

Quantifying Sub-National Human Development Indices from Household Survey Data

Research Report No.96



2016

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May 2016

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Karachi, Pakistan

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Design and Layout: Muhammad Rizwanullah Khan

Published by Social Policy and Development Centre
Printed in Karachi

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ABSTRACT

This research presents estimates of Human Development Indices (HDIs) for Pakistan at regional, provincial and district levels. Earlier attempts to estimate HDI at sub-national levels were based on various unauthentic supply-side data sources, while this study for the first time develops HDIs from the demand-side single source of information with better proxies of HDI dimensions. Large household survey data of Pakistan Social and Living-standard Measurement (PSLM) survey for the year 2014-15 is used in this study to develop sub-national HDIs. PSLM is a district representative survey which covers more than 78000 households across four provinces of Pakistan.

The estimated magnitude of national HDI is 0.524 which indicates low level of human development in Pakistan according to UNDP-HDI classification. However, urban Pakistan is placed in the medium development category with the HDI magnitude of 0.614, while the magnitude of estimated rural HDI is 0.473.

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1. INTRODUCTION

The Human Development Index (HDI) of the United Nations Development Programme (UNDP) was created to re-emphasize that people and their capabilities should be the ultimate criteria for assessing the development of a country or a region, and not economic growth alone. Thus, the HDI draws the attention of policy makers away from the usual economic statistics. This summary measure also highlights differences within countries, between provinces or states, as well as other socioeconomic groups. Highlighting internal or regional disparities with the help of HDIs has raised the national discourse in many countries. It opens the debate on how countries/regions with the same level of income per person can end up with different human development outcomes.

The UNDP-HDI is a composite index that measures the average achievements in a country/region in three basic dimensions: a long and healthy life, knowledge, and a decent standard of living. Since 1990 UNDP develops Human Development Indices annually for all economies of the world.

With regard to sub-national HDIs in the context of Pakistan, the first attempt was made by UNDP-Pakistan in its National Human Development Reports 2003 (UNDP, 2003) for the year 1998. Due to data constraints at regional level, Pakistan NHDR used some crude proxies for income and health components. Jamal and Khan (2007) updated sub-national HDIs for the year 2005 by using standard UNDP-HDI indicators for the health and education components. However, they were also not able to use a better proxy for regional income. Both studies used agriculture and manufacturing value-added as a measure of the income of regions/districts. Thus, the income component was underestimated due to non-representation of the service sector which is a major source of income in various parts of the country. Further, information on sectoral (agriculture and manufacturing) value added were based on various unauthentic supply-side sources.

In this backdrop, this study for the first time develops national and sub-national HDIs for Pakistan from the demand-side single source of information with better proxies of HDI dimensions. Large household survey data of Pakistan Social and Living-standard Measurement (PSLM) survey for the year 2014-15 is used in this study to develop regional HDIs. PSLM is a district representative survey, covers more than 78,000 households across four provinces of Pakistan and is statistically comparable with the data of Pakistan's Population Census, with some margin of sampling error.

2. COMPONENTS AND METHODOLOGY

The use of standard UNDP-HDI indicators is not feasible due to non-availability of relevant data at sub-national level. Thus the attempt is made to construct the best proxies for education, health and standard of living components of HDI. This section provides brief description of the chosen proxies and adopted methodology for combining HDI ingredients. Further, the standard UNDP-HDI components and methodology is also furnished in Box-1 for information and comparison.

Table 1
Dimensions of Human Development used in this Study

Access to Knowledge:	
Education	Adult Literacy Rate
	Enrollments in 6-24 Years of Age Cohort
Long and Healthy Life:	
Child Health	Immunization - Polio
	Child Delivery at Hospitals/Nursing Homes
Maternal Health	Prenatal Care
	Had Tetanus Injection
Living Standard:	
Income	Household Income Per Capita

Box 1
UNDP-HDI Components and Methodology

Till 2009, the dimensions of human development were estimated by UNDP as follows: long and healthy life has been measured by life expectancy at birth; knowledge has been measured by the adult literacy rate and combined primary, secondary and tertiary gross enrollment ratios; while decent standard of living has been measured by GDP per capita in terms of PPP US dollars. The knowledge or education index has been developed by giving two-third weight to adult literacy and one-third to combined enrollment rates. To arrive at HDI value, the arithmetic mean of the above three indices has been calculated.

The components and calculation method of two (Education and Income) of the three dimensions were changed by UNDP in 2010. The literacy rate of the population has been replaced by an indicator of expected years of schooling and the combined gross enrollment by the average number of years of education (knowledge dimension) and dimensions of living standards is now measured by Gross National Income (GNI) per capita in purchasing power parity to the US\$.

The overall UNDP-HDI index was previously calculated as the arithmetic average of all indices. This method allowed for there to be substitution between different dimensions, i.e. low values in one dimension can be compensated by high values of another dimension. However, the substitutability issue may be resolved by taking geometric mean instead of combining indicators using a simple average. Starting from 2010 the UNDP Human Development Index did switch to this mode of calculation for combining component indicators of HDI. UNDP argues that the geometric mean better reflects the non-substitutable nature of the statistics being compiled and compared.

2.1 Education Index

Both stock and flow measures are included in the study to represent the educational status of population. The stock measure is the adult literacy rate, whereas enrolment rates with respect to population of age cohort 5-24 years represent a flow in the educational attainment. Data of both of these measures are available in PSLM district representative survey. The pertinent question regarding literacy in the PSLM questionnaire narrates: “Can this person read and writes in any language with understanding?” Thus the adult literacy is defined for this study as the “proportion of population aged 15 years and older who is able with understanding to both read and write in any language”. The enrollment component is estimated as the proportion of children in the age cohort 5-24 years who are currently attending any formal educational institutions out of all children in this age cohort.

These indicators are transformed by using 100 percent as a maximum and 0 percent as a minimum for school enrollment and literacy rate. As described in the UNDP-HDR technical notes, these natural goalposts act as the ‘aspirational goal’ and ‘natural zones’ respectively. The composite index for education gives two-third weight to adult literacy rate and one-third weight to enrolment rate for the 5-24 years age cohort¹.

2.2 Health Index

A long and healthy life may best be evaluated with the help of ultimate output indicators such as life expectancy at birth, infant and maternal mortality rates etc. However, non-availability of data has restricted the choice of indicators. Thus, the dimension of health is represented by some proxies of the health status of a mother and children. Polio vaccination of children under the age of five according to a vaccination card or through a polio campaign and the child delivery at hospitals are used to represent child health status, while two indicators are developed to assess the maternal health status; prenatal care and the proportion of mothers who had tetanus toxoid injections during a previous pregnancy

Again, all chosen indicators for the health component are relative proportions or percentages and thus have natural goalposts (minimum and maximum) in order to transform the indicators expressed in different units into indices between 0 and 1. An arithmetic average is applied to form a composite index for health.

¹ Till 2009, UNDP was using these two indicators and the same methodology for combining the education component of HDI.

2.3 Standard of Living Index

Income is the appropriate indicator to evaluate the standard of living of person, family or region. Fortunately, PSLM reports monthly or annual income of each family member of a household aged 10 years and above. However, it is worth mentioning that the reported income might be biased downward due to the fact that the majority of the economically active population is not in a salaried remuneration, but is either self-employed or works in farms or in other family business. Thus, non-salaried respondents provide guesses regarding annual income.

Nonetheless due to the non-availability of other appropriate data on household economic status² at sub-national level, household income is used in this study despite the problems of non-response rate³ as well as under reporting typically found in household surveys on standard of living in developing countries.

The income index is computed by adjusting district per capita income with the UNDP recommended minimum and maximum values for the income dimension of HDI. However these goalposts are adjusted with the Purchasing Power Parity (PPP) conversion factor⁴ for Pakistan for the year 2014. The natural logarithm is also applied in calculating the income index following the practice of UNDP.

2.4 Combining HDI Components

One of the issues in the context of composite indexing like HDI is the substitutability among component indicators. This situation is not suitable in most cases where a minimum of all components are required for a combined index. The issue of substitutability may be resolved

² One of the non-monetary indicators of household welfare is the asset-based index which has been introduced and developed as an alternative tool for classifying household socio-economic status. This method employs data of household's assets such as durable and semi-durable goods to describe household welfare instead of using household's income or expenditure data. However, this approach is not applicable for this research; as welfare indicators are aggregated here at regional level instead of classifying household economic status. For detail methodology of developing asset-based index, see Filmer and Pritchett (2001).

³ About 15 percent sample households refused to give response regarding employment activities and household income.

⁴ Official PPP conversion rates are produced by the International Comparison Program, whose surveys periodically collect thousands of prices of matched goods and services in many countries. The last round of this exercise refers to 2011 and covered 199 countries. The conversion factor for Pakistan is obtained from World Bank Database, <http://data.worldbank.org/indicator/PA.NUS.PPP>

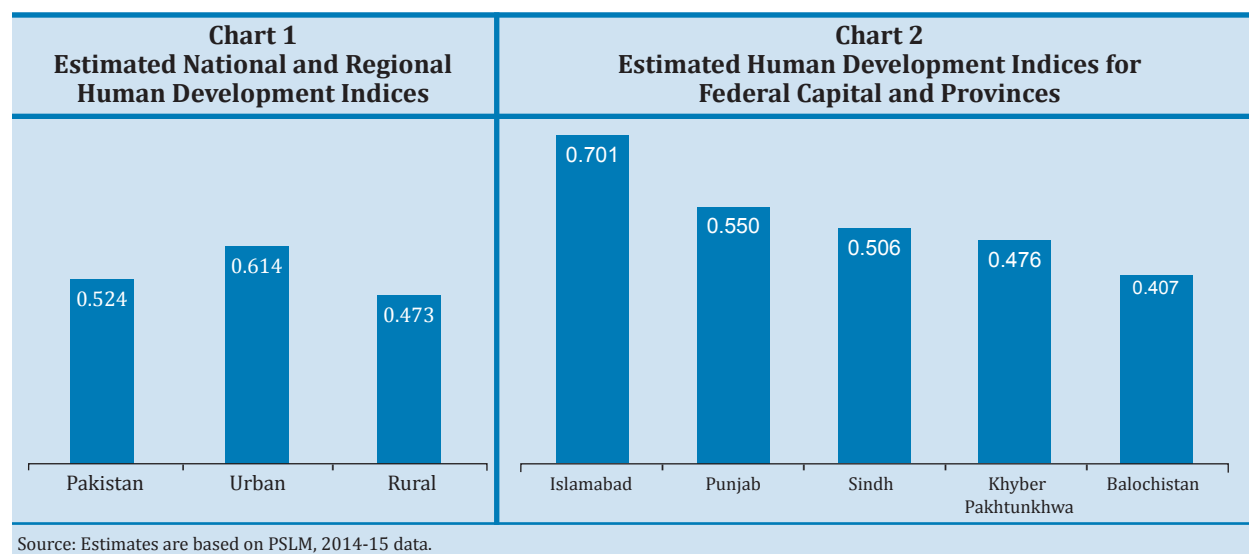
to some extent by taking the geometric mean of the components indicators instead of using simple average. Although use of the geometric mean has been relatively rare in computing social statistics, starting from 2010 the UNDP Human Development Index did switch to this mode of calculation for combining component indicators of HDI. UNDP argues that it reflects well the non-substitutable nature of the statistics being compiled and compared. According to UNDP (2010)⁵:

“The geometric mean reduces the level of substitutability between dimensions [being compared] and at the same time ensures that a 1 percent decline in say life expectancy at birth has the same impact on the HDI as a 1 percent decline in education or income. Thus, as a basis for comparisons of achievements, this method is also more respectful of the intrinsic differences across the dimensions than a simple average”.

Thus after developing component indices, the HDI for this research is estimated by taking geometric mean of education, health and income components at the second stage.

3. ESTIMATES OF HUMAN DEVELOPMENT INDICES

The estimated⁶ HDIs for districts of Pakistan for the year 2014-15 are collated in Table 4, while national and provincial pictures are portrayed in Chart 1 and Chart 2 respectively. Further, Tables 3 and 4 are developed to list bottom and top 15 districts of Pakistan according to the estimated levels of HDI.



⁵ Visit UNDP site: <http://hdr.undp.org/en/statistics/faq/>

⁶ The results of this study are not comparable in any way with the finding of earlier attempt by Jamal and Khan (2007) due to the fundamental differences in HDI indicators and methodology, especially for the standard of living component.

According to the Human Development Report (2015), Pakistan ranks 147th out of 188 countries of the World for the year 2014 with the HDI magnitude of 0.538 that categorizes Pakistan in the group of ‘Low Human Development’ countries⁷. Due to differences in the methodology, UNDP-HDI and the estimates of this study are not strictly comparable; however the difference is not substantial. The magnitude of national HDI estimated from PSLM 2014-15 data is 0.524 which also indicates the low level of human development in Pakistan. However, urban Pakistan (37 percent of total population) is placed in the medium development category with the HDI magnitude of 0.614, while the magnitude of estimated rural HDI is 0.473.

The provincial ranking in terms of the level of human development is according to a priory expectation. Highest level of human development is estimated for Punjab with the HDI magnitude of 0.55 followed by Sindh, Khyber Pakhtunkhwa and Balochistan. Balochistan possess the lowest rank with the value of 0.407. According to the UNDP classification, barring Punjab all provinces are placed in the category of ‘Low Human Development’ (Chart 2).

Table 2 lists bottom fifteen districts according to the estimated values of HDIs. Two out of these districts belong each to Khyber Pakhtunkhwa (Tor Ghar and Kohistan) and Sindh

Province	District	HDI Value	National Rank Order
Balochistan	Dera Bugti	0.297	113
Khyber Pakhtunkhwa	Tor Ghar	0.323	112
Khyber Pakhtunkhwa	Kohistan	0.330	111
Balochistan	Jhal Magsi	0.330	110
Balochistan	Killa Abdullah	0.332	109
Balochistan	Chagai	0.332	108
Balochistan	Nasirabad/ Tamboo	0.336	107
Balochistan	Sheerani	0.338	106
Sindh	Kashmore	0.343	105
Balochistan	Harnai	0.350	104
Balochistan	Barkhan	0.356	103
Balochistan	Bolan/ Kachhi	0.360	102
Balochistan	Kohlu	0.360	101
Balochistan	Jaffarabad	0.361	100
Sindh	Tando Mohammad Khan	0.361	99

Source: Estimates are based on PSLM, 2014-15 data.

⁷ UNDP classifies countries into low, medium, high and very high level of development according to HDI magnitudes of <0.55, >=0.55 but less than 0.7, >=0.7 but less than 0.8 and >=0.8 respectively.

(Kashmore and Tando Mohammed Khan) provinces. The remaining 11 districts belong to Balochistan Province, while no district of the province of Punjab is placed in the cluster of lowest 15 districts.

In contrast, Table 3 furnishes a list of top fifteen districts of Pakistan in terms of level of human development. According to UNDP-HDI classification, all districts lie in the category of medium level of human development. The table also shows that 12 out of top 15 districts of Pakistan belong to the Punjab province, while Karachi, Abbottabad and Haripur districts are also in the group of top 15 districts.

Province	District	HDI Value	National Rank Order
Punjab	Lahore	0.670	1
Sindh	Karachi	0.654	2
Punjab	Rawalpindi	0.646	3
Punjab	Sialkot	0.635	4
Punjab	Gujrat	0.628	5
Punjab	Jhelum	0.627	6
Punjab	Nankana Sahib	0.613	7
Punjab	Gujranwala	0.604	8
Punjab	Chakwal	0.591	9
Punjab	Sheikhupura	0.590	10
Punjab	Mandi Bahauddin	0.590	11
Punjab	Attock	0.576	12
Khyber Pakhtunkhwa	Abbottabad	0.573	13
Khyber Pakhtunkhwa	Haripur	0.573	14
Punjab	T.T. Singh	0.563	15

Source: Estimates are based on PSLM, 2014-15 data.

Table 4 portrays spatial disparities in the level of human development across districts of Pakistan. The table clearly reveals that barring Karachi, all districts of Sindh and Balochistan belong to the low human development category according to UNDP classification. Although districts Abbottabad and Haripur of KPK province lie in the category of medium level of human development, the other districts of the province including the capital city belong to the low level category. The provincial capitals of Punjab with other 15 districts of the province lie in the category of medium level of human development.

Table 4
Estimated Human Development Indices for Districts of Pakistan

Punjab		Sindh		Khyber Pakhtunkhwa		Balochistan	
Low Level HD		Low Level HD		Low Level HD		Low Level HD	
Rajanpur	0.425	Kashmore	0.343	Tor Ghar	0.323	Dera Bugti	0.297
Muzaffargarh	0.427	Tando M. Khan	0.361	Kohistan	0.330	Jhal Magsi	0.330
Rahim Yar Khan	0.440	Jacobabad	0.369	Upper Dir	0.366	Killa Abdullah	0.332
D. G. Khan	0.445	Ghotki	0.371	Buner	0.388	Chagai	0.332
Bahawalpur	0.462	Tharparkar	0.372	Batagram	0.412	Nasirabad	0.336
Lodhran	0.466	Umer kot	0.385	Shangla	0.416	Sheerani	0.338
Bhakkar	0.475	Shahdadkot	0.386	Tank	0.423	Harnai	0.350
Bahawalnagar	0.478	Tando Allah Yar	0.388	Hangu	0.425	Barkhan	0.356
Khanewal	0.491	Badin	0.395	D. I. Khan	0.442	Kohlu	0.360
Chiniot	0.499	Sujawal	0.408	Swabi	0.447	Bolan/ Kachhi	0.360
Jhang	0.505	Shikarpur	0.412	Swat	0.450	Jaffarabad	0.361
Pakpattan	0.505	Khairpur	0.412	Charsadda	0.469	Washuk	0.372
Vehari	0.507	Thatta	0.422	Lakki Marwat	0.469	Killa Saifullah	0.378
Mianwali	0.511	Jamshoro	0.439	Lower Dir	0.471	Ziarat	0.388
Multan	0.515	Mirpur Khas	0.440	Kohat	0.475	Awaran	0.388
Okara	0.517	Matiari	0.442	Nowshera	0.483	Kharan	0.392
Khushab	0.530	Sanghar	0.446	Mardan	0.484	Musakhel	0.400
Kasur	0.545	Benazir Abad	0.463	Bannu	0.492	Khuzdar	0.400
Sargodha	0.548	Larkana	0.478	Karak	0.495	Nushki	0.402
Layyah	0.549	Sukkur	0.478	Mansehra	0.506	Zhob	0.403
Medium Level HD		Naushahro Feroze	0.511	Malakand	0.515	Sibbi	0.413
Faisalabad	0.554	Hyderabad	0.513	Chitral	0.529	Lasbela	0.415
Sahiwal	0.554	Dadu	0.514	Peshawar	0.534	Pishin	0.416
Hafizabad	0.555	Medium Level HD		Medium Level HD		Loralai	0.424
Narowal	0.562	Karachi	0.654	Abbottabad	0.573	Kalat	0.432
T.T. Singh	0.563			Haripur	0.573	Mastung	0.443
Attock	0.576					Gwadar	0.492
Mandi Bahauddin	0.590					Quetta	0.496
Sheikhupura	0.590						
Chakwal	0.591						
Gujranwala	0.604						
Nankana Sahib	0.613						
Jhelum	0.627						
Gujrat	0.628						
Sialkot	0.635						
Rawalpindi	0.646						
Lahore	0.670						

Source: Estimates are based on PSLM, 2014-15 data.

Besides ranking of districts, the magnitude of HDIs is also important to visualize the extent of disparities in the level of human development. For instance, approximately 75 percent districts of Punjab in terms of the magnitude of HDIs are above Quetta which is the capital city of Balochistan. The Figure also reveals intra-provincial inequalities in the level of human development. It is evident from the figure that the magnitude of districts' HDIs in Punjab varies from 0.43 (Rajanpur) to 0.67 (Lahore). Similar trends are also observed in other provinces.

4. CONCLUDING REMARKS

This research facilitates policy makers, regional planners and politicians by providing a single composite index from household survey data to evaluate relative position of districts of Pakistan in terms of human development. HDIs for Pakistan at regional, provincial and district levels are developed from the demand-side single source of information with better proxies of HDI dimensions. Large household survey data of Pakistan Social and Living-standard Measurement (PSLM) survey for the year 2014-15 is used in this study to develop sub-national HDIs.

The magnitude of national HDI is estimated at 0.524 which indicates the low level of human development. However, urban Pakistan is placed in the medium development category with the HDI magnitude of 0.614, while the magnitude of estimated rural HDI is 0.473.

In terms of provincial ranking, highest level of human development is estimated for Punjab with the HDI magnitude of 0.55 followed by Sindh, Khyber Pakhtunkhwa and Balochistan. Balochistan possess the lowest rank with the value of 0.407. However barring Punjab all provinces are placed in the 'Low Human Development' category.

The study also reveals that barring Karachi, all districts of Sindh and Balochistan belong to the low human development category, while 16 districts of the Punjab province including the provincial capital are classified in the category of medium level of human development. In Khyber Pakhtunkhwa province, Abbottabad and Haripur districts lie in the category of medium level, while all other districts, including provincial capital belong to the category of low level of human development.

The findings are useful for profiling and bench marking district positions in terms of the level of human development. The comparative magnitudes of HDIs across districts may also be used as a criterion in determining the Provincial Finance Commission Awards by the provincial governments.

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