficient for Education

Human Development		ID Regional	IC Regional	ID Mainstream	IC Mainstream
Capital	Islamabad	0.2738	0.7262	0.1122	0.8878
Pakistan	Overall	—	—	0.6012	0.3988
	Urban	0.3954	0.6046	0.2762	0.7238
	Rural	0.6820	0.3180	0.7918	0.2082
KPK	Overall	0.6254	0.3746	0.7474	0.2526
	Urban	0.4392	0.5608	0.4082	0.5918
	Rural	0.6578	0.3422	0.8245	0.1755
Punjab	Overall	0.5630	0.4370	0.5447	0.4553
	Urban	0.3503	0.6497	0.2433	0.7567
	Rural	0.6056	0.3944	0.6958	0.3042
Sindh	Overall	0.6172	0.3828	0.6051	0.3949
	Urban	0.4580	0.5420	0.2810	0.7190
	Rural	0.7830	0.2170	0.9918	0.0082
Balochistan	Overall	0.7450	0.2550	0.9276	0.0724
	Urban	0.5028	0.4972	0.5089	0.4911
	Rural	0.8211	0.1789	1.0841	-0.0841

Table B.9 District-Wise Estimates of Incidence of Deprived and Inclusion Coefficient for Education

Education		Incidence of Deprived (ID) & Inclusion Coefficient (IC)				
Province	District	ID Regional	IC Regional	ID Main-stream	IC Main-stream	Rank IC Main-stream
Capital	Islamabad	0.2738	0.7262	0.1122	0.8878	1
Punjab	Sialkot	0.2521	0.7479	0.1413	0.8587	2
Punjab	Rawalpindi	0.3388	0.6612	0.1683	0.8317	3
Sindh	Karachi	0.3459	0.6541	0.2044	0.7956	4
Punjab	Lahore	0.3597	0.6403	0.2061	0.7939	5
Punjab	Jhelum	0.3482	0.6518	0.2303	0.7697	6
Punjab	Gujrat	0.3476	0.6524	0.2440	0.7560	7
KPK	Haripur	0.3358	0.6642	0.2673	0.7327	8
Punjab	Chakwal	0.3341	0.6659	0.2817	0.7183	9
Punjab	Narowal	0.3882	0.6118	0.3141	0.6859	10
Sindh	Naushahro Feroze	0.4139	0.5861	0.3497	0.6503	11
Punjab	Attock	0.4162	0.5838	0.3591	0.6409	12
Punjab	Gujranwala	0.4194	0.5806	0.3616	0.6384	13
Sindh	Dadu	0.4458	0.5542	0.4025	0.5975	14
Punjab	Mandi Bahaud-din	0.4300	0.5700	0.4046	0.5954	15

Table B.9 Continued						
Education		Incidence of Deprived (ID) & Inclusion Coefficient (IC)				
Province	District	ID Regional	IC Regional	ID Main-stream	IC Main-stream	Rank IC Main-stream
KPK	Karak	0.4167	0.5833	0.4167	0.5833	16
Punjab	Sheikhupura	0.4826	0.5174	0.4462	0.5538	17
Punjab	Faisalabad	0.5126	0.4874	0.4467	0.5533	18
Punjab	Layyah	0.4577	0.5423	0.4577	0.5423	19
Balochistan	Quetta	0.4921	0.5079	0.4746	0.5254	20
Punjab	Nankana Sahib	0.5099	0.4901	0.4790	0.5210	21
Punjab	T.T. Singh	0.5502	0.4498	0.4976	0.5024	22
KPK	Malakand	0.4409	0.5591	0.5047	0.4953	23
KPK	Chitral	0.4952	0.5048	0.5055	0.4945	24
Punjab	Sargodha	0.5120	0.4880	0.5113	0.4887	25
KPK	Abbottabad	0.5768	0.4232	0.5330	0.4670	26
Sindh	Sukkur	0.4869	0.5131	0.5339	0.4661	27
Balochistan	Mastung	0.5003	0.4997	0.5342	0.4658	28
KPK	Lakki Marwat	0.4746	0.5254	0.5350	0.4650	29
Balochistan	Gwadar	0.4744	0.5256	0.5440	0.4560	30
KPK	Peshawar	0.5028	0.4972	0.5707	0.4293	31
KPK	Lower Dir	0.5173	0.4828	0.5764	0.4236	32
Punjab	Khushab	0.5079	0.4921	0.5840	0.4160	33
Punjab	Kasur	0.5961	0.4039	0.5961	0.4039	34
Punjab	Mianwali	0.5005	0.4995	0.5976	0.4024	35
Sindh	Matiari	0.4870	0.5130	0.6012	0.3988	36
Sindh	Hyderabad	0.6283	0.3717	0.6023	0.3977	37
Punjab	Hafizabad	0.5565	0.4435	0.6023	0.3977	38
Punjab	Multan	0.6011	0.3989	0.6043	0.3957	39
Sindh	Larkana	0.4959	0.5041	0.6085	0.3915	40
KPK	Mansehra	0.6099	0.3901	0.6099	0.3901	41
KPK	Bannu	0.4807	0.5193	0.6134	0.3866	42
KPK	Nowshera	0.5218	0.4782	0.6279	0.3721	43
Punjab	Khanewal	0.5996	0.4004	0.6489	0.3511	44
Punjab	Bhakkar	0.5952	0.4048	0.6796	0.3204	45
Punjab	Jhang	0.5926	0.4074	0.6896	0.3104	46
Punjab	Sahiwal	0.6908	0.3092	0.6988	0.3012	47
Sindh	Shaheed Benazir Abad	0.6253	0.3747	0.7088	0.2912	48
KPK	Mardan	0.5980	0.4020	0.7204	0.2796	49
Punjab	Okara	0.6343	0.3657	0.7206	0.2794	50
Punjab	Lodhran	0.6556	0.3444	0.7339	0.2661	51
Balochistan	Kalat	0.6298	0.3702	0.7448	0.2552	52
Balochistan	Awaran	0.7080	0.2920	0.7515	0.2485	53

Table B.9 Continued						
Education		Incidence of Deprived (ID) & Inclusion Coefficient (IC)				
Province	District	ID Regional	IC Regional	ID Main-stream	IC Main-stream	Rank IC Main-stream
Punjab	Pakpattan	0.6763	0.3237	0.7592	0.2408	54
Punjab	Bahawalnagar	0.6561	0.3439	0.7839	0.2161	55
Punjab	Chiniot	0.6992	0.3008	0.7870	0.2130	56
KPK	Kohat	0.6360	0.3640	0.7877	0.2123	57
Balochistan	Pishin	0.6524	0.3476	0.7966	0.2034	58
Balochistan	Nushki	0.6908	0.3092	0.8046	0.1954	59
KPK	Swat	0.6257	0.3743	0.8048	0.1952	60
KPK	Swabi	0.6823	0.3177	0.8052	0.1948	61
Sindh	Khairpur	0.6276	0.3724	0.8108	0.1892	62
KPK	Charsadda	0.6408	0.3592	0.8175	0.1825	63
Sindh	Sanghar	0.7517	0.2483	0.8356	0.1644	64
Balochistan	Killa Saifullah	0.5740	0.4260	0.8667	0.1333	65
Punjab	Vehari	0.7382	0.2618	0.8734	0.1266	66
Sindh	Jamshoro	0.6993	0.3007	0.8765	0.1235	67
KPK	Tank	0.6760	0.3240	0.9055	0.0945	68
Sindh	Mirpur Khas	0.7796	0.2204	0.9111	0.0889	69
Sindh	Shikarpur	0.7189	0.2811	0.9121	0.0879	70
Punjab	Bahawalpur	0.7576	0.2424	0.9192	0.0808	71
Balochistan	Sheerani	0.7462	0.2538	0.9208	0.0792	72
Punjab	Rahim Yar Khan	0.7535	0.2465	0.9271	0.0729	73
Sindh	Thatta	0.7911	0.2089	0.9327	0.0673	74
KPK	D. I. Khan	0.6604	0.3396	0.9391	0.0609	75
Balochistan	Loralai	0.7301	0.2699	0.9403	0.0597	76
Balochistan	Khuzdar	0.6405	0.3595	0.9433	0.0567	77
Balochistan	Kharan	0.8713	0.1287	0.9438	0.0562	78
Punjab	Muzaffargarh	0.7688	0.2312	0.9502	0.0498	79
Balochistan	Bolan/ Kachhi	0.8294	0.1706	0.9632	0.0368	80
Balochistan	Sibbi	0.8313	0.1687	0.9750	0.0250	81
Sindh	Tharparkar	0.7435	0.2565	0.9891	0.0109	82
Sindh	Ghotki	0.7210	0.2790	1.0086	-0.0086	83
KPK	Hangu	0.6371	0.3629	1.0138	-0.0138	84
Punjab	D. G. Khan	0.7393	0.2607	1.0205	-0.0205	85
Sindh	Badin	0.7770	0.2230	1.0232	-0.0232	86
Sindh	Umer Kot	0.8229	0.1771	1.0305	-0.0305	87
Balochistan	Zhob	0.8213	0.1787	1.0350	-0.0350	88
Balochistan	Lasbela	0.8271	0.1729	1.0474	-0.0474	89
KPK	Upper Dir	0.6517	0.3484	1.0476	-0.0476	90
Sindh	Tando Allah Yar	0.8163	0.1837	1.0506	-0.0506	91

Table B.9 Continued						
Education		Incidence of Deprived (ID) & Inclusion Coefficient (IC)				
Province	District	ID Regional	IC Regional	ID Main-stream	IC Main-stream	Rank IC Main-stream
Sindh	Sujawal	0.7951	0.2049	1.0530	-0.0530	92
Balochistan	Ziarat	0.8203	0.1797	1.1088	-0.1088	93
Balochistan	Jaffarabad	0.8120	0.1880	1.1137	-0.1137	94
Sindh	Shahdadkot	0.7377	0.2623	1.1251	-0.1251	95
Balochistan	Musakhel	0.8270	0.1730	1.1281	-0.1281	96
Punjab	Rajanpur	0.8047	0.1953	1.1424	-0.1424	97
Balochistan	Washuk	0.7785	0.2215	1.1432	-0.1432	98
KPK	Batagram	0.6844	0.3156	1.1518	-0.1518	99
Balochistan	Chagai	0.8940	0.1060	1.1633	-0.1633	100
Sindh	Jacobabad	0.8141	0.1859	1.1918	-0.1918	101
Balochistan	Dera Bugti	0.8835	0.1165	1.2183	-0.2183	102
KPK	Shangla	0.7354	0.2646	1.2186	-0.2186	103
KPK	Buner	0.6587	0.3413	1.2312	-0.2312	104
Sindh	Kashmore	0.8459	0.1541	1.2379	-0.2379	105
Balochistan	Nasirabad/ Tamboo	0.8282	0.1718	1.2857	-0.2857	106
Balochistan	Kohlu	0.9095	0.0905	1.2889	-0.2889	107
Sindh	Tando Moham-mad khan	0.8766	0.1234	1.3051	-0.3051	108
Balochistan	Barkhan	0.6721	0.3279	1.3351	-0.3351	109
Balochistan	Harnai	0.9106	0.0894	1.3610	-0.3610	110
Balochistan	Jhal Magsi	0.7795	0.2205	1.3612	-0.3612	111
Balochistan	Killa Abdullah	0.8270	0.1730	1.3882	-0.3882	112
KPK	Kohistan	0.7905	0.2095	1.4511	-0.4511	113
KPK	Tor Ghar	0.7163	0.2837	1.4699	-0.4699	114

APPENDIX C

Table C.1 Pearson's correlation coefficient

Variables	Asset scores	Child Survival rate	Household's literacy Index
Asset scores	1.0000	0.4005 (0.0000) *	0.6051 (0.0000) *
Child Survival rate	0.4005 (0.0000) *	1.0000	0.2684 (0.0000) *
Household's literacy index	0.6051 (0.0000) *	0.4005 (0.0000) *	1.0000

*The P-value of Pearson correlation coefficient

Table C.2 Cox Proportional Hazards Model (1), and Model (2)

Covariates	Cox Proportional Hazard Model (1)		Cox Proportional Hazard Model (2)	
	Hazard Ratio	P-value	Hazard Ratio	P-value
Number of under-five children	0.3371	0.0000	0.3381	0.0000
Number of adults	1.1049	0.0010	1.1023	0.0020
Household's size	0.9942	0.8100	0.9440	0.0400
Household's head gender:				
Female	Reference	—	Reference	—
Male	1.0662	0.6320	1.0111	0.9410
Household's head literacy				
No	Reference	—	Reference	—
Yes	0.8612	0.0660	0.6655	0.1750
Number of rooms	0.9232	0.0430	0.7982	0.0000
Gas connection				
No	Reference	—	Reference	—
Yes	0.5878	0.0000	0.5905	0.0000
Telephone connection				
No	Reference	—	Reference	—
Yes	0.9014	0.6810	0.9170	0.7320
Drinking water facility				
No facility at home	Reference	—	Reference	—
Hand pump/Tube well	1.6599	0.0000	1.6657	0.0000
Piped water/Motorized pumping/ Mineral water/ Filtration plant/ Water tanker/Others	1.0868	0.5720	1.0901	0.5570

Table C.2 Continued

Covariates	Cox Proportional Hazard Model (1)		Cox Proportional Hazard Model (2)	
	Hazard Ratio	P-value	Hazard Ratio	P-value
Toilet facility				
No facility at home	Reference	—	Reference	—
Dry raised latrine/Dry pit latrine	1.1561	0.1570	1.1345	0.2270
Flush connected to some type of sewerage	0.9105	0.3480	0.9180	0.3870
Household's head gender* Household's head literacy	—	—	1.3165	0.3750
Household's size*Number of rooms	—	—	1.0161	0.0000
Wald χ2	377.16		378.71 (14 df)	
P-value	0.0000		0.0000	
Akaike's information criterion	43700000 (12 df)		43600000 (14 df)	

Table C.3 Cox Proportional Hazards Model (3), and Model (4)

Covariates	Cox Proportional Hazard Model (3)		Cox Proportional Hazard Model (4)	
	Hazard Ratio	P-value	Hazard Ratio	P-value
Number of under-five Children	0.3357	0.0000	0.3280	0.0000
Number of adults	1.0987	0.0000	1.0559	0.0330
Household's head gender				
Female	Reference	—	Reference	—
Male	1.0665	0.6310	1.0038	0.9800
Household's head literacy				
No	Reference	—	Reference	—
Yes	0.8613	0.0650	0.6793	0.2000
Number of rooms	0.9199	0.0300	0.8230	0.0000
Gas connection				
No	Reference	—	Reference	—
Yes	0.5850	0.0000	0.5931	0.0000
Drinking water facility				
No facility at home	Reference	—	Reference	—
Hand pump/Tube well	1.6629	0.0000	1.6693	0.0000
Piped water/Motorized pumping/ Mineral water/ Filtration plant/ Water tanker/Others	1.0857	0.5770	1.0888	0.5630

Table C.3 (Continued)				
Toilet facility				
No facility at home	Reference	—	Reference	—
Dry raised latrine/Dry pit latrine	1.1550	0.1590	1.1340	0.2290
Flush connected to some type of sewerage	0.9119	0.3550	0.9250	0.4300
Household's head gender* Household's head literacy	—	—	1.3009	0.3980
Household's size* Number of rooms	—	—	1.0114	0.0050
Wald $\chi 2$	373.19 (10 df)		381.57 (12 df)	
P-value	0.0000		0.0000	
Akaike's information criterion	43700000 (10 df)		43700000 (12 df)	

Table C.4 Complementary log-log Hazard Model (1), & Model (2)

Covariates	Complementary log-log Model (1)		Complementary log-log Model (2)	
	Hazard Ratio	P-value	Hazard Ratio	P-value
Number of under-five Children	0.2927	0.0000	0.3076	0.0000
Number of adults	1.3111	0.0000	1.2446	0.0000
Household's size	0.8501	0.0000	0.8094	0.0000
Household's head gender				
Female	Reference	—	Reference	—
Male	0.5675	0.0000	0.6033	0.0000
Household's head literacy				
No	Reference	—	Reference	—
Yes	0.8402	0.0440	0.3821	0.0010
Number of rooms	0.8339	0.0000	0.6919	0.0000
Gas connection				
No	Reference	—	Reference	—
Yes	0.5753	0.0000	0.5645	0.0000
Telephone connection				
No	Reference	—	Reference	—
Yes	0.9195	0.7490	0.9254	0.7700
Drinking water facility				
No facility at home	Reference	—	Reference	—
Hand pump/Tube well	0.8688	0.1500	1.1480	0.1690
Piped water/Motorized pumping/ Mineral water/ Filtration plant/Water tanker/Others	0.5899	0.0000	0.7604	0.0580

Table C.4 (Continued)				
Toilet facility				
No facility at home	Reference	—	Reference	—
Dry raised latrine/Dry pit latrine	0.8959	0.2870	0.9436	0.5920
Flush connected to some type of sewerage	0.6997	0.0000	0.7833	0.0130
Household's head gender* Household's head literacy	—	—	2.3837	0.0050
Household's size*Number of rooms	—	—	1.0283	0.0000
Wald χ2	5986.47 (12 df)		6411.18 (14 df)	
P-value	0.0000		0.0000	
Akaike's information criterion	11700000 (12 df)		11500000 (14 df)	

Table C.5 Complementary log-log Hazard Model (3), & Model (4)

Covariates	Complementary log-log Model (3)		Complementary log-log Model (4)	
	Hazard Ratio	P-value	Hazard Ratio	P-value
Number of under-five Children	0.2548	0.0000	0.2617	0.0000
Number of adults	1.1063	0.0000	1.0346	0.2410
Household's head gender				
Female	Reference	—	Reference	—
Male	0.5003	0.0000	0.4673	0.0000
Household's head literacy				
No	Reference	—	Reference	—
Yes	0.8574	0.0750	0.3352	0.0000
Number of rooms	0.7810	0.0000	0.6783	0.0000
Gas connection				
No	Reference	—	Reference	—
Yes	0.6050	0.0000	0.6010	0.0000
Drinking water facility				
No facility at home	Reference	—	Reference	—
Hand pump/Tube well	0.7722	0.0070	0.9173	0.3720
Piped water/Motorized pumping/ Mineral water/ Filtration plant/ Water tanker/Others	0.5324	0.0000	0.6204	0.0010
Toilet facility				
No facility at home	Reference	—	Reference	—
Dry raised latrine/Dry pit latrine	0.8383	00870	0.8638	0.1720

Table C. 5 (Continued)				
Flush connected to some type of sewerage	0.6893	0.0000	0.7534	0.0030
Household's head gender* Household's head literacy	—	—	2.8816	0.0010
Household's size* Number of rooms	—	—	1.0192	0.0000
Wald χ2	5866.77 (10 df)		6227.86 (12 df)	
P-value	0.0000		0.0000	
Akaike's information criterion	11800000 (10 df)		11700000 (12 df)	

Table C.6 District-wise Estimates of Health Indices and Inequality Measure

Health						
Province	District	Health Index (I_H)	Inequality-Adjusted Health Index (I_{iH})	% Loss due to Inequality (A_H)	Rank I_H	Rank I_{iH}
Balochistan	Quetta	0.8619	0.8522	0.0112	1	1
Punjab	Lahore	0.8361	.8210	0.0180	3	2
Sindh	Karachi	0.8253	0.8160	0.0112	5	3
Capital	Islamabad	0.8390	0.8073	0.0377	2	4
Balochistan	Barkhan	0.8320	0.7823	0.0597	4	5
Balochistan	Khuzdar	0.8072	0.7657	0.0514	7	6
Balochistan	Zhob	0.7997	0.7545	0.0565	10	7
Punjab	Rawalpindi	0.7987	0.7499	0.0611	13	8
KPK	Peshawar	0.8173	0.7383	0.0966	6	9
Balochistan	Killa Saifullah	0.7882	0.7344	0.0683	14	10
Balochistan	Nasirabad/ Tamboo	0.7807	0.7238	0.0729	15	11
Punjab	Gujranwala	0.7990	0.7169	0.1027	12	12
Balochistan	Mastung	0.8057	0.7121	0.1162	8	13
KPK	Lakki Marwat	0.7660	0.7106	0.0723	20	14
Balochistan	Gwadar	0.7518	0.7049	0.0623	30	15
Punjab	Sialkot	0.8042	0.7036	0.1252	9	16
Balochistan	Nushki	0.7702	0.7024	0.0880	18	17
KPK	Karak	0.7676	0.7007	0.0871	19	18
Balochistan	Pishin	0.7995	0.6927	0.1336	11	19
Sindh	Hyderabad	0.7573	0.6858	0.0944	26	20
Punjab	Jhelum	0.7595	0.6833	0.1004	25	21
Balochistan	Kalat	0.7204	0.6557	0.0897	48	22
Sindh	Sukkur	0.7647	0.6509	0.1487	21	23
Punjab	Gujrat	0.7615	0.6442	0.1541	23	24
KPK	Tank	0.7727	0.6352	0.1780	17	25
Balochistan	Jaffarabad	0.7563	0.6289	0.1685	27	26
Punjab	Attock	0.7444	0.6250	0.1604	33	27

Table C.6 (Continued)

Balochistan	Sibbi	0.7304	0.6132	0.1605	40	28
KPK	Haripur	0.7757	0.6130	0.2098	16	29
KPK	Mardan	0.7614	0.6019	0.2094	24	30
Punjab	Faisalabad	0.7455	0.5983	0.1974	31	31
KPK	Bannu	0.7556	0.5940	0.2139	29	32
KPK	Malakand	0.7433	0.5894	0.2071	34	33
Sindh	Larkana	0.7204	0.5892	0.1821	47	34
Balochistan	Ziarat	0.7627	0.5818	0.2372	22	35
Punjab	Sheikhupura	0.7451	0.5808	0.2205	32	36
KPK	D. I. Khan	0.7430	0.5803	0.2190	35	37
Sindh	Khairpur	0.7019	0.5773	0.1775	62	38
Punjab	D. G. Khan	0.7414	0.5748	0.2248	36	39
Sindh	Ghotki	0.7108	0.5725	0.1945	55	40
Balochistan	Washuk	0.6689	0.5633	0.1579	82	41
Punjab	Okara	0.7268	0.5607	0.2284	43	42
Punjab	Chakwal	0.7371	0.5558	0.2460	38	43
Sindh	Kashmore	0.6871	0.5528	0.1954	68	44
Punjab	Multan	0.7276	0.5505	0.2435	42	45
Sindh	Shaheed Benazir Abad	0.6549	0.5485	0.1624	88	46
Balochistan	Loralai	0.6241	0.5466	0.1243	102	47
Sindh	Shahdadkot	0.7220	0.5460	0.2437	46	48
Sindh	Shikarpur	0.7119	0.5454	0.2339	52	49
Balochistan	Killa Abdullah	0.7080	0.5327	0.2475	57	50
Balochistan	Kharan	0.6790	0.5216	0.2318	71	51
Balochistan	Harnai	0.6728	0.5188	0.2289	78	52
Punjab	Layyah	0.6705	0.5153	0.2314	80	53
Punjab	Hafizabad	0.7120	0.5150	0.2767	51	54
Sindh	Naushahro Feroze	0.6732	0.5117	0.2400	77	55
Sindh	Jacobabad	0.6782	0.5105	0.2472	72	56
Punjab	Lodhran	0.6864	0.5058	0.2632	69	57
KPK	Chitral	0.6738	0.5035	0.2528	76	58
Sindh	Dadu	0.7261	0.5029	0.3074	44	59
Punjab	Khanewal	0.6915	0.5026	0.2732	65	60
Punjab	T.T. Singh	0.7115	0.4984	0.2995	54	61
KPK	Swat	0.7225	0.4982	0.3105	45	62
Sindh	Tando Allah Yar	0.6557	0.4977	0.2409	87	63
KPK	Nowshera	0.7192	0.4957	0.3108	49	64
KPK	Charsadda	0.7150	0.4926	0.3110	50	65
Punjab	Mandi Bahauddin	0.7103	0.4913	0.3083	56	66
KPK	Batagram	0.7325	0.4900	0.3310	39	67
Balochistan	Jhal Magsi	0.6879	0.4848	0.2953	66	68

Table C.6 (Continued)						
KPK	Abbottabad	0.7069	0.4836	0.3159	59	69
Sindh	Sanghar	0.6382	0.4815	0.2455	97	70
Punjab	Narowal	0.7289	0.4814	0.3395	41	71
Sindh	Mirpur Khas	0.6407	0.4809	0.2494	96	72
Balochistan	Musakhel	0.6310	0.4799	0.2395	100	73
KPK	Upper Dir	0.7375	0.4781	0.3518	37	74
Punjab	Khushab	0.6774	0.4744	0.2997	73	75
Punjab	Nankana Sahib	0.7064	0.4708	0.3336	61	76
Punjab	Pakpattan	0.6879	0.4677	0.3201	67	77
Punjab	Kasur	0.6817	0.4646	0.3184	70	78
Punjab	Vehari	0.6941	0.4638	0.3317	63	79
KPK	Lower Dir	0.7073	0.4622	0.3464	58	80
Sindh	Tando Mohammad khan	0.6247	0.4581	0.2667	101	81
Punjab	Bahawalnagar	0.6616	0.4554	0.3116	86	82
Punjab	Sahiwal	0.7067	0.4544	0.3570	60	83
Sindh	Tharparkar	0.6319	0.4543	0.2811	99	84
Punjab	Bahawalpur	0.6921	0.4533	0.3450	64	85
Punjab	Sargodha	0.6759	0.4471	0.3386	74	86
Punjab	Bhakkar	0.6512	0.4468	0.3139	91	87
Balochistan	Awaran	0.6058	0.4436	0.2677	105	88
Balochistan	Dera Bugti	0.7559	0.4416	0.4158	28	89
Punjab	Mianwali	0.6625	0.4387	0.3377	85	90
Punjab	Rahim Yar Khan	0.6749	0.4169	0.3824	75	91
Punjab	Rajanpur	0.6697	0.4115	0.3855	81	92
Sindh	Jamshoro	0.6711	0.4108	0.3878	79	93
Sindh	Matiari	0.6342	0.4048	0.3617	98	94
Sindh	Badin	0.5967	0.4006	0.3287	108	95
Punjab	Jhang	0.6669	0.3922	0.4118	83	96
Punjab	Chiniot	0.6478	0.3863	0.4036	94	97
Balochistan	Lasbela	0.5372	0.3759	0.3002	111	98
Balochistan	Bolan/ Kachhi	0.6433	0.3756	0.4162	95	99
KPK	Kohat	0.7118	0.3716	0.4779	53	100
KPK	Shangla	0.6548	0.3707	0.4339	89	101
KPK	Hangu	0.6484	0.3631	0.4399	93	102
KPK	Tor Ghar	0.6541	0.3477	0.4684	90	103
Punjab	Muzaffargarh	0.6167	0.3339	0.4585	104	104
KPK	Swabi	0.6216	0.3339	0.4629	103	105
Balochistan	Kohlu	0.6003	0.3150	0.4753	107	106
Sindh	Umer Kot	0.5940	0.3141	0.4712	109	107
Sindh	Thatta	0.5202	0.3053	0.4132	112	108
KPK	Kohistan	0.6015	0.3043	0.4941	106	109

Table C.6 (Continued)						
KPK	Mansehra	0.6489	0.3024	0.5340	92	110
Balochistan	Chagai	0.5773	0.3017	0.4774	110	111
KPK	Buner	0.6650	0.2876	0.5675	84	112
Sindh	Sujawal	0.4934	0.1875	0.6201	113	113
Balochistan	Sheerani	0.3316	0.1051	0.6829	114	114

Table C.7 Inter-Regional Inclusion/Exclusion in terms of Health Index for Districts of KPK

Province	Health District	Median Health Index	Inter-regional Inclusion/Exclusion*
KPK	Chitral	0.7118	Inclusion
KPK	Upper Dir	0.8286	Inclusion
KPK	Lower Dir	0.8056	Inclusion
KPK	Swat	0.8162	Inclusion
KPK	Shangla	0.7611	Inclusion
KPK	Buner	0.7710	Inclusion
KPK	Malakand	0.8344	Inclusion
KPK	Kohistan	0.6359	Inclusion
KPK	Mansehra	0.7395	Inclusion
KPK	Batagram	0.8505	Inclusion
KPK	Abbottabad	0.7655	Inclusion
KPK	Haripur	0.8423	Inclusion
KPK	Tor Ghar	0.7379	Inclusion
KPK	Mardan	0.8650	Inclusion
KPK	Swabi	0.6876	Inclusion
KPK	Charsadda	0.7958	Inclusion
KPK	Peshawar	0.8909	Inclusion
KPK	Nowshera	0.7766	Inclusion
KPK	Kohat	0.7886	Inclusion
KPK	Hangu	0.7093	Inclusion
KPK	Karak	0.8596	Inclusion
KPK	Bannu	0.8552	Inclusion
KPK	Lakki Marwat	0.8445	Inclusion
KPK	D. I. Khan	0.8514	Inclusion
KPK	Tank	0.8705	Inclusion

*Criterion for inter-regional inclusion is, regional median>= (0.6*national overall median).

Table C.8 Inter-Regional Inclusion/Exclusion in terms of Health Index for Districts of Punjab

Province	Health District	Median Health Index	Inter-regional Inclusion/Exclusion*
Punjab	Attock	0.7947	Inclusion
Punjab	Rawalpindi	0.8260	Inclusion
Punjab	Jhelum	0.8293	Inclusion
Punjab	Chakwal	0.7991	Inclusion
Punjab	Sargodha	0.7607	Inclusion
Punjab	Bhakkar	0.7357	Inclusion
Punjab	Khushab	0.7474	Inclusion
Punjab	Mianwali	0.7219	Inclusion
Punjab	Faisalabad	0.7877	Inclusion
Punjab	Chiniot	0.7357	Inclusion
Punjab	Jhang	0.7597	Inclusion
Punjab	T.T. Singh	0.7766	Inclusion
Punjab	Gujranwala	0.8452	Inclusion
Punjab	Hafizabad	0.7862	Inclusion
Punjab	Gujrat	0.8296	Inclusion
Punjab	Mandi Bahauddin	0.7933	Inclusion
Punjab	Sialkot	0.8655	Inclusion
Punjab	Narowal	0.8345	Inclusion
Punjab	Lahore	0.8622	Inclusion
Punjab	Kasur	0.7587	Inclusion
Punjab	Sheikhupura	0.8119	Inclusion
Punjab	Nankana Sahib	0.7830	Inclusion
Punjab	Okara	0.7884	Inclusion
Punjab	Sahiwal	0.7877	Inclusion
Punjab	Pakpattan	0.7394	Inclusion
Punjab	Vehari	0.7647	Inclusion
Punjab	Multan	0.7758	Inclusion
Punjab	Lodhran	0.7384	Inclusion
Punjab	Khanewal	0.7529	Inclusion
Punjab	D. G. Khan	0.8395	Inclusion
Punjab	Rajanpur	0.7802	Inclusion
Punjab	Layyah	0.7579	Inclusion
Punjab	Muzaffargarh	0.7317	Inclusion
Punjab	Bahawalpur	0.7919	Inclusion
Punjab	Bahawalnagar	0.7309	Inclusion
Punjab	Rahim Yar Khan	0.7740	Inclusion

*Criterion for inter-regional inclusion is, regional median>= (0.6*national overall median).

Table C.9 Inter-Regional Inclusion/Exclusion in terms of Health Index for Districts of Sindh

Province	Health District	Median Health Index	Inter-regional Inclusion/Exclusion*
Sindh	Jacobabad	0.7669	Inclusion
Sindh	Kashmore	0.7731	Inclusion
Sindh	Shikarpur	0.7981	Inclusion
Sindh	Larkana	0.7881	Inclusion
Sindh	Shahdadkot	0.8219	Inclusion
Sindh	Sukkur	0.8222	Inclusion
Sindh	Ghotki	0.8018	Inclusion
Sindh	Khairpur	0.7974	Inclusion
Sindh	Naushahro Feroze	0.7637	Inclusion
Sindh	Shaheed Benazir Abad	0.7661	Inclusion
Sindh	Dadu	0.8996	Inclusion
Sindh	Jamshoro	0.7549	Inclusion
Sindh	Hyderabad	0.7805	Inclusion
Sindh	Tando Allah Yar	0.7582	Inclusion
Sindh	Tando Mohammad khan	0.7494	Inclusion
Sindh	Matiari	0.7268	Inclusion
Sindh	Badin	0.7223	Inclusion
Sindh	Thatta	0.4792	Inclusion
Sindh	Sujawal	0.4520	Exclusion
Sindh	Sanghar	0.7618	Inclusion
Sindh	Mirpur Khas	0.7419	Inclusion
Sindh	Umer Kot	0.7086	Inclusion
Sindh	Tharparkar	0.7463	Inclusion
Sindh	Karachi	0.8161	Inclusion

*Criterion for inter-regional inclusion is, regional median>= (0.6*national overall median).

Table C.10 Inter-Regional Inclusion/Exclusion in terms of Health Index for Districts of Balochistan

Province	Health District	Median Health Index	Inter-regional Inclusion/Exclusion*
Balochistan	Quetta	0.8957	Inclusion
Balochistan	Pishin	0.8909	Inclusion
Balochistan	Killa Abdullah	0.7877	Inclusion
Balochistan	Chagai	0.7033	Inclusion
Balochistan	Nushki	0.8740	Inclusion
Balochistan	Loralai	0.6279	Inclusion
Balochistan	Barkhan	0.9025	Inclusion
Balochistan	Musakhel	0.7088	Inclusion

Table C.10 (Continued)			
Balochistan	Killa Saifullah	0.8660	Inclusion
Balochistan	Zhob	0.8835	Inclusion
Balochistan	Sheerani	0.2394	Exclusion
Balochistan	Sibbi	0.8012	Inclusion
Balochistan	Harnai	0.7718	Inclusion
Balochistan	Ziarat	0.8776	Inclusion
Balochistan	Kohlu	0.7454	Inclusion
Balochistan	Dera Bugti	0.9046	Inclusion
Balochistan	Bolan/ Kachhi	0.7551	Inclusion
Balochistan	Jaffarabad	0.8408	Inclusion
Balochistan	Nasirabad/ Tamboo	0.8364	Inclusion
Balochistan	Jhal Magsi	0.8019	Inclusion
Balochistan	Kalat	0.8380	Inclusion
Balochistan	Mastung	0.8791	Inclusion
Balochistan	Khuzdar	0.9017	Inclusion
Balochistan	Awaran	0.7286	Inclusion
Balochistan	Kharan	0.7681	Inclusion
Balochistan	Washuk	0.7789	Inclusion
Balochistan	Lasbela	0.6040	Inclusion
Balochistan	Gwadar	0.8625	Inclusion

*Criterion for inter-regional inclusion is, regional median>= (0.6*national overall median).

Table C.11 National and Provincial Estimates of Index Incidence of Deprived and Inclusion Coefficient for Health

Health		ID Regional	IC Regional	ID Mainstream	IC Mainstream
Capital	Islamabad	0.0589	0.9411	0.0401	0.9599
Pakistan	Overall	—	—	0.3406	0.6594
	Urban	0.0999	0.9001	0.0847	0.9153
	Rural	0.4706	0.5294	0.4906	0.5094
KPK	Overall	0.3719	0.6281	0.3645	0.6355
	Urban	0.1511	0.8489	0.1188	0.8812
	Rural	0.4189	0.5811	0.4204	0.5796
Punjab	Overall	0.3350	0.6650	0.3333	0.6667
	Urban	0.1200	0.8800	0.0979	0.9021
	Rural	0.4294	0.5706	0.4513	0.5487
Sindh	Overall	0.3393	0.6607	0.3416	0.6584
	Urban	0.0670	0.9330	0.0621	0.9379
	Rural	0.6560	0.3440	0.6752	0.3248
Balochistan	Overall	0.3767	0.6233	0.3647	0.6353
	Urban	0.1224	0.8776	0.0848	0.9152
	Rural	0.4700	0.5300	0.4694	0.5306

Table C.12 District-Wise Estimates of Incidence of Deprived and Inclusion Coefficient for Health

Health		Incidence of Deprived (ID) & Inclusion Coefficient (IC)				
Province	District	ID Regional	IC Regional	ID Main-stream	IC Main-stream	Rank IC Main-stream
Balochistan	Quetta	0.0200	0.9800	0.0157	0.9843	1
Sindh	Karachi	0.0214	0.9786	0.0175	0.9825	2
Punjab	Lahore	0.0456	0.9544	0.0360	0.9640	3
Capital	Islamabad	0.0589	0.9411	0.0401	0.9599	4
Balochistan	Killa Saifullah	0.1483	0.8517	0.1065	0.8935	5
Punjab	Rawalpindi	0.1293	0.8707	0.1185	0.8815	6
Punjab	Sialkot	0.1704	0.8296	0.1546	0.8454	7
Punjab	Gujranwala	0.1730	0.8270	0.1576	0.8424	8
Balochistan	Barkhan	0.2433	0.7567	0.1677	0.8323	9
KPK	Peshawar	0.2095	0.7905	0.1744	0.8256	10
Balochistan	Nushki	0.3188	0.6812	0.1836	0.8164	11
Balochistan	Pishin	0.2699	0.7301	0.2051	0.7949	12
Sindh	Hyderabad	0.2011	0.7989	0.2088	0.7912	13
KPK	Haripur	0.2509	0.7491	0.2256	0.7744	14
Balochistan	Mastung	0.3057	0.6943	0.2291	0.7709	15
Balochistan	Zhob	0.2522	0.7478	0.2315	0.7685	16
Punjab	Attock	0.2322	0.7678	0.2322	0.7678	17
Punjab	Gujrat	0.2553	0.7447	0.2381	0.7619	18
Punjab	Faisalabad	0.2319	0.7681	0.2401	0.7599	19
Punjab	Chakwal	0.2501	0.7499	0.2447	0.7553	20
Sindh	Sukkur	0.2560	0.7440	0.2534	0.7466	21
Balochistan	Khuzdar	0.3666	0.6334	0.2590	0.7410	22
Balochistan	Gwadar	0.3596	0.6404	0.2600	0.7400	23
Punjab	Jhelum	0.2754	0.7246	0.2619	0.7381	24
Punjab	Sheikhupura	0.2821	0.7179	0.2622	0.7378	25
KPK	Tank	0.3182	0.6818	0.2738	0.7262	26
KPK	Karak	0.3032	0.6968	0.2784	0.7216	27
KPK	Lakki Marwat	0.3317	0.6683	0.2799	0.7201	28
KPK	Malakand	0.3191	0.6809	0.2827	0.7173	29
Punjab	Multan	0.2729	0.7271	0.2863	0.7137	30
KPK	Mardan	0.3422	0.6578	0.2927	0.7073	31
KPK	Bannu	0.3523	0.6477	0.2970	0.7030	32
KPK	Nowshera	0.2881	0.7119	0.2978	0.7022	33
Balochistan	Nasirabad/ Tam-boo	0.3128	0.6872	0.3000	0.7000	34
Punjab	Okara	0.3011	0.6989	0.3098	0.6902	35
Balochistan	Dera Bugti	0.3521	0.6479	0.3220	0.6780	36
KPK	Abbottabad	0.3089	0.6911	0.3375	0.6625	37
KPK	Upper Dir	0.3647	0.6353	0.3439	0.6561	38

Table C.12 (Continued)

Balochistan	Jaffarabad	0.3792	0.6208	0.3464	0.6536	39
Balochistan	Ziarat	0.3723	0.6277	0.3492	0.6508	40
KPK	Kohat	0.3552	0.6448	0.3552	0.6448	41
Balochistan	Sibbi	0.3585	0.6415	0.3585	0.6415	42
Sindh	Larkana	0.3569	0.6431	0.3594	0.6406	43
KPK	Batagram	0.4067	0.5933	0.3598	0.6402	44
KPK	Chitral	0.2962	0.7038	0.3610	0.6390	45
KPK	Swat	0.3780	0.6220	0.3614	0.6386	46
Punjab	Nankana Sahib	0.3581	0.6419	0.3621	0.6379	47
Punjab	T.T. Singh	0.3535	0.6465	0.3637	0.6363	48
KPK	D. I. Khan	0.3987	0.6013	0.3682	0.6318	49
KPK	Lower Dir	0.3856	0.6144	0.3688	0.6312	50
Punjab	Narowal	0.4059	0.5941	0.3693	0.6307	51
Punjab	Hafizabad	0.3719	0.6281	0.3743	0.6257	52
Punjab	D. G. Khan	0.4073	0.5927	0.3800	0.6200	53
Punjab	Khanewal	0.3587	0.6413	0.3885	0.6115	54
Punjab	Sahiwal	0.3845	0.6155	0.3917	0.6083	55
Punjab	Vehari	0.3648	0.6352	0.3920	0.6080	56
Balochistan	Killa Abdullah	0.3954	0.6046	0.3989	0.6011	57
Balochistan	Kharan	0.3901	0.6099	0.3998	0.6002	58
Punjab	Pakpattan	0.3295	0.6705	0.4028	0.5972	59
Punjab	Lodhran	0.3560	0.6440	0.4031	0.5969	60
Punjab	Mandi Bahauddin	0.4043	0.5957	0.4043	0.5957	61
KPK	Charsadda	0.4119	0.5881	0.4119	0.5881	62
Balochistan	Kalat	0.4854	0.5146	0.4283	0.5717	63
Sindh	Shahdadkot	0.4507	0.5493	0.4407	0.5593	64
Punjab	Bahawalpur	0.4590	0.5410	0.4590	0.5410	65
Sindh	Dadu	0.4904	0.5096	0.4592	0.5408	66
Punjab	Khushab	0.4218	0.5782	0.4643	0.5357	67
Sindh	Ghotki	0.4674	0.5326	0.4658	0.5342	68
Sindh	Shikarpur	0.4675	0.5325	0.4675	0.5325	69
Sindh	Naushahro Feroze	0.4716	0.5284	0.4812	0.5188	70
Sindh	Jamshoro	0.4458	0.5542	0.4846	0.5154	71
Punjab	Kasur	0.4533	0.5467	0.4851	0.5149	72
Punjab	Mianwali	0.4156	0.5844	0.4958	0.5042	73
Punjab	Sargodha	0.4725	0.5275	0.4970	0.5030	74
Punjab	Rahim Yar Khan	0.4994	0.5006	0.5109	0.4891	75
KPK	Buner	0.4973	0.5027	0.5111	0.4889	76
KPK	Tor Ghar	0.4621	0.5379	0.5136	0.4864	77
KPK	Hangu	0.4416	0.5584	0.5161	0.4839	78
Sindh	Kashmore	0.5147	0.4853	0.5168	0.4832	79
KPK	Mansehra	0.4870	0.5130	0.5247	0.4754	80

Table C.12 (Continued)						
Punjab	Jhang	0.4945	0.5055	0.5268	0.4732	81
Sindh	Khairpur	0.5273	0.4727	0.5273	0.4727	82
Punjab	Bahawalnagar	0.4694	0.5306	0.5274	0.4726	83
Sindh	Jacobabad	0.5199	0.4801	0.5277	0.4723	84
Punjab	Rajanpur	0.5310	0.4690	0.5391	0.4609	85
Punjab	Chiniot	0.4996	0.5004	0.5425	0.4575	86
Punjab	Layyah	0.5126	0.4874	0.5445	0.4555	87
Balochistan	Jhal Magsi	0.5518	0.4482	0.5518	0.4482	88
Sindh	Tando Allah Yar	0.5287	0.4713	0.5586	0.4414	89
KPK	Shangla	0.5330	0.4670	0.5666	0.4334	90
KPK	Swabi	0.4418	0.5582	0.5721	0.4279	91
Balochistan	Harnai	0.5727	0.4273	0.5727	0.4273	92
Sindh	Matiari	0.5665	0.4335	0.5844	0.4156	93
Balochistan	Washuk	0.5764	0.4236	0.5871	0.4129	94
Sindh	Shaheed Benazir Abad	0.5851	0.4149	0.5942	0.4058	95
Balochistan	Loralai	0.3386	0.6614	0.5970	0.4030	96
Sindh	Mirpur Khas	0.5598	0.4402	0.6214	0.3786	97
Punjab	Bhakkar	0.5451	0.4549	0.6220	0.3780	98
Sindh	Sanghar	0.6115	0.3885	0.6267	0.3733	99
Balochistan	Bolan/ Kachhi	0.6025	0.3975	0.6368	0.3632	100
Balochistan	Musakhel	0.6131	0.3869	0.6580	0.3420	101
Sindh	Tharparkar	0.6193	0.3807	0.6822	0.3178	102
Punjab	Muzaffargarh	0.6457	0.3543	0.6859	0.3141	103
Balochistan	Awaran	0.6084	0.3916	0.6923	0.3077	104
Sindh	Tando Moham-mad khan	0.6825	0.3175	0.7048	0.2952	105
Balochistan	Kohlu	0.6796	0.3204	0.7199	0.2801	106
KPK	Kohistan	0.5163	0.4837	0.7203	0.2797	107
Sindh	Umer Kot	0.6464	0.3536	0.7211	0.2789	108
Sindh	Badin	0.7377	0.2623	0.7690	0.2310	109
Balochistan	Chagai	0.7759	0.2241	0.8196	0.1804	110
Balochistan	Lasbela	0.7305	0.2695	0.8666	0.1334	111
Sindh	Thatta	0.6378	0.3622	0.9981	0.0019	112
Sindh	Sujawal	0.8345	0.1655	1.0072	-0.0072	113
Balochistan	Sheerani	0.6779	0.3221	1.4621	-0.4621	114

APPENDIX D

Table D.1 District-wise Estimates of Human Development Indices and Inequality Measures

Human Development		HDI	IHDI	A_{HD}	C_{HI}	Rank HDI	Rank IHDI	Change in rank due to inequality
Province	District							
Capital	Islamabad	0.7500	0.7016	0.0646	0.0541	1	1	0
Sindh	Karachi	0.7454	0.6989	0.0624	0.0535	2	2	0
Punjab	Lahore	0.7364	0.6884	0.0653	0.0558	3	3	0
Punjab	Rawalpindi	0.7119	0.6476	0.0903	0.0764	4	4	0
Punjab	Sialkot	0.6780	0.5979	0.1181	0.0958	5	5	0
Punjab	Jhelum	0.6532	0.5751	0.1196	0.0979	6	6	0
Punjab	Gujranwala	0.6470	0.5561	0.1404	0.1191	7	7	0
Balochistan	Quetta	0.6339	0.5545	0.1253	0.0910	9	8	1
Punjab	Gujrat	0.6444	0.5527	0.1424	0.1228	8	9	-1
KPK	Haripur	0.6320	0.5322	0.1579	0.1373	10	10	0
KPK	Peshawar	0.6250	0.5212	0.1660	0.1454	11	11	0
Punjab	Attock	0.6114	0.5180	0.1526	0.1338	12	12	0
Punjab	Chakwal	0.6067	0.4904	0.1917	0.1607	13	13	0
Punjab	Faisalabad	0.6054	0.4849	0.1990	0.1764	14	14	0
KPK	Karak	0.5634	0.4762	0.1547	0.1130	19	15	4
Punjab	Sheikhupura	0.5837	0.4607	0.2107	0.1792	17	16	1
Sindh	Hyderabad	0.5881	0.4593	0.2191	0.1905	16	17	-1
KPK	Malakand	0.5597	0.4522	0.1921	0.1634	20	18	2
KPK	Abbottabad	0.5902	0.4504	0.2368	0.2193	15	19	-4
KPK	Lakki Mar-wat	0.5369	0.4422	0.1764	0.1278	30	20	10
KPK	Bannu	0.5439	0.4323	0.2052	0.1706	26	21	5
KPK	Chitral	0.5390	0.4320	0.1986	0.1790	28	22	6
Punjab	Mandi Bahauddin	0.5594	0.4283	0.2343	0.2002	21	23	-2
Punjab	Narowal	0.5679	0.4253	0.2512	0.1983	18	24	-6
KPK	Nowshera	0.5542	0.4233	0.2362	0.2140	23	25	-2
Balochistan	Gwadar	0.5207	0.4224	0.1887	0.1235	38	26	12
KPK	Mardan	0.5393	0.4182	0.2245	0.1898	27	27	0
Sindh	Sukkur	0.5477	0.4152	0.2418	0.1929	25	28	-3
Punjab	T.T. Singh	0.5575	0.4137	0.2578	0.2236	22	29	-7
Balochistan	Pishin	0.5139	0.3975	0.2266	0.1635	41	30	11
Balochistan	Mastung	0.5355	0.3969	0.2589	0.1822	32	31	1
Punjab	Hafizabad	0.5329	0.3956	0.2577	0.2234	34	32	2

Table D.1 (Continued)

Punjab	Nankana Sahib	0.5516	0.3942	0.2853	0.2462	24	33	-9
KPK	Lower Dir	0.5224	0.3934	0.2470	0.2105	37	34	3
Punjab	Multan	0.5378	0.3890	0.2766	0.2396	29	35	-6
Punjab	Layyah	0.5095	0.3884	0.2375	0.1865	45	36	9
Balochistan	Kill Saiful-lah	0.4764	0.3788	0.2049	0.1163	59	37	22
Punjab	Kasur	0.5162	0.3787	0.2664	0.2257	40	38	2
Sindh	Dadu	0.5339	0.3786	0.2908	0.2239	33	39	-6
KPK	Swat	0.5126	0.3770	0.2646	0.2310	43	40	3
Punjab	Sargodha	0.5272	0.3749	0.2889	0.2566	35	41	-6
Punjab	Okara	0.5123	0.3738	0.2704	0.2213	44	42	2
Balochistan	Kalat	0.4897	0.3733	0.2376	0.1729	50	43	7
Sindh	Naushahro Feroze	0.5130	0.3726	0.2737	0.1949	42	44	-2
Punjab	Khushab	0.5067	0.3722	0.2654	0.2224	46	45	1
Balochistan	Nushki	0.4841	0.3673	0.2413	0.1594	53	46	7
KPK	Charsadda	0.5015	0.3630	0.2763	0.2401	47	47	0
Punjab	Sahiwal	0.5256	0.3614	0.3124	0.2739	36	48	-12
KPK	Mansehra	0.5357	0.3594	0.3291	0.2899	31	49	-18
KPK	Tank	0.4840	0.3566	0.2632	0.1948	55	50	5
Balochistan	Khuzdar	0.4840	0.3545	0.2675	0.1670	54	51	3
Punjab	Mianwali	0.4914	0.3513	0.2850	0.2399	49	52	-3
Sindh	Larkana	0.4935	0.3503	0.2902	0.2144	48	53	-5
KPK	Kohat	0.5202	0.3439	0.3390	0.3010	39	54	-15
Punjab	Khanewal	0.4879	0.3401	0.3029	0.2398	51	55	-4
KPK	D. I. Khan	0.4788	0.3357	0.2988	0.2355	57	56	1
KPK	Batagram	0.4752	0.3328	0.2997	0.2448	61	57	4
KPK	Swabi	0.4852	0.3324	0.3149	0.2860	52	58	-6
Punjab	Bahawalna-gar	0.4740	0.3278	0.3085	0.2647	62	59	3
Punjab	Pakpattan	0.4753	0.3277	0.3105	0.2557	60	60	0
Balochistan	Sibbi	0.4803	0.3251	0.3230	0.2658	56	61	-5
Punjab	Bhakkar	0.4608	0.3226	0.2999	0.2401	68	62	6
Punjab	Lodhran	0.4708	0.3217	0.3167	0.2571	63	63	0
KPK	Hangu	0.4650	0.3180	0.3162	0.2784	64	64	0
Sindh	Shaheed Benazir Abad	0.4476	0.3178	0.2899	0.2220	76	65	11
Balochistan	Zhob	0.4550	0.3139	0.3101	0.1985	71	66	5
Punjab	Jhang	0.4777	0.3105	0.3501	0.2951	58	67	-9
Punjab	D. G. Khan	0.4636	0.3081	0.3354	0.2655	66	68	-2
Sindh	Khairpur	0.4480	0.3071	0.3144	0.2249	75	69	6
Punjab	Vehari	0.4607	0.3020	0.3446	0.2833	69	70	-1

Table D.1 (Continued)

Punjab	Chiniot	0.4605	0.2996	0.3495	0.3024	70	71	-1
Punjab	Bahawalpur	0.4640	0.2977	0.3583	0.3066	65	72	-7
KPK	Upper Dir	0.4483	0.2932	0.3460	0.2698	73	73	0
Balochistan	Ziarat	0.4483	0.2923	0.3479	0.2613	74	74	0
Sindh	Jamshoro	0.4632	0.2923	0.3690	0.3227	67	75	-8
Balochistan	Loralai	0.3990	0.2893	0.2748	0.1870	92	76	16
Punjab	Rahim Yar Khan	0.4538	0.2833	0.3757	0.3228	72	77	-5
Balochistan	Kharan	0.4278	0.2813	0.3426	0.2774	79	78	1
Sindh	Ghotki	0.4282	0.2776	0.3517	0.2576	78	79	-1
Sindh	Sanghar	0.4150	0.2715	0.3458	0.2648	86	80	6
KPK	Shangla	0.4184	0.2652	0.3662	0.3080	82	81	1
Sindh	Mirpur Khas	0.4260	0.2636	0.3810	0.3155	80	82	-2
Sindh	Shikarpur	0.4300	0.2608	0.3936	0.2884	77	83	-6
Balochistan	Jaffarabad	0.4170	0.2601	0.3761	0.2494	84	84	0
Balochistan	Barkhan	0.4145	0.2577	0.3784	0.1956	87	85	2
Balochistan	Nasirabad/ Tamboo	0.4125	0.2574	0.3761	0.2295	88	86	2
Sindh	Matiari	0.4173	0.2515	0.3972	0.3217	83	87	-4
Sindh	Tando Allah Yar	0.4058	0.2487	0.3871	0.3017	90	88	2
KPK	Buner	0.4240	0.2456	0.4208	0.3557	81	89	-8
Balochistan	Musakhel	0.3859	0.2447	0.3659	0.2755	99	90	9
Punjab	Rajanpur	0.4059	0.2430	0.4012	0.3224	89	91	-2
Balochistan	Awaran	0.3874	0.2396	0.3815	0.2533	96	92	4
Sindh	Shahdadkot	0.4167	0.2383	0.4281	0.3258	85	93	-8
Balochistan	Killa Abdul-lah	0.3861	0.2369	0.3864	0.2726	98	94	4
Balochistan	Bolan/ Ka-chhi	0.4053	0.2359	0.4179	0.3388	91	95	-4
Sindh	Kashmore	0.3857	0.2319	0.3988	0.2819	100	96	4
Sindh	Jacobabad	0.3928	0.2233	0.4315	0.3380	94	97	-3
Punjab	Muzaffar-garh	0.3971	0.2214	0.4425	0.3653	93	98	-5
KPK	Tor Ghar	0.3712	0.2184	0.4116	0.3121	102	99	3
Sindh	Tharparkar	0.3698	0.2180	0.4104	0.2732	103	100	3
Balochistan	Lasbela	0.3890	0.2168	0.4428	0.4052	95	101	-6
Balochistan	Washuk	0.3673	0.2156	0.4130	0.2653	104	102	2
Sindh	Badin	0.3748	0.2105	0.4385	0.3525	101	103	-2
Balochistan	Harnai	0.3605	0.2055	0.4298	0.3037	107	104	3
Sindh	Thatta	0.3641	0.2010	0.4480	0.3952	105	105	0
Balochistan	Jhal Magsi	0.3635	0.2005	0.4484	0.3068	106	106	0
Sindh	Tando Mo-hammad khan	0.3555	0.1916	0.4609	0.3568	109	107	2
Balochistan	Dera Bugti	0.3873	0.1877	0.5155	0.3896	97	108	-11

Table D.1 (Continued)

Sindh	Umer Kot	0.3582	0.1858	0.4811	0.3839	108	109	-1
Balochistan	Kohlu	0.3330	0.1791	0.4620	0.3407	110	110	0
KPK	Kohistan	0.3255	0.1742	0.4649	0.3495	113	111	2
Balochistan	Chagai	0.3314	0.1699	0.4874	0.3823	111	112	-1
Sindh	Sujawal	0.3298	0.1519	0.5395	0.4655	112	113	-1
Balochistan	Sheerani	0.2803	0.1389	0.5047	0.4415	114	114	0

Table D.2 Inter-Regional Inclusion/Exclusion in terms of IHDI for Districts of KPK

Human Development		Median IHDIi	Inter-regional Inclusion/Exclusion*
Province	District		
KPK	Haripur	0.6292	Inclusion
KPK	Peshawar	0.6058	Inclusion
KPK	Abbottabad	0.5946	Inclusion
KPK	Nowshera	0.5290	Inclusion
KPK	Karak	0.5253	Inclusion
KPK	Chitral	0.5150	Inclusion
KPK	Mansehra	0.5116	Inclusion
KPK	Malakand	0.5075	Inclusion
KPK	Bannu	0.5057	Inclusion
KPK	Mardan	0.4971	Inclusion
KPK	Kohat	0.4864	Inclusion
KPK	Lakki Marwat	0.4862	Inclusion
KPK	Lower Dir	0.4743	Inclusion
KPK	Swabi	0.4497	Inclusion
KPK	Charsadda	0.4438	Inclusion
KPK	Swat	0.4400	Inclusion
KPK	Tank	0.4280	Inclusion
KPK	Hangu	0.4186	Inclusion
KPK	D. I. Khan	0.4006	Inclusion
KPK	Batagram	0.3971	Inclusion
KPK	Upper Dir	0.3513	Inclusion
KPK	Shangla	0.3408	Inclusion
KPK	Buner	0.3380	Inclusion
KPK	Tor Ghar	0.2628	Exclusion
KPK	Kohistan	0.1964	Exclusion

*Criterion for inter-regional inclusion is, regional median>= (0.6*national median).

Table D.3 Inter-Regional Inclusion/Exclusion in Terms of IHDI for Districts of Punjab

Human Development		Median IHDIi	Inter-regional Inclusion/Exclusion*
Province	District		
Punjab	Lahore	0.7566	Inclusion
Punjab	Rawalpindi	0.7218	Inclusion
Punjab	Sialkot	0.6718	Inclusion
Punjab	Jhelum	0.6512	Inclusion
Punjab	Gujranwala	0.6458	Inclusion
Punjab	Gujrat	0.6419	Inclusion
Punjab	Faisalabad	0.6043	Inclusion
Punjab	Chakwal	0.5902	Inclusion
Punjab	Attock	0.5819	Inclusion
Punjab	Sheikhupura	0.5544	Inclusion
Punjab	T.T. Singh	0.5386	Inclusion
Punjab	Narowal	0.5342	Inclusion
Punjab	Mandi Bahauddin	0.5264	Inclusion
Punjab	Nankana Sahib	0.5223	Inclusion
Punjab	Hafizabad	0.5031	Inclusion
Punjab	Multan	0.4881	Inclusion
Punjab	Sahiwal	0.4875	Inclusion
Punjab	Sargodha	0.4787	Inclusion
Punjab	Kasur	0.4733	Inclusion
Punjab	Khushab	0.4641	Inclusion
Punjab	Layyah	0.4582	Inclusion
Punjab	Okara	0.4491	Inclusion
Punjab	Mianwali	0.4348	Inclusion
Punjab	Khanewal	0.4234	Inclusion
Punjab	Bahawalnagar	0.4194	Inclusion
Punjab	Pakpattan	0.4063	Inclusion
Punjab	Lodhran	0.4026	Inclusion
Punjab	Jhang	0.3991	Inclusion
Punjab	Chiniot	0.3912	Inclusion
Punjab	Vehari	0.3880	Inclusion
Punjab	Bhakkar	0.3861	Inclusion
Punjab	Bahawalpur	0.3860	Inclusion
Punjab	Rahim Yar Khan	0.3615	Inclusion
Punjab	D. G. Khan	0.3412	Inclusion
Punjab	Rajanpur	0.2946	Exclusion
Punjab	Muzaffargarh	0.2902	Exclusion

*Criterion for inter-regional inclusion is, regional median>= (0.6*national median).

Table D.4 Inter-Regional Inclusion/Exclusion in Terms of IHDI for Districts of Sindh

Human Development		Median IHDIi	Inter-regional Inclusion/Exclusion*
Province	District		
Sindh	Karachi	0.7688	Inclusion
Sindh	Hyderabad	0.5894	Inclusion
Sindh	Sukkur	0.5092	Inclusion
Sindh	Dadu	0.4711	Inclusion
Sindh	Naushahro Feroze	0.4515	Inclusion
Sindh	Larkana	0.4177	Inclusion
Sindh	Jamshoro	0.3939	Inclusion
Sindh	Shaheed Benazir Abad	0.3617	Inclusion
Sindh	Khairpur	0.3547	Inclusion
Sindh	Matiari	0.3185	Inclusion
Sindh	Shikarpur	0.3044	Exclusion
Sindh	Sanghar	0.3041	Exclusion
Sindh	Ghotki	0.3025	Exclusion
Sindh	Mirpur Khas	0.2912	Exclusion
Sindh	Tando Allah Yar	0.2742	Exclusion
Sindh	Shahdadkot	0.2730	Exclusion
Sindh	Tharparkar	0.2511	Exclusion
Sindh	Thatta	0.2462	Exclusion
Sindh	Jacobabad	0.2393	Exclusion
Sindh	Badin	0.2316	Exclusion
Sindh	Kashmore	0.2283	Exclusion
Sindh	Umer Kot	0.2257	Exclusion
Sindh	Sujawal	0.1901	Exclusion
Sindh	Tando Mohammad khan	0.1803	Exclusion

*Criterion for inter-regional inclusion is, regional median>= (0.6*national median).

Table D.5 Inter-Regional Inclusion/Exclusion in Terms of IHDI for Districts of Balochistan

Human Development		Median IHDIi	Inter-regional Inclusion/Exclusion*
Province	District		
Balochistan	Quetta	0.5990	Inclusion
Balochistan	Gwadar	0.4675	Inclusion
Balochistan	Pishin	0.4521	Inclusion
Balochistan	Mastung	0.4467	Inclusion
Balochistan	Killa Saifullah	0.4334	Inclusion
Balochistan	Nushki	0.4299	Inclusion
Balochistan	Khuzdar	0.4002	Inclusion
Balochistan	Kalat	0.3971	Inclusion
Balochistan	Sibbi	0.3955	Inclusion

Table D.5 (Continued)			
Balochistan	Kharan	0.3762	Inclusion
Balochistan	Zhob	0.3325	Inclusion
Balochistan	Ziarat	0.3253	Inclusion
Balochistan	Loralai	0.3161	Inclusion
Balochistan	Jaffarabad	0.2895	Exclusion
Balochistan	Bolan/ Kachhi	0.2844	Exclusion
Balochistan	Musakhel	0.2750	Exclusion
Balochistan	Killa Abdullah	0.2635	Exclusion
Balochistan	Awaran	0.2631	Exclusion
Balochistan	Nasirabad/ Tamboo	0.2546	Exclusion
Balochistan	Barkhan	0.2448	Exclusion
Balochistan	Washuk	0.2345	Exclusion
Balochistan	Dera Bugti	0.2255	Exclusion
Balochistan	Lasbela	0.2159	Exclusion
Balochistan	Jhal Magsi	0.2096	Exclusion
Balochistan	Harnai	0.2012	Exclusion
Balochistan	Chagai	0.1989	Exclusion
Balochistan	Kohlu	0.1983	Exclusion
Balochistan	Sheerani	0.1956	Exclusion

*Criterion for inter-regional inclusion is, regional median>= (0.6*national median).

Table D.6 National and Provincial Estimates of Incidence of Deprived and Inclusion Coefficient for Human Development

Human Development		ID Regional	IC Regional	ID Mainstream	IC Mainstream
Capital	Islamabad	0.1288	0.8712	0.0643	0.9357
Pakistan	Overall	—	—	0.5185	0.4815
	Urban	0.2500	0.7500	0.1490	0.8510
	Rural	0.5410	0.4590	0.7352	0.2648
KPK	Overall	0.4431	0.5569	0.5008	0.4992
	Urban	0.2591	0.7409	0.1854	0.8146
	Rural	0.4536	0.5464	0.5725	0.4275
Punjab	Overall	0.4823	0.5177	0.4563	0.5437
	Urban	0.2298	0.7702	0.1298	0.8702
	Rural	0.5118	0.4882	0.6200	0.3800
Sindh	Overall	0.6144	0.3856	0.6128	0.3872
	Urban	0.2714	0.7286	0.1639	0.8361
	Rural	0.5584	0.4416	1.1484	-0.1484
Balochistan	Overall	0.5542	0.4458	0.8153	0.1847
	Urban	0.2543	0.7457	0.2073	0.7927
	Rural	0.5264	0.4736	1.0426	-0.0426

Table D.7 District-Wise Estimates of Incidence of Deprived and Inclusion Coefficient for Human development

Human Development		Incidence of Deprived (ID) & Inclusion Coefficient (IC)				
Province	District	ID Regional	IC Regional	ID Mainstream	IC Mainstream	Rank IC Main-stream
Capital	Islamabad	0.1288	0.8712	0.0643	0.9357	1
Punjab	Lahore	0.1525	0.8475	0.0681	0.9319	2
Sindh	Karachi	0.1605	0.8395	0.0850	0.9150	3
Punjab	Sialkot	0.1763	0.8237	0.0907	0.9093	4
Punjab	Rawalpindi	0.2032	0.7968	0.1005	0.8995	5
Punjab	Jhelum	0.2837	0.7163	0.1588	0.8412	6
Balochistan	Quetta	0.2488	0.7512	0.1627	0.8373	7
Punjab	Gujrat	0.2655	0.7345	0.1662	0.8338	8
KPK	Haripur	0.2495	0.7505	0.1699	0.8301	9
Punjab	Gujranwala	0.3044	0.6956	0.1888	0.8112	10
Punjab	Chakwal	0.2984	0.7016	0.2177	0.7823	11
Punjab	Attock	0.2786	0.7214	0.2231	0.7769	12
KPK	Karak	0.2723	0.7277	0.2534	0.7466	13
Punjab	Sheikhupura	0.3075	0.6925	0.2741	0.7259	14
KPK	Chitral	0.2844	0.7156	0.2752	0.7248	15
KPK	Peshawar	0.3769	0.6231	0.2797	0.7203	16
KPK	Malakand	0.2592	0.7408	0.2801	0.7199	17
Punjab	Faisalabad	0.4009	0.5991	0.2920	0.7080	18
Punjab	Narowal	0.3254	0.6746	0.2942	0.7058	19
Punjab	Mandi Bahauddin	0.3167	0.6833	0.3097	0.6903	20
KPK	Lakki Marwat	0.2679	0.7321	0.3126	0.6874	21
KPK	Bannu	0.3271	0.6729	0.3271	0.6729	22
KPK	Nowshera	0.3478	0.6522	0.3302	0.6698	23
KPK	Lower Dir	0.3180	0.6820	0.3664	0.6336	24
Balochistan	Gwadar	0.2664	0.7336	0.3690	0.6310	25
KPK	Abbottabad	0.4576	0.5424	0.3883	0.6117	26
KPK	Mansehra	0.4091	0.5909	0.4091	0.5909	27
Punjab	T.T. Singh	0.4431	0.5569	0.4091	0.5909	28
Balochistan	Mastung	0.3640	0.6360	0.4233	0.5767	29
Balochistan	Killa Saifullah	0.3210	0.6790	0.4430	0.5570	30
KPK	Mardan	0.4312	0.5688	0.4511	0.5489	31
Punjab	Nankana Sahib	0.4711	0.5289	0.4538	0.5462	32
Sindh	Hyderabad	0.4952	0.5048	0.4549	0.5451	33
Balochistan	Pishin	0.3609	0.6391	0.4602	0.5398	34
Sindh	Sukkur	0.4622	0.5378	0.4622	0.5378	35
Punjab	Kasur	0.3952	0.6048	0.4661	0.5339	36
Punjab	Hafizabad	0.4657	0.5343	0.4777	0.5223	37

Table D.7 (Continued)						
Punjab	Khushab	0.4298	0.5702	0.4906	0.5094	38
Punjab	Layyah	0.3813	0.6187	0.4910	0.5090	39
Punjab	Sargodha	0.4520	0.5480	0.4928	0.5072	40
KPK	Swat	0.3609	0.6391	0.4942	0.5058	41
Punjab	Mianwali	0.4111	0.5889	0.5161	0.4839	42
Sindh	Naushahro Feroze	0.4083	0.5917	0.5303	0.4697	43
KPK	Kohat	0.5035	0.4965	0.5389	0.4611	44
Punjab	Multan	0.4989	0.5011	0.5469	0.4531	45
Balochistan	Nushki	0.3754	0.6246	0.5472	0.4528	46
Punjab	Sahiwal	0.5297	0.4703	0.5598	0.4402	47
Sindh	Dadu	0.4976	0.5024	0.5783	0.4217	48
KPK	Charsadda	0.4672	0.5328	0.5787	0.4213	49
Punjab	Okara	0.4620	0.5380	0.5788	0.4212	50
KPK	Swabi	0.5072	0.4928	0.5874	0.4126	51
KPK	Tank	0.4526	0.5474	0.5884	0.4116	52
Punjab	Khanewal	0.4472	0.5528	0.5904	0.4096	53
KPK	Hangu	0.4645	0.5355	0.5906	0.4094	54
Sindh	Larkana	0.4944	0.5056	0.6468	0.3532	55
Balochistan	Kalat	0.3648	0.6352	0.6493	0.3507	56
Punjab	Pakpattan	0.4762	0.5238	0.6610	0.3390	57
Balochistan	Khuzdar	0.4758	0.5242	0.6686	0.3314	58
Punjab	Bahawalnagar	0.5270	0.4730	0.6818	0.3182	59
KPK	Batagram	0.4132	0.5868	0.6855	0.3145	60
KPK	D. I. Khan	0.4587	0.5413	0.6924	0.3076	61
Punjab	Lodhran	0.5348	0.4652	0.6956	0.3044	62
Punjab	Bhakkar	0.4700	0.5300	0.7050	0.2950	63
Punjab	Jhang	0.4959	0.5041	0.7149	0.2851	64
Punjab	Vehari	0.5251	0.4749	0.7180	0.2820	65
Sindh	Shaheed Benazir Abad	0.5051	0.4949	0.7691	0.2309	66
Sindh	Jamshoro	0.5762	0.4238	0.7702	0.2298	67
Punjab	Chiniot	0.5722	0.4278	0.7751	0.2249	68
KPK	Upper Dir	0.4139	0.5861	0.7874	0.2126	69
Punjab	Bahawalpur	0.6234	0.3766	0.8118	0.1882	70
Sindh	Khairpur	0.4797	0.5203	0.8216	0.1784	71
Balochistan	Sibbi	0.7484	0.2516	0.8324	0.1676	72
Punjab	Rahim Yar Khan	0.5812	0.4188	0.8390	0.1610	73
Balochistan	Kharan	0.6457	0.3543	0.8402	0.1598	74
KPK	Shangla	0.5146	0.4854	0.8684	0.1316	75
Punjab	D. G. Khan	0.5224	0.4776	0.8688	0.1312	76
KPK	Buner	0.4853	0.5147	0.8944	0.1056	77
Balochistan	Zhob	0.4623	0.5377	0.9004	0.0996	78
Balochistan	Ziarat	0.4176	0.5824	0.9226	0.0774	79
Balochistan	Loralai	0.4784	0.5216	0.9596	0.0404	80
Sindh	Matiari	0.6243	0.3757	0.9719	0.0281	81

Table D.7 (Continued)

Sindh	Shikarpur	0.5987	0.4013	1.0064	-0.0064	82
Sindh	Sanghar	0.5487	0.4513	1.0195	-0.0195	83
Sindh	Ghotki	0.4458	0.5542	1.0247	-0.0247	84
Punjab	Rajanpur	0.5825	0.4175	1.0391	-0.0391	85
Punjab	Muzaffargarh	0.6087	0.3913	1.0462	-0.0462	86
Sindh	Mirpur Khas	0.5636	0.4364	1.0478	-0.0478	87
Balochistan	Bolan/ Kachhi	0.5771	0.4229	1.0566	-0.0566	88
Balochistan	Jaffarabad	0.5158	0.4842	1.0616	-0.0616	89
Balochistan	Musakhel	0.5860	0.4140	1.0722	-0.0722	90
Balochistan	Killa Abdullah	0.4984	0.5016	1.1215	-0.1215	91
Sindh	Shahdadkot	0.5131	0.4869	1.1273	-0.1273	92
Sindh	Tando Allah Yar	0.5160	0.4840	1.1430	-0.1430	93
Sindh	Thatta	0.6563	0.3437	1.1508	-0.1508	94
KPK	Tor Ghar	0.3442	0.6558	1.1718	-0.1718	95
Balochistan	Awaran	0.3650	0.6350	1.1729	-0.1729	96
Balochistan	Lasbela	0.6329	0.3671	1.1958	-0.1958	97
Sindh	Jacobabad	0.6065	0.3935	1.2224	-0.2224	98
Balochistan	Barkhan	0.2864	0.7136	1.2266	-0.2266	99
Balochistan	Nasirabad/ Tamboo	0.3944	0.6056	1.2515	-0.2515	100
Balochistan	Dera Bugti	0.5350	0.4650	1.2535	-0.2535	101
Sindh	Badin	0.5596	0.4404	1.2559	-0.2559	102
Sindh	Kashmore	0.4332	0.5668	1.2562	-0.2562	103
Sindh	Tharparkar	0.5075	0.4925	1.2610	-0.2610	104
Balochistan	Washuk	0.5413	0.4587	1.2752	-0.2752	105
Sindh	Umer Kot	0.5471	0.4529	1.2789	-0.2789	106
Balochistan	Harnai	0.3567	0.6433	1.3054	-0.3054	107
Balochistan	Chagai	0.4879	0.5121	1.3871	-0.3871	108
Balochistan	Jhal Magsi	0.4032	0.5968	1.3927	-0.3927	109
Balochistan	Kohlu	0.3670	0.6330	1.3936	-0.3936	110
Sindh	Tando Mohammad khan	0.4038	0.5962	1.4040	-0.4040	111
Sindh	Sujawal	0.5807	0.4193	1.4041	-0.4041	112
KPK	Kohistan	0.3045	0.6955	1.4440	-0.4440	113
Balochistan	Sheerani	0.6419	0.3581	1.4470	-0.4470	114

APPENDIX E

Table E.1 Correlation Matrix of Inclusive Development's Indicators and Determinants

	HDI	Inequality coefficient	IC main-stream	IC regional	Forest density
HDI	1				
Inequality coefficient	-0.9374	1			
IC-mainstream	0.9481	-0.9412	1		
IC-regional	0.6391	-0.7051	0.6001	1	
Forest density	0.0687	-0.0559	0.0929	-0.0531	1
Population density	0.5962	-0.5039	0.4599	0.4016	-0.0128
Urbanization	0.4784	-0.3913	0.3109	0.1396	-0.1338
Sex ratio	-0.4584	0.3822	-0.5157	-0.2749	-0.153
Primary Schools	-0.5068	0.4251	-0.503	-0.2616	0.3198
Middle Schools	-0.1429	0.0235	-0.0494	0.0905	0.2102
High Schools	0.0868	-0.1593	0.1437	0.1914	0.3483
Colleges	0.3684	-0.4022	0.4457	0.3448	0.3514
Schools' ST ratio	0.2656	-0.1812	0.3217	0.0831	0.0124
Colleges' ST ratio	-0.0075	0.0491	-0.0671	-0.163	-0.2592
Doctors	-0.0646	0.0354	-0.1206	-0.1128	0.1648
Paramedics	0.0495	-0.1167	0.0336	0.0765	0.3907
Hospitals	0.0515	-0.0984	0.0889	0.2016	0.2237
Cultivated area	-0.1395	0.0961	-0.1819	-0.0799	0.1959
Road Density	0.4318	-0.3818	0.4071	0.3721	-0.0474
Police Stations	-0.0908	0.0598	-0.1751	0.0077	0.0781

	Population Density	Urbanization	Sex ratio	Primary Schools	Middle Schools
Population density	1				
Urbanization	0.5724	1			
Sex ratio	-0.0894	0.121	1		
Primary Schools	-0.4039	-0.2547	0.3281	1	
Middle Schools	-0.3812	-0.3891	-0.0117	0.5014	1
High Schools	-0.2454	-0.2131	-0.1119	0.3946	0.791
Colleges	0.0301	-0.1789	-0.3035	-0.0117	0.343
Schools' ST ratio	0.3142	-0.0213	-0.5582	-0.4861	-0.4263
Colleges' ST ratio	0.0509	0.3357	0.0718	-0.0297	-0.3005
Doctors	-0.0342	0.2427	0.3285	0.5037	0.1479
Paramedics	-0.0023	0.0062	0.1767	0.3887	0.5591
Hospitals	-0.1046	-0.1246	-0.1516	0.2251	0.4095
Cultivated area	-0.1496	-0.0091	0.1435	0.3046	0.2584
Road Density	0.3619	0.0145	-0.3757	-0.43	-0.029
Police Stations	-0.0655	0.201	0.3386	0.3537	0.2345

Table E.1 Continued

	High Schools	Colleges	Schools' ST ratio	Colleges' ST ratio	Doctors
High Schools	1				
Colleges	0.5542	1			
Schools' ST ratio	-0.4055	0.0056	1		
Colleges' ST ratio	-0.3405	-0.5398	0.1168	1	
Doctors	0.2209	0.025	-0.4443	0.0351	1
Paramedics	0.6659	0.3056	-0.4844	-0.3197	0.3345
Hospitals	0.488	0.4124	-0.1651	-0.3938	0.2076
Cultivated area	0.2238	-0.0245	-0.3444	-0.0607	0.1359
Road Density	-0.0086	0.0789	0.2464	-0.0341	-0.2112
Police Stations	0.3061	-0.0585	-0.5439	-0.0379	0.4846
	Paramedics	**Hospitals**	**Cultivated area**	**Road density**	**Police stations**
Paramedics	1				
Hospitals	0.3727	1			
Cultivated area	0.4296	0.1051	1		
Road Density	0.0115	-0.1048	0.1186	1	
Police Stations	0.344	0.2096	0.1684	-0.2015	1

Table E.2 Regression Model for Determinants of Inclusive Development (Full Specification)

Regressor \ Regressand		HDI	Inequality Coefficient	IC Mainstream	IC Regional
Province (Balochistan=0)	Sindh	0.0306 (0.033)	-0.0064 (0.048)	0.0510 (0.177)	-0.0518 (0.069)
	KPK	0.0469 (0.029)	-0.0437 (0.044)	0.2088 (0.150)	0.0619 (0.084)
	Punjab	0.0454* (0.026)	-0.0113 (0.037)	0.1418 (0.124)	-0.0496 (0.071)
Divisional HQ (No=0)	Yes	0.0021 (0.014)	-0.0009 (0.020)	-0.0011 (0.071)	-0.0457* (0.026)
Forest density	—	0.0002 (0.000)	0.00004 (0.000)	0.0008 (0.001)	-0.0011** (0.000)
Population density	—	0.00003*** (0.000)	-0.00003*** (0.000)	0.00007* (0.000)	0.00005*** (0.000)
Urbanization	—	0.0014** (0.001)	-0.0014 (0.001)	0.0047 (0.003)	0.0008 (0.001)
Sex ratio	—	-0.0043*** (0.001)	0.0040** (0.002)	-0.0169*** (0.006)	-0.0037 (0.004)
Primary schools	—	-0.0004** (0.000)	0.0004 (0.000)	-0.0019** (0.001)	0.00005 (0.000)
Middle schools	—	0.0022 (0.002)	-0.0053* (0.003)	0.0170 (0.012)	0.0023 (0.004)
High schools	—	0.0018 (0.003)	-0.0011 (0.005)	0.0059 (0.017)	0.0051 (0.006)
Colleges	—	0.0346*** (0.011)	-0.0411** (0.018)	0.1541*** (0.060)	0.0222 (0.024)

Table E.2 Continued					
Schools' ST ratio	—	-0.0023** (0.001)	0.0020 (0.002)	-0.0056 (0.005)	-0.0031 (0.002)
Colleges' ST ratio	—	0.0004 (0.000)	-0.0007 (0.001)	0.0024 (0.002)	0.0007 (0.001)
Doctors	—	0.0034 (0.007)	-0.0036 (0.011)	0.0278 (0.041)	-0.0176 (0.016)
Paramedics	—	-0.0015 (0.007)	0.0007 (0.010)	-0.005 (0.035)	-0.0225 (0.015)
Hospitals	—	-0.0047 (0.018)	0.0094 (0.029)	-0.0379 (0.091)	0.0267 (0.046)
Cultivated area	—	-0.00002 (0.000)	0.0001 (0.001)	-0.0014 (0.002)	-0.0005 (0.001)
Railway Station (No=0)	Yes	0.0244* (0.014)	-0.0329 (0.024)	0.1118 (0.078)	0.0063 (0.029)
Airport (No=0)	Yes	0.0283* (0.015)	-0.0382* (0.022)	0.1038 (0.070)	0.0570** (0.026)
Road Density	—	0.0004 (0.000)	-0.0004 (0.000)	0.0011 (0.001)	0.0017*** (0.001)
Police Stations	—	0 (0.002)	0.0001 (0.003)	-0.0052 (0.011)	0.0045 (0.004)
Constant	—	0.8312*** (0.145)	0.0133 (0.238)	1.5809** (0.769)	0.9015* (0.494)
R-Squared		0.7816	0.6438	0.7063	0.4929
F value		30.84***	22.76***	23.78***	10.24***
Root MSE		0.048	0.06844	0.23008	0.09408

Note: ***, **, * indicate 1%, 5% and 10% significance level. Robust standard errors are cited in parenthesis.

Table E.3 Diagnostic Tests for Determinants Regression Models (Full Specification)

Regressand	HDI		Inequality Coefficient		IC-Mainstream		IC-Regional	
Diagnostic Tests	Stat	P	Stat	P	Stat	P	Stat	P
Shapiro-Wilk W	0.986	0.279	0.987	0.364	0.977	0.045	0.989	0.508
White's Chi-square	113	0.456	113	0.456	113	0.456	113	0.456

Analysis of the Variance-Inflating Factors (VIF) for Multicollinearity

Regressand		HDI		Inequality Coefficient		IC-Mainstream		IC-Regional	
Regressors		VIF	1/VIF	VIF	1/VIF	VIF	1/VIF	VIF	1/VIF
Province (Balochistan=0)	Sindh	7.39	0.135	7.39	0.135	7.39	0.135	7.39	0.135
	KPK	8.49	0.118	8.49	0.118	8.49	0.118	8.49	0.118
	Punjab	7.69	0.13	7.69	0.13	7.69	0.13	7.69	0.13
Divisional HQ (No=0)	Yes	1.72	0.583	1.72	0.583	1.72	0.583	1.72	0.583
Forest density	—	1.93	0.519	1.93	0.519	1.93	0.519	1.93	0.519
Population density	—	2.87	0.349	2.87	0.349	2.87	0.349	2.87	0.349
Urbanization	—	3.6	0.277	3.6	0.277	3.6	0.277	3.6	0.277
Sex ratio	—	2.8	0.357	2.8	0.357	2.8	0.357	2.8	0.357

Table E.3 Continued

Primary schools	—	4.48	0.223	4.48	0.223	4.48	0.223	4.48	0.223
Middle schools	—	4.71	0.213	4.71	0.213	4.71	0.212	4.71	0.212
High schools	—	6.14	0.163	6.14	0.163	6.14	0.163	6.14	0.163
Colleges	—	3.34	0.299	3.34	0.299	3.34	0.299	3.34	0.299
Schools' ST ratio	—	4.87	0.205	4.87	0.205	4.87	0.205	4.87	0.205
Colleges' ST ratio	—	2.31	0.432	2.31	0.432	2.31	0.432	2.31	0.432
Doctors	—	2.14	0.466	2.14	0.466	2.14	0.466	2.14	0.466
Paramedics	—	4.19	0.238	4.19	0.238	4.19	0.238	4.19	0.238
Hospitals	—	1.86	0.539	1.86	0.539	1.86	0.539	1.86	0.539
Cultivated area	—	1.97	0.506	1.97	0.506	1.97	0.506	1.97	0.506
Railway Station (No=0)	Yes	1.69	0.591	1.69	0.591	1.69	0.591	1.69	0.591
Airport (No=0)	Yes	1.71	0.585	1.71	0.585	1.71	0.585	1.71	0.585
Road Density	—	2.43	0.411	2.43	0.411	2.43	0.411	2.43	0.411
Police Stations	—	1.85	0.540	1.85	0.540	1.85	0.54	1.85	0.54
Mean		3.65	0.274	3.65	0.274	3.65	0.274	3.65	0.274

Note: ‘Stat’ is for test statistic and ‘P’ is for probability value. Mean represents the arithmetic mean.

Table E.4 Diagnostic Tests for Inclusive Development's Determinants Regression Models (Final Specification)

Regressand	HDI		Inequality Coefficient		IC-Mainstream		IC-Regional	
Diagnostic Tests	Stat	P	Stat	P	Stat	P	Stat	P
Shapiro-Wilk W Test	0.980	0.083	0.991	0.671	0.994	0.934	0.992	0.774
White's Chi-square Test	67.09	0.339	86.52	0.171	81.01	0.074	93.75	0.07

Analysis of the Variance-Inflating Factors (VIF) for Multicollinearity

Regressand		HDI		Inequality Coefficient		IC-Mainstream		IC-Regional	
Regressors		VIF	1/VIF	VIF	1/VIF	VIF	1/VIF	VIF	1/VIF
Divisional-HQ (No=0)	Yes	1.41	0.707	1.43	0.698	1.29	0.774	1.43	0.698
Forest density	—	—	—	1.3	0.771	1.3	0.772	1.3	0.771
Population density	—	2.02	0.494	2.12	0.471	2.12	0.472	2.12	0.471
Urbanization	—	2.12	0.472	2.21	0.452	2.06	0.484	2.21	0.452
Sex ratio	—	1.48	0.675	1.54	0.648	1.54	0.649	1.54	0.648
High schools	—	1.61	0.622	1.72	0.581	1.72	0.581	1.72	0.581
Hospitals	—	1.41	0.708	1.41	0.708	1.41	0.708	1.41	0.708
Cultivated area	—	1.21	0.829	1.27	0.789	1.26	0.791	1.27	0.789
Airport (No=0)	Yes	1.45	0.690	1.45	0.690	—	—	1.45	0.69
Road Density	—	1.63	0.614	1.71	0.583	1.69	0.593	1.71	0.583
Police Stations	—	1.46	0.686	1.46	0.685	1.46	0.686	1.46	0.685
Mean		1.58	0.633	1.6	0.625	1.59	0.629	1.6	0.625

Note: ‘Stat’ is for test statistic and ‘P’ is for probability value. Mean represents the arithmetic mean.

BIBLIOGRAPHY

Acemoglu, D., & Robinson, J. (2012). *Why Nations Fail: The Origin of Power, Prosperity and Poverty.* New York: Crown Business.

African Development Bank Group. (2012, April 10). Inclusive Growth Agenda. *Briefing notes for AfDB's Long Term Strategy*. African Development Bank Group.

Aisha, A., Pasha, H. A., & Ghaus, R. (1996). Social Development Ranking of Districts of Pakistan. *The Pakistan Development Review 35:4 Part II*, 593-614.

Akbar, A. (2015, March 3). *Over 600,000 Afghan Refugees in KP*. Retrieved from Dawn: https://www.dawn.com/news/1167103

Ali, I., & Son, H. H. (2007). Measuring Inclusive growth. *Asian Development Review,Vol. 24, no.1*, 11-31.

Ali, I., & Zhuang, J. (2007, July). Inclusive Growth toward a Prosperous Asia: Policy Implications. *ERD Working Paper No. 97*. Manila, Philippines: Asian Development Bank.

Ali, S. W. (2016, September 22). *The Poorest State of Pakistani Health Care System.* Retrieved from DAWN: http://www.dawn.com/news/1285181/the-poor-state-of-pakistans-healthcare-system

Alkire, S. (2003). A Conceptual Framework for Human Security. *CRISE Working Paper No. 2*. Oxford: Centre for Research on Inequality, Human Security and Ethnicity, CRISE, Queen Elizebeth House, University of Oxford .

Alkire, S., & Foster, J. (2010). *Designing the Inequality adjusted Human Development Index (HDI).* Oxford: Oxford Poverty and Human Development Initiative.

Allison, P. (2012, September 10). *When Can You Safely Ignore Multicollinearity?* Retrieved from Statistical Horizons: https://statisticalhorizons.com/multicollinearity

Allison, P. D. (1982). Time Methods for the Analysis of Event Histories. *Sociological Methodology, Vol. 13*, 61-98.

Allison, P. D. (1998). *Multiple Regression A Primer.* SAGE Publications, Inc.

Allison, P. D. (2012). *Logistic Regression Using SAS: Theory and Application, Second Edition.* North Carolina: SAS Press.

Aluja-Banet, T., Daunis-i-Estadella, P., & Pellicer, D. (2007). GRAFT, a complete system for data fusion. *Computational Statistics & Data Analysis 52(2)*, 635-649.

Aluja-Banet, Tomàs, Daunis-i-Estadella, J., Brunsó, N., & Mompart-Penina, A. (2015). Improving prevalence estimation through data fusion: methods and validation. *BMC Medical Informatics and DecisionMaking*, 15-49.

Anand, R., Mishra, S., & Peiris, S. J. (2013, July). *Inclusive Growth Revisited: Measurement and Determinants.* Retrieved from The World Bank Economic Premise: http://www.worldbank.org/economicpremise

Anand, S., & Sen, A. (2000). The Income concept of Human Development Index. *Jounal of Human Development* , 83-106.

Anand, S., & Sen, A. K. (1994, July). Human Development Index: Methodology and Measurement. *Human Development Repot Office, Occasional Papers*. New York, United States of America: Human Development Repot Office.

Arim, R., & Vigorito, A. (2009). Human development and inequality: The adjusted human development index. *Background paper for the Regional Human Development Report for Latin America and the Caribbean 2010*.

Asghar, R. (2009, May 25). *Anatomy of Balochistan Conflict.* Retrieved from Dawn: https://www.dawn.com/news/869478/anatomy-of-balochistan-conflict

Asghar, S., & Javed, S. A. (2011). On Measuring Inclusiveness of Growth in Pakistan. *Pakistan Development Review*, 879-894. Retrieved from pide.org.pk: http://pide.org.pk/psde/pdf/AGM27/Saima%20Asghar.pdf

Aslam, A., & Zulfiqar, K. (2016). Policy Framework for Inclusive Growth: A Case Study of Selected Asian Countries. *Forman Journal of Economic Studies, Vol. 12*, 21-40.

Atkinson, A. B. (1970). On the measurement of inequality. *Journal of Economic Theory 2(3)*, 244-263.

Atkinson, A. B., Piketty, T., & Saez, E. (2011). Top Incomes in the Long Run of History. *Journal of Economic Literature 2011, 49:1* , 3–71.

Baluch, M. U., & Razi, S. (2007). Social Welfare Measurement in Pakistan An Ordinal and Cardinal Approach. *Pakistan Economic and Social Review, Volume 45, No.1*, 55-88.

Barro, R. J. (1999). *Education and Economic Growth.* Retrieved from http://www.oecd.org/education/innovation-education/1825455.pdf

Behera, D. K. (2015). Agricultural Development and Inclusive Growth in India: A Case Study of Gujarat. *International Journal of Food, Agriculture and Veterinary Sciences* , 41-52.

Berg, A. G., & Ostry, J. D. (2011). Equality and efficiency, Is there a trade-off between the two or do they go hand in hand? *Finance and Development*, 12-15.

Berg, C. (2015, December 14). *How far do roads contribute to Development?* Retrieved from World Economic Forum: https://www.weforum.org/agenda/2015/12/how-far-do-roads-contribute-to-development/

Berg, L. A., & Desai, D. (2013, August). *Background Paper: Overview on the Rule of Law and Sustainable Development for the Global Dialogue on Rule of Law and the Post-2015 Development Agenda.* Retrieved from UNDP: http://www.undp.org

Berglund, P. A. (2011). *Paper 338-2011: An Introduction to Survival Analysis Using Complex Sample Survey Data.* Retrieved from SAS Global Forum 2011: Statistics and Data Analysis: http://support.sas.com/resources/papers/proceedings11/338-2011.pdf

Berry, W. D. (1993). *Understanding Regression Assumptions.* London: SAGE Publication, Inc.

Bhutta, Z. A., Chopra, M., Axelson, H., Berman, P., Boerma, T., Bryce, J., . . . Cavagnero, E. (2010). Countdown to 2015 decade report (2000–10): taking stock of maternal, newborn, and child survival. *Lancet; 375* , 2032–44.

Binder, M., & Georgiadis, G. (2010, September). Determinants of Human Development: Insights from State-Dependent Panel Models. *Human Development Research Paper 2010/24*. UNDP.

Birdsall, N., & Meyer, C. J. (2014, January). The Median Is the Message: A Good-Enough Measure of Material Well-Being and Shared Development Progress. *CGD Working Paper 351*. Washington, DC, United States of America: Center for Global Development.

Bloom, D. E., Canning, D., & Sevilla, J. (2003). *The Demographiv Dividend: A New Perspective on the Economic Consequences of Population Change.* Pittsburgh: RAND.

Bradshaw, J., & Mayhew, E. (2011). The Measurement of Extreme Poverty in Europian Union. York: European Commission.

Brewer, M., & O'Dea, C. (2012). *Measuring living standards with income and consumption: evidence from the UK.* Retrieved from Institute for Social & Economic Research (ISER): https://www.iser.essex.ac.uk/research/publications/working-papers/iser/2012-05.pdf

Buis, M. L. (2010). Stata tip 87: Interpretation of interactions in nonlinear models. *The Stata Journal (2010), Number 2*, 305–308.

Burki, A. A., & Khan, M. A. (2010, November 15). *Spatial Inequality and Geographic Concentration of Manufacturing.* Retrieved from Pakitan Institute of Development Economics: http://www.pide.org.pk/psde/pdf/agm26/Day3/Abid%20A.%20Burki.pdf

Burki, A. A., Memon, R., & Mir, K. (2015). *Multiple inequalities and policies to mitigate inequality traps in Pakistan.* Lahore: Oxfam.

Business Recorder. (2016, June 07). *No relief for health care sector in budget*. Retrieved from BR Research: http://www.brecorder.com

CAFOD. (2016). *Sustainable Development Goals : Actions tawards 2030.* Retrieved from CAFOD Just One World: www.together2030.org

Can Independent Variables with Low Correlation with Dependent Variable be Significant Predictors? (2014, March 20). Retrieved from Cross Validated: https://stats.stackexchange.com/questions/90711/can-independent-variables-with-low-correlation-with-dependent-variable-be-signif

Canette, I. (2016, October 20). Discrete-time survival analysis with Stata. *Stata Users Group Meeting*. Barcelona.

Chakravarty, S. R. (2009). Deprivation, Inequality and Welfare. *The Japanese Economic Review*, 172-190.

Clark, T., Bradburn, M., Love, S., & Altman, D. (2003). Survival Analysis Part I: Basic concepts and first analyses. *British Journal of Cancer*, 232 – 238.

Cohen, G. (2017, July 24). *What is social infrastructure?* Retrieved from Thinking Aloud from Aberdeen Standard Investments : http://www.aberdeen-asset.fr/en/thinkingaloud/investment-clarity/what-is-social-infrastructure

Costello, A. B., & Osborne, J. W. (2005). Best Practices in Exploratory Factor Analysis: Four Recommendations for Getting the Most From Your Analysis. *Practical Assessment, Research & Evaluation, 10(7),* 1-9.

Cox, D. R. (1972). Regression Models and Life-Tables. *Journal of the Royal Statistical Society, Series B (Methodological), Vol. 34, No. 2.*, 187-220.

Cutler, D. M., & Katz, L. F. (1992). Rising Inequality? Changes in the Distribution of Income and Consumption in the 1980s. *American Economic Review: Papers and Proceedings*, 546-551.

Daoud, J. I. (2017). Multicollinearity and Regression Analysis. *Journal of Physics: Conf. Series 949012009*.

Davila, R. L., McCarthy, A. S., Gondwe, D., Kirdruang, P., & Sharma, U. (2014, September). Water, Walls and Bicycles: Wealth Index Composition Using Census Microdata. *Working Paper No. 2014-7*. Minnesota, United States of America: Minnesota Population Center.

Dawn . (2011, July 3). *Gender Imbalance: Pakistan's Missing Women.* Retrieved from Dawn: https://www.dawn.com/news/641175

Deaton, A., & Zaidi, S. (2002, May). Guidelines for Constructing Consumption aggregates for Welfare Analysis. *Living Standards and Measurement Study Working Paper No.135*. Washington, DC, United States of America: The World Bank.

Department of Economic and Social Affairs, Population Division, United Nations. (2017). *Pakistan Population*. Retrieved from Worldometers: http://www.worldometers.info/world-population/pakistan-population/

Directorate General Health Services Punjab. (2014). *DHIS Annual Report 2014.* Lahore: Government of the Punjab.

D'Orazio, M., Zio, M. D., & Scanu, M. (2006). *Statistical Matching: Theory and Practice.* Chichester: John Wiley & Sons, Ltd.

Dutt, A. (2016, November 11). *What Does it Really Mean to "Leave No One Behind"? .* Retrieved from Inter Press Service, News Agency: http://www.ipsnews.net

Easterly, W. (2001, June). The Political Economy of Growth without Development: A Case Study of Pakistan. *Paper for the analytical narratives of growth project, Kennedy School of Government, Harvard University*. Development Research Group World Bank.

Encyclopaedia Britannica. (2018, July). *Population: Biology and Anthropology*. Retrieved from Encyclopaedia Britannica: https://www.britannica.com/science/population-biology-and-anthropology/Age-distribution#ref366921

Eren, M., Çelik, A. K., & Kubat, A. (2014). Determinants of the Levels of Development Based on the Human Development Index: A Comparison of Regression Models for Limited Dependent Variables. *Review of European Studies; Vol. 6, No. 1*, 10-22.

European Urban Knowlelge Network. (n.d.). *Social Exclusion*. Retrieved from EUKN website: https://www.eukn.eu/policy-labs/policy-lab-for-be-solidarity-and-diversity-new-recipes-for-urban-social-policy/social-exclusion/

Express Tribune. (2012). Karachi: Express Tribune.

Falkingham, J., & Namazie, C. (2002). *Measuring health and poverty: a review of approaches to identifying the poor.* Retrieved from http://www.healthsystemsrc.org/: http://hdrc.dfid.gov.uk/wp-content/uploads/2012/10/Measuring-health-and-poverty.pdf

FAO. (2018). *FAO in Pakistan: Pakistan at a Glance.* Retrieved from Food and Agriculture Orgnization of The United Nations: http://www.fao.org/pakistan/fao-in-pakistan/pakistan-at-a-glance/en/

Filmer, D., & Pritchett, L. (1999). The Effect of Household Wealth on Educational Attainment: Evidence from 35 Countries. *Population and Development Review, Vol. 25, No. 1*, 85-120.

Filmer, D., & Pritchett, L. (2001, September 1). Estimating wealth effects without expenditure data - or tears: An application of educational enrollment in states of India. *Demography, 38 (1)*, 115-132. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.195.5502&rep=rep1&type=pdf

Filmer, D., & Scott, K. (2008, April). Assessing Asset Indices. *Policy Research Working Paper No. 4605*. World Bank.

Filmer, D., & Scott, K. (2012). Assessing Asset Indices. *Demography*, 359–392 .

Flipe, J. (2012). Inclusive growth: Why it is important for developing Asia. *Cadmus Volume I, Issue 4*, 36-58.

Fontes, M., & Soneson, C. (2011). The projection score - an evaluation criterion for variable subset selection in PCA visualization. *BMC Bioinformatics* .

Foster, J. E., López-Calva, L. F., & Székely, M. (2005). Measuring the Distribution of Human Development: Methodology and an Application to Mexico. *Journal of Human Development*. Retrieved from http://www.cid.harvard.edu/events/papers/LopezCavala050406.pdf

Foster, J., Seth, S., Lokshinl, M., & Sajaia, Z. (2013). *A uniform approach to measuring poverty and inequality Theory and practice.* Washington, DC: World Bank.

Frost, J. (2017, April 15). *How To Interpret R-squared in Regression Analysis.* Retrieved from Statistics By Jim: http://statisticsbyjim.com/regression/interpret-r-squared-regression/

Fry, K., Firestone, R., & Chakraborty, N. (2014). 2014).Measuring Equity with Nationally Representative Wealth Quintiles. . Washington, DC, United States of America: Population Services International.

Gakidou, E., & King, G. (2001). *An Individual-Level Approach to Health Inequality: Child Survival in 50 Countries.* Retrieved from GPE Discussion Paper Series: No.18. EIP .World Health Organization: http://www.who.int/healthinfo/paper18.pdf

Garin, E., Idele, P., You, D., Hug, L., Amouzou, A., Velez, L. C., . . . Brazier, C. (2015). *Commiting to Child Survival: A Promise Renewed.* New York: UNICEF.

Getachew, Y., & Bekele, S. (2016). Survival Analysis of Under-Five Mortality of Children and its Associated Risk Factors in Ethiopia. *Journal of Biosensors & Bioelectronics Risk Factors in Ethiopia 7:213*.

Global Peace Index (GPI). (2016, November 9). Retrieved from Vision of Humanity: http://www.visionofhumanity.org

Government of Pakistan, Ministry of Finance. (2016). *Pakistan Economic Survey 2015-16.* Retrieved from Government of Pakistan, Ministry of Finance: http://www.finance.gov.pk/

Grace-Martin, K. (2018). *Assessing the Fit of Regression Models.* Retrieved from The Analysis Factor: https://www.theanalysisfactor.com/assessing-the-fit-of-regression-models/

Grimm, M., Harttgen, K., Klasen, S., & Misselhorn, M. (2006, July 25). A Human Development Index by Income Groups. *Human Development Report Office Occasionl Paper*. UNDP.

Grimm, M., Harttgen, K., Klasen, S., & Misselhorn, M. (2008). A human development index by income groups. *World Development, 36(12),* 2527–2546.

Grimm, M., Harttgen, K., Klasen, S., Misselhorn, M., Munzi, T., & Smeeding, T. (2009, April). Inequality in Human Development An empirical assessment of thirty-two countries. *Working Paper No. 471*. Hague, Netherlands: Institute of Social Studies.

Habyarimana, F., Zewotir, T., & Ramroop, S. (2015). Analysis of demographic and health survey to measure poverty of household in Rwanda. *African Population Studies 29(1)*, 1472-1482.

Haq, R. (1998). Trends in Inequality and Welfare in Consumption expenditure: The Case of Pakistan. *The Pakistan Development Review 37:4 Part II*, 765-779.

Haq, R. (2016, October 6). *Pakistanis Have Greater Empathy Than Neighbors*. Retrieved from PakAlumni Worldwide: The Global Social Network: http://www.pakalumni.com

Haq, R., Ahmed, A., & Shafique, a. S. (2010). Variation in the Quality of Life within Punjab: Evidence from MICS, 2007-08. *The Pakistan Development Review 49:4 Part II*, 863–879.

Harttgen, K., & Klasen, S. (2012, September). A household-based Human Development Index. *World Development Vol. 40, No. 5*, 878–899. Retrieved from http://hdr.undp.org

Harttgen, K., & Vollmer, S. (2010). Validate the use of an asset index as a proxy for income, . Goettingen, Germany: Mimeo.

Harttgen, K., & Vollmer, S. (2011, November). Inequality Decomposition without Income or Expenditure Data: Using an Asset Index to Simulate Household Income. *Human Development Research Paper 2011/13*. United Nations Development Programme.

Hassan, R. (2014, September 19). The ‘Missing Women’ in India. *ISAS Working Paper No. 195*. Singapore: Institute of South Asian Studies.

Herrero, C., Marti´nez, R., & Villar, A. (2012). A Newer Human Development Index. *Journal of Human Development and Capabilities: A Multi-Disciplinary Journal for People-Centered Development*.

Herrmann, M. (. (2015). *Consequential omissions. How demography shapes development –Lessons from the MDGs for the SDGs.* Berlin: Berlin Institute for Population and Development.

Hicks, D. A. (1997). The Inequality-Adjusted Human Development Index: A Constructive Proposal. *World Development, Vol. 25, No. 8,* 1283-1298.

History of SD. (n.d.). Retrieved from Sustainable Development Commission: http://www.sd-commission.org.uk

Hou, J., Walsh, P. P., & Zhang, J. (2015). The dynamics of Human Development Index. *The Social Science Journal (52),* 331-342.

How can I perform a Factor Analysis with categorical (or categorical and continuous) variables? | STATA FAQ. (n.d.). Retrieved from UCLA Institute for Digital Research and Education: https://stats.idre.ucla.edu/stata/faq/how-can-i-perform-a-factor-analysis-with-categorical-or-categorical-and-continuous-variables/(accessed July 15, 2017)

Howe, L. D., Hargreaves, J. R., & Huttly, S. R. (2008, January 30). Issues in the construction of wealth indices for the measurement of socio-economic position in low-income countries. *Emerging Themes in Epidemiology 5:3*. Retrieved from http://www.ete-online.com/content/5/1/3

Human Rights Watch. (2016, September 26). *Police Abuse and Reform in Pakistan.* Retrieved from “This Crooked System”: https://www.hrw.org/report/2016/09/26/crooked-system/police-abuse-and-reform-pakistan

Hussain, A. (1988). *Strategic Issues in Pakistan's Economic Policy.* Progressive Publishers.

Hussain, D. A. (2003). *Pakistan National Development Report 2003: Poverty, Growth and Governance.* Karachi: Oxford University Press.

Iqbal, N., & Nawaz, S. (2015). Spatial Differences and Socio-economic Determinants of Health Poverty. *Population & Health Working Paper Series, PIDE-CPHSP-1*. Islamabad, Pakistan: Pakistan Institute of Development Economics.

IRC; WaterAid; WSSCC. (2008). *Beyond Construction Use by All.* Delft: IRC; WaterAid; WSSCC.

Is high variation in Independent Variable Desirable? (2016, January 26). Retrieved from Cross Validated: https://stats.stackexchange.com/questions/192564/is-high-variation-in-the-independent-variable-desirable

I-SAPS. (2016). *Public Financing of Education in Pakistan and Agenda for Education Budget 2016-17.* Islamabad: Institute of Social and Policy Sciences (I-SAPS).

Ismail, Z. H. (2016). *Political Economy of Social Development in Pakistan.* Karachi: Social Policy and Development Centre (SPDC).

Jamal, H. (2010). *A Profile of Social Protection.* Karachi: Social Policy and Development Centre(SPDC).

Jamal, H. (2016). *Quantifying Sub-national Human Development Indices from Household Survey data.* Karachi: Social Policy and Development Centre.

Jamal, H., & Jahan, A. (2007). *Trends in Regional Human Development Indices.* Karachi: Social Policy and Development Centre.

James, C. (2016). Health and Inclusive Growth: Changing the Dialogue. *Policy Brief - Pre-Publication Version*. World Health Orgnization.

Jan, D., Chishti, A., & Eberle, P. (2008). *An Analysis of Major Determinants of Poverty in Agriculture Sector in Pakistan.* Retrieved from https://ageconsearch.umn.edu/bitstream/6241/2/469828.pdf

Jenkins, S. P. (2005, July 18). *Survival Analysis.* Retrieved from Unpublished manuscript, Institute for Social and Economic Research, University of Essex, Colchester, UK: http://www.iser.essex.ac.uk/teaching/degree/stephenj/ec968/pdfs/ec968lnotesv6.pd

Jenkins, S. P. (n.d.). *Essex Summer School course 'Survival Analysis', Lesson 6. Estimation: (ii) discrete time models (logistic and cloglog).* Retrieved from University of Essex Institute for Social and Economic Research: https://www.iser.essex.ac.uk/files/teaching/stephenj/ec968/pdfs/ec968st6.pdf

Jorgenson, D., & Slesnick, D. T. (1987). Aggregate Consumer Behavior and Household. *Journal of Business and Economic Statistics*, 219-232.

Kabeer, N., Mumtaz, K., & Sayeed, A. (2010). Beyond Risk Management: Vulnerability, Social Protection and Citizenship in Pakistan. *Journal of International Development*, 1-19.

Kalbfleisch, J. D., & Prentice, R. L. (2011). *The Statistical Analysis of Failure Time Data, Second Edition.* Hoboken: John Wiley & Sons, Inc.

Kato, H. (2014). Executive Summary. In *Perspectives on the Post-2015 Development Agenda* (pp. 1-15). Tokyo: Japan International CooperationAgency Research Institute.

Keho, Y. (2012). The Basics of Linear Principal Components Analysis (Ed.). In P. Sanguansat, *Principal Component Analysis* (pp. 181-206). Shanghai: InTech.

Keskinen, M. (2008). Population, natural resources & development in the Mekong: Does high population density hinder development? Helsinki, Finland: Water & Development Publications - Helsinki University of Technology.

Khaliq, F., & Ahmad, W. (2018, April). State of Health Sector in Pakistan. *SBP Staff notes*. Pakistan: State Bank of Pakistan.

Khan, A., Khan, G., Safdar, S., Munir, S., & Andleeb, Z. (2016). Measurement and Determinants of Inclusive Growth: A Case Study of Pakistan (1990-2012). *The Pakistan Development Review*, 455–466.

Khan, M. A. (2017, April 13). *Facing off the 'Timber Mafia'- Kyber Pakhtunkhwa's Forest Crusade.* Retrieved from Dawn: https://www.dawn.com/news/1326708

Khan, Z., Sulaiman, J., Ibrahim, M., & Shah, W. H. (2013). Social Safety Nets and Sustainable Economic. *The Dialogue*, 198-207.

Khandker, S. R., & Koolwal, G. B. (2010). How Infrastructure and Financial Institutions Affect Rural Income and Poverty : Evidence from Bangladesh. *Journal of Development Studies 46*, 1109-1137.

Khattak, D. (2017, December 20). *Reviewing Pakistan's Anti-Terror Fight, 3 Years After the Peshawar School Attack.* Retrieved from The Diplomate: https://thediplomat.com/2017/12/reviewing-pakistans-anti-terror-fight-3-years-after-the-peshawar-school-attack/

Kirkman, T. (1996). *Box Plot: Display of Distribution*. Retrieved from Statistics to Use: http://www.physics.csbsju.edu/stats/box2.html (18 Aug 2016)

Klasen, S. (2010). Measuring and Monitoring Inclusive Growth: Multiple Definitions, Open Questions, and Some Constructive Proposals. *ADB Sustainable*

Development Working Paper Series. Manila, Philippines: Asian Development Bank.

Koissi, M.-C., & Högnäs, G. (2005). Using WinBUGS to Study Family Frailty in Child Mortality, with an Application to Child Survival in Ivory Coast. *African Population Studies Vol.20 No.1*, 1-17.

Kolenikov, S., & Angeles, G. (2004, October 20). *The use of discrete data in PCA: theory, simulations, and applications to socioeconomic indices.* Retrieved from https://www.academia.edu/10856735/The_use_of_discrete_data_in_PCA_theory_simulations_and_applications_to_socioeconomic_indices?auto=download

Kolenikov, S., & Angeles, G. (2009). Socioeconomic status measurement with discrete proxy variables: Is principal component analysis a reliable answer? *Review of Income and Wealth, 55(1)*, 128–165.

Kovacevic, M. (2010, November). Measurement of Inequality in Human Development – A Review. *United Nations Development Programme Human Development Reports Research Paper*. United Nations Development Programme .

Kozuka, E. (2014). Inclusive Development: Definition and Principles for the post 2015 Development agenda. In *Perspectives on the post 2015 Development agenda* (pp. 109-122). Tokyo: Japan International CooperationAgency Research Institute .

Leulescu, A., & Agafitei, M. (2013). *Statistical matching: a model based approach for data integration.* Luxembourg: Publications Office of the European Union.

Levy, R. (2013, January 18). *The spatial distribution of human development.* Retrieved from Data-Driven Economics: https://datadrivenecon.wordpress.com/2013/01/18/the-spatial-distribution-of-human-development/

Li, C. (2013). Little’s test of missing completely at random. *The Stata Journal, volume 13, Number 4*, 795–809.

Lieven, A. (2011). *Pakistan: A hard country*. New York: Public affairs TM.

Loayza, N., & Wada, T. (2012, August). Public Infrastructure Trends and Gaps in Pakistan. *World Bank Policy Paper Series on Pakistan*. The World Bank.

Lopez-Calva, L. F., & Ortiz-Juarez, E. (2011, August 17). *A Household-Based Distribution-Sensitive Human*. https://www.springer.com: Springer Science+Business Media B.V. 2011 .

Mack, J. (2016, January 21). *Income threshold approach.* Retrieved from Poverty and Social Exclusion: http://www.poverty.ac.uk/definitions-poverty/income-threshold-approach

Malik, R., & Rose, P. (2015, July 6-7). Financing education in Pakistan Opportunities for Action. *Country Case Study for the Oslo Summit on Education for Development*. Oslo, Norway.

Malik, S. J. (2015, April 24). *Agriculture Policy in Pakistan –what it is and what it should be.* Retrieved from https://www.pide.org.pk/pdf/Seminar/AgriculturePolicyPakistan.pdf

Marmot, M. (2007). Achieving health equity: from root causes to fair outcomes. *Lancet; volume 370* , 1153–63.

McCartney, C., & Naudé, W. (. (2012, August 10). *Shared Societies, The Case for Inclusive Development.* Retrieved from World Leadership Allience, Club De Madrid: www.clubmadrid.org

McKenzie, D. J. (2005). Measuring inequality with asset indicators. *Journal of Population Economics* , 229-260.

McKinley, T. (2010, June). Inclusive Growth Criteria and Indicators: An Inclusive Growth Index for Diagnosis of Country Progress. *ADB Sustainable Development Working Paper Series* . Mandaluyong, Philippines: Asian Development Bank.

Measuring Living Standards: Household Consumption and Wealth Indices. (n.d.). Retrieved from Quantitative Techniques for Health Equity Analysis—Technical Note #4: http://siteresources.worldbank.org/INTPAH/Resources/Publications/Quantitative-Techniques/health_eq_tn04.pdf

Melamed, C. (2015, March). *Leaving no one behind, How the SDGs can bring real change.* Retrieved from Overseas Development Institute, Development Progress: https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications...files/9534.pdf

Meyer, B. D., & Sullivan, J. X. (2011, January). *Consumption and Income Poverty over the Business Cycle.* Retrieved from NBER Working Paper Series: http://www.nber.org/papers/w16751.pdf

Michel, J. (2014, March 31). *Economic Reform Feature Service Article: Linking Growth and Governance for Inclusive Development and Effective International Cooperation.* Retrieved from Center for International Private Enterprise: https://www.cipe.org/.../2014/.../31/linking-growth-and-governance-for- inclusive-development-and-effective-international-cooperation/

Mills, M. (2010). *Introducing survival analysis and event history analysis.* London: SAGE .

Ministry of Education, Trainings and Standards in Higher Education, Academy of Educational Planning and Management Islamabad, Pakistan. (2014, June). *Pakistan Education for All 2015 National Review.* Retrieved from http://unesdoc.unesco.org/images/0022/002297/229718E.pdf

Ministry of Planning, Development & Reform, Pakistan. (2016). *Multidimentional Poverty in Pakistan.* Retrieved from Oxford Poverty and Human Development Initiative(OPHI): http://www.ophi.org.uk

Mitra, D. (2011). *Pennsylvania's Best Investment: The Social and Economic Benefits of Public Education.* Retrieved from https://www.elc-pa.org/wp-content/uploads/2011/06/BestInvestment_Full_Report_6.27.11.pdf

Moser, C., & Felton, A. (2007, July). The Construction of an Asset Index Measuring Asset Accumulation in Ecuador. *Chronic Poverty Research Centre (CPRP) Working Paper 87*. Washington DC, USA: The Brookings Institution.

MRGLOBALIZATION. (2010, June Tuesday, 08 June 2010 06:17). Retrieved from Tackling the Paradoxes of Globalization: http://www.mrglobalization.com

Muhammad, A. S., & Sardar, M. (2012, September 17). *Inclusive growth strategies for Pakistan: Myth or reality for policy makers*. Retrieved from Munich Personal RePEc Archive: http://mpra.ub.uni-muenchen.de/41376/

Murotani, R. (2014). Realizing Human Security in the Post-2015 Era: Principles to Promote Inclusive Development and Resilience. In *Perspectives on the Post-2015 Development Agenda* (pp. 85-108). Tokyo: Japan International Cooperation Agency Research Institute (JICA-RI).

Najam, A., & Bari, F. (2017). *Pakistan Human Development Index Report, 2017.* Islamabad: UNDP, Pakistan.

Naseem, S. (2012). A Review of Studies on Poverty in Pakistan: Origin, Evolution, Thematic Content and Future Decisions. *Hitory of PIDE Series-6*. Islamabad, Capital, Pakistan: Pakistan Institute of Development Economics.

Nasejje, J. B., Mwambi, H. G., & Achia, T. N. (2015). Understanding the determinants of under-five child mortality in Uganda including the estimation of unobserved household and community effects using both frequentist and Bayesian survival analysis approaches. *BMC Public Health*.

National Institute of Population Studies, Islamabad, Pakistan; MEASURE DHS, ICF International, Calverton, Maryland, USA. (2013). *Pakistan Demographic and Health Survey 2012-13, Priliminary Report.* Islamabad: National Institute of Population Studies, Islamabad, Pakistan.

National Literacy Policies Pakistan. (1997). Retrieved from http://www.accu.or.jp/litdbase/policy/pak/

Naz, A., Daraz, U., Khan, T., Waseem Khan, M. H., & Sohail, T. (2012). An Analytical Study of Patients' Health Problems in Public Hospitals of Khyber Pakh-tunkhwa Pakistan. *International Journal of Business and Social Science, Vol. 3 No. 5*, 133-143.

Ngo, D. L. (2012, August 8). *TVs, Toilets, and Thresholds: Measuring Household Wealth Comparably Using an Asset-based Index.* Retrieved from https://www.dartmouth.edu/~neudc2012/docs/paper_193.pdf

Nishtar, D. S. (2016, November 2). *Governance in Pakistan Real Problems Real Solutions.* Retrieved from HILAL: The Pakistan Armed Forces' Magazine: http://hilal.gov.pk/index.php/read-more/item/1167-governance-in-pakistan-real-problems-real-solutions

Noll, H.-H. (2007). *Household Consumption, Household Incomes and Living Standards, A review of related recent research activities*. Retrieved from gesis – Leibniz-Institute for the Social Sciences: http://www.gesis.org/fileadmin/upload/institut/wiss_arbeitsbereiche/soz_indikatoren/Publikationen/Household-Expenditures-Research-Report.pdf

O'Donnel, O., Doorslaer, E. V., Wagstaff, A., & Lindelow, M. (2007). Measurement of Living Standards. In O. O'Donnel, E. V. Doorslaer, A. Wagstaff, & M. Lindelow, *Analyzing Health Equity Using Household Survey Data: A Guide to*

Techniques and their Implementation (pp. 69-82). World Bank Group. Retrieved from Quantitative Techniques for Health Equity Analysis—Technical Note #4: http://siteresources.worldbank.org/INTPAH/Resources/Publications/Quantitative-Techniques/health_eq_tn04.pdf

OECD. (2013). *OECD Framework for Statistics on the Distribution of Household Income, Consumption and Wealth.* Retrieved from OECD Publishing: http://dx.doi.org/10.1787/9789264194830-en

Office of the Inspector General of Forests, Ministry of Environment, Government of Pakistan. (2009). Pakistan Forestry Outlook Study. *Asia-Pacific Forestry Sector Outlook Study II, Wirking Paper Series, Working Paper No. APFSOS II/WP/2009/28*. Bangkok, Thialand: FAO Regional Office for Asia and The Pacific.

Okun, A. M. (1975). *Equity and Eficiency: The Big Tradeoff.* Washington D.C.: The Brooking Institute Washington.

Oluseye, I. C., & Gabriel, A. A. (2017). Determinants of Inclusive Growth in Nigeria: An ARDL Approach. *American Journal of Economics*, 97-109.

Pakistan Bureau of Statistics. (2015[a]). *Pakistan Social and Living Standard Survey (2013-14), National/Provincial Report.* Islamabad: Statistics Division, Pakistan Bureau of Statistics.

Pakistan Bureau of Statistics. (2015[b]). *Pakistan Social And Living Standards Measurement Survey (PSLM) 2013-14.* Islamabad: Pakistan Bureau of Statistics.

Pakistan Bureau of Statistics. (2016). *PSLM 2014-15.* Islamabad: Pakistan Bureau of Statistics.

Pakistan Bureaue of Statistics. (2018, July 27). *Agriculture Statistics.* Retrieved from Pakistan Bureaue of Statistics, Government of Pakistan: http://www.pbs.gov.pk/content/agriculture-statistics

Pakistan Economic Survey 2015-16. (2016). Retrieved from Government of Pakistan, Ministry of Finance: http://www.finance.gov.pk/

Pakistan2025, One nation- One Vision. (2014, May 29). Retrieved from Planning Commission, Ministry of Planning, Development and Reform, Government of Pakistan: http://www.pc.gov.pk

Pillai, V. (2008, February). Infrastructure, growth, and Human Development in Kerala. Kerala, India: Munich Personal RePEc Archive.

Piscitelli, A. (2008). A double imputation method for Data Fusion. *Quaderni di Statistica, volume 10,* 1-18.

Psaki, S. R., Seidman, J. C., Miller, M., Gottlieb, M., Bhutta, Z. A., & Ahmed, T. (2014). Measuring socioeconomic status in multicountry studies: results from the eight-country MAL-ED study. *Population Health Metrics 12:8*.

PSR: Physicians for Social Responsibility; PGS: Physicians for Global Survival; IPPNW (International Physicians for the Prevention of Nuclear War). (2015, March). *Body Count: Casualty Figures after 10 Years of the "War on Terror" Iraq Afghanistan Pakistan.* Retrieved from PSR Physician for Social Responsibility: http://www.psr.org/assets/pdfs/body-count.pdf

Qasim, M., & Chaudhary, A. R. (2014). Determinants of Human Development Disparities: A Cross District Analysis of Punjab, Pakistan. *30TH Annual General Meeting and Conference on Poverty, Inequality and Economic Growth orgnized by PSDE.* Ialamabad: Pakistan Institute of Development Economics.

Qureshi, S. K. (2001, January). An Overview of Government's Poverty Alleviation Policies and Programmes. *MIMAP Technical Paper Series No.12*. Islamabad, Pakistan: Pakistan Institue of Development Economics.

Raheem, I. D., Isah, K. O., & Adedeji, A. A. (2018). Inclusive growth, human capital development and natural resource rent in SSA. *Economic Change and Restructuring*, 29-48.

Ranieri, R., & Ramos, R. A. (2013, March). Inclusive growth: Building up a Concept. *Working Paper No.104*. International Policy Centre for Inclusive Growth (IPC-IG).

Rauniyar, G., & Kanbur, R. (2010, January). Conceptualizing Inclusive development: with application to Rural infrastructure and Development Assistance. *Inclusive Development: Two papers on Conceptualization, Application, and the ADB Perspective* . Ithaca, Newyork, USA: Department of Applied Economics and Management, Cornell University, Ithaca, Newyork.

Rehman, A., Jingdong, L., & Hussain, I. (2015). The province-wise literacy rate in Pakistan and its impact on the economy. *Pacific Science Review B: Humanities and Social Sciences*, 140-144.

Rehman, F. (2016, August 21). *Pakistan's Deteriorating Industrial Sector.* Retrieved from The Express Tribune: https://tribune.com.pk/story/1167178/deteriorating-industrial-sector/

Rida-i-Zainab. (2016, November 24). *Govt hospital conditions.* Retrieved from Pakistan Observer: https://pakobserver.net/govt-hospital-conditions/

Rodríguez, G. (2010, September). *Chapter 7, Survival models.* Retrieved from Lecture Notes on Generalized Linear Models Generalized Linear Models: http://data.princeton.edu/wws509/notes/

Sachs, I. (2004, May). Inclusive Development Strategy in an era of Globalization. *Working Paper No. 35*. Geneva: Policy Integration Department, World Commission on the Social dimension of Globalization, International Labour Office, Geneva.

Sahn, D. E., & Stifel, D. C. (2000). Poverty Comparisons Over Time and Across Countries in Africa. *World Development Vol. 28, No. 12*, 2123-2155.

Sahn, D. E., & Stifel, D. C. (2003). Exploring Alternative Measures of Welfare in the Absence of Expenditure Data. *Review of Income and Wealth, Vol. 49, No. 4*, 463-489.

Samaa. (2015, November 24). *Over 1.2 million farmers to benefit from Kisan Package: PM.* Retrieved from Samaa Web Desk: https://www.samaa.tv/pakistan/2015/11/over-1-2-million-farmers-to-benefit-from-kisan-package-pm

Samans, R., Blanke, J., Corrigan, G., & Drzeniek, M. (2015). *The Inclusive Growth and Development Report 2015.* Geneva: World Economic Forum.

Sapkota, J. B. (2014). Access to Infrastructure and Human Development: Cross-Country Evidence. In *Perspectives on the Post-2015 Development Agenda* (pp. 59-82). Tokyo: JICA Research Institute.

Schmitt, T. A. (2011). Current Methodological Considerations in Exploratory and Confirmatory Factor Analysis. *Journal of Psychoeducational Assessment, 29(4)*, 304–321.

Scott, C., & Amenuvegbe, B. (1999). An Experimental Study in Ghana Social Dimensions of Adjustment in Sub-Saharan Africa Working Paper 6. Washington DC, United States of America: World Bank.

Screeplot and Parallel Analysis after Polychoric Correlation Matrix based PCA. (2015, January 24). Retrieved from STATALIST: The Stata Forum:

https://www.statalist.org/forums/forum/general-stata-discussion/general/672361-screeplot-and-parallel-analysis-after-polychoric-correlation-matrix-based-pca

Sen, A. (1976). Poverty: An Ordinal Approach to Measurement. *Econometrica, Vol. 44, No. 2*, 219-231.

Sen, A. (1979). Issues in the measurement of Poverty. *Scand. J. of Economics*, 285-307.

Sen, A. (1987). *Commodities and capabilities.* New Delhi: Oxford University Press.

Sen, A. (1990, December 20). More Than 100 Million Women Are Missing. *The New York Review of Books*.

Sen, A. (1992). Missing women: Social inequality outweighs women's survival advantage in Asia and north Africa. *British Medical Journal, volume 304*, 587.

Sen, K. (2014). Inclusive Growth: When May We Expect It? When May We Not? *Asian Development Review, vol. 31, no. 1*, 136-162.

Seth, S. (2009, August). Inequality, Interactions, and Human Development. *OPHI Working Paper NO. 23*. Oxford Poverty & Human Development Initiative (OPHI).

Shafqat, M. (2016, November 16). *Government looks for Private Invetments in Forests*. Retrieved from The Express Tribune: https://tribune.com.pk/story/1232631/sustainable-future-government-looks-private-investments-forests/

Shahbaz, B., Ali, T., & Suleri, A. Q. (2006). A Critical Analysis of Forest Policies of Pakistan: Implication for Sustainable Livelihoods. *Mitigation and Adaptation Strategies for Global Change*. Springer.

Sherwani, R. A., Kamal, S., & Abbas, S. (2017). Correlates of Human Development Index in Low , Medium, high, and very high Human Developed Nations. *Pakistan Economic and Social Review*, 31-52.

Shujaat, Q. (2015). *The State of Children in Pakistan.* Islamabad: Head Office of Wafaqi Mohtasib (Ombudsman's) Secretariat.

Siddiqa, A. (2016, April 27). *Pakistan: The road towards achieving the SDGs.* Retrieved from Institute of Strategic Studies: http://issi.org.pk/wp-content/uploads/2016/04/Final-Issue-brief-arhama-dated-27-4-2016.pdf

Siddiqui, R. (2008). Income, Public Social Services, and Capability Development: A Cross-district Analysis of Pakistan. *PIDE Working Papers, 2008:43*. Pakistan Institute of Development Economics.

Sijbesma, C. (2008). Sanitation and Hygiene in South Asia: Progress and Challenges. *Waterlines Vol. 27 No. 3*, 184-204.

Smits, J., & Steendijk, R. (2013, December). *The International Wealth Index (IWI).* Retrieved from http://www.ru.nl/nice/workingpapers

SPDC . (2016). *Social Development in Pakistan: Annual review 2014-15.* Karachi: Social Policy and Development Centre.

SPDC. (2016, June). *Analytical Brief, Key Issues in the state of Economy 2015-16.* Retrieved from Social Policy and Development Centre: http://www.spdc.org.pk

Stanton, E. A. (2007, February). *The Human Development Index: A History.* Retrieved from Political Economy Research Institute, University of Massachusetts Amherst: http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1101&context=peri_workingpapers

Steele, F. (2005, September). *Event History Analysis* . Retrieved from Economic and Social Research Council: National Centre for Reseach Methods: https://pdfs.semanticscholar.org/c05a/c8a68efdaae3dd39059437115d10dcb063ae.pdf

Steele, F., & Washbrook, E. (2013, July 16-17). *Discrete-time Event History Analysis Lectures.* Retrieved from University of Bristol: https://www.bristol.ac.uk/media-library/sites/cmm/migrated/documents/discrete-time-eha-july2013-combined.pdf

Steiger, J. H. (2010). *Extending the Discrete-Time Hazard Model.* Retrieved from http://www.statpower.net/Content/GCM/Lectures/SW12.pdf

Stewart, F., & Brown, G. (2009, January). Fragile States. *CRISE Working Paper No. 51*. Oxford, UK: Centre for Research on Inequality, Human Security and Ethnicity (CRISE), Queen Elizabeth House, University of Oxford.

Stiglitz, J. E., Sen, A., & Fitoussi, J.-P. (2009, September). *Report by the Commission on the Measurement of Economic Performance and Social Progress.*

Retrieved from http://www.insee.fr/fr/publications-et-services/dossiers_web/stiglitz/doc-commission/RAPPORT_anglais.pdf

Streeten, P. (1994). Human Development: Means and Ends. *American Economic Review, 84(2)*, 232-237.

Suryanarayana, M. H. (2008, October 25). What is Exclusive about 'Inclusive Growth'? *Economic & Political Weekly*, pp. 93-101.

Suryanarayana, M. H., & Agrawal, A. (2013, May). *Promoting Human Development in India: Cost of Inequality, Working paper Number 109.* Retrieved from International Policy Centre for Inclusive Growth, UNDP: www.ipc-undp.org

Suryanarayana, M. H., & Das, M. (2014, February 08). How inclusive is India's reform(ed) growth? *Economic and Political Weekly*, pp. 44-52.

Suryanarayana, M. H., Agrawal, A., & Prabhu, K. S. (2011). *Inequality adjusted Human Development Index for India's States.* New Delhi: UNDP India.

Syed, M. (2014). Need for a Paradigm Shift in Security: Adopting Human Security in Pakistan. *IPRI Journal XIV, no.2 (Summer 2014)*, 79-97.

Teichman, J. A. (2016, February 27). *Inclusive Development, the Crisis of Global Capitalism, and the 2016 Sustainable Development Goals.* Retrieved from Judith Teichman Ph.D. FRCS.: http://www.judith-teichman.com

Teichman, J. A. (2016). *The Politics of Inclusive Development: Policy, State Capacity and Coalition Builbing.* Palgrave Macmillan US.

Tella, S. A., & Alimi, O. Y. (2016). Determinants of Inclusive Growth in Africa: Role of Health and Demographic Changes. *African Journal of Economic Review, Volume IV, Issue 2*, 138-146.

The Nation. (2016, October 30). *Country heading towards debt trap: Experts.* Retrieved from The Nation: http://nation.com.pk/business/30-Oct-2016/country-heading-towards-debt-trap-experts

The Nation. (2016, April 4). *Pak committed to achieving SDGs by 2030: Ahsan.* Retrieved from The Nation: http://nation.com.pk/business/04-Apr-2016/pak-committed-to-achieving-sdgs-by-2030-ahsan

The World Bank. (2008[a]). *Agriculture for Development.* Washington DC: The World Bank.

The World Bank. (2008[b]). *Environmental health and child survival : epidemiology, economics, experiences.* Washington, DC : The World Bank.

The World Bank. (2013, August 28). *Forests and Economic Development.* Retrieved from The World Bank: http://www.worldbank.org/en/topic/forests/brief/forests-and-economic-development

The World Bank. (2016). *Mortality rate, infant (per 1,000 live births).* Retrieved from The World Bank: http://data.worldbank.org/indicator/SP.DYN.IMRT.IN

The World Bank. (2016, May 17). *Pakistan Overview*. Retrieved from The World Bank: http://www.worldbank.org

The World Bank. (2018). *Forest Area (% of Land Area).* Retrieved from The World Bank Data: https://data.worldbank.org/indicator/AG.LND.FRST.ZS

The World Bank Group. (2015). *Poverty headcount ratio at national poverty lines (% of population).* Retrieved from The World Bank: http://data.worldbank.org/indicator/SI.POV.NAHC?end=2015&start=2015&view=bar

Thode, H. C. (2002). *Testing for Normality.* New York: Marcel Dekker, Inc.

Timmer, C. P. (2007). How Indonesia Connected To Pro Poor Growth. In T. Basley, & L. J. Cord, *Delivering on The Promise of Pro Poor Growth* (pp. 29-58). Washington DC: Palgrave Macmillan and the World Bank.

Tirmazee, Z. S., & Haroon, M. (2014). *Growth in Pakistan: Inclusive or Not?* Retrieved from http://pide.org.pk/psde/pdf/AGM30/papers/Growth%20in%20Pakistan%20-%20Inclusive%20or%20Not.pdf

Townsend, I., & Kennedy, S. (2004, March 4). *Poverty: Measures and Targets.* Retrieved from Library House of Commons: http://www.parliament.uk

UCLA Institue for Digital Research and Education. (n.d.). *How Can I Perform Factor Analysis with Categorical (or Categorical and Continuous) Variables? | STATA FAQ*. Retrieved from UCLA Institue for Digital Research and Education: https://stats.idre.ucla.edu/stata/faq/how-can-i-perform-a-factor-analysis-with-categorical-or-categorical-and-continuous-variables

UCLA: Statistical Consulting Group. (2017). *Survival Analysis with STATA.* Retrieved from UCLA Institute for Digital Research and Education: https://stats.idre.ucla.edu/stata/seminars/stata-survival/

UNDP. (1990). *Human Development Report 1990.* New York: Oxford University Press.

UNDP. (1994). *"New Dimensions of Security", Human Development Report 1994.* New York: Oxford University Press.

UNDP. (2006). *Human Development Report 2006: Beyond scarcity: Power, poverty and the global water crisis.* New York: Palgrave Macmillan.

UNDP. (2010). *Human Development Report 2010: The Real Wealth of Nations: Pathways to Human Development.* New York: UNDP.

UNDP. (2013). *Humanity Divided: Confronting Inequality in Developing Countries.* New York: United Nations Development Programme.

UNDP. (2014). *Human Development Report 2014,Technical notes.* Retrieved from United Nations Development Programme: http://hdr.undp.org/sites/default/files/hdr14_technical_notes.pdf

UNDP. (2015[a]). *Human Development Report 2015: Work For Human Development.* New York: UNDP.

UNDP. (2015[b]). *Technical Notes.* Retrieved from Human Development Report 2015: http://hdr.undp.org/sites/default/files/hdr2015_technical_notes.pdf

UNDP. (2015[c]). *We can end poverty: Millennium Development Goals and beyond 2015, Backgroung*. Retrieved from United Nations Millennium Development Goals: http://www.un.org/millenniumgoals/bkgd.shtml

UNDP. (2016[a]). *Human Development Data (1990-2015).* Retrieved from UNDP Human Development Reports: http://hdr.undp.org/en/data

UNDP. (2016[b]). *Human Development Report 2016: Human Development for Everyone.* New York: UNDP.

UNDP. (2016[c]). *Inclusive Development*. Retrieved from United Nations Development Programme; our work: http://www.undp.org/content/undp/en/home/ourwork/povertyreduction/focus_areas/focus_inclusive_development.html

UNDP. (2016[d]). *The Sustainable Development Goals Report 2016.* Retrieved from http://unstats.un.org/sdgs/report/2016/The%20Sustainable%20Development%20Goals%20Report%202016.pdf

UNDP. (n.d.). *Human Development Data (1990-2015).* Retrieved from Human Development Reports: http://hdr.undp.org/en/data

UNDP Pakistan. (2016, June). *Development Advocate Pakistan, Volume 3, Issue 2, Inequality: Missing from the Public Agenda.* Islamabad: UNDP Pakistan.

UNESCO. (n.d.). *Adult Literacy Rate.* Retrieved from UNESCO Institute for Statistics: http://uis.unesco.org/en/glossary-term/adult-literacy-rate

UNICEF. (2015). *Pakistan Annual Report 2015.* Retrieved from FINAL_UNICEF_Annual_Report_2015_.pdf: https://www.unicef.org/pakistan/FINAL_UNICEF_Annual_Report_2015_.pdf

UNICEF. (2017, October). *Statistics by Topic.* Retrieved from UNICEF Data: Monitoring the Situation of Children and Women: https://data.unicef.org/topic/child-survival/child-survival-sdgs/

UNICEF. (n.d.). *Definitions of the indicators.* Retrieved from UNICEF Web site: http://www.unicef.org/infobycountry/stats_popup1.html

UNICEF, WHO. (2009). *Diarrhoea: Why children are still dying and what can be done.* Geneva: UNICEF, WHO.

UNIDO. (2014). *Inclusive and Sustainable Industrial Development.* Vienna: United Nations Industrial Development Orgnization.

United Nations. (1987). *Our Common Future; Brundtland Report 1987.* Retrieved from World Commission on Environment and Development : http://www.exteriores.gob.es/Portal/es/PoliticaExteriorCooperacion/Desarrollosostenible/Documents/Informe%20Brundtland%20(En%20ingl%C3%A9s).pdf

United Nations. (2009). *Creating an Inclusive Society: Practical Strategies to Promote Social Integration* . Retrieved from Inclusive Society: http://www.un.org/esa/socdev/egms/docs/2009/Ghana/inclusive-society.pdf

United Nations Development Programme. (2010). *The Real Wealth of Nations: Pathways to Human Development.* New York: Palgrave Macmillan.

Vyas, S., & Kumaranayake, L. (2006). Constructing socio-economic status indices: how to use principal components analysis. *Health Policy and Planning, 21(6),* 459-468.

Ward, P. (2014). Measuring the Level and Inequality of Wealth: An Application to China. *Review of Income and Wealth*, 613-635.

Williams, R. (2015, January 13). *Heteroskedasticity.* Retrieved from Heteroscedasticity: https://www3.nd.edu/~rwilliam/stats2/l25.pdf

Wittenberg, M., & Leibbrandt, M. (2017). Measuring Inequality by Asset Indices: A General Approach With Application to South Africa. *Review of Income and Wealth, Series 00, Number 00*, 1-25.

World Bank. (2006). *World Development Report 2006: Equity and Development.* Washingto DC: World Bank.

World Bank. (2009). What Is Inclusive Growth? *PRMED Knowledge Brief*. Wasington DC, USA: Economic Policy and Debt Department (PRMED), World Bank.

World Bank Group. (2015). *Purchasing Power Parities and the Real Size of World Economies: A Comprehensive Report of the 2011 International Comparison Program.* Washington, DC: World Bank. doi:10.1596/978-1-4648-0329-1. License: Creative.

World Bank Group. (2016). *Global Monitoring Report 2015/2016: Development Goals in an era of Demographic Change.* Washington, DC: The World Bank .

World Economic Forum. (2017). *The Inclusive Growth and Development Report, 2017.* Geneva: World Economic Forum.

Yousaf, N. (2013, July 15). *Kyber Pukhtunkhawa's Sad South.* Retrieved from Dawn: https://www.dawn.com/news/1029031

Zorya, S., Kshirsagar, V., Gautam, M., Odwongo, W., Jos Verbeek, & Sebudde, R. (n.d.). *Inclusive Growth Policy Note: Agriculture for Inclusive Growth in Uganda.* Retrieved from World Bank Document: https://openknowledge.worldbank.org/bitstream/handle/10986/27436/695200WP0ugand0d060402010Box369278B.pdf?sequence=1&isAllowed=y