Assessment of Social Progress in Pakistan

A Sub-national Analysis

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Declaration

I, Balaaj Ahmad Mustafa, declare that this Master's thesis entitled 'Assessment of Social Progress in Pakistan: A Sub-national Analysis' is my original work completed under the supervision of Professor Jaromír Harmáček. I confirm that the work and all ideas are my own unless stated otherwise. All borrowed ideas and texts are duly cited and referenced. I further declare that I have honestly conducted and presented all analysis without engaging in any misrepresentations or malpractice.

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Zásady pro vypracování

Pakistan has been a regional laggard in terms of social progress which encompasses basic human needs, wellbeing and opportunities available to the population. There have been previous attempts to estimate the social progress in Pakistan at the national level, however, these estimates do not highlight the acute regional disparities within the country. This paper aims to estimate the social progress for Pakistan at the sub-national level by developing a social progress index. Results of this paper will aid policymakers in drafting evidence-based policies grounded on local realities.

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The Social Progress Imperative is a global non-profit organization based in Washington, DC which developed the Global Social Progress Index in 2014. The index has been globally adopted as a comprehensive measure of social progress. It is a key tool employed by policymakers around the globe, to inform policies of development and sustainability.

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ABSTRACT

Globally and regionally, Pakistan ranks poorly in indices of social progress and wellbeing. However, this plight is not shared uniformly across all regions of Pakistan and policymakers aiming to improve social progress need to consider spatial social disparities. This study aims to first, evaluate the spatial patterns of disparities in social progress across Pakistan and second, identify critical components of social progress in which the districts of Pakistan are most deficient. To measure sub-national levels of social progress, the paper constructs a Social Progress Index (SPI) for the districts of Pakistan by following the methodology of the Global SPI.

Results reveal acute disparities in social progress across and within provinces. On average, the districts of Punjab perform better than the rest of Pakistan and the districts of Balochistan have lowest levels of social progress. Distinct patterns of disparities are also observed within the provinces. Overall, the districts of Pakistan perform worst in components of access to advanced education, personal rights and access to information and communication.

This study equips policymakers with evidence to make spatially targeted interventions and prioritize deprived areas. The results are also a key resource for further research into social progress and its determinants in Pakistan.

Keywords: Social Progress, Composite Index, Social disparity, Spatial Analysis

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List of Abbreviations

AJK	Azad Jammu and Kashmir
BLI	Better Life Index
DHS	Demographic and Health Survey
EPIC	Energy Policy Institute at the University of Chicago
EU	European Union
FAFEN	Free and Fair Election Network
GB	Gilgit Baltistan
GDP	Gross Domestic Product
GNHI	Gross National Happiness Index
GNP	Gross National Product
HDI	Human Development Index
HPI	Happy Planet Index
ICT	Information and Communications Technology
ISP	Index of Social Progress
JRC-COIN	Joint Research Centre's Competence Centre on Composite Indicators and Scoreboards
KPK	Khyber Pakhtunkhwa
LFS	Labour Force Survey
MAR	Missing at Random
MDPI	Multidimensional Poverty Index
MMS	Maternal Mortality Survey
MNHSRC	Ministry of National Health Services, Regulation and Coordination
NGO	Non-Governmental Organization
NNS	National Nutrition Survey
OECD	Organization of Economic Cooperation and Development
OPHI	Oxford Poverty and Human Development Initiative
PCA	Principal Component Analysis
PM	Particulate Matter
PQLI	Physical Quality of Life Index
PSLM	Pakistan Social and Living Standards Measurement Survey
SPI	Social Progress Index
UNDP	United Nations Development Programme
WASH	Water, Sanitation and Hygiene
WISP	Weighted Index of Social Progress

Introduction

Social progress is a multidimensional concept that encapsulates the aspects of a society's wellbeing in its entirety. The notion that economic growth is not synonymous to social progress was advocated most prominently by the 'Beyond GDP' campaign. Initiated in 2007, the campaign aimed to engender the necessity for a standalone measurement of progress and wellbeing that dissociates the concept from economic growth (European Commission, 2014). The need for an all-encompasing and systematic measure of social progress that consolidates the concepts of sustainability, opportunity and quality of life, led to the development of the Social Progress Index (SPI) in 2013 (Porter, 2015). SPI is a global composite index that scores and ranks countries on their performance across multiple dimensions of progress. The index incorporates twelve exhaustive components which provide an inclusive and comprehensive measurement of social progress. These components are categorized into three broad dimensions which include, 'Basic Human Needs', 'Foundations of Wellbeing, and 'Opportunity'. The index measures social progress through the aggregation of only social and environmental indicators whereby giving a direct measurement of social progress rather than measuring it through proxy economic indicators (Social Progress Imperative, 2021). The index has captured the interest of policymakers across the globe as a guiding tool for evaluating social progress and augmenting its levels in a society.

Significance of the SPI is more pressingly realized in developing countries with low levels of social development and a need to identify and prioritize critical policy areas for intervention. Pakistan is one such country that has consistently ranked among the bottom tier as per the SPI yearly rankings. It has also been one of the worst performers in the South Asian region since the inception of the index. As per the latest SPI report, Pakistan ranks a lowly 143rd out of 168 ranked countries. The country does not fare much better in other metrics of wellbeing such as the Human Development Index 2019 which ranked Pakistan 154 out of 189 countries (UNDP, 2020*b*). Social progress in Pakistan is not shared uniformly across its regions and acute spatial disparities are evidenced by several national and semi-national studies (Hasan et al., 2019; Haq, 2009; Rana et al, 2017; Sameehullah & Mustafa, 2017; UNDP, 2020a). Although country-level indicators of social progress for Pakistan do indicate a broad predicament and invoke the need for intervention, they do not provide sufficient information for decisionmakers to be able to make actionable policies. Blanket policies without a better understanding of the widespread and persistent disparities usually achieve little to offset them (Sen & Ali, 2009).

To effectuate a more egalitarian growth in social progress, a localized approach is required which implements spatially targeted interventions and prioritizes disadvantaged areas. For a result-oriented implementation of this approach, it is imperative for policymakers to be equipped with actionable evidence on the levels of social progress at the local level. In Pakistan however, localized information on the aspects of social progress is only scantily available and that too in a disaggregated form. This warrants an

investigation into measuring social progress in the country at a subnational level and uncovering the underlying spatial disparities.

With the objective of empowering policymakers, this study endeavours to provide a novel measurement of social progress in Pakistan at the sub-national level and identify spatial patterns of social disparity. The paper takes inspiration from previous sub-national measurements of social progress conducted in the European Union, India, USA and countries in Latin America and Africa. The primary outcome of this research is a sub-national Social Progress Index for Pakistan (Pakistan SPI) at the district level. Spatial representations of Pakistan SPI are then used to evaluate the inequalities in social progress across the districts. The paper also aims to identify the aspects that are bottlenecks in the advancement of social progress in Pakistan. In effect, this paper tries to answer two key questions:

    I.   Are there any identifiable spatial patterns of disparity in social progress in districts across Pakistan?

    II.   What are the critical components of social progress in which the districts of Pakistan are most deficient?

For the construction of Pakistan SPI, this study borrows largely from the methodology of the Global SPI with a few adjustments as per the requirements of the data structure. Data for the indicators is collected from various district-level sources with adequate national coverage. The paper measures SPI for the districts of the four autonomous provinces of Pakistan; Punjab, Sindh, Khyber Pakhtunkhwa (KPK) and Balochistan.

The paper is organized into six chapters. The first chapter conducts a literature review to define social progress and how it has been measured in the past. Chapter two explores the levels of social progress in Pakistan by considering its international standing across various global indices as well as its temporal growth in various social indicators. The third chapter establishes the indicators selection framework for Pakistan SPI and deals with the collection of data for the indicators. The methodology for index construction is discussed in the fourth chapter which involves data treatment and the aggregation of indicators into components, components into dimensions and dimensions into the Pakistan SPI. Spatial representations of Pakistan SPI are developed in the fifth chapter to identify disparities in social progress across the districts. The sixth and final chapter of the study discusses the policy implications of the spatial patterns of social progress in Pakistan. Important conclusions are drawn in the last section of the paper.

CHAPTER 1

Literature Review

This section explores the history of the development of the concept of social progress and reviews how various authors have attempted to measure social progress. The section starts with discussing the evolution of the concept and definition of social progress over time. Further the section discusses the tools and methodologies that have been developed and employed in the past to measure social progress. The section also reviews the literature on social progress and its measurement in the context of Pakistan to be able to take inspiration from the previous attempts as well as identify gaps in available literature.

1.1 Defining Social Progress

Many sociologists and scholars have deliberated on the constitution of social progress and how it materializes in society. The concept of social progress has been up for debate since the early 20th century however, till now, there is no agreed upon concrete definition of social progress. Scholars from different school of thought can have very contrasting opinions about the definition of social progress. Bernard (1922) describes social progress as the highest form of progress that is an amalgamation of all forms of progress be it spiritual, intellectual, political, economic or industrial. In his view, social progress cannot be achieved without attaining other forms of progress to a certain extent (Bernard, 1922). Henderson (1940) takes a more cynical approach to defining social progress and borrows from the early 19th century elaborations on social change by Auguste Comte and Herbert Spencer. However, according to him change is more appropriately defined as social evolution and may or may not be social progress. He ascribes a certain nuisance to the word of social progress and denotes its definition as being subjective and dependent on the prevailing ideology, technologies and social structures (Henderson, 1940).

Discussions on social progress prior to the 21st century, have overall been more philosophical in nature and have contributed little to its measurement. Focus of most sociologists had been on emphasizing the nuisances in describing social progress rather than measuring it in a meaningful manner. Shay (1957) described social progress as acquisition of "*more of the good*". However, he goes on to debate that "good" is subjective and cannot be universally defined. Acquisition of one good could lead to the diminution of the other for example increase life expectancy and decreased mortality rates would lead to higher population growth which in turn lowers the standard of living, given finite resources. Hence, he concludes, that social progress is a myth which is difficult to define and measure (Shay, 1957). One of the rationales for the scepticism of sociologists in defining social progress is to avoid making universal judgements that are not privy to cultural relativism (Best, 2001). Estes and Morgan (1976) were one of the first authors to give a practical definition of social progress as they defined it as an outcome that highlights the capacity of a society to cater to the most basic and material needs of its increasing population (Estes and Morgan, 1976).

Modern theorists have made more elaborate attempts to give a concrete definition to social progress and impetus has been given to the actual measurement of the same for lateral and historical comparability.

Heylighen and Bernheim (2001) adopt a subjective definition of social progress and describe it as something that increases the happiness of the population as a whole. They argue that although cultural relativism demands that the definition of 'happiness' is subjective, however, people's own assessment of happiness can be estimated and compared (Heylighen & Bernheim, 2001). A rather interesting take on social progress is conceptualized by Kitcher (2017, 59) who theorizes that "*Social progress consists in removing, or diminishing, the factors that confine*" (Kitcher, 2017, 59). This offers a pragmatic definition of social progress that is inspired by the concept developed by Amartya Sen and promotes the idea of removing the confining factors which will eventually lead to the increment in the indicators of social progress.

Porter et al. (2013, 7) offered one of the most comprehensive and significant definitions of social progress which they defined as "*the capacity of a society to meet the basic human needs of its citizens, establish the building blocks that allow citizens and communities to enhance and sustain the quality of their lives, and create the conditions for all individuals to reach their full potential*" (Porter et al., 2013, 7). This definition lays the base for development of the Social Progress Index. However, the meaning of social progress keeps evolving as sociologists and theorists continue to deliberate on the topic.

1.2   Measuring Social Progress

1.2.1   Monetary vs. Non-monetary Indicators of Social Progress

Given that the definition of social progress has expanded overtime to include multivariate indicators, there has been several attempts by sociologists and academics to develop an overarching measure for social progress which indicate its level in society. The main motivation behind being able to measure social progress is to be able to compare, evaluate and enhance the various components of social progress. There has been a debate on whether monetary indicators such are the GDP and GNP per capita are a good indicator of progress. GDP is a widely recognized and used measure due its simplicity in understanding and it being a very comparable indicator that encapsulates a lot of information about the economic dynamics of a country (Callen, 2020). Historically, GDP has also been regarded as a valid measure of wellbeing and is still widely used to depict and compare the quality of life of individuals across countries. Policymakers and economists often treat GDP as an all-encompassing measure that that signifies both economic prosperity and social wellbeing (Kapoor & Debroy, 2019). More than the validation of GDP as an adequate measure of social progress, the perpetual relevance of the measure in the development context, merely indicates the lack of another indicator that is as precise or as widely measured and recognized (Costanza et al., 2014). A more accepted notion regarding GDP is that although it does not fully measure progress, it definitely represents one of the more important components of progress of societies hence its use as a proxy for progress is acceptable. Other arguments in favour of GDP as a proximate measure of societal progress are its strong correlation with the presumed components of social progress such as infant mortality rates (Oulton, 2012).

As opposed to the literature supporting monetary indicators as valid proxies of social progress, overwhelming literature is available on why monetary indicators such as GDP per capita are not adequate indicators for measuring the level of social progress in a society. Since the early 2000's there has been significant debate on the need to have more comprehensive indicators for social progress that take direct measurement of the dimensions of progress. Frecker (2005) contested that GDP as an indicator for social progress is inadequate as it does not capture several vital aspects of well-being. GDP only indirectly estimates the impact on personal and societal wellbeing and as per Frecker, an indicator for social progress needs to be meaningful, comprehensive and rigorous. He also believed that "*the construction of social progress indices through an open, inclusive, participatory approach can contribute to the development of a more deeply democratic culture*" (Frecker, 2005, 5). The 'Beyond GDP' initiative was started in 2007 to explore the development of practical indicators that are more inclusive of environment and social progress than GDP. Through this initiative, clear and measurable indicators for estimating progress and wellbeing were urged as a necessity towards the objective of tackling the modern global development problems in a sustainable manner (European Commission, 2014). In 2008, the French president formed a commission chaired by Joseph E. Stiglitz and advised by Amartya Sen to identify the limits of GDP as a measure of economic performance and social progress. In the backdrop of the 2008 financial crisis, the commission stressed the need to shift emphasis from measuring economic production to measuring wellbeing which has a much broader scope and has to be tied to the concept of sustainability (Stiglitz et al., 2009).

GDP as a measure, was not designed to measure social progress or wellbeing (Costanza et al., 2009). This idea is supported by the Social Justice Ireland (2009) report which contends that economic growth does not necessarily translate into social prosperity until it is directed by targeted policies to improve aspects of prosperity which include unemployment, literacy, healthcare, housing etc (Social Justice Ireland, 2009). Particularly after the 2008 economic crisis, there have been many instances of countries having high growth but not being able to translate that into lower unemployment which indicates how obsolete purely monetary measures are as indicators of social progress (Schwartz, 2010). Failure to predict the 2008 economic crisis highlighted the importance of detaching the concept of wellbeing from economic growth to policymakers as policy interventions required to augment either are not be the same (Stiglitz et al., 2018).

The realization that social progress is not just about GDP and is rather, a multidimensional concept that includes social, environmental, governance as well as economic areas, is critical for the policy-makers of a country to be able to genuinely understand and address the needs of its citizens (Trewin & Hall, 2010). For governments, it is important to internalize the inadequacy of GDP as a measure of social progress to be able to set progressive development goals for its citizens. The ultimate goal should be to improve overall progress of society rather than just the augmentation of pure material wellbeing that the GDP represents. Only a comprehensive measure of social progress that considers all aspects of progress can support the decision-making process to achieve that goal (Frajman Ivković, 2016).

Kitcher (2017) contributes to the critique of using economic measures as indicators of social progress by highlighting the inability of economic measures such as GDP to measure the unequal distribution of wealth in society. For developing countries, in particular, rising GDP and hence GDP per capita usually goes hand in hand with the accumulation of material wealth in a few hands and the increasing relative depravation of the majority of the people (Kitcher, 2017). Apart from the failure of GDP to capture the inequality in distribution of wealth in society, it also does not take into account the negative externalities of economic growth that actually have a negative impact on society such as environmental degradation (Kapoor & Debroy, 2019). Joseph Stiglitz, a noble laureate economist, has been a strong advocate for the development of adequate and comprehensive measures of wellbeing. Stiglitz (2019) furthers the narrative of GDP as an inadept measure for wellbeing and warns against construing economic progress as social progress as it does not take into account the environmental degradation and resource depletion caused by the growth. As the climate crisis becomes more evident, there has been a realization towards the need of better indicators that measure all aspects of social progress and significant work has been done towards that development (Stiglitz, 2019).

The correlation of economic growth and social progress has also been a keep topic of interest. Pritchett (2022) seems to suggest that economic growth indicators can to an extent explain the variation in social progress. However, he also observes that economic wellbeing is much more significant for achieving social progress at low levels of income and it becomes less significant at higher levels of income (Pritchett, 2022). The Social Progress Imperative has developed the Social Progress Index which excludes all economic indicators and directly measures the various aspects of social progress. This allows for the rigorous and systematic analysis of the relationship between GDP per capita and social progress. The data reveals that there is a strong and positive correlation of GDP per capita with social progress. However, the relationship is not linear. At low-income levels, small changes in the GDP per capita are associated with large improvements in social progress but as countries reach high levels of income, the rate of change slows. Another expected revelation of the data is that GDP per capita does not entirely explain the changes in social progress as countries with similar levels of GDP per capita can have varying levels of social progress (Social Progress Imperative, 2020).

1.2.2 Composite Indices for Multivariate Aggregation

Social progress is a multivariate concept that incapsulates various aspects of the social and economic lives of individuals in society. Although all the variables of social progress including education, health etc. hold weight individually to policymakers, some way of aggregating these indicators into a single impactful measure is necessary (Stiglitz et al., 2009). This aggregation into a single indicator is only possible through a composite index that standardizes the data from various variables and then aggregates it into a single meaningful number, using various methods and techniques. Standardization of data is necessary as there is no other obvious way to aggregate multiple variables with different units of measurement (Saisana, 2004). This not only allows for aggregating a complex phenomenon into a single number but also gives insight on

a broader spectrum. This is useful for devising overarching policy interventions (Schlossarek et al., 2019). Composite indicators make it easier to interpret broad phenomenon than finding patterns between individual indicators. They make cross-country as well as subnational comparisons easier and much more meaningful. They also allow for the assessment of the progress of countries over time (Nardo et al., 2005).

Realization of the inadequacy of economic measures alone for measuring social progress has led to the development of a variety of tools to measure it in a society. It is worth noting that all of these measures are composite multivariate indices that aggregate the indicators considered adequate to measure social progress.

1.2.2.1 *History of Composite Indices of Social Progress*

This subchapter discusses some of the more recognized and widely used indices for measuring social progress. Some of these indices are purely based on social indicators while some are a mix of social and economic indicators. All of them, to a large extent share the same basic components such as health and education, among others, however, the actual variables used to measure these components vary.

Weighted Index of Social Progress (WISP—1973)

One of the very first measures of social progress—the Index of Social Progress (ISP) was developed my Richard J. Estes in 1973. The index, since then has gone through many refinements and is now known as the Weighted Index of Social Progress (WISP). This is a global index that measures the ability of a society to reduce the factors impeding the quality of life of the population. The index is made up of ten subindices: education, health, women status, defence effort, economic, demography, environmental, social chaos, cultural cohesion, and welfare effort. The subindices are an aggregation of multiple input and output indicators and both monetary and non-monetary indicators that are either positively or negatively associated with social progress (Estes, 2014).

Human Development Index (HDI—1990)

Today, the Human Development Index is one of the most recognized of the development indices for measuring social progress. Since its conceptualization in 1990, the UNDP has published yearly reports on global HDI ranking all the countries with available data on the human development scale. The main idea behind the indicator was monitoring the progress of developing countries along the development journey (UNDP, 1990). The HDI is measured across three dimensions; long & healthy life, knowledge and decent standard of living. The long and healthy life dimension is measured using the life expectancy, education is measured using expected years of schooling and mean years of schooling and standard of living is measured using GNI per capita. In this way, the HDI considers human development as both a social and an economic concept. The dimensions are aggregated using the geometric mean (UNDP, 2020). In 2016, UNDP also introduced the Inequality adjusted HDI (IHDI) which accounts for the inequality.

Gross National Happiness Index (GNHI—2008)

The Gross National Happiness Index was envisioned by the 4th King of Bhutan, King Jigme Singye Wangchuck in 1972 and materialized in 2008. The index offers an all-encompassing approach to measuring the happiness and wellbeing of the population of Bhutan. Bhutan has aligned its policies and governance mechanisms towards a goal of maximizing the GNHI instead of the GDP per capita which is a significant win for the Beyond GDP initiative (GNH Centre Bhutan, 2022). The index includes nine themes—psychological wellbeing, health, education, time use, cultural diversity and resilience, good governance, community vitality, ecological diversity and resilience, and living standards (GNH Centre Bhutan, 2022). These themes are measured using 151 variables that are aggregated using the Alkire and Foster (2007) decomposable threshold method (Alkire and Foster, 2007).

Better Life Index (BLI—2011)

The Better Life Index was introduced by the OECD in 2011 in response to the limitations of GDP as a measure of social progress as discussed by Stiglitz et al. (2009) (Stiglitz et al., 2009). The index measures the wellbeing and progress of OECD countries based on a set of 11 dimensions; "*housing, income, jobs, community, education, environment, governance, health, life satisfaction, safety, work-life balance. These dimensions are further composed of 20 sub-indicators*" (OECD, 2011). The BLI is innovative and unique in the way that it is an interactive index that allows users to change the weights for the aggregation of the dimensions and see its impact on the country rankings (OECD, 2020).

Multi-Dimensional Poverty Index (MDPI—2010)

The multidimensional poverty index was introduced by the Oxford Poverty & Human Development Initiative and the United Nations Development Programme in 2010. The MDPI is a specialized development index that measures acute poverty across 100 developing countries. The MDPI recognizes poverty as a multidimensional social concept and not merely a monetary concept. The broad concept of poverty developed by the UNDP is closely tied to social progress as it measures an individual's deprivation across three equally weighted dimensions: health, education and standard of living. They are measured by ten indicators including nutrition, child mortality, years of schooling, school attendance, cooking fuel, sanitation, drinking water, electricity, housing and assets (OPHI & UNDP, 2021). The MDPI is widely recognized and used as a more meaningful measure of poverty than the poverty line.

Social Progress Index (SPI—2013)

The Social Progress Index was developed and introduced by the Social Progress Imperative in 2013. The index was envisioned in response to the 'Beyond GDP' initiative and to provide a comprehensive measurement of social progress. The SPI "provides a holistic, objective, outcome-based measure of a country's wellbeing" (Social Progress Imperative, 2013, 7). The main objective of the index was to have a globally comparable tool that measures social progress directly using social and environmental indicators and refraining from the use economic proxies. The index measures SPI across three dimensions, basic

human needs, foundations of wellbeing and opportunity. The dimensions are measured by 12 components which represent various aspects of the social life of an individual. The index aims to invoke actionable policies that can target specific components of social progress (Social Progress Imperative, 2021). Since its inception, the index has gained global attention in policy circles and has become a gold standard in social progress measurement due to its comprehensive approach. The Social Progress Imperative releases yearly SPI reports which compare the social progress of countries globally and across dimensions and components. The various aspects of SPI's theoretical background and methodology are discussed in more detail in the following section.

1.3 Social Progress Index—Theoretical Background

The Social Progress Index (SPI) employs 12 components to measure the three prescribed dimensions of social progress. The component-level framework of the SPI is detailed in **Figure 1.1**. The first dimension—basic human needs, gauges whether or not the most basic social needs of citizens are being catered to. The second dimension—foundations of wellbeing, assesses if a society possesses the fundamentals to enhance and sustain wellbeing. The third dimension—opportunity, assesses if a society provides enough opportunities to its citizens to reach their maximum potential (Social Progress Imperative, 2021).

Figure 1.1: SPI Component-Level Framework

Source: Social Progress Imperative, Social Progress Index Methodology Report (2021)

1.3.1 Justification for Components of SPI

The 12 components that measure these dimensions represent a comprehensive and rigorous characterisation of social progress and have an important role in establishing SPI as a holistic measure (Social Progress Imperative, 2021). The representation of these components in the SPI is backed by a robust body of literature establishing linkages and impact on social progress. First, we take the case of nutrition and basic medical care. Sufficient early childhood nutrition is essential in physical and mental development of children which has a significant impact on their health and wellbeing in later years of their life (Owen &

Corfe, 2017). Essential nutrients help in the neurocognitive development of children which influences the ability of a child to learn and grow (Nyaradi et al., 2013). Similarly, improvements in the access and quality of healthcare services have been found to engender significant improvements in health and quality of life of a population (Bunker, 2001). These improvements, hence, also have significant impacts on the socio-economic development of a society (Strittmatter & Sunde, 2011).

Water and sanitation are also an important contributor to social progress due to its significant impact on health. Globally, millions of deaths are attributed to the diseases caused by infected drinking water and poor sanitation services. These deaths can, to a large extent, be prevented through improvements in water and sanitation services (Bartram & Cairncross, 2010). Affordable housing and access to basic utilities are another critical aspect of human wellbeing. It is an unavoidable necessity and a basic human right to have adequate and affordable housing where individuals and families can nourish and live in a sheltered environment (Rao & Min, 2017). The excessive financialization of housing is making it less affordable with the progression of time and depriving individuals of this basic right. This component can be a difficult bottleneck towards the improvement of social progress hence needs immediate policy attention (Leijten & de Bel, 2020). Research also shows that perceptions of safety from crime have a strong and positive relationship to perceived quality of life (Kitchen & Williams, 2009). Indices such as the Better Life Index and the Personal Wellbeing Index also include a component for personal safety for measuring social wellbeing (OECD, 2020; Cummins & Lau, 2005).

There is an abundant body of literature establishing the impact of both early and advanced education on economic and social wellbeing. Hessami (2010), while analysing data from Europe, finds that wellbeing of a society can be improved by improving the access and quality of education through higher resource allocation towards the sector (Hessami, 2010). Similarly, Williams & Swail (2005) reviews literature on advanced education to conclude that investment in improving the access to advanced education can lead to significant non-economic returns including increased life expectancy and improved health, improved quality of life and increased social participation (Williams & Swail, 2005).

Access to information and communication influences and improves human life in multitude of ways including easier dissemination of knowledge, time saving, increase in productivity, enhanced social capital and improvements in transparency and governance. Maiti & Awasthi (2019) study the impact of information and communication on wellbeing by constructing indices of ICT exposure and wellbeing & progress. They find that ICT exposure significantly improves wellbeing and progress (Maiti & Awasthi, 2019). Environment quality is another important and differentiating component of the SPI. One of the major instigators of the 'Beyond GDP' initiative was the inability of economic measures to assess the cost of growth to the environment. The Commission on the Measurement of Economic Performance and Social Progress, stressed the need to include sustainability and environment components in measures of social progress to inculcate it into policy discussions for augmenting social progress (Stiglitz et al., 2009). Keles (2012) also discusses the impacts of environmental changes on quality of life (Keles, 2012).

The Eurostat (2021) also identifies governance and basic rights as a key component of quality of life and social progress. Aspects of governance and basic rights such as rule of law, political impartiality, equal rights, active citizenship and political participation are all measures of social progress in a society (Eurostat, 2021). Similarly, freedom is another important and recognized component of social progress. Veenhoven (2014) describes freedom as the opportunity to choose. It is a broad concept that encompasses the opportunity of choice in the domains of economic freedom, personal freedom and political freedom. Veenhoven also performs an empirical analysis to conclude that all three types of freedoms contribute significantly towards happiness and quality of life (Veenhoven, 2014). Several authors also tie inclusiveness to achieving wellbeing and social progress. Gupta et al. (2015) identifies the importance of inclusiveness towards achieving improvements in societal wellbeing through equal opportunity in the aspects of economy, politics, society, ecology and culture for all segments of society (Gupta et al., 2015). Diversity, inclusion and inclusiveness are also identified as important building blocks of high-level societal wellbeing (Talmage & Knopf, 2017).

1.3.2 SPI Indicator Selection & Aggregation Methodology

1.3.2.1 SPI Indicator Selection

The Global SPI 2021 employs 53 indicators to represent the 12 components and each component is defined and measured using three to five indicators. Social Progress Imperative uses high quality indicators that are measured well and with a consistent methodology globally. Only indicators that have the same source across all countries, are used. Data sources for indicators range from global institutions, NGOs and global surveys. All indicators are outcome-based and measure social progress directly and not through economic proxies (Social Progress Imperative, 2021). **Figure 1.2** depicts the indicators used to measure the components.

Figure 1.2: SPI Indicator-level Framework

Source: Social Progress Imperative, Social Progress Index Methodology Report (2021)

The indicator selection framework for the SPI is illustrated in **Figure 1.3**.

Figure 1.3: SPI Indicator Selection Framework

Included Indicators	Eliminated Indicators
Does the indicator measure an economic, social or environmental concept?	
✓ A social or environmental indicator	✗ An economic concept indicator
Does this indicator measure an input or an outcome?	
✓ A concept that we are interested in because it is good or bad for its own sake	✗ Important mainly because it signals some - thing else and is therefore an input indicator
What is the source of this indicator?	
✓ Widely reputable and the methods it uses are sound	✗ Unknown, uses biased methods, or lacks rigorous data collection
How old are the data points?	
✓ Reasonably current	✗ Most data points are more than 5-10 years old
How many geographic regions does this indicator cover?	
✓ 95-100% of geographic regions	✗ Fewer than 95% of the geographic regions in the Index
SOCIAL PROGRESS INDEX	

Source: Social Progress Imperative, Social Progress Index Methodology Report (2021)

1.3.2.2 SPI Data Aggregation

The SPI first aggregates the indicator level data into the 12 individual components. SPI uses Principal Component Analysis (PCA) to assign weights to the indicators within a component. Using PCA as opposed to equal weights allows for capturing maximum variance in the data and reducing redundancy between the indicators (Social Progress Imperative, 2021). PCA is a widely used technique for index construction across a range of disciplines, to assign weights for data aggregation (International Telecommunication Union, 2015; Lamichhane et al., 2021; Primpas et al., 2010; Senna et al., 2019; Tripathi & Singal, 2019; Vyas & Kumaranayake, 2006). The Joint Research Centre's Competence Centre on Composite Indicators and Scoreboards (JRC-COIN) proposes PCA as one of the methods to find a set of weights for composite indicators as it gives an empirical and objective option for weight selection (JRC-COIN, 2021). The component value is calculated by multiplying the weights of the corresponding indicators and aggregating them for the respective components. Min-Max normalization then used to derive the component scores ranging from 0-100 (Social Progress Imperative, 2021).

The second level aggregation at the level of the components to derive the dimension scores is done using arithmetic average. Similarly, the highest-level aggregation is then performed at the dimension level to calculate the SPI scores using arithmetic average (Social Progress Imperative, 2021). The JRC-COIN proposes arithmetic average as a simple and widely used and understood method of aggregation (JRC-COIN, 2021).

1.4 Social Progress Literature in Pakistan

1.4.1 Review of Social Progress Literature in Pakistan

Pakistan is a geographically and socio-economically diverse country. Distinct and widely acknowledged socio-economic disparities exist in the country across provinces and even within provinces (Rana et al, 2017). Huda & Burke (2011) analyse socio-economic indicators across two provinces of Pakistan—Sindh and Balochistan, and find severe disparities across several dimensions including health, education, income, housing and social welfare (Huda & Burke, 2011). With administrative power across several aspects of social progress being delegated to the provinces, analysing these disparities has been of keen interest to researchers to gauge the varying performance of the four provincial administrations.

Many studies have ventured to measure the various aspects of social progress or wellbeing at different levels in the country. Most prominently, the Pakistan National Human Development Report (2020) estimates indices for child development, youth development, labour development and gender inequality at the provincial level in Pakistan (UNDP, 2020*a*). The report focuses on estimating the inequalities that exist in opportunity, income and accessibility across the nation. At a lower administration stratum, Oxford Poverty & Human Development Initiative and the United Nations Development Programme (2015) calculate the district level Multidimensional Poverty Index for all the districts of Pakistan in 2015 (OPHI & UNDP, 2015). Haq (2009) constructs an index for measuring wellbeing across 100 districts in Pakistan. The paper uses data from the Pakistan Social and Living Standards Measurement Survey (PSLM) of 2007 for multiple indicators of wellbeing aggregated into four components including education, health, living conditions and perceptions of wellbeing.[1] PCA is used to assign weights to aggregate the indicators and calculate the wellbeing index. Distinct patterns of spatial disparity emerge from the index scores and rankings (Haq, 2009).

Hasan et al. (2019) measures social development across 36 districts of Punjab—a province in Pakistan. The authors construct a Social Development Index which is a combination of subindices of education, health and water, sanitation & hygiene (WASH). The paper employs multiple indicators from various district-level data sources to measure the subindices and uses PCA to assign weights to indicators for aggregation. The index scores reveal severe disparity in levels of social development across districts of Punjab and stagnated social development levels despite improvements in economic conditions (Hasan et

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[1] The perception of wellbeing component incorporates indicators ranging from satisfaction with services of education, health & public safety, perception of housing cost and perception of economic status of community where they live.

al., 2019). Similarly, Sameehullah & Mustafa (2017) develop the Human Capital Index to measure the levels of human capital across the 36 districts of Punjab, Pakistan. The index is a comprehensive effort to measure the quality of human capital available to the industrial sector of the province. The index is measured through the aggregation of four subindices; basic knowledge, skillset, innovation & ingenuity and economic participation. PCA is used to assign weights and aggregate the 17 district-level indicators. As expected, the cross-district levels of human capital are acutely disparate (Sameehullah & Mustafa, 2017).

1.4.2 Gaps in Literature in Pakistan

All the above-mentioned papers are significant in terms of measuring aspects of social progress and wellbeing at the national or subnational level, given the data constraints. There is however a distinct lack of a sub-national index of social progress or wellbeing with national coverage and based on latest data, that encapsulates the broad scope of the concept. Development of such an index, at the lowest denomination possible, is critical to augmenting social progress in Pakistan as policies and interventions need to be spatially relevant (Rae, 2011). A sub-national index of social progress in Pakistan will offer critical information and actionable evidence at the local level to policymakers. Also, social progress is tied to the concepts of sustainability and social liberty. None of the current papers on Pakistan consider environment quality or other components such as safety, rights, freedom or inclusiveness which have been established to be integral parts of social progress. This is a significant gap in the social research in Pakistan that needs to be addressed to inform policy for sustainable development.

CHAPTER 2

Pakistan Social Progress Landscape

This section discusses Pakistan's standing on various aspects of social progress using global indices and indicators. The section also details the administrative system of Pakistan and legislative power delimitations within the country which are important to understand the service delivery responsibilities and mechanisms catering to the various aspects of social progress.

2.1 Pakistan Administrative System

Pakistan is a parliamentary democracy and consists of four formally recognized provinces—Punjab, Sindh, Khyber Pakhtunkhwa (KPK) and Balochistan along with the capital territory of Islamabad which is geographically inside the province of Punjab. Pakistan also has within its territory, two autonomous regions of Gilgit Baltistan and Azad Jammu & Kashmir. Each province has their own provincial governments that manage critical portfolios of social progress including education, health, law enforcement, environment, housing and urban development. The provinces are further divided into divisions and the divisions are divided into districts. The districts are further divided into tehsils. Most powers from the provinces are delegated down to the local level—the tehsils. The four provinces of Pakistan have a total of 29 divisions and 130 districts. The autonomous regions of Gilgit Baltistan (GB) and Azad Jammu & Kashmir (AJK) have a total of 26 districts (PCGN, 2019).

The last official population census in Pakistan was conducted in 2017. As per the census, Pakistan has a population of 208 million making it the fifth most populated country in the world (Pakistan Bureau of Statistics, 2017). The province-wise population is given in **Table 2.1**.

Table 2.1: Pakistan Province-wise Population

Province	Population (millions)	Population Density per Sq. KM
Islamabad	2.0	2211.2
Punjab	110.0	535.6
Sindh	47.9	339.6
KPK	30.5	409.4
Balochistan	12.3	35.5
GB and AJK	5.0	183.4

Source: Pakistan Bureau of Statistics, 6th Population Census of Pakistan (2017)

2.2 Status of Social Progress in Pakistan

Pakistan has been a consistent laggard in terms of social progress both globally and regionally. Lack of robust and consistent policies along with political instability has meant a lacklustre growth in social progress (Yasmeen et al., 2011). This section provides an outlook of Pakistan's standing on various social progress metrics and comparisons with regional peers.

2.2.1 Comparison to Regional Countries on Global Indies

Figure 2.1 illustrates the ranking of Pakistan among regional countries for various global development indices that measure some aspect of social progress. Pakistan is one of the bottom ranked countries across most of the indices.[2] Not only does Pakistan rank lowly among regional peers, its ranking across most indices is among the worst performers globally. Pakistan's ranking across global indices entails the need for extensive reforms and concerted and multi-dimensional efforts. To be effective, policies need to be localized and designed to spatially target the lagging areas (Rogerson & Nel, 2015). This reinforces the need for a comprehensive sub-national indicator of social progress to enable informed policy-making at the local level.

Figure 2.1: Ranking of South-Asian Countries Across Development Indices
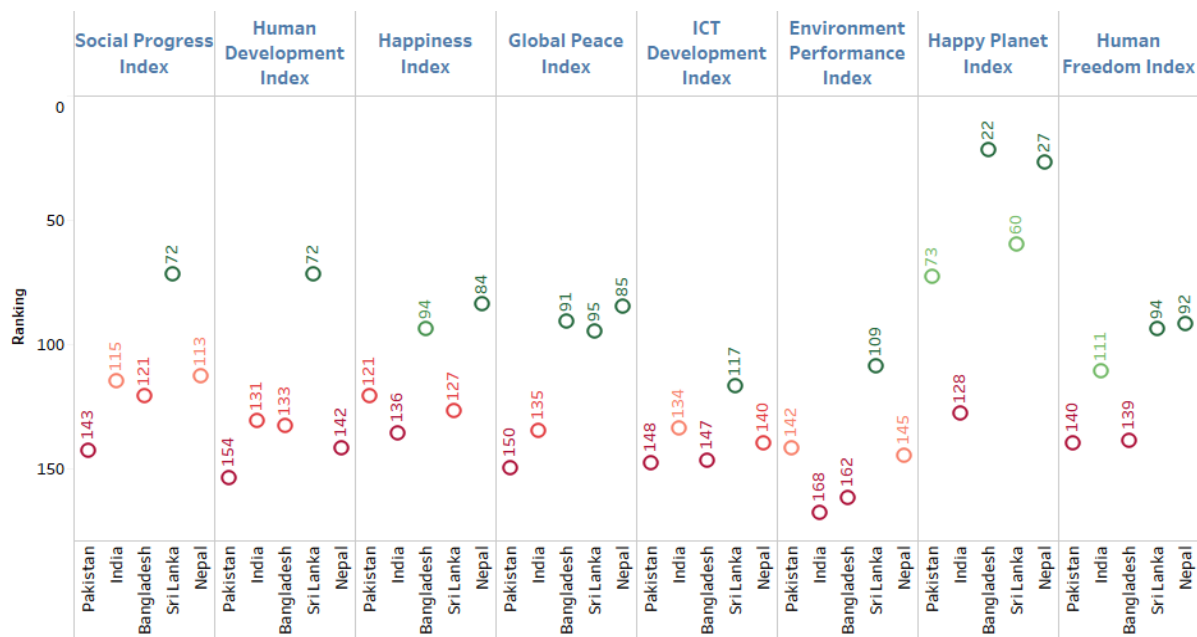
Source: Authors illustration based on multiple data sources for global indices

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2.2.2 Temporal Growth on Critical Indicators

Figure 2.2 depicts Pakistan's growth on key indicators of social progress over the past two decades.[3]

Figure 2.2: Pakistan's Growth on Select Social Progress Indicators from 2000-2020

Over the past two decades, Pakistan has shown improvement across all of the development indicators illustrated in **Figure 2.2**. However, when compared with other regional countries and their improvement in these indicators, it is evident that Pakistan has not been able to keep up with the pace of growth in social progress in the region (see **Figure 2.3** and **Figure 2.4**). Pakistan has consistently remained the worst performer in the region in terms of the social progress index and its ranking has worsened over the years with a sharp decline since 2017. Other regional countries follow a similar trend but are ranked highest than Pakistan. Similarly, for the human development index, Pakistan has fallen behind both Bangladesh and Nepal.

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[3] Data for all indicators is sourced from World Bank and WHO databases up till the latest available year. Sources available at https://data.worldbank.org/ and https://www.who.int/data/gho/data/indicators.

Figure 2.3: Temporal SPI Rankings for South Asian Countries
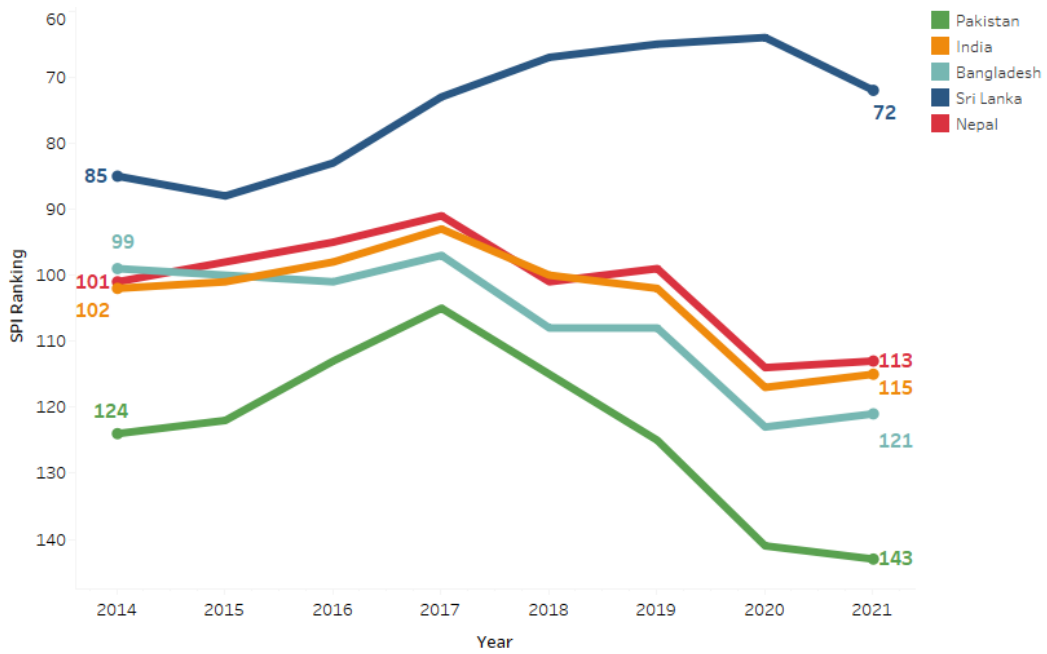
Figure 2.4: HDI trends for Pakistan, Bangladesh and Nepal, 1990-2019
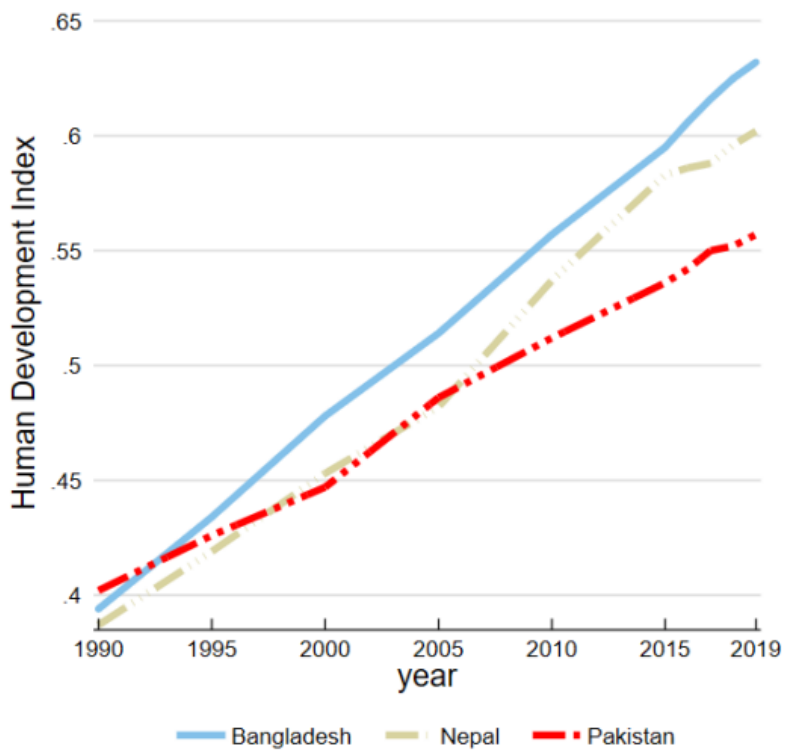
National statistics however, do not reveal the underlying disparities and inequalities that exist in the country. Although Pakistan exhibits national - albeit slow, growth in many aspects of social progress, it is not shared uniformly across all regions of the country. Spatial patterns of inequalities in human development become apparent in a subnational analysis as the one exhibited in the National Human Development Report (2020). As per the report, the issue of spatial disparities is particularly evident in Pakistan and provincial or district boundaries have come to define the inequality in the country. Although provinces such as KPK have experienced growth in human development metrics across the board over the past two decades, others such as Balochistan have remained stagnant. This is despite the increase in the per capita share of national revenue going to the province of Balochistan, meant to redress national inequalities (UNDP, 2020a). These disparities are usually more deep rooted in the mechanisms of resource utilization and service delivery and need to be addressed through informed and spatially targeted policy-making (Sen & Ali, 2009).

The next sections of the paper discuss the construction of a sub-national Social Progress Index for Pakistan at the district level. The forthcoming analysis aims to initiate a discussion about the persistent spatial inequalities of social progress in Pakistan. The analysis will also help policy-makers in making informed decisions to augment social progress at the district level.

CHAPTER 3

Data

3.1   Indicator Selection

This study accumulates extensive data from multiple sources for Pakistan at the district level for social progress indicators. The indicators are grouped into 12 components as per the Global SPI methodology (see **Figure 1.1**). The next section discusses the modified indicator selection framework developed for Pakistan SPI.

3.1.1   Indicator Selection Framework for Pakistan SPI

This paper borrows largely from the indicator selection framework prescribed for the Global SPI (see **Figure 1.3**) with a few alterations. **Figure 3.1** illustrates the indicator selection framework followed by this paper for construction of Pakistan SPI. The only major change from the Global SPI is that this framework allows for the selection of an indicator that covers at least 75% of the geographical regions as opposed to the 95-100% prescribed for the Global SPI. This relaxation is adopted from the JRC-COIN guidebook for construction of composite indicators which allows for indicators covering as low as 50% of the geographical regions (JRC-COIN, 2021). It is adopted as a consequence of the data availability constraints in Pakistan as most data sources do not cover all districts.

Figure 3.1: Pakistan SPI Indicator Selection Framework

The selected indicator should measure a Social or Environmental concept

The selected indicator should measure an outcome indicator that in itself is a concept of interest

The selected indicator should have a reputable source that uses sound methods

The selected indicator should have reasonably current data

The selected indicator should be contextually relevant to the geographical region

The selected indicator should cover at least 75% of the geographical regions

Source: Authors adaptation from Social Progress Index Methodology Report (2021)

The framework also has an additional condition for indicators to be contextually relevant to the geographical region which the indicator is designed to measure social progress for. This is particularly prudent for a sub-national calculation of SPI as the inherent social realities for each society are diverse and unique. A country may have characteristic indicators that critically inhibit social progress and need to be included in the measurement of it. The EU Regional SPI (2020) for example, includes an indicator for housing quality due to dampness (European Commission, 2020). Houses with problems of damp are an issue in Europe—Eastern Europe in particular, and it causes respiratory diseases in children (WHO ECEH,

2009). Similarly, the Social Progress Index for the States of India (2017) include indicators of rural sanitation, pukka (brick) houses and women in Panchyati Raj Institutions, all of which are prevailing issues of social progress in the country (Kapoor et al., 2017).

3.1.2 Pakistan SPI Indicator Level Framework

Table 3.1 illustrates the indicators included in the measurement of Pakistan SPI in this paper, sorted by the dimensions and components which are adopted from the Global SPI framework (see **Figure 1.1**). With a total of 45 indicators, each component is represented by three to six indicators. While most indicators have been taken from national surveys, some indicators have been constructed using data from unconventional yet reliable and reputable sources. Refer to **Table A-1** for more details on the 45 indicators and their construction. The next section describes the data sources used to construct the Pakistan SPI.

Table 3.1: Pakistan SPI Indicator Level Framework

Basic Human Needs	Foundations of Wellbeing	Opportunity
Nutrition & Basic Medical Care	**Access to Basic Knowledge**	**Personal Rights**
- Skilled Attendant at Birth - Antenatal Pregnancy Care - Stunting - Wasting	- Women with No Schooling - Net Secondary Enrolment Rate - Out of School Children	- Average Voter Turnout - Civil Cases Clearence Rates - Criminal Cases Clearence Rates
Water & Sanitation	**Access to Information & Communication**	**Personal Freedom & Choice**
- Absence of Toilet - Improved source of Drinking Water - Handwashing with Soap - Connection to Drainage System	- Individuals using Internet - Individuals with Mobile Ownership - Households with TV ownership - Households with Computer/ Laptop/ Tablet	- Vulnerable Employment - Youth not in Employment, Education or Training - Contraceptive Prevalence - Adolescent Marriage - Adolescent Birth
Shelter	**Health & Wellness**	**Inclusiveness**
- Clean Fuel for Cooking - Electricity for Lighting - Owned Dwellings - Robust Roofing Materials	- Benefiting from Social Protection Schemes - Quality of Health Facilities - Tuberculosis Effective Treatment - Fully Immunized Children	- Gender Employment Rate Gap - Gender Wage Gap - Female Candidates for National Assembly Elections
Personal Safety	**Environmental Quality**	**Access to Advanced Education**
- Quality of Service of Police - Murder Cases - Occupational Injury - Domestic Violence from Husband/Partner	- Proper Solid Waste Disposal - Climate Risk & Hazard Assessment - Air Quality PM2.5 Concentration	- Attained Tertiary Education - Enrolled in Tertiary Education - Years of Education after Secondary for Females - Uneducated population with Technical/Vocational Training

Source: Authors illustration

3.1.3 Data Sources

For the purpose of this paper, multiple data sources have been employed to construct the Pakistan SPI. The latest available data from these sources has been used. **Table 3.2** lists the data sources employed for all the indicators. The Pakistan Social and Living Standards Measurement (PSLM) survey is used as a reference for the list of districts of Pakistan as all sources have a varying list of districts covered. The PSLM

lists 130 total districts in the four provinces of Pakistan however, the survey excludes four districts in Balochistan from data collection due to various reasons (Pakistan Bureau of Statistics, 2021). As a significant number of indicators have been sourced from the PSLM survey, these four districts have also been excluded from the calculation of Pakistan SPI in this paper. A list of 126 districts has been finalized for constructing the Pakistan SPI (see **Table A-2**). The last column of **Table 3.2** shows the coverage of the data source out of a total of 126 districts. The lowest coverage of 94% is for the indicators sourced from the National Nutrition Survey which is well within the requirement of having coverage of more than 75% of the geographical regions (see **Figure 3.1**).

Table 3.2: Data Sources for Construction of Pakistan SPI

Source	Responsible Authority	Year	Geographic level	Coverage of total Districts	Indicators Adopted
Pakistan Social and Living Standards Measurement (PSLM)	Pakistan Bureau of Statistics	2019-20	District	100%	21
Labour Force Survey (LFS)	Pakistan Bureau of Statistics	2020-21	District	100%	9
National Nutrition Survey (NNS)	Ministry of National Health Services, Regulations & Coordination (MNHSRC)	2018	District	94%	3
Maternal Mortality Survey (MMS)	Demographic and Health Surveys (DHS) Program	2019	District	98%	3
Demographic and Health Survey (DHS)	Demographic and Health Surveys (DHS) Program	2017-18	District	94%	1
Judicial Statistics of Pakistan	Law & Justice Commission of Pakistan	2020	District	100%	3
Candidate list for 2018 National Elections	Election Commission of Pakistan	2018	District	100%	1
Voter turnouts for 2018 National Elections	Free and Fair Election Network (FAFEN)	2018	District	100%	1
Climate Change Profile of Pakistan Report	Asian Development Bank	2017	District	95%	1
Air Quality Life Index	Energy Policy Institute at the University of Chicago (EPIC)	2019	District	98%	1
Pakistan 2021 Monitoring Report Universal Health Coverage	Ministry of National Health Services, Regulations & Coordination (MNHSRC)	2021	District	99%	1

Source: Multiple sources for social progress indicators

3.2 Brief Descriptive Statistics

Table 3.3 details some brief descriptive statistics for all the indicators used in constructing Pakistan SPI. Some salient statistics are discussed here. On average, 43.4% of the children under 5 years of age in Pakistan have stunted growth which forms a significant proportion of the population. This is particularly a concerning figure as children facing stunted growth have problems in cognitive development and school performance which can translate into limited opportunities of socio-economic growth in their future lives (Perkins et al., 2017). Another noticeable figure that seems to be a bottleneck for social progress is that only 46.6% of the houses on average are connected to the drainage system, be it either covered, underground or open drain. Rest of the houses, 92% of which are in the rural areas, are not connected to the drainage system at all (Pakistan Bureau of Statistics, 2021). The issue of domestic violence against women is also an apparent widespread vice with almost 30% of women, on average, experiencing domestic violence at the hands of their partners. This coupled with the statistic that 63.6% of women overall have received no formal schooling, a severely compromised state of social progress for women in Pakistan becomes evident. Another theme that stands out from the statistics of social progress indicators is employment. Over 50.1% of the employed persons have vulnerable employment which signals towards high risk of income loss and low opportunities for steady employment in Pakistan. Also, 19.4% of the youth of Pakistan is not in employment, education or training. With Pakistan experiencing a youth bulge and over 19% of the population aged 15-24 years, this raises serious concerns for the lack of opportunities available to the youth to become contributing members of society (Pakistan Bureau of Statistics, 2017).

Table 3.3: Descriptive Statistics

Indicator	N	Mean	Std. Dev.	Max	Min
Nutrition & Basic Medical Care					
Skilled Attendant at Birth (%age of deliveries)	126	79.6	18.3	100.0	10.4
Antenatal Pregnancy Care (%age of births to women aged 15-49 years)	124	83.5	16.8	100.0	11.0
Stunting (%age of children under 5)	119	43.4	8.2	62.9	28.3
Wasting (%age of children under 5)	119	19.1	6.7	42.6	4.5
Water & Sanitation					
Absence of Toilet (%age of households)	126	14.9	15.5	67.0	0.0
Improved source of Drinking Water (%age of households)	126	70.7	23.8	100.0	1.3
Handwashing with Soap (%age of households)	126	39.3	26.8	96.0	0.0
Connection to Drainage System (%age of households)	126	46.6	30.6	99.0	0.0
Shelter					
Clean Fuel for Cooking (%age of households)	126	32.3	27.6	99.8	0.0
Electricity for Lighting (%age of households)	126	83.0	21.6	99.8	0.0
Owned Dwellings (%age of households)	126	85.3	11.5	100.0	42.0
Robust Roofing Materials (%age of households)	126	59.4	28.9	99.9	0.0

Personal Safety					
Quality of Service of Police (%age of households satisfied)	125	57.2	23.0	100.0	1.4
Domestic Violence from Husband/Partner (% of ever married women aged 15-49)	119	29.7	25.0	100.0	0.0
Murder Cases (per 10,000 population)	126	0.8	0.6	3.3	0.0
Occupational Injury (%age of employed population over 10 years)	126	2.4	2.2	11.4	0.0
Access to Basic Education					
Women with No Schooling (%age of women)	126	63.6	20.7	99.0	20.0
Net Secondary Enrolment Rate (%age of children aged 10-12 years)	126	18.9	8.3	41.0	2.0
Out of School Children (%age of children aged 5-16 years)	126	38.0	16.8	76.0	9.0
Access to Information and Communication					
Households with Computer/ Laptop/ Tablet (%age of households)	126	8.5	6.6	40.0	0.0
Individuals with Mobile Ownership (%age of population)	126	42.3	8.9	73.0	24.0
Individuals using Internet (%age of population)	126	26.4	15.0	70.0	0.0
Households with TV ownership (%age of households)	123	47.0	26.6	97.5	0.0
Health & Wellness					
Benefiting from Social Protection Schemes (%age of households)	119	5.7	8.1	38.7	0.0
Quality of Health Facilities (%age of households satisfied)	126	75.6	20.2	97.1	0.0
Tuberculosis Effective Treatment (%age of TB cases)	125	36.8	17.7	98.0	2.2
Fully Immunized Children (%age of children aged 12-23 months)	126	73.4	20.5	100.0	0.0
Environmental Quality					
Proper Solid Waste Disposal (%age of households)	126	11.4	17.4	77.1	0.0
Climate Risk & Hazard Assessment (categorical 7-30)	120	15.7	4.8	30.0	7.0
Air Quality PM2.5 Concentration ($\mu g/m^3$)	124	48.3	13.6	71.7	24.8
Personal Rights					
Civil Cases Clearence Rates (ratio of disposed to instituted cases)	126	90.4	11.8	121.0	13.2
Criminal Cases Clearence Rates (ratio of disposed to instituted cases)	126	92.4	7.1	109.2	74.6
Average Voter Turnout (%age of registered voters)	126	49.5	8.6	69.8	23.3
Personal Freedom & Choice					
Vulnerable Employment (%age of employed)	126	50.1	12.4	78.8	24.8

Youth not in Employment, Education or Training (%age of population aged 15-24 years)	126	19.4	11.5	56.9	2.4
Contraceptive Prevalence (%age of married women aged 15-49)	123	32.3	13.5	64.2	0.0
Adolescent Marriage (% of women aged 14-18)	126	6.8	5.3	22.3	0.0
Adolescent Birth (% of women aged 15-18)	123	2.6	3.1	24.2	0.0
Inclusiveness					
Gender Employment Rate Gap (ratio of male to female employment rate aged 15-60)	126	6.6	8.1	45.6	0.0
Gender Wage Gap (ratio of female to male wage)	124	26.0	26.0	185.8	1.0
Female Candidates for National Assembly Elections (%age of candidates)	126	4.5	5.4	28.6	0.0
Access to Advanced Education					
Attained Tertiary Education (%age of population over 20 years)	126	6.4	4.2	27.4	0.1
Enrolled in Tertiary Education (%age of population over 18 years)	126	1.7	1.0	5.3	0.0
Years of Education after Secondary for Females (years)	126	4.2	0.7	7.0	2.0
Uneducated population with Technical/Vocational Training (%age of uneducated population aged 15 and above)	126	7.2	7.0	35.8	0.0

Source: Authors calculations

CHAPTER 4

Methodology

This paper largely borrows from the methodology of the construction of Global SPI with a few changes based on the structure of Pakistan's data for all 45 indicators. This chapter applies a step-wise methodology for the construction of Pakistan SPI and scoring of Pakistan's districts on the index. The chapter is divided into two main sections pertaining to first, the data treatment and then second, the data aggregation for attaining the components, dimensions and SPI scores for all the districts of Pakistan. Spatial representations of the final scores are then developed at the level of districts as well as provinces to identify the patterns of social disparities within Pakistan.

For the purposes of data manipulations, analysis and index construction, *Stata 17* software has been employed and the spatial representations are developed using the *Tableau* software.

4.1   Data Treatment

Prior to calculation of the index, the data for all indicators needs to the treated for missing values and outliers so that a complete and unbiased SPI can be calculated for all districts of Pakistan. The following sections first discuss the imputation of missing data and then data transformation to treat the outliers.

4.1.1   Missing Values

4.1.1.1   Type of Missing Data

The indicators for Pakistan SPI have been collected from multiple data sources, some of which do not cover all the districts of Pakistan as discussed in **Section 3.1.3**. There are various reasons for these missing values for certain districts. One reason why national surveys do not agree on which districts to include in a survey, is that district delimitations in Pakistan keep changing. The districts included in a survey, really depend on the official number of districts when it was conducted. This type of missing data is classified as 'structurally missing' which is when the data is missing because it was not supposed to exist in the first place, for e.g., if a survey has an indicator targeted towards women, data for men on that indicator will obviously be missing (Pandey, 2020). Another reason for missing data for districts is surveyors not being able to collect a representative sample from certain districts due to various reasons ranging from remote locations to lockdowns during the COVID-19 pandemic (Pakistan Bureau of Statistics, 2021). These districts are hence omitted from the final released microdata or compiled district-level publications. These types of missing values can be categorized as missing at random (MAR) where the non-inclusion of districts is due to known variabilities (Buuren, 2018). Both these types of missing data can be imputed through various approaches.

4.1.1.2 *Data Imputations*

To have a complete SPI for all districts of Pakistan, the missing data needs to be imputed. The indicator selection framework for Pakistan SPI requires that all indicators cover more than 75% of the districts. As discussed earlier in **Section 3.1.3**, all the chosen indicators meet this criterion. Similarly, as per the JRC-COIN recommendations, each geographical region should also be covered by at least 65% of the indicators at the dimension level (JRC-COIN, 2021). For the 45 indicators of Pakistan SPI, all districts satisfy this condition at the dimension level. The least coverage for a district is for Shaheed SikandarAbad in Balochistan province which is covered by 67% of the indicators from the 'foundations of wellbeing' dimension. Hence, after the data imputations, the SPI can be calculated for all 126 districts.

The Global SPI employs various imputation approaches both prior and during the index calculation. The imputations prior to calculation basically rely on historical data which is either used to carry forward a historical value or for linear interpolation (Social Progress Imperative, 2021). However, most of the data sources employed for Pakistan SPI in this paper, do not have previous versions of usable data available. Under this scenario, data is only imputed during the calculations.

For imputations during calculation, the Global SPI uses regression imputation to regress each indicator that needs to be imputed, on other indicators within its respective component and then predicts the missing values (Social Progress Imperative, 2021). For Pakistan SPI, some districts have missing values for more than one indicator in a component. Therefore, regression imputation cannot be used as a general imputation strategy for the purpose of having a complete SPI for all districts. The JRC-COIN has recommended several imputation approaches depending on characteristics of the data. One such approach is mean substitution which involves imputation of missing values with the indicator average (JRC-COIN, 2021). However, considering that Pakistan has acute disparities in social progress across the districts as discussed in **Section 2.2.2**, using indicator average will lead to skewed index scores (Kang, 2013). Instead, this paper uses a more refined approach of imputing missing values with the average of other districts in a division (Tay, 2021).

The approach of using the average of other districts in a division to impute district values has a justifiable rationale. A division is an administrative level in Pakistan which consists of three or more districts (see **Section 2.1**). Each division has a capital district which has on average, better facilities and administrative mechanisms for service delivery. People from adjoining districts avail the services available in the capital district hence, to an extent, convergence throughout all districts in the division, is expected overtime for some of the output indicators of social progress. There are also intra-regional cultural spill overs which also contribute to convergence in various aspects of social progress. The notion of regional convergence for social progress and human development is a well-established hypothesis with plenty of literature to support it (Konya & Guisan, 2008; Siddiqui et al., 2021; Stângaciu & Bucur, 2015; Susanto & Welly Udjianto, 2019).

On account of the aforementioned considerations, this paper uses the average of other districts in the respective division as the general imputation approach. Out of the 45 indicators of Pakistan SPI, 13 indicators have missing values and are imputed using this method. These indicators are listed below:

Table 4.1: Indicators with Values Imputed Through Division Average

Indicators	No. of Values Imputed
Antenatal Pregnancy Care	2
Stunting	7
Wasting	7
Quality of Service of Police	1
Domestic Violence from Husband/Partner	7
Households with TV ownership	2
Benefiting from Social Protection Schemes	7
Tuberculosis Effective Treatment	1
Climate Risk & Hazard Assessment	6
Air Quality PM2.5 Concentration	2
Contraceptive Prevalence	3
Adolescent Birth	3
Gender Wage Gap	2

Source: Authors elaboration

4.1.2 Data Transformations

Once the dataset for all 45 indicators is complete after imputations, the district-level data for Pakistan needs to be transformed before aggregation. The first step is to identify and treat the extreme values so as to not skew the final values of the index. This is a necessary step as outliers could be a result of either heavy-tailed distribution of values or due to measurement errors, both of which can introduce bias in the descriptive statistics as well as the correlations (JRC-COIN, 2021). The Global SPI uses two methods to transform the indicators with skewed distributions; 1) capping, which is to set an upper or lower bound for the indicator, or 2) taking the log of an indicator. The transformation method for the Global SPI is chosen individually based on an indicator's distribution. Indicators are capped to limit the influence of a few near outliers. Inversely, log transformation is used when the indicator has a set of few extreme values which are deemed to represent a meaningful distinguishing characteristic which needs to be preserved in the analysis (Social Progress Imperative, 2021). For the construction of Pakistan SPI, both methods are used for transforming the indicators with skewed distribution. For this paper, the identification of indicators to be transformed is done using the JRC-COIN's recommended methodology of evaluating the skewness and kurtosis of the indicator. Skewness is simply a measure of how skewed a distribution is from a normal distribution which has a skewness of 0 (Oracle, 2022a). On the other hand, kurtosis is a measure of the tailedness of a distribution or heaviness of the tails in relation to the centre of the distribution. A normal distribution has a kurtosis value of 3 and as the tails get fatter, the kurtosis increases (Oracle, 2022b). The JRC-COIN handbook suggests the presence of outliers and hence transformation of the indicator if;

$$|\textbf{Skewness}| > \textbf{2} \qquad \& \qquad \textbf{Kurtosis} > \textbf{3.5}$$

i.e., the absolute value of skewness is greater than 2 and the value of kurtosis is greater than 3.5 (JRC-COIN, 2021). **Table A-3** displays the skewness and kurtosis values for all indicators with the ones meeting the above-stated conditionality being highlighted.

Following the JRC-COIN conditions, ten indicators have been found to have outliers. Further investigation into the indicator distribution is performed for the decision to either cap the indicator or take log, on an indicator-to-indicator basis. **Figure A-1** shows the distributions of the ten indicators under investigation.

4.1.2.1   Capped Indicators

Capping the indicators is a 'winsorization' process by which an indicator is trimmed by treating only the extreme values rather than removing them (Ruppert, 2014). Capping an indicator does not preserve the order relations of the values (JRC-COIN, 2021). This paper sets the lower and upper caps to trim outliers as is recommended by the JRC-COIN handbook. The outliers are capped to the next highest or lowest value, up to the point that either the absolute value of the skewness becomes lower than 2 or the kurtosis becomes less than 3.5 (JRC-COIN, 2021). In this process of meeting the condition, one or more outliers may have to be capped. JRC recommends the use of winsorization for an indicator only if, at most five outliers need to be capped to meet the condition (JRC-COIN, 2021). By this process, eight indicators have been bound by an upper or lower cap as depicted in **Table 4.2**.

Table 4.2: Upper and Lower Caps on Outliers

Indicator	Cap
Antenatal Pregnancy Care	Capped to 21.4 (Lower)
Benefiting from Social Protection Schemes	Capped to 32.7 (Upper)
Quality of Health Facilities	Capped to 20.0 (Lower)
Civil Cases Clearence Rates	Capper of 62.8 (Lower)
Adolescent Birth	Capped to 11.3 (Upper)
Gender Employment Rate Gap	Capped to 32.2 (Upper)
Gender Wage Gap	Capped to 89.1 (Upper)
Attained Tertiary Education	Capped to 24.2 (Upper)

Source: Authors elaboration

4.1.2.2   Log-Transformed Indicators

Log transformation of an indictor makes its distribution spread more homogenously across the scale. Taking the log transforms all the values of the indicator unlike capping which transforms only the outliers. It also preserves the order relation of the values (JRC-COIN, 2021). For the decision to log-transform an indictor with outliers, both the JRC-COIN recommendation and the Global SPI methodology have been followed. Indicators have been log-transformed either if more than 5 outliers need to be capped to meet the skewness and kurtosis condition, or the outliers are deemed to represent a distinguished characteristic

of the districts and need to be preserved. By this process, two indicators with outliers have been log-transformed, 1) Households with Computer/ Laptop/ Tablet and 2) Proper Solid Waste Disposal. Before the log transformation, an alpha of 1 percentage point is added to both the indicators as both of them have multiple values of zeros in them (Social Progress Imperative, 2021).

4.2 Calculation of Pakistan SPI

There are five main steps involved in the calculation of Pakistan SPI after we have the treated and complete dataset. First, all the indicators need to be calibrated and standardized. For calibration, the utopias and dystopias i.e., the best and worst scenarios, are defined for all indicators (these are later used as minima and maxima to transform all values to 0-100 scale). Then the indicators with a negative relation to social progress, depending on their definition are inverted, after which the indicators are standardized using the z-scores. Then we move on to the aggregation of the indicators into components, components into dimensions, and dimensions into the Pakistan SPI while transforming all scores to 0-100 scale. The next sections discuss all the steps for the calculation of Pakistan SPI in greater detail.

4.2.1 Standardization

4.2.1.1 Utopia and Dystopia

Standardization is a necessary step in the construction of a composite index to transform all indicators onto a common scale before aggregation. Prior to the standardization and in accordance with the Global SPI methodology, this paper assigns utopias and dystopias to each indicator which signifies the best and the worst possible scenarios. This is to establish the best (ideal)/worst case scenarios which will affect the transformation to 0-100 scale (Social Progress Imperative, 2021). The Global SPI uses either the theoretical worst and best possible values for an indicator, or the historical best and worst performance for an indicator as the utopias and dystopias. As historical values for most indicators of Pakistan SPI are not available and the main purpose of the index is to highlight the disparities within Pakistan, it is most prudent to use the maximum and minimum values within the dataset as the utopias and dystopias. For indicators contributing negatively to social progress, as listed in **Table 4.3**, the minimum values are utopias and the maximum values are dystopias.

4.2.1.2 Inversion

After the utopias and dystopias have been assigned, the next step is to invert the indicators to correct their orientation with the index. The indicators that have a negative perceived relationship with social progress i.e., those indicators for which a higher value contributes negatively social progress are inverted. By definition, it is relatively easy to determine such indicators and the last column of **Table A-1** denotes whether the indicator has positive or negative relation to social progress. **Table 4.3** lists the inverted variables.

Table 4.3: List of Inverted Variables

Inverted Variables
Stunting
Wasting
Absence of Toilet
Murder Cases
Occupational Injury
Domestic Violence from Husband/Partner
Women with No Schooling
Out of School Children
Climate Risk & Hazard Assessment
Air Quality PM2.5 Concentration
Vulnerable Employment
Youth not in Employment, Education or Training
Adolescent Marriage
Adolescent Birth
Gender Employment Rate Gap
Gender Wage Gap

Source: Authors elaboration

4.2.1.3 Z-score Standardization

Once the indicators have been inverted, they are then standardized using the z-score standardization following the approach of Global SPI. This process standardizes each value of the indicator such that the mean of the indicator values is 0 and the standard deviation of the indicator values is 1. Following is the equation for converting all values of the indicators into z-scores.

$$z_{ij} = \frac{x_{ij} - \mu_j}{\sigma_j} \tag{4.1}$$

where for indicator j, z is the z-score of district i $(i = 1, ..., n)$, x is the value of district i, μ is the mean, σ is the standard deviation.

4.2.2 Aggregation

This paper considers several approaches for aggregation at the indicator, component and dimension level. An important consideration in the selection of an approach is the compensability or substitutability it offers to variables in the model. Compensability of an aggregation approach is the degree to which it allows the under-performance in one variable to be compensated by an over-performance in another variable (Bruzzi et al., 2019). Ideally, compensability between the indicators should be controlled to avoid masking poor performance in certain metrics (Annoni & Scioni, 2022). The following sections discuss the hybrid aggregation approach employed for the construction of Pakistan SPI.

4.2.2.1 Calculation of Component Scores

In a composite index like the SPI, weights assigned to indicators have a significant impact on the eventual scores and rankings. As discussed in **Section 1.3**, the Global SPI uses Principal Component Analysis (PCA) to assign weights to the indicators for their aggregation into components. PCA is used to

account for the highest possible variation in the indicators and correcting for the overlapping information between correlated indicators to make their aggregation more meaningful (European Commission, 2022).

Apart from PCA, JRC-COIN also suggests other approaches for aggregation at the indicator level. One such commonly used approach is arithmetic mean (JRC-COIN, 2021). In principle, arithmetic mean is equivalent to assigning equal weights to all indicators within a component. Several global indices including the Quality of Life Index use arithmetic mean to aggregate indicators (Morris, 1978). More relevantly, the EU-SPI also uses arithmetic mean to aggregate the indicators into components (European Commission, 2020). One issue often highlighted with unweighted arithmetic mean is that it offers perfect substitutability to indicators (Jitmaneeroj, 2017). EU-SPI resolves this by using PCA to identify and remove non-influencing indicators that are not consistent with others in a component. The final included indicators have a limited compensability effect (European Commission, 2020).

For Pakistan SPI, while most of the indictors depict a fair level of positive correlation between them, some indicators also have negative correlations even after the inversions. **Table A-4** depicts the correlation between the indicators after the data treatment and inversions. It is usually not advisable to aggregate indicators that have negative correlations with other indicators in their respective components. The use of PCA to assign weights to such indicators may lead to negative weights which raises conceptual issues of the index (Becker et al., 2017). Due to the presence of some negative correlations between the indicators of Pakistan SPI, using PCA to assign weights in not the most prudent approach. Here, it is pertinent to reiterate the data limitations for the construction of Pakistan SPI as usable district-level data across social progress domains is not readily available. Hence, with limited choice of variables, aggregation despite some negative correlations is pursued in this paper with the recognition that it is not the most ideal approach. Removing indicators with negative correlations or non-influencing indicators through PCA, will compromise the completeness of the index.

For this paper, assigning equal weights to aggregate the indicators serves the intended purpose of highlighting spatial disparities especially considering a sub-national context. The indicators are aggregated into components by summing all the indicators in a component and dividing the sum by number of indicators in the component as per the following notation:

$$Component = \frac{1}{n} \sum_{i=1}^{n} x_i \qquad (4.2)$$

where n is the number of components and x is the respective indicators starting from i $(i = 1, ..., n)$.

After the component scores have been calculated, they are normalized on the 0-100 scale using min-max normalization for better comparability and interpretability using the following notation:

$$\frac{x_j - worst\ case}{best\ case - worst\ case} \times 100 \qquad (4.3)$$

where x is district j $(j = 1, \dots n)$ and the worst case corresponds to the dystopian value while the best case corresponds to the utopian value.

4.2.2.2   *Calculation of Dimension and Index Scores*

More so than at the indicator level, the effect of compensability is pronounced at the component and the dimension level. To avoid full substitutability between the components and dimensions, the EU-SPI uses generalised unweighted mean for aggregating them (European Commission, 2020). Generalized unweighted mean is used as an inequality adverse type of aggregation. If the parameters are adjusted as such, it can be used to reward an increase in the lower values of a distribution with a greater increase in the dimension or index score as opposed to an increase in the higher values, essentially giving more importance to low levels (Ruiz, 2011). This paper follows the approach employed by the EU-SPI for the aggregation of components and dimensions as described below.

Let x_{ij} denote the score of component (or dimension) j for district i $(i = 1, \dots, n)$. The aggregate dimension or index scores for district i (I_i) is computed as the unweighted generalised power mean of order β of q components (or dimension) (European Commission, 2020).

$$I_i^{(\beta)} = \begin{cases} \left(\left(\frac{1}{q} \sum_{j=1}^{q} x_{ji}^{\beta} \right)^{1/\beta} \right. & \beta \neq 0 \\ \left(\prod_{j=i}^{q} x_{ij} \right)^{1/q} & for\ \beta = 0 \end{cases} \tag{4.4}$$

where β is a constant that can be controlled to adjust the level of substitutability between the components or dimensions. Adjusting the value of $\beta = 1$ gives the arithmetic mean which has perfect substitutability and adjusting value of $\beta = 0$ gives the geometric mean which has partial substitutability. The EU-SPI uses $\beta = 0.5$ to have a partial substitutability between the arithmetic and geometric mean (European Commission, 2021). This paper uses the same value of β for Pakistan SPI.

After computing the scores for Pakistan SPI, maps are developed to spatially represent the scores of SPI using Tableau software. The spatial layers for Pakistan's district boundaries are sourced from The Urban Unit, which is a spatial analysis thinktank in Pakistan. The districts have also been ranked based on the scores for the components, dimensions and Pakistan SPI. Further analysis is also performed at the provincial and national levels by applying population weights to the scores.

CHAPTER 5

Analysis

This chapter presents the results of Pakistan SPI scores at the district and provincial level. Maps and other illustrations are used to present the scores of the components, dimensions and Pakistan SPI. These illustrations are then used to identify and analyse the spatial disparities present within the country.

5.1   District Level Findings

Table 5.1 presents the top and bottom ten districts according to the Pakistan SPI scores. A distinct pattern of spatial inequality is evident from the scores. It is important to note that the scores for Pakistan SPI, its components and dimensions, are contextual only to Pakistan and cannot be compared to Global SPI scores of other countries.

Table 5.1: Top and Bottom 10 Districts Scores and Rankings

District	Province	Basic Human Needs		Foundations of Wellbeing		Opportunity		Pakistan SPI	
		Score	Rank	Score	Rank	Score	Rank	Score	Rank
Top 10									
Islamabad	Punjab	83.4	10	77.6	1	69.4	1	76.7	1
Rawalpindi	Punjab	81.5	16	72.0	3	62.6	2	71.8	2
Lahore	Punjab	82.5	12	72.1	2	61.2	6	71.7	3
Sialkot	Punjab	83.5	9	70.0	6	59.6	8	70.7	4
Gujrat	Punjab	87.6	1	68.5	7	56.6	20	70.3	5
Gujranwala	Punjab	83.5	8	70.0	5	57.3	18	69.9	6
Hafizabad	Punjab	81.6	15	63.7	15	62.3	3	68.9	7
Chakwal	Punjab	84.6	4	67.4	9	52.1	43	67.4	8
Karachi Central	Sindh	85.1	3	61.6	18	56.2	23	67.1	9
Jhelum	Punjab	82.0	13	70.1	4	50.9	56	67.0	10
Bottom 10									
Tharparkar	Sindh	39.0	124	27.7	119	46.1	80	37.2	117
Mohmand	KPK	45.2	116	29.8	114	35.2	116	36.5	118
Sohbatpur	Balochistan	38.9	125	29.2	116	38.1	111	35.3	119
Awaran	Balochistan	47.1	115	28.5	117	31.1	123	35.1	120
Sheerani	Balochistan	35.0	126	21.9	124	51.3	52	35.0	121
Nasirabad	Balochistan	53.1	102	23.7	122	31.1	122	34.9	122
South Waziristan	KPK	50.9	107	32.5	106	23.6	125	34.8	123
Shaheed SikandarAbad	Balochistan	40.1	122	18.3	126	36.2	115	30.7	124
Khuzdar	Balochistan	39.0	123	18.9	125	34.1	119	30.0	125
Dera Bugti	Balochistan	41.6	121	22.6	123	22.5	126	28.3	126

Source: Authors calculations

Nine of the top ten districts that scored the highest as per Pakistan SPI are in Punjab and none of the bottom ten districts are from the province. Expectedly, Islamabad—the capital district of Pakistan, ranks the highest by some margin in terms of SPI scores and is also the top ranked district in the dimensions of 'Foundations of wellbeing' and 'Opportunity'. On the bottom end of Pakistan SPI, seven out of the ten bottom districts are from Balochistan province including the last ranked Dera Bugti. Most of the bottom ranked districts have received poor scores across all dimensions of SPI. A complete list of district scores and rankings is presented in **Table A-5**.

Patterns of inter-provincial disparity in social progress become more obvious from the province-segregated representation of Pakistan SPI scores illustrated in **Figure 5.1**. The median SPI score for Punjab's districts is around 64 with highest and lowest scores of 76.7 and 49.4 for Islamabad and Rajanpur respectively. The median for Sindh is 53 which is 11 points lower than Punjab. The highest and lowest scores for Sindh are 67.1 and 37.2 for Karachi Central and Tharparkar respectively. The districts of KPK have very similar score distribution to Sindh with a median of 52 and highest and lowest value of 65.5 and 34.8 for Abbottabad and South Waziristan respectively. Balochistan is certainly a laggard in terms of social progress with a median SPI score of 42 and having the lowest scored district in Pakistan as discussed earlier. Quetta seems to be an oasis within the province with a score of 64.2. Balochistan is a scarcely populated province and Quetta represents 20% of the population (Pakistan Bureau of Statistics, 2017). Population weighted scores for provinces are discussed in later sections.

Figure 5.1: Province-segregated Pakistan SPI Scores for Districts of Pakistan
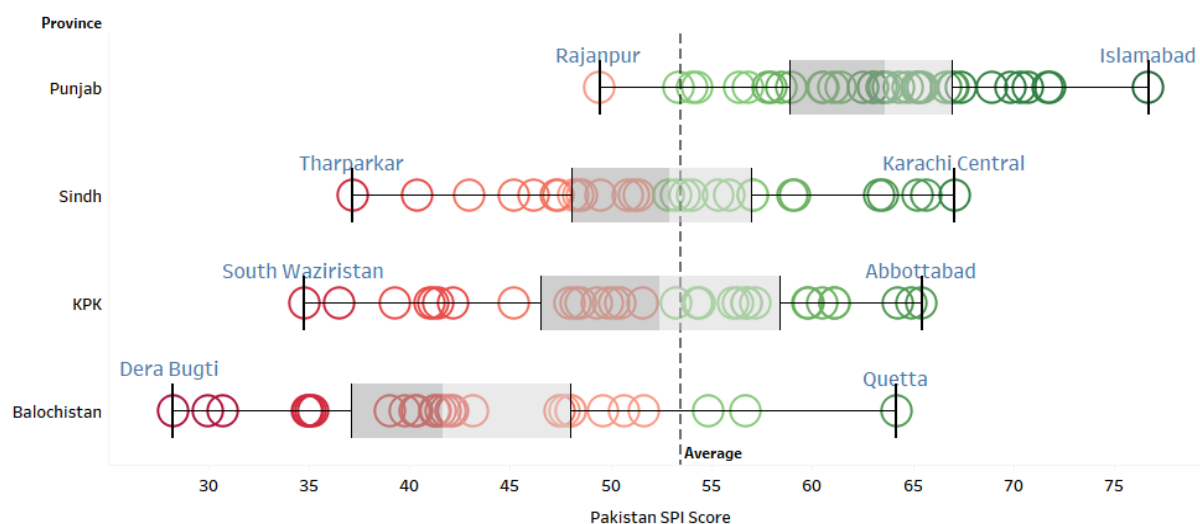
Source: Authors illustration

Similarly, the province-segregated dimension scores for Pakistan SPI are depicted in **Figure 5.2**. On average, the districts of Pakistan appear to perform better in the 'Basic Human Needs' dimension with a median score of 68 across all districts. The median for 'Foundations of Wellbeing' dimension is 47 and the median for 'Opportunity' dimension is 50 across all districts.

Figure 5.2: Province-segregated Dimension Scores of Pakistan SPI for Districts of Pakistan

Figure 5.3 depicts the box plots for the component scores of all districts of Pakistan. An important thing to note is that the whiskers of this particular plot show the full extent of the data i.e., the maximum and minimum values and not the interquartile range. An interesting observation from the plot is that many districts of Sindh and Balochistan have scored highest across several components. Umer Kot of Sindh in particular, is the highest scoring district across two components, 'Health and Wellness' and 'Inclusiveness'. However, it can be deduced, that these districts are not able to perform as good across other components, hence they lose out on aggregation to dimensions. On average, the districts score the best in 'Nutrition and Basic Medical Care' and 'Personal Safety' and these components have the least variation in scores across the districts. Similarly, the districts on average perform worst across the access to education components; advanced education in particular, and access to information & communication. These components along with inclusiveness and water & sanitation also have the highest variability in scores across the districts.

Figure 5.3: Component Score Box-Plots with Best and Worst Performing Districts
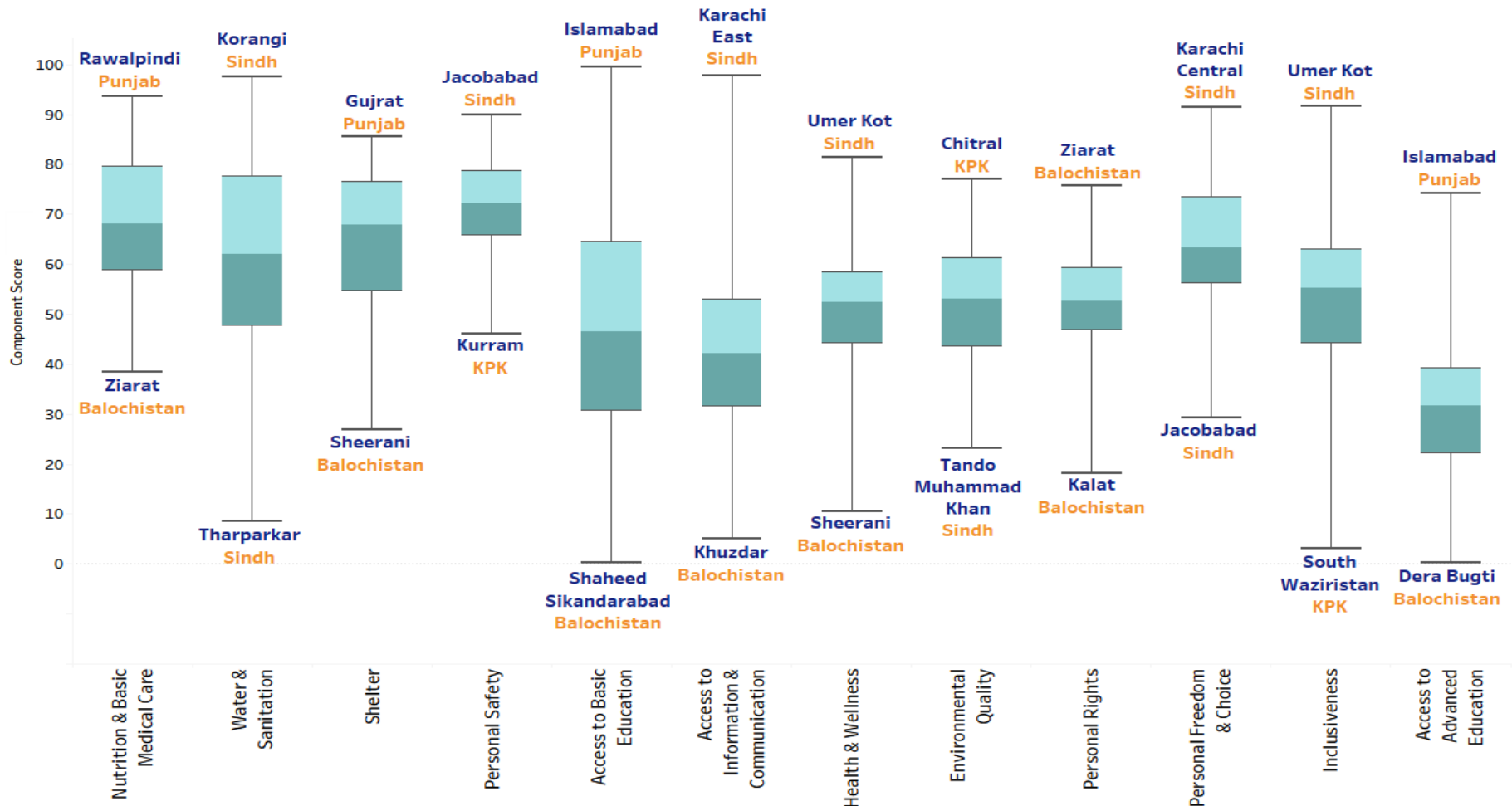
Source: Authors illustration

The Pakistan SPI map in **Figure 5.4** shows all districts of Pakistan grouped into six equal tiers as per their scores. The districts with no data are the ones that were removed from index calculation in the indicator selection stage. Labels for only select districts are shown to prevent clutter. Very clear patterns of spatial inequalities in social progress can be observed all across Pakistan especially between the provinces. Most districts of Punjab fall in tier 1 to 3 while most districts of Balochistan fall in tier 4 to 6. Not only are there acute disparities between the provinces, but even within the provinces. Most of North-Eastern Punjab districts fall in tier 1 while Southern and Western districts mostly fall in tier 3 or even 4 in the case of Rajanpur. Similarly, while most of Central Sindh districts fall in tier 3, Southern Punjab districts fall in tier 4 to 5.

Similar patterns of disparity between and within the provinces can be observed across all the dimensions of Pakistan SPI as depicted by **Figure 5.5**, **Figure 5.6** and **Figure 5.7**. Northern Punjab districts on average perform better than the rest of Pakistan across all the dimensions. Barring the district of Quetta, Balochistan under-performs on all dimensions of social progress. Similar patterns of under-performance across dimensions are observed in Western KPK and Southern Sindh.

Figure 5.4: District-wise Pakistan SPI Map
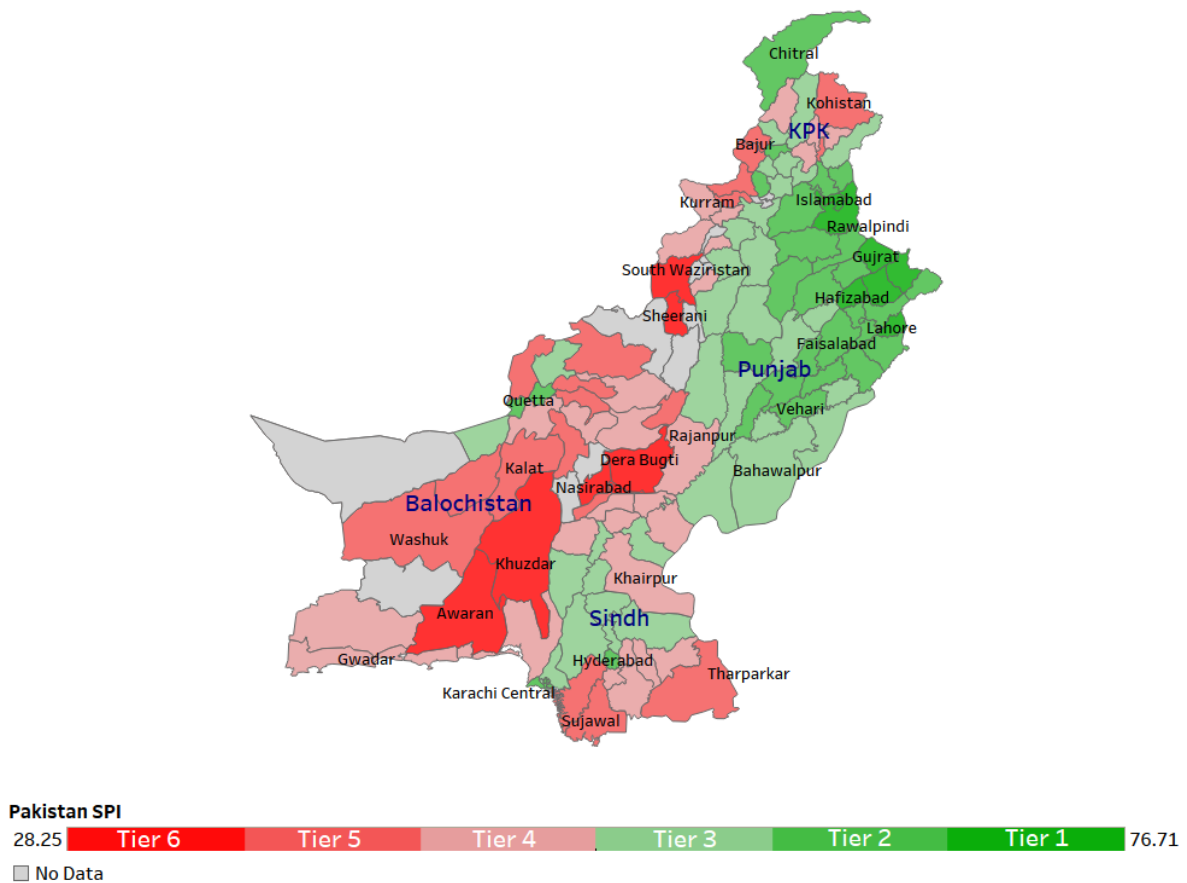
Source: Authors illustration

Figure 5.5: District-wise Foundations of Wellbeing Dimension Map

Foundations of Wellbeing

| 18.92 | Tier 6 | Tier 5 | Tier 4 | Tier 3 | Tier 2 | Tier 1 | 77.59 |

☐ No Data

Figure 5.6: District-wise Basic Human Needs Dimension Map

Basic Human Needs

| 34.96 | Tier 6 | Tier 5 | Tier 4 | Tier 3 | Tier 2 | Tier 1 | 87.57 |

☐ No Data

Figure 5.7: District-wise Opportunity Dimension Map
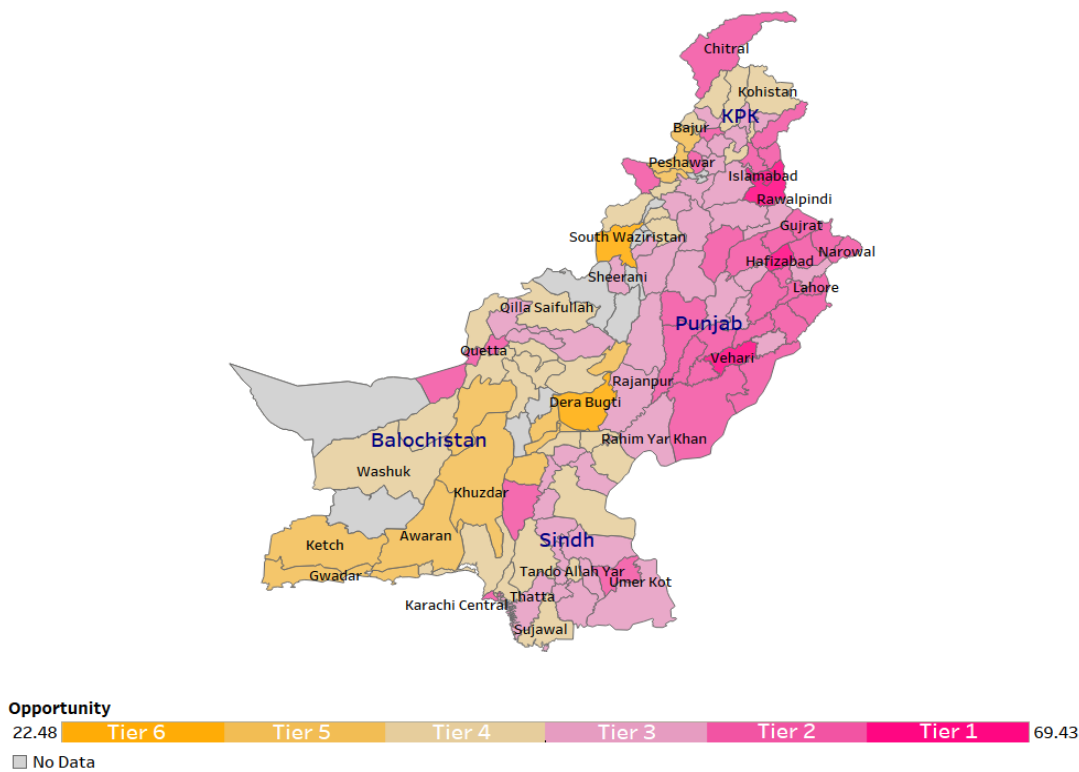
5.1.1 Wealth and Social Progress

Further, the Pakistan SPI scores for the districts are plotted against the average wealth quintile for the districts. The National Nutrition Survey 2018, provides district representative wealth quintiles at the individual level. Wealth quintiles are represented by categories of one to five; one being the poorest and five being the richest (MNHSRC, 2018). The average wealth quintile for a district is calculated by aggregating the product of the category number i.e., 1 to 5, and the population weight for that category. As can be seen from **Figure 5.8**, there is a positive and strong correlation between the SPI scores and the average wealth quintile for the districts which is also evidenced by the corelation coefficient of 0.87 between them. A distinct trend can be seen of districts with higher average wealth quintiles having higher SPI scores. The chart also shows that on average, more districts of Punjab have higher average wealth quintiles than the other provinces and the districts of Balochistan on average have the lowest wealth quintiles. This correlates with the average SPI scores in these provinces. It is also however clear from **Figure 5.8** that wealth does not fully explain the variations in social progress as districts with almost the same level of average wealth can have widely divergent SPI scores. Case in point are Islamabad and Karachi South. The Global SPI report also establishes a similar relationship between Global SPI scores for countries and their GDP per capita (Social Progress Imperative, 2021).

Figure 5.8: Pakistan SPI Score vs Average Wealth Quintile
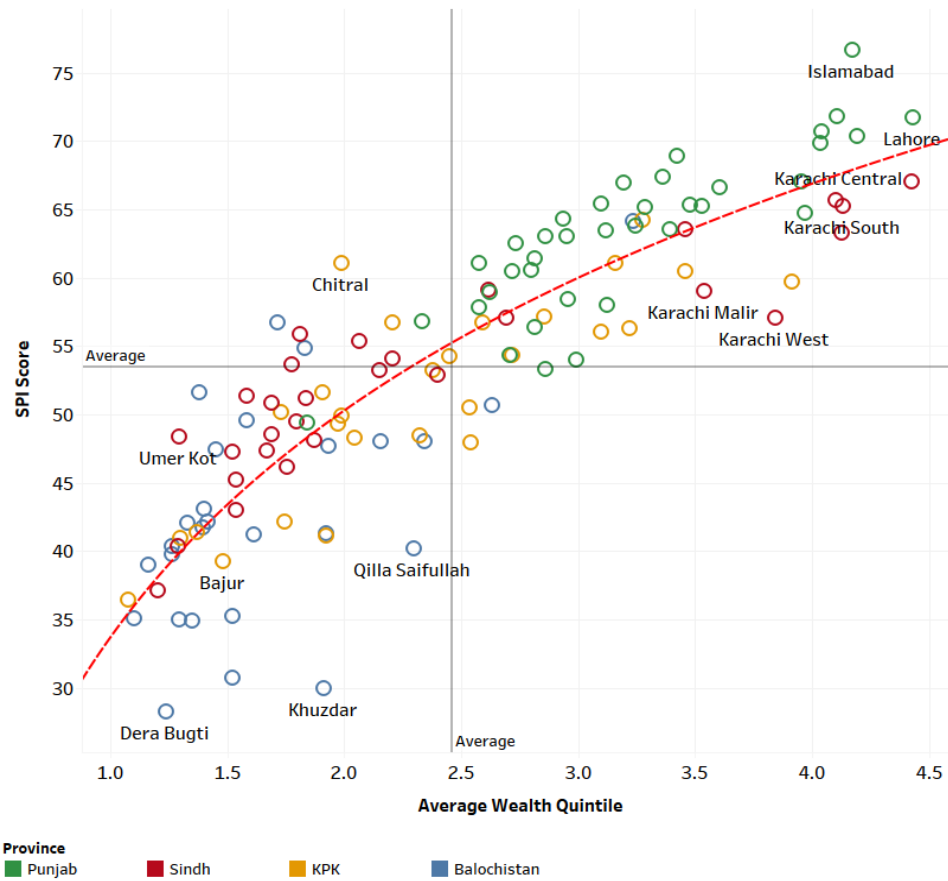
5.2   Province Level Findings

The province level scores for components, dimensions and SPI are generated by aggregating the product of population weights for districts of a province with their respective values.[4] Islamabad, being the federal capital and under the control of federal administration, has been analysed separately from Punjab. **Figure 5.9** shows the population weighted provincial Pakistan SPI scores. The Pakistan SPI score for Islamabad is expectedly much higher than the rest of Pakistan which distinguishes its status as the capital district of Pakistan.[5] On average, Islamabad has better facilities for service delivery to augment the social progress of the population. Punjab has the second highest social progress and is markedly higher than the rest of the provinces in social progress even after excluding Islamabad. Sindh and KPK has received the same population weighted SPI score of 55 while Balochistan still slacks behind other provinces.

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[4] Population weighted scores for the provinces do not consider the populations for the districts that were excluded in the initial index calculation.

[5] District and population weighted scores for Islamabad are the same as only that district is considered.

Figure 5.9: Province-wise Pakistan SPI Map
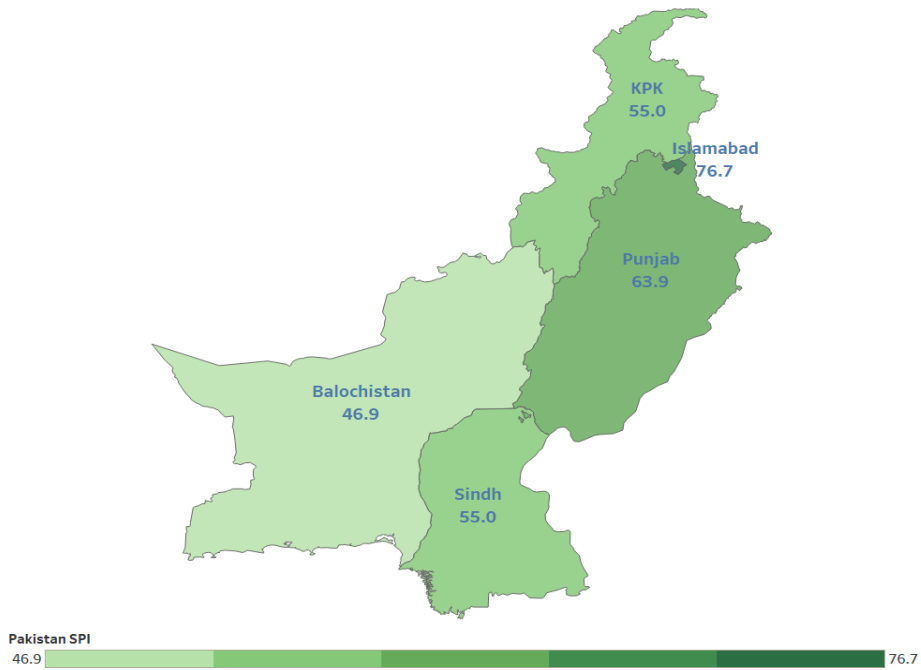
Figure 5.10 compares the population weighted scores for the provinces with the average score of all districts in the province. All provinces have higher population weighted scores than the mean of their district scores which indicates that higher proportions of populations live in districts with better Pakistan SPI scores. This is particularly true for Balochistan and KPK where a significant proportion of population lives in districts that score higher than the province average such as Quetta and Peshawar respectively. Whereas for Punjab, there is not much difference between the two scores which indicates that the population is more spread-out across high scoring and low scoring districts.

Figure 5.10: Comparison of Population Weighted and Mean District Scores
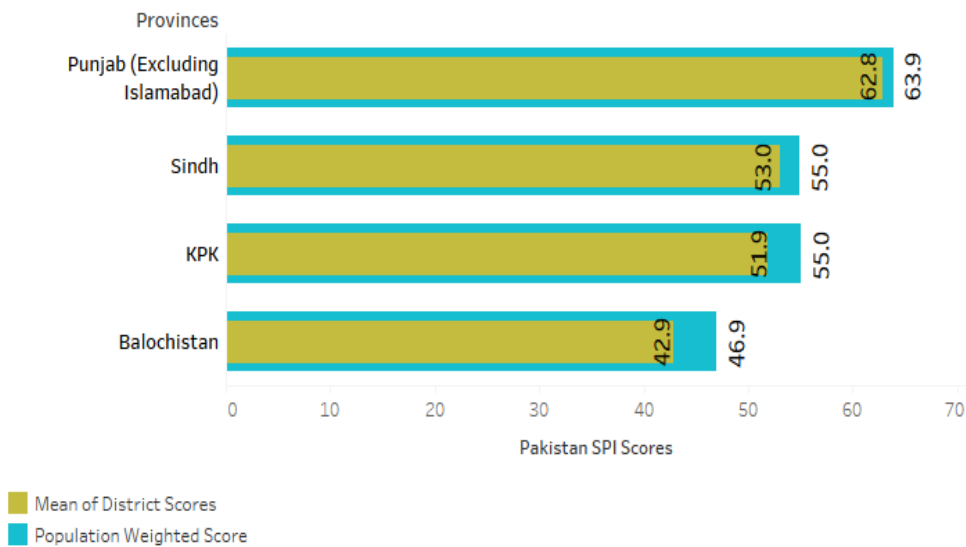
A comparison of population weighted component scores for all provinces is shown in **Figure 5.11**. Islamabad outperforms other provinces in almost all components barring 'Health & Wellness' and 'Shelter'. Islamabad is most ahead of other provinces in 'Access to Basic and Advanced Education' and 'Access to Information & Communication'. In comparison, other provinces score poorly in these three components especially in 'Access to Advanced Education'. Sindh particularly scores poorly in the 'Environmental Quality'. Balochistan is a low scorer across all the components and receives a particularly low score in components of education and information and communication. On average, the provinces score better on the 'Nutrition and Basic Medical Care' and 'Personal Safety' components. Inversely, on average the provinces receive lowest scores in the 'Access to Advanced Education' component followed by the 'Health and Wellness' component as per the population weighted provincial scores.

Significant variation can be seen between provinces in the component scores across most of the components particularly comparing Islamabad and even Punjab with the rest of Pakistan's provinces. Similarly, the variances in scores can be observed between the provinces at the dimension level (see **Figure 5.12**). On average, the provinces perform best in the 'Basic Human Needs' dimension and roughly the same across the other two dimensions. Highest variability between the provinces can be observed in the 'Foundations of Wellbeing' dimension.

Figure 5.11: Comparison of Population Weighted Component Scores of Provinces
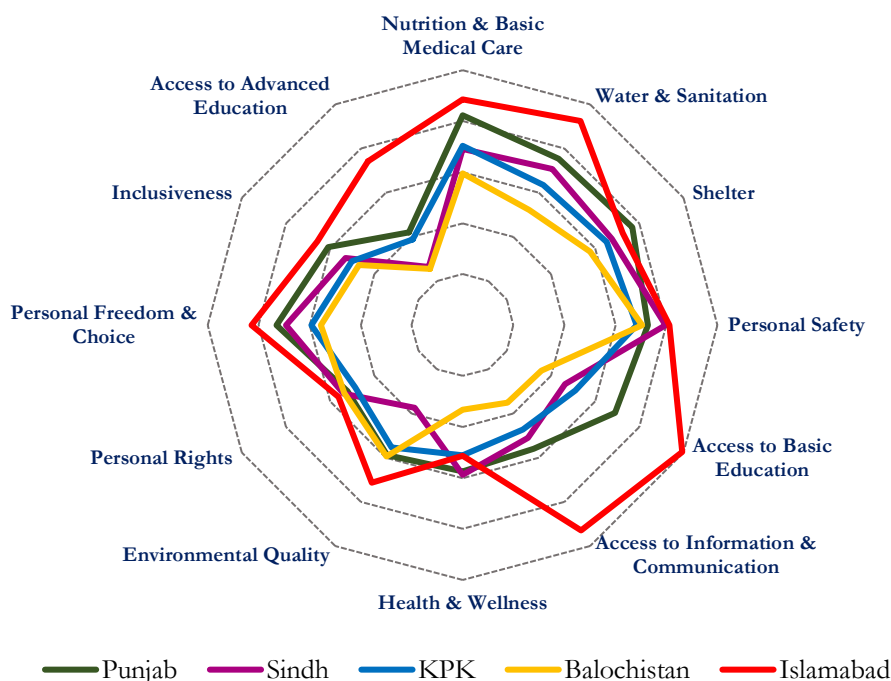
Figure 5.12: Comparison of Population Weighted Dimension Scores of Provinces
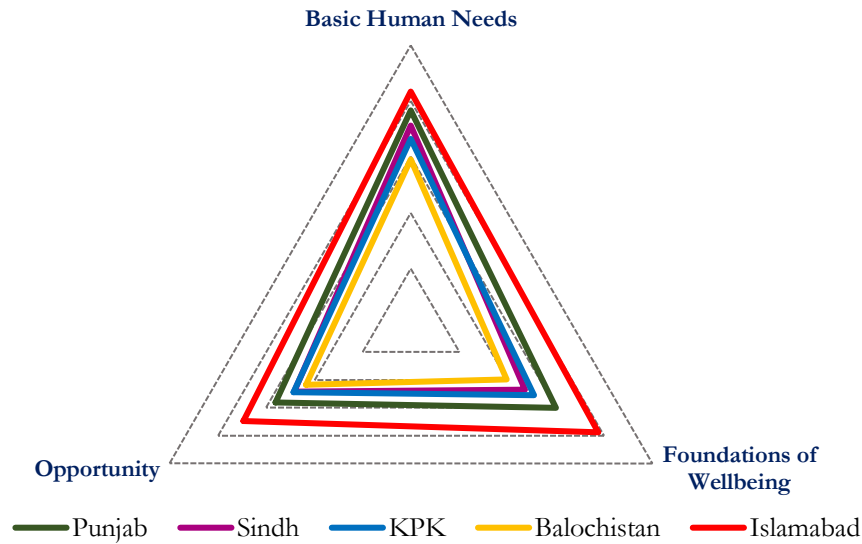
Source: Authors illustration

5.3   National Level Findings

The national level scores for components, dimensions and SPI are calculated by aggregating the product of the national population weights of the districts with their respective scores. Overall Pakistan receives a population weighted SPI score of 59.5 which is significantly higher than the mean SPI score of all districts, i.e., 53.4. It implies that greater proportions of the population live in districts with higher SPI scores, as was also established in the provincial level analysis. **Figure 5.13** depicts the population weighted component scores for Pakistan. Pakistan's performance is clearly the worst in 'Access to Advanced Education' component. Scores across components of the dimensions 'Foundations of Wellbeing' and 'Opportunity' are comparatively low except for the 'Personal Freedom and Choice' component. Overall, Pakistan performs better in 'Basic Human Needs' dimension.

Figure 5.13: Population Weighted Component Scores for Pakistan
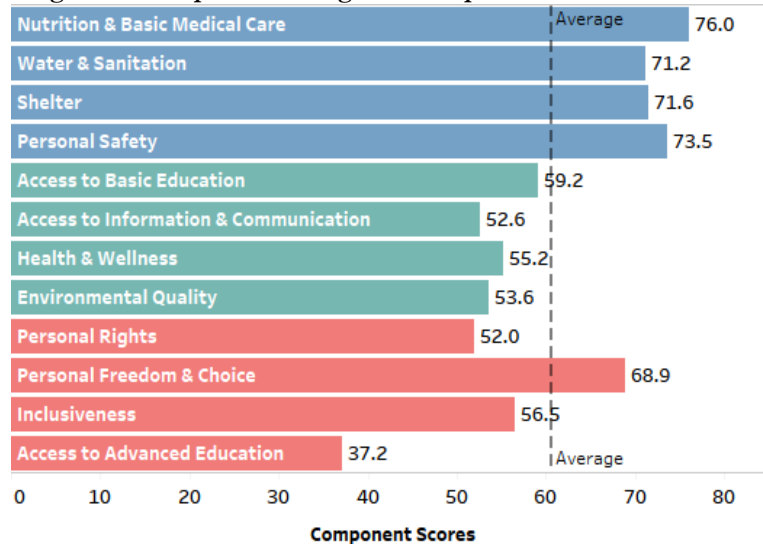
Source: Authors illustration

CHAPTER 6

Discussion and Policy Implication

6.1 Pakistan SPI as a tool for Policy

Distinct patterns of spatial disparity in social progress and its components have been observed across the districts of Pakistan. The analysis shows that not only do spatial inequalities exist between the provinces but they also emerge even within the provinces. This paper delivers an unprecedented and multidimensional insight into the regions of low progress in Pakistan. It also provides an extensive basis for policymakers to formulate targeted interventions across the districts and prioritize policy areas to augment the social progress of the people of Pakistan.

The Pakistan SPI can be a guiding tool for targeted policy making and interventions across districts as well as across sectors. In particular, the districts of Balochistan have been left far behind in almost all components of social progress. Wide-ranging and cross-sectoral policies will be required with contributions from local stakeholders to elevate the plight of the province. In particular, lowest ranking districts such as Dera Bugti need to be prioritized. Dera Bugti has received particularly low scores in both the access to basic and advanced education components. At the sectoral level, most districts of Pakistan perform poorly on the access to advanced education component. Tertiary education is crucial for an economy's productivity and competitiveness (Murthi et al., 2021). At sectoral level, an action plan is required to identify the impediments and implement policies to improve access across all regions. The SPI also engenders the importance of environment in the achievement of social progress elevation by highlighting the poor performance of most districts in this component. Inclusiveness and rights of women are also particular concerns that need to be addressed.

Prioritization does not only mean the allocation of higher budgets for the underperforming districts or regions and this alone cannot improve social progress. Balochistan and KPK already receive a greater share of the national budget than their population proportion as part of the national scheme to elevate social progress in these regions (National Finance Commission, 2020). However, this has not translated into an elevation of social progress levels in these provinces. The scores of districts on the social progress index provide an essence of the social progress scenario and direct policymakers to which policy areas need to be prioritized. To actually improve social progress in these areas, a greater understanding of the underlying impeding factors that contribute to social progress is required. For example, most districts perform the worst in the access to education and access to information and communication components. There are several causal factors which contribute to these disparities such as access to and quality of infrastructure, income, urbanization and other cultural factors (Sajjad et al., 2022).

Before policies and interventions can be developed to augment social progress, these causal factors that determine and vary the levels of social progress need to be identified. The results of this study can be key in evaluating and identifying these causal factors for the components of social progress. Once these

determinants have been identified, specific and spatially targeted projects pertaining to these factors need to be implemented for example infrastructure improvements or cash transfers.

Essentially, an important takeaway from the results of this study is that the inequalities in social progress and its components across the districts of Pakistan, stems from a disparate distribution of these determinant factors. Districts that are division or province capitals are ones with better facilities and infrastructure such as Islamabad, Lahore, Quetta, Karachi or Peshawar and they have better levels of social progress across most components. Patterns of convergence can also be observed around these districts as was earlier hypothesised in this paper while imputing the data in **Section 4.1.1.2**.

Sustainability is a consistent concern in Pakistan. The performance of Pakistan's districts in the environmental quality component is also not very encouraging. Pakistan is an environmentally stressed country that is facing the brunt of climate change (Khan, 2020). Climate change is one of the factors contributing to the spread of poverty in Pakistan mainly through its impact on the agriculture sector (Anjum et al., 2022). This could have adverse impacts on other components of social progress as was earlier established that social progress is correlated to wealth (see **Figure 5.8**). The results of this study can also be used to identify the most environmentally stressed regions in the country and steps be taken to mitigate these climate risks. These interrelations between the components of social progress also need to be further explored.

This astute analysis presented in this section, demonstrates the usefulness of the sub-national index of social progress in identifying the regions and sectors that need to be prioritized for interventions.

6.2 Further Work and Improvements

As has been discussed earlier, data at the district level in Pakistan is scarcely available. This has restricted the choice of variables for the current construction of Pakistan SPI. In future, if adequate data becomes more readily available, not only can the components be represented with a broader range of indicators, the methodology can also be further refined particularly in terms of reducing redundancies from the indicators and choosing only indicators with positive correlations.

Further work in continuation of this paper can be pursued to identify the disparities in social progress within the districts by including the aspect of urban and rural areas in the analysis. Essentially, this will add another layer to the analysis of SPI as not only are disparities existent between the districts, they also materialize profoundly in the urban rural divide (UNDP, 2020a). This study also establishes a basis for further investigation and research into the explanatory factors that contribute to spatial variations in social progress across the country to empower policymakers in making informed decisions.

Conclusion

Pakistan has been a chronic laggard among the South Asian countries in terms of social progress. Although temporal analysis of key social indicators shows that Pakistan's performance has improved over the years, but this growth is not shared equally across the country. Regional inequalities in social progress across Pakistan are well researched and established. However, there does not exist a comprehensive sub-national measurement of social progress in Pakistan which captures the broad connotation of the concept and makes use of latest available data. To fill this gap, this paper constructs a sub-national Social Progress Index for Pakistan at the district level while employing 45 indicators of social progress grouped into 12 broad components.

Spatial representations of SPI and its components for the districts of Pakistan reveal distinct patterns of disparities in social progress across and within the provinces. Overall, districts of Punjab emerge as the best performers and Balochistan is clearly the most deprived province. Sindh and KPK have similar overall levels of social progress. Within Punjab, the Northern districts including Islamabad, Rawalpindi and Lahore on average have the highest levels of social progress across Pakistan. Contrarily, districts of Southern Punjab perform worse than the provincial average. Within the other provinces, there are pockets of districts with higher social progress levels including Quetta in Balochistan, Abbottabad and Peshawar in KPK and Karachi and Hyderabad in Sindh. The levels of social progress are also seemingly correlated to the average wealth in the districts. The component level analysis of Pakistan SPI also shows that the districts perform the worst in components of access to advanced education, followed by personal rights and access to information and communication. Districts also have the highest variability in scores across these components.

The results of this study can provide invaluable evidence to policymakers in planning to reduce social inequalities across the country by prioritizing regions and policy areas for intervention. The results will also be useful for understanding the explanatory factors that contribute to the variations of social progress in Pakistan. This will allow for specific programmes and projects to be designed to achieve targeted improvements in social progress across the country.

This paper also contributes to the initiative of Social Progress Imperative; the developers of SPI, to expand the use of this index in policy circles by implementing it at a regional and sub-national scale. Such a comprehensive measurement of social progress or wellbeing has not been conducted before in Pakistan at the national level. The multidimensional approach to social progress which this paper adopts from the Global SPI and one that incorporates notions of environment, safety, inclusiveness, freedom and rights is definitely a novel one for social progress literature in Pakistan. The district-wise score of social progress can hence be a significant resource for further research into social progress and wellbeing studies in Pakistan.

The biggest challenge in the construction of Pakistan SPI has been the limited availability of data at the district level for Pakistan. The study has at times had to improvise in terms of indicator selection and methodology although only by using reliable data sources and established approaches for construction of composite indices. In future, as more adequate data becomes available, the methodology and indicator selection can certainly be improved.

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Appendix

Table A-1: Indicator Features and Definitions for Pakistan SPI

Indicator	Long Definition	Data Source	Year of Measurement	Relation to Social Progress
Skilled Attendant at Birth	Percentage of deliveries attended by personnel trained to give the necessary supervision, care, and advice to women during pregnancy, labour, and the postpartum period; to conduct deliveries on their own; and to care for newborns.	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Antenatal Pregnancy Care	Among ever-married women age 15-49 who had a live birth in the 3 years before the survey, percent who received ANC from a skilled provider (for most recent live birth).	Maternal Mortality Survey	2019	Positive
Stunting	Prevalence of stunting among children under-five years of age (height-for-age <-2SD of the median).	National Nutrition Survey	2018	Negative
Wasting	Prevalence of wasting among children under-five years of age (weight-for-height <-2SD of the median).	National Nutrition Survey	2018	Negative
Absence of Toilet	Percentage of households with no toilet within household.	Pakistan Social and Living Standards Measurement	2019-2020	Negative
Improved source of Drinking Water	Percentage of households with improved source of drinking water including piped water on premises and other improved drinking water sources (public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs, and rainwater collection).	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Handwashing with Soap	Percentage of households with specific place to wash hands with soap.	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Connection to Drainage System	Percentage of households connected to covered, underground or open drainage system.	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Clean Fuel for Cooking	Percentage of households using clean fuel for cooking including electricity, gas, ethanol, solar, and the highest performing biomass stoves.	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Electricity for Lighting	Percentage of households using electricity as fuel for lighting.	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Owned Dwellings	Percentage of households living in owned dwelling units.	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Robust Roofing Materials	Percentage of households using robust roofing materials including reinforced brick concrete, reinforced cement concrete, sheet/cement/iron, graders and T-iron bars.	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Quality of Service of Police	Percentage of Households Satisfied with quality of service of Police.	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Murder Cases	Murder cases registered in district courts per 10,000 population.	Judicial Statistics of Pakistan (Law & Justice Commission of Pakistan)	2020	Negative
Occupational Injury	Percentage of employed people over 10 years who in the past 12 months received any	Labour Force Survey	2020-2021	Negative

	occupational injury/disease that caused to take time off work and/or consulted a doctor.			
Domestic Violence from Husband/Partner	Percentage of ever-married women aged 15-49 years who have experienced physical violence from their husband/partner.	Demographic and Health Survey	2017-2018	Negative
Women with No Schooling	Percentage of women having received no schooling.	Pakistan Social and Living Standards Measurement	2019-2020	Negative
Net Secondary Enrolment Rate	Percentage of children of age 10-12 who are enrolled in school to the total children aged 10-12 years.	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Out of School Children	Percentage of out of school children aged 5-16 years.	Pakistan Social and Living Standards Measurement	2019-2020	Negative
Individuals using Internet	Percentage of individuals using internet.	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Individuals with Mobile Ownership	Percentage of people with mobile ownership.	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Households with TV ownership	Percentage of households with TV ownership.	Maternal Mortality Survey	2019	Positive
Households with Computer/ Laptop/ Tablet	Percentage of households with Computer/ Laptop/ Table.	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Benefiting from Social Protection Schemes	Percentage of households benefiting from government social protection schemes.	National Nutrition Survey	2018	Positive
Quality of Health Facilities	Percentage of Households Satisfied with quality of Health facilities (BHUs, Family Planning Units, Clinics, Hospitals).	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Tuberculosis Effective Treatment	This indicator combines two more common ones – treatment coverage and the treatment success rate – to estimate the proportion of TB cases that are detected and successfully treated. Treatment coverage is multiplied by the treatment success rate of previous year.	Pakistan Monitoring Report Universal Health Coverage	2021	Positive
Fully Immunized Children	Percentage of Fully Immunized Children (aged 12-23 months). Full immunization means that the child has received: BCG, DPT1, DPT2, DPT3, Polio1, Polio2, Polio3, H.B1, H.B2, H.B3 and measle.	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Proper Solid Waste Disposal	Percentage of Households having Proper Solid Waste Disposal.	Pakistan Social and Living Standards Measurement	2019-2020	Positive
Climate Risk & Hazard Assessment	Based on a combined risk and hazard assessment score for several categories pertaining to climate change and propensity for hazards.	Asian Development Bank Report 'Climate Change Profile of Pakistan	2017	Negative
Air Quality PM2.5 Concentration	Air Quality PM2.5 Concentration (μg/m3) for the year 2019.	Air Quality Life Index	2019	Negative
Average Voter Turnout	Average percentage of votes casted from the total registered voters across all sub-districts in National Elections 2018.	FAFEN	2018	Positive
Civil Cases Clearence Rates	Civil clearance rates are calculated by dividing the total number of disposed civil cases by the total number of instituted civil cases.	Judicial Statistics of Pakistan (Law & Justice Commission of Pakistan)	2020	Positive
Criminal Cases Clearence Rates	Criminal clearance rates are calculated by dividing the total number of disposed criminal	Judicial Statistics of Pakistan (Law &	2020	Positive

	cases by the total number of disposed criminal cases.	Justice Commission of Pakistan)		
Vulnerable Employment	Percentage of contributing family workers and own-account workers as a percentage of total employment.	Labour Force Survey	2020-2021	Negative
Youth not in Employment, Education or Training	Youth aged 15-24 years not currently in employment, education or training.	Labour Force Survey	2020-2021	Negative
Contraceptive Prevalence	Percentage of women aged 15–49 years, married or in-union, who are currently using, or whose sexual partner is using, at least one modern method of contraception.	Maternal Mortality Survey	2019	Positive
Adolescent Marriage	The percentage of women aged 14-18 years who are married.	Pakistan Social and Living Standards Measurement	2019-2020	Negative
Adolescent Birth	Percentage of teenage women aged 15-18 years who have given birth	Pakistan Social and Living Standards Measurement	2019-2020	Negative
Gender Employment Rate Gap	Absolute value of ratio male employment rate to female employment rate for labour force aged 15-60 years.	Labour Force Survey	2020-2021	Negative
Gender Wage Gap	Absolute value of the ratio of difference in male and female average wage to the male average wage for employed population.	Labour Force Survey	2020-2021	Negative
Female Candidates for National Assembly Elections	Percentage of female candidates out of total candidates contesting elections in 2018 National Assembly elections.	Election Commission of Pakistan	2018	Positive
Attained Tertiary Education	Percentage of Population having attained Tertiary Education (aged 20 years and above)	Labour Force Survey	2020-2021	Positive
Enrolled in Tertiary Education	Percentage of Population Enrolled in Tertiary Education (aged 18 years and above)	Labour Force Survey	2020-2021	Positive
Years of Education after Secondary for Females	Average Years of Education after Secondary School for Females (Matric Education and Above)	Labour Force Survey	2020-2021	Positive
Uneducated population with Technical/Vocational Training	Percentage of Population with no schooling but having Technical/ Vocational Training (aged 15 years and above)	Labour Force Survey	2020-2021	Positive

Table A-2: List of Districts and Indicator Coverage for Pakistan SPI

Province	Division	District	Indicator Coverage
Punjab	**Bahawalpur**	Bahawalnagar	100%
		Bahawalpur	100%
		Rahim Yar Khan	100%
	D.G.Khan	D.G.Khan	100%
		Layyah	100%
		Muzaffar Garh	100%
		Rajanpur	100%
	Faisalabad	Chiniot	100%
		Faisalabad	100%
		Jhang	100%
		Toba Tek Singh	100%
	Gujranwala	Gujranwala	100%
		Gujrat	100%
		Hafizabad	100%
		Mandi Bahuddin	100%
		Narowal	100%
		Sialkot	100%
	Islamabad	Islamabad	100%
	Lahore	Kasur	100%
		Lahore	100%
		Nankana Sahib	100%
		Sheikhupura	100%
	Multan	Khanewal	100%
		Lodhran	100%
		Multan	100%
		Vehari	100%
	Rawalpindi	Attock	100%
		Chakwal	100%
		Jhelum	100%
		Rawalpindi	100%
	Sahiwal	Okara	100%
		Pakpattan	100%
		Sahiwal	100%
	Sargodha	Bhakhar	100%
		Khushab	100%
		Mianwali	100%
		Sargodha	100%
Sindh	**Hyderabad**	Badin	100%
		Dadu	100%
		Hyderabad	100%
		Jamshoro	100%
		Matiari	100%
		Sujawal	98%
		Tando Allah Yar	100%
		Tando Muhammad Khan	100%
		Thatta	100%
	Karachi	Karachi Central	100%
		Karachi East	100%
		Karachi Malir	100%
		Karachi South	100%
		Karachi West	100%

		Korangi	100%
	Larkana	Jacobabad	100%
		Kashmore	100%
		Larkana	100%
		Shahdadkot	100%
		Shikarpur	100%
	Mirpur Khas	Mir Pur Khas	100%
		Tharparkar	100%
		Umer Kot	100%
	S.Benazirabad	Naushahro Feroze	100%
		Sanghar	100%
		Shaheed Benazirabad	100%
	Sukkur	Ghotki	100%
		Khairpur	100%
		Sukkur	100%
KPK	**Bannu**	Bannu	100%
		Lakki Marwat	100%
		North Waziristan	93%
	D.I.Khan	D.I.Khan	100%
		South Waziristan	93%
		Tank	100%
	Hazara	Abbottabad	93%
		Batagram	100%
		Haripur	93%
		Kohistan	91%
		Mansehra	93%
		Tor Ghar	98%
	Kohat	Hangu	100%
		Karak	100%
		Kohat	100%
		Kurram	100%
		Orakzai	100%
	Malakand	Bajur	100%
		Buner	100%
		Chitral	100%
		Lower Dir	100%
		Malakand PA	100%
		Shangla	100%
		Swat	100%
		Upper Dir	100%
	Mardan	Mardan	100%
		Swabi	100%
	Peshawar	Charsadda	100%
		Khyber	100%
		Mohmand	100%
		Nowshera	100%
		Peshawar	100%
Balochistan	**Kalat**	Awaran	100%
		Kalat	100%
		Kharan	100%
		Khuzdar	100%
		Lasbela	100%
		Mastung	100%
		Shaheed SikandarAbad	80%

	Washuk	100%
Mekran	Gwadar	100%
	Ketch	100%
Nasirabad	Jaffarabad	100%
	Kachhi (Bolan)	98%
	Nasirabad	98%
	Sohbatpur	98%
Quetta	Nushki	96%
	Pishin	100%
	Qilla Abdullah	100%
	Quetta	100%
Sibbi	Dera Bugti	98%
	Harnai	96%
	Kohlu	100%
	Ziarat	98%
Zhob	Barkhan	98%
	Duki	78%
	Loralai	100%
	Qilla Saifullah	100%
	Sheerani	98%
	Sibi	100%

Table A-3: Indicator Skewness and Kurtosis

Indicator	Skewness	Kurtosis
Skilled Attendant at Birth	-1.5509543	5.20931
Antenatal Pregnancy Care	-2.0095929	7.728386
Stunting	0.0466752	2.148496
Wasting	0.4561560	3.391901
Absence of Toilet	1.4332136	4.612008
Improved source of Drinking Water	-1.1733439	3.68283
Handwashing with Soap	0.4729985	2.305075
Connection to Drainage System	0.2200685	1.755836
Clean Fuel for Cooking	0.9414679	3.052864
Electricity for Lighting	-1.8777414	6.206338
Owned Dwellings	-1.5358786	5.050535
Robust Roofing Materials	-0.4207255	2.002192
Quality of Service of Police	-0.4714593	2.617422
Domestic Violence from Husband/Partner	0.8599872	2.855651
Murder Cases	1.4863410	5.544747
Occupational Injury	1.6164853	6.084616
Women with No Schooling	-0.3751953	2.237336
Net Secondary Enrolment Rate	0.1614900	2.471856
Out of School Children	0.1048177	2.058231
Households with Computer/ Laptop/ Tablet	2.5717946	7.158006
Individuals with Mobile Ownership	0.9231222	4.233364
Individuals using Internet	0.5059562	2.889969
Households with TV ownership	0.0375056	1.990622
Benefiting from Social Protection Schemes	2.0676036	6.896077
Quality of Health Facilities	-2.2250501	8.267416
Tuberculosis Effective Treatment	0.3838932	3.351332
Fully Immunized Children	-1.1075917	3.76146
Proper Solid Waste Disposal	2.3769181	8.331949
Climate Risk & Hazard Assessment	1.0018806	4.764963
Air Quality PM2.5 Concentration	0.2961173	1.761481
Civil Cases Clearence Rates	-2.3687541	16.61016
Criminal Cases Clearence Rates	-0.3798458	3.284079
Average Voter Turnout	-0.4643995	2.891665
Vulnerable Employment	0.0000125	2.187157
Youth not in Employment, Education or Training	0.6428737	3.038832
Contraceptive Prevalence	-0.0905698	2.465461
Adolescent Marriage	1.0915600	3.554253
Adolescent Birth	3.3356175	20.93611
Gender Employment Rate Gap	2.2591594	8.798782
Gender Wage Gap	2.5921023	13.67518
Female Candidates for National Assembly Elections	1.4890638	5.823981
Attained Tertiary Education	2.1805891	10.20629
Enrolled in Tertiary Education	0.5710568	3.177164
Years of Education after Secondary for Females	0.1955282	4.877299
Uneducated population with Technical/Vocational Training	1.0541366	3.987583

Figure A-1: Distributions for Indicators having Outliers
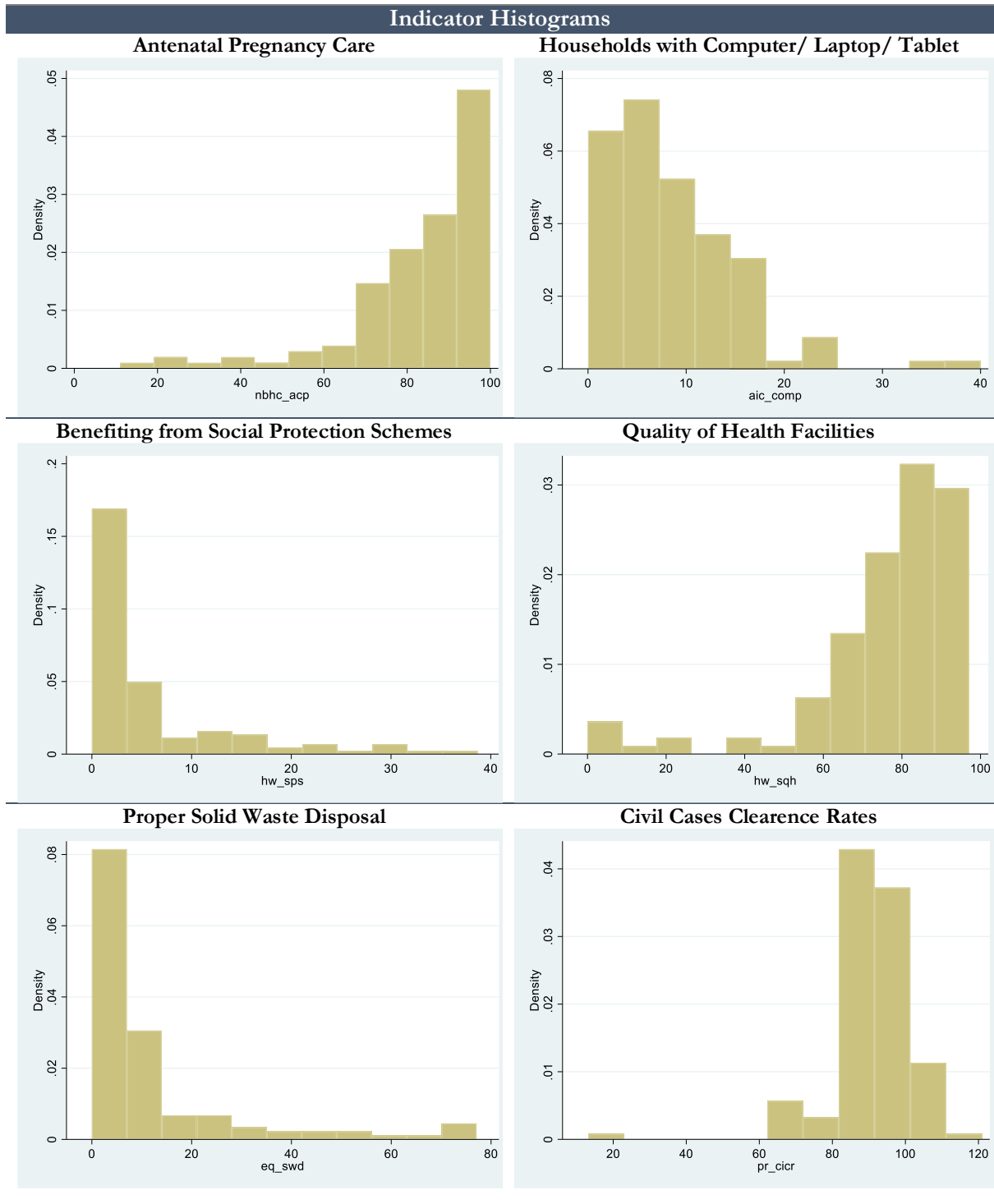
Adolescent Birth
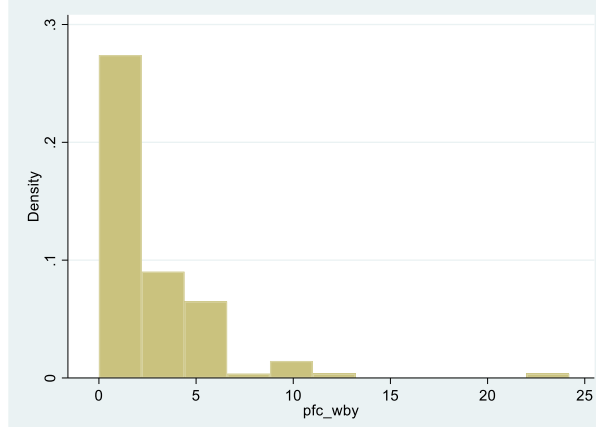
Gender Employment Rate Gap
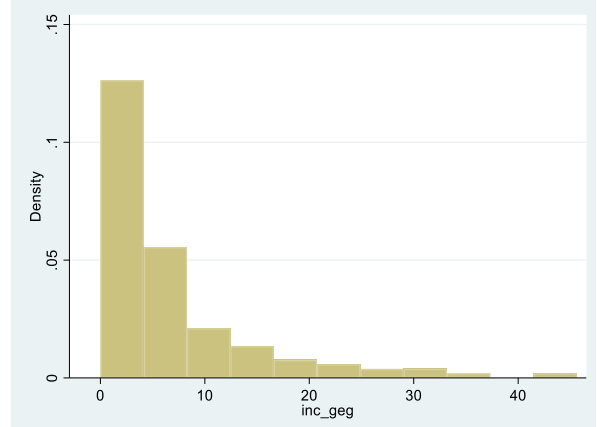
Gender Wage Gap
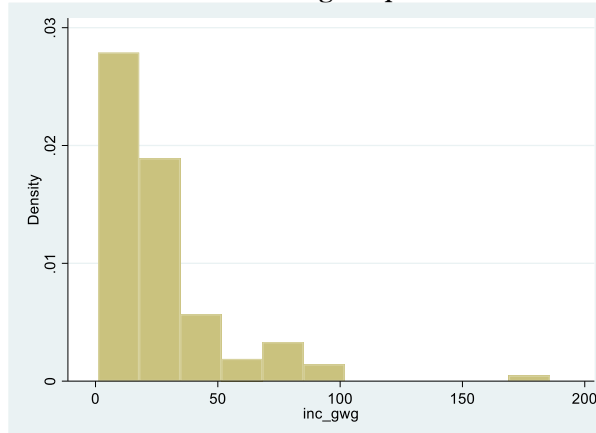
Attained Tertiary Education
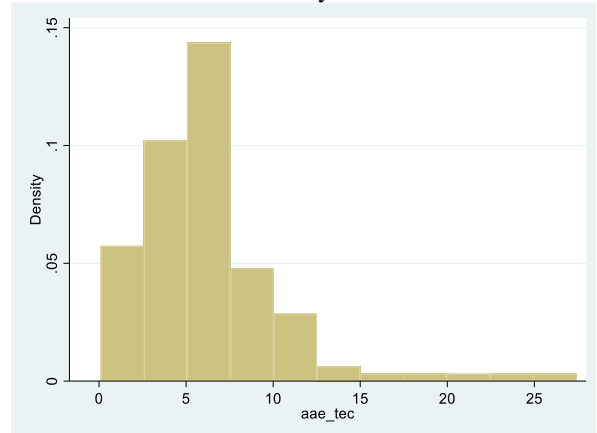
Table A-4: Indicator Correlations by Component after Data Treatment and Inversions

Nutrition & Basic Medical Care	Skilled Attendant at Birth	Antenatal Pregnancy Care	Stunting	Wasting
Skilled Attendant at Birth	1.000			
Antenatal Pregnancy Care	0.409	1.000		
Stunting	0.417	0.532	1.000	
Wasting	-0.010	0.122	0.422	1.000

Water & Sanitation	Absence of Toilet	Improved source of Drinking Water	Handwashing with Soap	Connection to Drainage System
Absence of Toilet	1.000			
Improved source of Drinking Water	0.613	1.000		
Handwashing with Soap	0.619	0.499	1.000	
Connection to Drainage System	0.644	0.566	0.810	1.000

Shelter	Clean Fuel for Cooking	Electricity for Lighting	Owned Dwellings	Robust Roofing Materials
Clean Fuel for Cooking	1.000			
Electricity for Lighting	0.548	1.000		
Owned Dwellings	-0.418	-0.136	1.000	
Robust Roofing Materials	0.674	0.686	-0.198	1.000

Personal Safety	Quality of Service of Police	Domestic Violence from Husband/Partner	Murder Cases	Occupational Injury
Quality of Service of Police	1.000			
Domestic Violence from Husband/Partner	0.209	1.000		
Murder Cases	-0.134	0.192	1.000	
Occupational Injury	-0.041	-0.006	0.065	1.000

Access to Basic Education	Women with No Schooling	Net Secondary Enrolment Rate	Out of School Children
Women with No Schooling	1.000		
Net Secondary Enrolment Rate	0.804	1.000	
Out of School Children	0.891	0.832	1.000

Access to Information & Communication	Households with Computer/ Laptop/ Tablet	Individuals with Mobile Ownership	Individuals using Internet	Households with TV ownership
Households with Computer/ Laptop/ Tablet	1.000			
Individuals with Mobile Ownership	0.594	1.000		
Individuals using Internet	0.730	0.752	1.000	
Households with TV ownership	0.466	0.453	0.521	1.000

Health & Wellness	Benefiting from Social Protection Schemes	Quality of Health Facilities	Tuberculosis Effective Treatment	Fully Immunized Children
Benefiting from Social Protection Schemes	1.000			
Quality of Health Facilities	0.029	1.000		
Tuberculosis Effective Treatment	0.266	0.383	1.000	
Fully Immunized Children	0.025	0.443	0.370	1.000

Environmental Quality	Proper Solid Waste Disposal	Climate Risk & Hazard Assessment	Air Quality PM2.5 Concentration
Proper Solid Waste Disposal	1.000		
Climate Risk & Hazard Assessment	-0.362	1.000	
Air Quality PM2.5 Concentration	-0.227	0.278	1.000

Personal Rights	Civil Cases Clearence Rates	Criminal Cases Clearence Rates	Average Voter Turnout
Civil Cases Clearence Rates	1.000		
Criminal Cases Clearence Rates	0.509	1.000	
Average Voter Turnout	0.115	-0.191	1.000

Personal Freedom & Choice	Vulnerable Employment	Youth not in Employment, Education or Training	Contraceptive Prevalence	Adolescent Marriage	Adolescent Birth
Vulnerable Employment	1.000				
Youth not in Employment, Education or Training	-0.131	1.000			
Contraceptive Prevalence	-0.016	0.482	1.000		
Adolescent Marriage	0.267	0.319	0.124	1.000	
Adolescent Birth	0.246	0.258	0.026	0.780	1.000

Inclusiveness	Gender Employment Rate Gap	Gender Wage Gap	Female Candidates for National Assembly Elections
Gender Employment Rate Gap	1.000		
Gender Wage Gap	0.256	1.000	
Female Candidates for National Assembly Elections	0.182	0.218	1.000

Access to Advanced Education	Attained Tertiary Education	Enrolled in Tertiary Education	Years of Education after Secondary for Females	Uneducated population with Technical/Vocational Training
Attained Tertiary Education	1.000			
Enrolled in Tertiary Education	0.797	1.000		
Years of Education after Secondary for Females	0.442	0.384	1.000	
Uneducated population with Technical/Vocational Training	0.274	0.416	0.277	1.000

Table A-5: District Scores and Rankings in order of Highest to Lowest (Coloured as per Tier Category)

District	Components												Dimensions			Index
	Nutrition & Basic Medical Care	Water & Sanitation	Shelter	Personal Safety	Access to Basic Education	Access to Information & Communication	Health & Wellness	Environmental Quality	Personal Rights	Personal Freedom & Choice	Inclusiveness	Access to Advanced Education	Basic Human Needs	Foundations of Wellbeing	Opportunity	Pakistan SPI
Islamabad	88.5	92.4	72.4	81.1	99.5	93.0	51.3	71.4	56.3	82.8	65.9	74.2	83.4	77.6	69.4	76.7
Rawalpindi	93.6	87.2	79.4	67.0	90.3	78.2	58.2	63.6	54.5	82.6	61.6	53.8	81.5	72.0	62.6	71.8
Lahore	88.3	88.2	80.9	73.2	81.5	80.3	55.1	73.3	45.8	87.8	54.3	60.8	82.5	72.1	61.2	71.7
Sialkot	87.0	90.9	84.7	71.9	92.3	71.4	56.2	62.4	48.9	79.4	63.4	49.4	83.5	70.0	59.6	70.7
Gujrat	92.9	89.0	85.5	83.1	88.2	69.2	54.9	63.9	45.4	78.4	55.9	49.4	87.6	68.5	56.6	70.3
Gujranwala	90.6	84.3	85.0	74.6	80.8	70.2	63.0	66.7	57.9	78.9	48.2	46.8	83.5	70.0	57.3	69.9
Hafizabad	86.0	77.0	81.9	81.5	73.6	51.5	62.6	68.1	55.8	75.7	80.2	41.7	81.6	63.7	62.3	68.9
Chakwal	87.8	89.7	83.6	77.6	89.4	63.1	51.5	68.3	54.1	75.2	51.5	32.2	84.6	67.4	52.1	67.4
Karachi Central	81.7	96.7	77.2	85.5	79.7	88.8	50.4	35.3	41.9	91.4	47.1	50.2	85.1	61.6	56.2	67.1
Jhelum	87.3	86.2	80.4	74.6	93.5	67.6	58.1	63.4	37.7	70.1	63.7	36.4	82.0	70.1	50.9	67.0
Mandi Bahuddin	86.2	75.8	78.1	82.4	75.9	57.8	64.8	66.6	45.8	78.5	55.2	45.2	80.6	66.1	55.5	67.0
Faisalabad	83.2	79.2	81.6	72.0	76.0	64.3	58.8	69.9	47.1	77.4	57.1	41.6	79.0	67.1	55.0	66.7
Karachi East	84.1	97.1	77.5	88.0	78.5	97.8	44.5	35.1	39.3	83.6	29.2	62.1	86.5	61.4	51.5	65.7
Sargodha	84.8	72.4	77.9	52.8	77.4	55.7	60.8	66.6	63.5	78.5	61.9	40.5	71.5	64.9	60.3	65.5
Abbottabad	70.2	65.5	78.9	72.3	83.1	70.3	53.9	61.5	53.3	80.2	62.8	40.7	71.6	66.8	58.3	65.5
Nankana Sahib	84.5	86.5	81.5	72.3	70.8	50.6	56.5	59.4	49.9	81.7	62.4	38.9	81.1	59.1	57.2	65.4
Karachi South	85.1	97.2	75.7	74.1	70.8	79.7	59.4	35.4	42.0	85.2	74.4	27.3	82.8	60.0	54.6	65.3
Attock	82.5	84.6	82.5	68.4	86.1	61.8	52.4	73.3	42.5	77.1	55.9	31.3	79.4	67.8	50.3	65.3
Narowal	79.7	90.1	76.6	78.6	89.6	52.5	57.5	48.5	39.4	69.9	71.8	42.2	81.2	61.1	54.8	65.2
Haripur	72.3	72.4	76.6	73.8	82.1	63.3	48.5	64.4	53.8	80.9	68.3	32.9	73.8	64.0	57.5	64.9
Sheikhupura	88.6	88.4	80.2	70.0	69.1	60.4	55.1	58.1	53.3	79.1	46.4	39.4	81.6	60.6	53.6	64.7
Okara	85.4	83.0	80.4	67.7	65.7	51.1	58.3	55.8	57.0	73.2	63.8	39.0	79.0	57.6	57.6	64.3
Peshawar	79.2	83.2	70.3	76.3	63.5	60.2	63.4	61.8	48.1	60.7	58.5	51.0	77.2	62.2	54.5	64.3
Quetta	77.7	85.1	76.8	77.8	52.3	60.1	40.4	69.8	64.3	62.6	65.9	45.8	79.3	55.1	59.4	64.2
Toba Tek Singh	82.4	77.6	76.7	70.7	74.7	56.5	57.7	61.8	48.3	76.5	61.9	31.6	76.8	62.5	53.2	63.8
Kasur	88.1	81.0	76.2	70.9	70.3	49.6	56.8	56.5	53.0	77.3	58.8	35.2	78.9	58.1	55.1	63.6
Hyderabad	75.1	86.5	83.4	75.6	63.2	64.5	70.4	43.8	55.0	78.8	42.7	36.4	80.0	60.0	52.1	63.5
Vehari	82.1	73.6	74.7	72.6	54.9	44.3	60.9	55.2	57.9	71.7	73.2	46.7	75.7	53.7	61.9	63.4
Korangi	76.2	97.6	81.5	82.4	82.0	79.0	49.1	34.5	38.5	87.7	47.2	30.4	84.3	59.4	48.8	63.3
Sahiwal	83.8	78.4	78.2	63.8	64.1	55.1	51.8	63.6	55.7	79.3	54.3	37.6	75.8	58.5	55.8	63.1
Multan	80.1	79.5	77.4	79.1	61.7	55.0	56.5	52.5	48.7	71.0	56.1	46.1	79.0	56.4	55.1	63.0
Khushab	80.2	65.2	73.6	68.4	64.3	45.2	61.0	61.6	64.9	72.0	68.3	33.9	71.7	57.8	58.6	62.6
Khanewal	78.2	72.5	76.6	78.0	63.4	41.0	55.9	54.7	58.1	70.8	58.5	38.4	76.3	53.4	55.8	61.4
Malakand PA	76.6	73.4	74.8	55.6	66.7	57.2	57.5	54.4	60.7	73.3	49.7	39.5	69.8	58.9	55.1	61.1
Chitral	76.2	59.1	66.5	69.8	68.2	41.7	53.5	77.1	71.4	77.4	35.2	47.3	67.8	59.3	56.5	61.1
Layyah	76.9	59.5	70.3	69.5	70.5	46.7	55.2	43.7	60.0	69.4	72.8	45.0	68.9	53.5	61.3	61.1
Bahawalnagar	79.1	58.0	69.6	86.3	55.9	46.0	54.1	49.9	67.9	62.4	71.2	35.7	72.9	51.4	58.3	60.5
Nowshera	84.2	78.0	75.7	79.1	65.0	52.8	47.0	48.6	55.8	55.9	53.2	40.3	79.2	53.1	51.1	60.5
Bahawalpur	80.7	61.8	75.5	73.9	50.7	43.9	63.0	56.1	46.7	63.7	79.7	39.4	72.8	53.2	56.3	60.5
Mansehra	65.2	71.0	72.6	61.1	67.1	50.5	49.8	50.9	52.1	69.6	80.5	35.5	67.4	54.3	58.1	59.8

Mardan	76.3	81.6	67.3	72.5	60.3	48.6	52.6	61.7	51.9	56.9	40.8	53.3	74.3	55.7	50.5	59.8
Larkana	63.0	77.5	78.7	71.9	39.7	51.7	70.9	51.5	62.7	53.2	66.4	32.9	72.6	52.9	52.9	59.1
Karachi Malir	77.8	91.2	80.3	87.3	57.3	73.1	51.2	30.4	46.2	78.5	44.1	19.7	84.1	51.8	44.7	59.0
Lodhran	74.2	77.3	75.2	79.0	48.4	39.9	57.2	40.5	63.6	59.0	69.8	35.4	76.4	46.2	56.1	58.9
Chiniot	79.6	64.3	73.1	72.1	60.1	44.6	60.3	61.2	52.8	50.7	62.8	29.5	72.2	56.3	48.1	58.5
Mianwali	79.4	59.9	68.1	63.9	62.7	48.5	52.8	56.6	54.9	63.4	53.4	37.5	67.6	55.0	51.8	58.0
Jhang	76.2	64.0	71.6	71.2	64.6	43.0	58.6	59.0	41.6	56.0	71.1	28.1	70.7	56.0	47.9	57.8
Swat	86.9	65.8	67.2	73.5	50.2	54.6	61.9	55.3	42.4	50.6	38.5	48.0	73.1	55.4	44.8	57.2
Sukkur	69.3	69.7	67.6	70.8	47.4	48.5	68.2	46.6	58.9	58.3	65.2	25.1	69.3	52.3	50.4	57.1
Karachi West	81.9	95.6	78.1	83.2	59.4	66.5	45.4	32.5	50.7	81.7	29.7	15.5	84.6	50.1	40.8	57.1
Bhakhar	77.7	57.6	69.8	65.7	61.2	38.2	52.7	66.3	49.6	65.2	57.2	30.3	67.5	54.1	49.6	56.8
Karak	77.6	55.8	84.5	71.5	60.9	46.9	47.1	58.4	62.2	67.2	26.0	37.6	71.9	53.2	46.6	56.7
Lower Dir	76.2	55.8	68.3	81.5	52.8	48.0	48.6	51.5	49.4	59.5	63.1	34.6	70.1	50.2	51.0	56.7
Pishin	56.5	72.6	67.7	83.7	51.5	56.8	36.0	69.8	47.8	68.8	55.7	27.3	69.8	52.8	48.6	56.7
Pakpattan	69.7	73.5	73.3	56.9	56.5	40.7	54.1	59.1	50.4	67.5	56.9	27.8	68.2	52.3	49.4	56.4
Charsadda	76.5	79.8	66.0	55.1	54.5	44.4	52.8	50.7	45.3	57.3	55.7	44.1	69.0	50.5	50.4	56.3
Swabi	66.8	84.4	70.2	68.3	59.7	51.8	49.1	52.3	40.7	69.9	39.6	31.7	72.3	53.2	44.5	56.1
Dadu	64.0	62.6	72.2	82.5	49.3	27.4	62.4	32.1	68.0	74.4	76.1	23.1	70.1	41.7	57.7	55.9
Naushahro Feroze	66.5	75.9	67.8	77.0	37.8	30.0	77.9	37.9	55.0	70.6	61.6	26.4	71.7	44.2	51.8	55.4
Nushki	54.4	48.4	62.2	70.0	56.7	39.4	39.0	59.5	74.9	71.8	60.9	31.2	58.5	48.2	58.2	54.8
Kohat	72.9	59.7	63.4	61.3	56.2	39.1	49.5	65.6	48.7	52.6	52.1	37.2	64.2	52.2	47.5	54.4
Rahim Yar Khan	72.0	53.3	71.2	76.3	44.9	44.5	56.2	35.3	56.4	58.4	63.5	30.8	67.9	44.9	51.4	54.3
D.I.Khan	58.6	63.5	71.8	69.6	41.8	41.9	47.1	54.9	52.9	70.1	57.6	30.4	65.8	46.3	51.7	54.3
Sanghar	63.2	56.6	59.5	87.8	36.0	39.5	62.1	51.8	67.9	54.0	59.9	24.8	66.3	46.8	50.1	54.1
Muzaffar Garh	68.1	57.3	68.9	79.0	39.9	29.0	53.3	39.8	59.2	59.5	66.8	39.9	68.1	40.0	55.9	54.0
Matiari	67.8	62.2	74.1	68.2	37.5	36.3	65.1	37.5	59.8	67.7	64.7	21.2	68.0	43.4	51.1	53.7
D.G.Khan	68.3	50.9	61.3	77.2	43.2	34.3	67.1	45.1	41.9	57.5	64.0	39.1	64.1	46.7	50.1	53.4
Lakki Marwat	75.8	58.8	69.7	50.6	48.2	42.9	50.9	65.2	48.2	62.7	37.7	36.6	63.4	51.5	45.7	53.3
Shaheed Benazirabad	60.4	58.0	60.2	88.8	38.8	40.4	75.5	40.7	50.7	52.6	65.2	24.1	66.3	47.8	46.7	53.2
Jamshoro	69.6	57.7	65.1	75.3	39.4	45.5	75.1	39.6	61.1	77.1	26.7	23.5	66.8	48.9	44.3	52.9
Loralai	58.6	60.6	44.3	71.3	40.2	46.3	35.3	66.1	54.0	62.9	55.3	33.1	58.3	46.3	50.7	51.6
Tank	52.1	63.4	61.9	60.2	40.5	33.0	48.3	53.4	70.6	60.5	55.1	29.1	59.3	43.5	52.6	51.6
Shikarpur	58.5	64.5	62.9	82.1	30.4	35.0	54.7	42.3	61.5	56.2	60.3	24.4	66.7	40.1	49.1	51.4
Tando Allah Yar	61.9	65.4	70.6	72.7	30.5	35.9	63.0	42.5	51.3	74.3	52.4	15.9	67.6	42.2	45.6	51.2
Khairpur	60.2	58.3	68.2	87.6	36.1	30.6	69.5	33.3	52.0	51.4	61.9	21.7	68.1	41.1	45.3	50.8
Sibi	64.6	48.8	68.5	85.9	32.4	45.4	43.3	54.1	52.5	74.7	43.1	16.4	66.3	43.4	43.9	50.7
Bannu	66.2	60.5	64.6	55.4	39.3	44.4	49.5	53.8	51.7	39.1	51.4	35.5	61.6	46.6	44.1	50.5
Upper Dir	68.8	48.7	60.9	62.5	41.7	41.5	48.1	50.1	52.3	44.8	50.9	36.7	60.0	45.3	46.0	50.2
Batagram	62.2	50.5	52.4	71.0	34.3	42.4	51.5	49.9	52.8	49.2	55.4	33.3	58.8	44.2	47.3	49.9
Lasbela	60.4	88.2	58.0	80.0	32.7	36.6	33.0	65.8	66.7	63.0	43.9	5.9	71.1	41.0	39.6	49.6
Jacobabad	63.0	71.9	54.4	89.9	30.4	35.4	61.5	44.1	60.4	29.2	53.5	22.1	69.2	42.1	39.7	49.5
Rajanpur	62.3	45.4	49.6	75.1	36.9	29.0	58.2	42.7	53.1	62.0	69.3	24.3	57.5	41.0	50.5	49.4
Buner	67.7	48.7	54.5	59.0	41.8	42.2	49.6	43.4	51.3	53.6	50.9	33.3	57.3	44.2	46.9	49.3
Ghotki	64.8	58.7	60.9	56.3	27.5	39.2	61.3	38.7	70.5	59.8	49.6	15.2	60.1	40.8	45.8	48.6
Hangu	74.7	62.3	53.9	52.5	34.1	36.4	46.2	57.7	33.3	55.8	44.0	39.8	60.5	43.1	42.8	48.5

Umer Kot	57.9	16.2	43.8	87.3	27.8	27.9	81.5	45.8	59.1	62.5	91.6	18.9	47.6	43.4	54.4	48.4
Shangla	48.9	44.7	66.0	64.8	30.6	40.9	52.6	47.6	46.6	60.7	42.7	39.6	55.7	42.5	47.1	48.3
Mir Pur Khas	62.4	44.7	42.5	66.5	31.6	35.7	56.2	38.1	64.5	66.7	55.3	25.9	53.5	39.9	51.6	48.1
Ketch	59.3	56.3	67.0	61.1	45.8	30.6	45.0	72.9	57.2	62.9	24.2	16.2	60.8	47.4	37.3	48.0
Mastung	57.2	53.5	76.3	52.5	56.3	31.4	45.7	54.2	53.3	64.4	25.1	22.4	59.5	46.3	39.3	48.0
Kurram	55.6	42.6	51.6	46.0	31.9	37.7	39.5	58.2	60.9	60.9	58.8	38.4	48.8	41.3	54.3	48.0
Gwadar	53.8	63.4	67.9	66.1	55.2	48.6	38.7	72.7	28.7	68.5	18.5	17.3	62.7	53.1	30.5	47.7
Kohlu	62.7	64.9	46.5	57.3	42.9	58.9	17.2	54.5	51.1	46.8	54.6	26.5	57.6	41.4	44.0	47.4
Shahdadkot	62.6	66.0	64.0	67.5	28.5	42.1	54.6	42.4	60.0	57.0	36.9	10.7	65.0	41.4	37.9	47.4
Kashmore	74.3	66.9	56.6	79.9	22.4	40.5	45.1	31.4	53.6	49.4	48.9	20.1	69.2	34.2	41.7	47.3
Tando Muhammad Khan	63.0	49.5	59.7	79.0	19.4	22.6	52.4	23.3	49.7	70.4	75.0	21.2	62.4	28.2	51.5	46.2
Badin	55.5	44.1	54.8	78.1	20.3	22.3	59.0	34.3	56.1	66.5	57.5	19.1	57.5	32.4	47.6	45.2
North Waziristan	69.4	37.3	68.6	65.9	21.6	33.6	40.7	54.5	41.9	42.0	49.0	32.1	59.4	36.6	41.0	45.2
Kharan	52.4	22.2	53.6	70.9	47.3	32.2	25.3	57.3	62.5	64.4	27.7	22.9	47.9	39.5	42.2	43.1
Thatta	64.2	46.7	56.0	72.3	10.1	25.0	56.8	24.4	47.5	65.8	67.9	15.4	59.4	26.7	46.2	43.0
Khyber	43.8	48.9	41.7	80.9	31.4	32.5	52.1	46.4	30.8	54.6	38.4	19.5	52.8	40.1	34.7	42.2
Ziarat	38.5	25.8	59.7	61.8	18.8	26.0	24.4	58.2	75.6	61.8	48.7	30.4	45.1	30.3	52.7	42.2
Washuk	38.6	31.2	47.2	57.2	41.6	27.1	25.8	60.7	50.6	68.3	31.2	37.1	43.0	37.6	45.7	42.0
Kachhi (Bolan)	39.4	41.5	60.8	69.9	25.1	20.7	29.3	48.0	48.4	57.1	49.8	27.2	52.1	30.0	44.8	41.8
Duki	62.3	48.3	49.8	54.8	36.3	30.4	23.2	47.5	54.0	59.5	33.9	15.5	53.6	33.8	38.5	41.6
Tor Ghar	46.0	49.2	35.1	74.6	20.8	20.5	41.7	51.6	69.2	45.7	42.7	20.6	50.3	32.3	42.8	41.4
Jaffarabad	47.1	44.1	59.2	81.4	26.7	19.0	45.8	36.9	34.2	38.3	48.6	31.0	57.1	31.3	37.7	41.3
Harnai	59.4	42.8	52.2	52.5	17.5	21.3	29.9	58.7	58.1	52.9	52.2	18.7	51.5	30.1	43.7	41.3
Orakzai	69.1	34.7	35.9	66.1	29.2	31.8	53.5	49.5	32.8	63.9	28.3	18.1	50.2	40.3	33.9	41.2
Kohistan	64.1	23.6	40.9	68.2	10.7	34.1	33.1	58.0	41.3	58.6	54.9	28.7	47.3	31.6	45.1	41.0
Qilla Abdullah	58.7	45.6	44.1	68.0	18.9	22.2	21.1	66.4	66.6	39.7	46.9	15.0	53.7	29.7	39.6	40.4
Sujawal	53.0	40.5	48.6	76.1	13.9	24.0	55.0	24.8	49.3	65.2	58.5	9.9	53.8	27.7	41.9	40.4
Qilla Saifullah	66.5	16.0	29.8	75.8	29.8	29.8	26.7	52.3	68.2	56.1	22.8	35.4	43.3	34.0	43.8	40.2
Barkhan	58.6	38.1	46.1	52.6	19.1	46.8	39.4	43.4	34.2	59.3	59.4	6.1	48.5	36.2	35.2	39.8
Bajur	52.7	19.7	35.5	72.5	16.7	37.2	42.6	47.1	50.7	38.9	43.5	30.2	42.8	34.8	40.4	39.3
Kalat	52.0	32.3	53.1	72.7	34.8	16.1	38.0	52.3	18.3	63.5	25.9	31.6	51.5	33.9	32.9	39.0
Tharparkar	48.0	8.5	38.1	80.5	21.5	13.8	48.3	32.9	67.2	59.3	52.4	16.1	39.0	27.7	46.1	37.2
Mohmand	46.5	21.5	44.5	77.0	17.1	18.9	44.0	45.1	38.5	46.9	29.4	27.8	45.2	29.8	35.2	36.5
Sohbatpur	48.1	11.5	30.6	82.4	32.5	23.4	35.5	26.1	34.2	38.6	73.4	16.5	38.9	29.2	38.1	35.3
Awaran	49.9	47.7	36.2	55.6	18.5	22.0	27.4	50.9	50.0	62.1	22.1	7.0	47.1	28.5	31.1	35.1
Sheerani	50.9	11.9	26.9	62.1	13.4	18.2	10.5	56.7	62.9	55.2	57.9	32.2	35.0	21.9	51.3	35.0
Nasirabad	61.7	35.4	43.9	76.0	11.1	22.8	26.6	38.4	47.2	31.2	50.4	7.7	53.1	23.7	31.1	34.9
South Waziristan	57.9	36.5	55.0	55.7	33.1	19.6	26.3	55.9	19.5	56.8	3.2	32.5	50.9	32.5	23.6	34.8
Shaheed SikandarAbad	59.2	12.2	43.9	56.6	0.4	7.3	42.7	52.7	18.3	61.6	57.7	18.9	40.1	18.3	36.2	30.7
Khuzdar	52.1	12.3	40.7	62.2	17.2	5.1	13.6	53.3	60.0	29.9	32.5	19.7	39.0	18.9	34.1	30.0
Dera Bugti	40.7	20.8	58.0	52.3	10.2	20.7	20.0	46.5	20.4	41.7	55.7	0.3	41.6	22.6	22.5	28.3