

Education Order in Punjab: A District Level Study

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1. INTRODUCTION

Development studies have continuously discussed avenues for development and progress with aims to eliminate poverty based on each country's resources, institutions and culture. One aspect that proves to alleviate inequality and poverty has been investment in human capital which is through the investment in development of knowledge and skills. As a result, education policy has been always been a core development issue for developing countries and international institutions. This development issue can truly be tackled once an assessment of education status is attempted. It helps pave decision-making for the future in education across regions. The task of education assessment is not a new consideration. Many attempts have been made in calculating and estimating an Education Index (EI) for countries and regions across the world. The most frequent attempt at estimating education is made by the UNDP in the process of estimating human development through the Human Development Index (HDI). Using the EI method from the HDI, UNDP has been successful in giving policy-makers a concise understanding of the status of education around the world.

In the process of development, Pakistan needs to invest in its human capital and evaluate its path for the future. Although an Education Index alone cannot point out the major hindrances to education, it is a tool which helps understand the level at which investment in human capital has truly made a difference to the nation. This paper aims to estimate the education standards using the latest Punjab MICS 2007-08 dataset and compare the findings with an estimation of the education standards in 1998 for Punjab. Simultaneously, gender based and rural/urban education indices are calculated to further understand trends and patterns in education attainment.

2. LITERATURE REVIEW

Modern economists can trace the understanding of human well-being as far back as Aristotle. Since then the awareness of human well-being has developed into a much larger balloon of academic discussions. The Human Development Index is one of the

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most widely used and acknowledged measures of human development. This measure, developed and published by the UNDP's first annual Human Development Report (HDR) 1990, helped pave the way for all future debates on human development. The HDI is structured around Amartya Sen's capabilities approach that underlines the importance of a standard of living which allows empowerment to individuals through three social goals: standard of living, health and education [Stanton (2007)]. By using GDP per capita, life expectancy, literacy and enrollment respectively, as proxies to measure each goal, the HDI is calculated to understand the overall state of human development for a particular area. Before the HDI, many cases have used other measures to calculate social well-being in a country such as GNP per capita and other quality of life indices. However, none of the indices has gained as much recognition as Mahbub ul Haq's HDI [HDR (1990)] has since its' introduction.

Critically considered, the HDI is criticised for measuring social well-being and development inaccurately. Some basic criticism surrounds the choice of variables, fixed weighting methodology and its redundancy. Authors advocate that the wrong indicators are used in measuring the three goals and other potential options must be added for better measurement such as civil liberties, distributional effects, and environmental impacts [Stanton (2007)]. Another important concern regarding the HDI is its weighting method. Each dimension of development is given an equal one-third weight which is continuously questioned by literature. Ghaus, Pasha, and Ghaus (1996) and Noorbakhsh (1998) have provided other ways of assigning weights and calculating ranks such as the Principal Component Analysis (PCA) method and Borda method.¹ Lastly, many question the true importance of the HDI and whether more than one dimension is required for the measurement of social wellbeing as compared to a standalone GDP per capita comparison. Regardless of these concerns, the HDI is continuously referred to and is commended for its ease in comparability and calculation across countries.

In estimating the geographic status of education, literature is divided between two branches. One branch evaluates education based on the quality of education. One such example is of Buchmann and Neri (2008), who use two components: average proficiency and passing rate to calculate an index. This index is used to help develop education targets for future evaluation of the Brazilian education system. The other branch of literature examines education ranking and status through the HDI. Many papers have discussed the education index in the process of calculating the HDI or other multi-dimensional development indices. Jordan (2008) presents an interesting case for examining the development levels of different counties in Georgia, USA. Using attainment of high school degree, attainment of Bachelors degree and enrollment from primary to high school, an equally weighted (one-third weight each) education index is calculated. This paper establishes an important finding that the education dimension contributes significantly to the HDI and thus gives argument for the importance of considering education in any development index. Various other studies such as by Agostini and Richardson (1997) and Hanham, *et al.* (2002) all evaluate Human Development Indices and consider the education index in their studies. Similarly, Bedi and Ramachandran (2008) consider the HDI for rural Andhra Pradesh, India. In their paper, they attempt to compare methodologies and ascertain the best technique in finding

¹Noorbakhsh (1998).

a meaningful measure of well-being. They use literacy rate and enrollment ratios in calculating the education index. They compare UNDP's method to the PCA method to conclude the greater benefit of the PCA method in approximating weights according to the variation within data alone.

In an attempt to study the education index in Punjab, Pakistan, it becomes important to consider literature which has already attempted to create the HDI and the EI for Punjab and/or Pakistan. In the case of Pakistan, data has always been a central problem especially for the purpose of the HDI. However, in calculating the education index, obtaining the necessary variables becomes fairly easier. The oldest attempt at measuring well being in Pakistan was in Ghaus, *et al.* (1996) where literacy rate, primary and secondary enrollment was collected from the District Census Reports of 1981. Both the PCA and the Z-sum technique were used to calculate the rankings of districts within the provinces of Pakistan. Jamal (1995) worked on the calculations of a social development index which considered primary, secondary and tertiary enrollment rates for males and females separately while using PCA. Next, the National Human Development Report (NHDR) for Pakistan was published in 2003. Due to lack of data, literacy rate and gross primary enrollment alone were extracted from the Population Census (1998) and Pakistan Integrated Household Survey (1998) and then used to calculate the HDI rankings. Lastly, the latest set of relevant papers is contributed by Jamal and Jahan (2007). This recent work uses literacy rate and combined gross enrollment for the understanding of how rankings and growth have taken place using the EI as a measurement tool.

3. DATA SOURCES AND METHODOLOGY

For the calculations of the year 1998, the annual Punjab Development Statistics 1998 Report and the 1998 Population Census were used. For the calculations of 2008, the data that is being used for this exercise is extracted from the recently conducted Punjab Multiple Indicator Clusters Survey (MICS) 2007-08. MICS is a household survey which was first conducted in 2003-04 for the entire country. Recently for the year 2007-08, the MICS was recollected only for Punjab by the Punjab Bureau of Statistics. It holds information of 91,075 households and lists 592,843 members. One great improvement in the collection of the MICS 2007-08 is that this dataset is also representative at the Tehsil level for Punjab. Such a dataset holds immense potential for more detailed work on the development of Tehsils in Punjab.

In order to calculate the intensity of education for each district, the following variables were extracted from the datasets. Enrollment in three age groups of 5-9 years, 10-14 years and 15-24 years which aim to represent primary, secondary and tertiary levels of education are used.² The tertiary grades are further divided into tertiary general (arts of science) and tertiary technical (medicine, law, engineering, business, commerce etc). Lastly, literacy is also included in the education index as the number of literate (who are read and write) individuals to the population of 10 years and above.

The first main concern in calculating the EI is deciding which methodology to use to assign weights to the different indices that enter the EI. There is the original method used by UNDP (in the process of calculating the HDI) which is to assign fixed weights.

²The classification of indicators is followed from the recent paper by Jamal and Jahan (2007).

The second method that is mostly used in recent literature is the Principal Components Analysis method which assigns weights depending on the variation within the indicators.

Through the first method, the Education Index (EI) is constructed using the two indicators: adult literacy and combined gross enrollment (primary, secondary and tertiary). These indicators are used to create indices by subtracting from the actual values, the lowest goalpost and dividing by the difference between the maximum and minimum goalposts, as shown below. The maximum goalpost for both is 100 percent and the minimum for both is 0; hence, an index is calculated. These two indices are combined to calculate the Education Index.

$$\text{Adult Literacy Index} = \frac{\text{adult literacy value} - \text{min}}{\text{max} - \text{min}} = \frac{\text{adult literacy value} - 0}{100 - 0} \quad (1)$$

$$\text{Combined Gross Enrolment Index} = \frac{\text{enrolment} - \text{min}}{\text{max} - \text{min}} = \frac{\text{enrolment} - 0}{100 - 0} \quad (2)$$

$$\text{Education Index} = \frac{2}{3} (\text{adult literacy index}) + \frac{1}{3} (\text{enrollment index}) \quad (3)$$

The second method by which the EI can be calculated is the Principal Components Analysis method. For this purpose, the following five components are considered: literacy rate, gross primary enrollment, gross secondary enrollment, gross tertiary (general) enrollment and gross tertiary (technical) enrollment. The advantage of the PCA method allows one to generate and assign weights to each component. The manner of generating weights is such that the variable which has the greatest variance will receive the largest weight. These five components are then weighted and added together to compute the Education Index for each district.

Other methodologies used in literature include the zero sum technique and computing the taxonomic distance between indicators [Ghaus, *et al.* (1996)]. These techniques are not used as widely as the UNDP and PCA method. For this paper, both weighting schemes have been used to calculate the EI for 2008. The need for this exercise is to ascertain the difference in both results. The results of both techniques can be compared to show that either method seems to yield similar results in ranking of the EI. As can be seen from Table 1, the groups of bottom and top ten districts remain the same even though the rankings may shift higher or lower by slight dissimilarity. This shows that regardless of the superiority of the PCA method, the UNDP process is reasonable and acceptable for any basic analysis.

4. PUNJAB: EDUCATION STATISTICS

The MICS 07-08 can hold a wealth of information helpful to development of Punjab. The first statistic that is usually reported when evaluating education is the literacy rate. As Table 2 shows, the literacy ratio for Punjab is 59.3 percent. By observation, the Punjab literacy rate is close to the rural literacy rate unlike the urban literacy rate which stands high at 74.6 percent. This suggests that Punjab could possibly be classified as rural at large. The primary gross attendance ratios seem encouraging for Punjab; however, it must be remembered that "gross" measures include enrollment of individuals of all ages.

Table 1
Comparing PCA and UNDP Methods

	PCA	Ranking		UNDP
Rawalpindi	67.8	1	Rawalpindi	75.6
Jhelum	66.8	2	Jhelum	73.4
Chakwal	65.1	3	Gujrat	71.8
Gujrat	64.7	4	Sialkot	71.3
Sialkot	63.3	5	Chakwal	71.0
Lahore	61.2	6	Lahore	70.2
Gujranwala	60.5	7	Gujranwala	69.6
Narowal	60.3	8	Narowal	69.3
Attock	59.4	9	Mandi Bahauddin	66.2
Mandi Bahauddin	58.4	10	Faisalabad	65.0
Toba Tek Singh	56.2	11	Toba Tek Singh	64.8
Faisalabad	55.8	12	Attock	64.5
Hafizabad	55.4	13	Hafizabad	62.1
Sahiwal	53.2	14	Mianwali	60.4
Mianwali	52.5	15	Sargodha	60.3
Sheikhupura	51.4	16	Sahiwal	60.2
Sargodha	51.2	17	Sheikhupura	60.0
Khushab	51.0	18	Layyah	59.6
Nankana Sahib	50.6	19	Multan	59.6
Bhakkar	50.3	20	Khanewal	59.2
Multan	50.1	21	Nankana Sahib	59.2
Layyah	48.9	22	Khushab	59.1
Khanewal	48.8	23	Bhakkar	58.9
Okara	48.7	24	Pakpattan	57.5
Kasur	48.6	25	Okara	57.5
Pakpattan	48.1	26	Kasur	57.4
Vehari	47.9	27	Vehari	55.6
Jhang	45.1	28	Jhang	55.1
Bahawalnagar	45.1	29	Bahawalnagar	54.6
Lodhran	43.0	30	Dera Ghazi Khan	54.2
Bahawalpur	40.6	31	Lodhran	52.6
Dera Ghazi Khan	40.1	32	Muzaffargarh	52.4
Muzaffargarh	39.6	33	Bahawalpur	51.5
Rahim Yar Khan	37.5	34	Rahim Yar Khan	50.3
Rajanpur	34.8	35	Rajanpur	48.4

Table 2

Education Profile for Punjab

	Punjab	Male	Female
Literacy ratio	59.3	68.7	49.5
Rural	52.0	63.5	40.0
Urban	74.6	79.6	69.4
Primary school gross attendance ratio	97.2	101.6	92.5
Primary school net attendance ratio	52.9	54.0	51.8
Secondary school net attendance ratio	28.7	29.6	27.8
Percentage of secondary school age children attending primary	43.4	46.3	40.4
Government and private primary school attendance rate			
Govt.	55.9	–	–
Private	43.0	–	–
Madrassa	0.2	–	–

The third statistic on the primary net attendance ratio shows that only approximately 53 percent of eligible population is attending primary school. The rest of the attendees would be students who are older and are not of the eligible population for primary school. Only 29 percent of eligible individuals are attending secondary school and consequently, 43 percent of eligible students for secondary school are actually attending primary school instead. These simple figures for Punjab are important in helping establish how effectively the student population is enrolled in schools. The last indicator shows the division of primary school attendance according to type of school. It seems that the private sector has a very close attendance rate to that of government schools. The large attendance rate of private schools proves its importance in contributing to the education sector of Punjab. District level values for each of the indicators below can give a better focus of the situation as it varies across the province.

5. MAIN FINDINGS

Primary schooling has been receiving the most attention in policy circles and has as a result also grown largely through the years. However, it is important that while primary enrollment is an issue so is enrollment at other education levels. Eligible student populations need to be targeted with policies that encourage attendance of eligible grades instead of lower levels of education. Hence, policies that encourage better enrollment at secondary and tertiary education levels will help enhance combined enrollment rates as well.

There are some very important considerations that arise from the data in the MICS. A common way of displaying data is in the form of tables; however, a more interesting manner is through color coded maps which help visualise hidden patterns. Consequently, similar maps have been displayed in the Appendix, which help display the results in a far more interesting manner. A compelling result appears consistently. Northern Punjab appears to perform better in all different assessments of education status as compared to Southern Punjab. Figure 1 shows the literacy rate spread for 2008 for all the districts of Punjab. It is clear that the districts which lie in the north of Punjab exhibit

Primary enrollment and education has always been a major goal of the World Bank. Hence, it is important to consider net primary enrollment rates in Punjab. Figure 3 shows that southern districts have around 40 percent or lower net primary enrollment ratios. This is a cause for concern for district governments. When comparing male and female enrollment ratios, strikingly, not all of the northern districts seem to have less than 0 percent difference (Figure 4). Only districts in the north-east and DG Khan show very small differences between male and female enrollment ratios (Figure 4). However when considering Punjab, the difference in education attainment between genders appears to be a serious situation even with continuous growth and development.

Fig. 3. Net Primary Enrolment Ratios (5–9 Years) MICS 2007-08

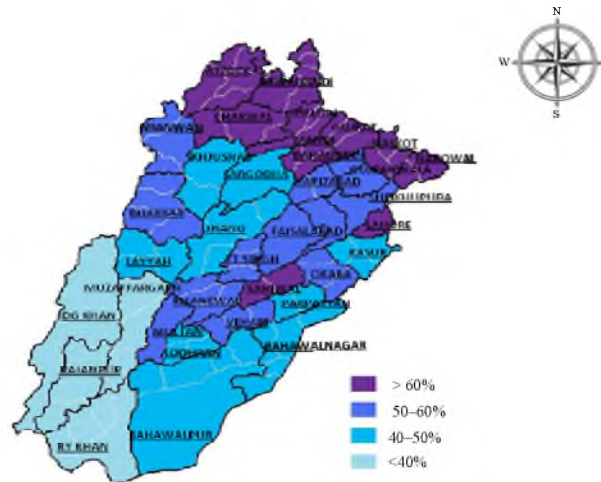


Fig. 4. Percentage Difference in Male and Female Enrolment Ratios MICS 2008

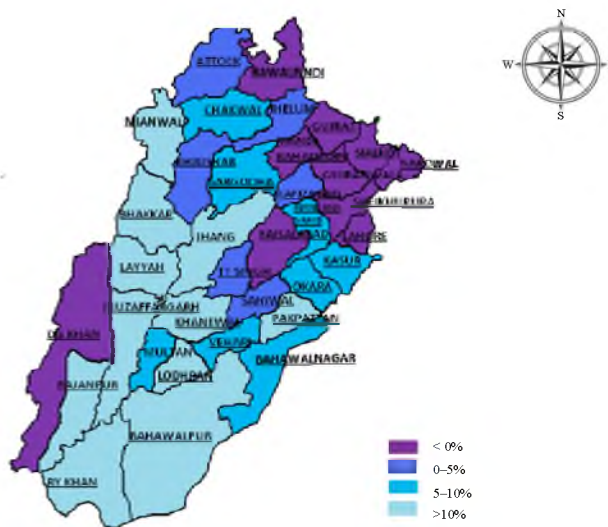


Fig. 8. Annual Growth Rate in Education Index

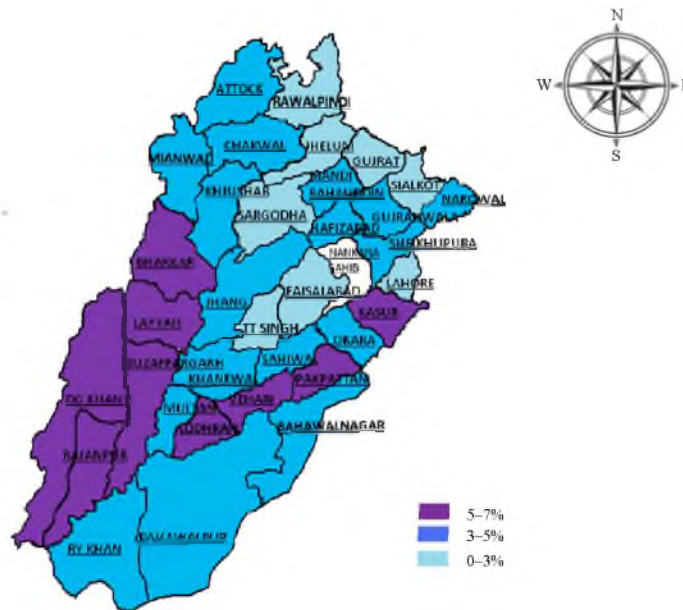
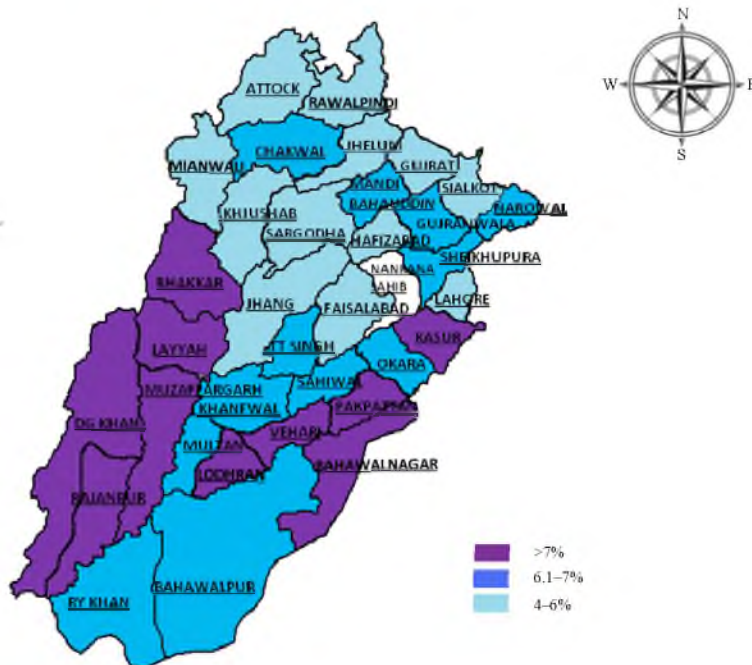


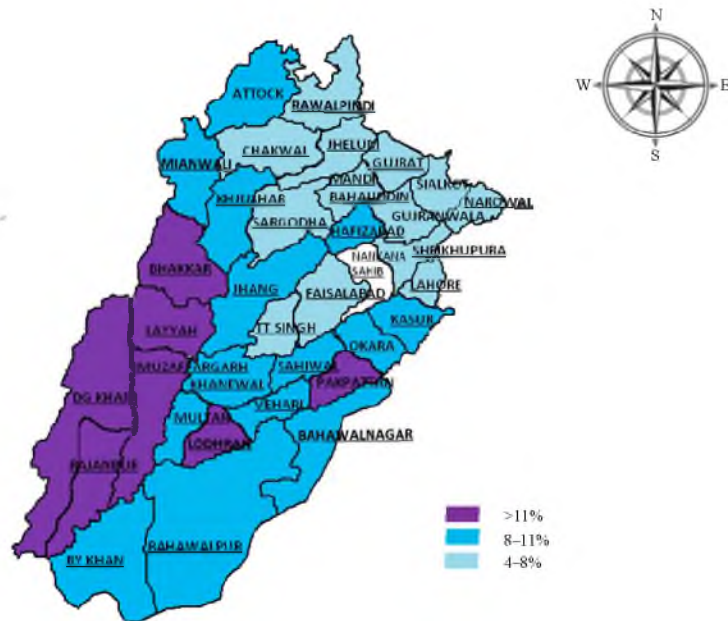
Fig. 9. Annual Growth Rate in Male Education Index



Also, the EI for females has seen larger annual growth rates than the growth rates of the EI for males. When comparing the years 1998 to 2008, it becomes clear that the spread of education status and intensity has hardly changed. There has been growth across the province which has yielded a somewhat “catch-up” effect for the southern districts. By

catching up, southern districts have been able to achieve higher literacy rates and enrollment rates which were reflective of the Northern provinces only a decade ago. Nonetheless, the relative pattern of education spread across Punjab seems hardly altered in the last ten years which implies that continuous construction and estimation of the Education Index might remain futile for the future. It is possible that such a pattern is entrenched due to historical and institutional forces within the province. The persistent pattern and divide between the northern and southern districts of Punjab is also reinforced by comparing Figure 2 and Figure 10.³

Fig. 10. Annual Growth Rate in Female Education Index



This discussion can be extended to estimate education status for the next ten or so years. If the respective average annual growth rate between 1998 and 2008 is assumed to remain constant in the future for each district, it is possible to estimate the value of the EI in 2018 and further. Since the pattern is the same across Punjab, this estimation seems a possible result for reflection. Table 3 shows these estimation results. Estimated EI values of 2018 and 2020 indicate that the literacy and enrollment levels, especially for the bottom ten, will increase considerably to reflect EI values in between 75-90. By projection, the possible education status of the districts in the future can be observed; however, achieving this education status by the proposed years is another task. For this to take place, the average annual growth rate must be sustained which will require simultaneous growth in the supply and demand of education. This responsibility of providing the supply of education will need to be shouldered between both the private and the government.

³Figures 2 and 10 have been replicated in Figures 11 and 12 with a slight alteration. Figures 11 and 12 show a north and south divide with respect to the median of the Education Index instead of the mean as in Figures 2 and 10.

Table 3

Education Index Projections

	Average Annual Growth 98-08	Projections	
		2018	2020
Attock	3.9	86.8	93.6
Bahawalnagar	4.8	71.9	78.9
Bahawalpur	4.6	63.8	69.9
Bhakkar	6.5	94.1	106.7
Chakwal	3.6	92.4	99.2
Dera Ghazi Khan	7.0	78.7	90.1
Faisalabad	2.7	72.6	76.5
Gujranwala	3.2	83.0	88.4
Gujrat	2.0	78.9	82.1
Hafizabad	3.7	80.1	86.2
Jhang	3.9	66.1	71.4
Jhelum	1.9	81.0	84.2
Kasur	5.2	80.7	89.2
Khanewal	4.8	77.6	85.1
Khushab	4.4	78.6	85.7
Lahore	1.6	71.7	74.0
Layyah	5.6	84.3	94.0
Lodhran	6.5	80.7	91.5
Mandi Bahauddin	3.6	83.1	89.2
Mianwali	4.0	77.6	83.9
Multan	4.3	76.6	83.4
Muzaffargarh	6.6	75.0	85.2
Nankana Sahib		50.6	50.6
Narowal	3.7	87.0	93.6
Okara	4.6	76.3	83.4
Pakpattan	6.2	87.5	98.6
Rahim Yar Khan	4.5	58.5	63.9
Rajanpur	7.1	69.3	79.6
Rawalpindi	1.0	75.2	76.8
Sahiwal	4.6	83.3	91.0
Sargodha	2.7	66.9	70.5
Sheikhupura	3.9	75.3	81.2
Sialkot	2.0	77.5	80.7
Toba Tek Singh	2.9	74.9	79.3
Vehari	5.5	81.4	90.6

Fig. 11. Districts Above and Below EI Mean (1998)

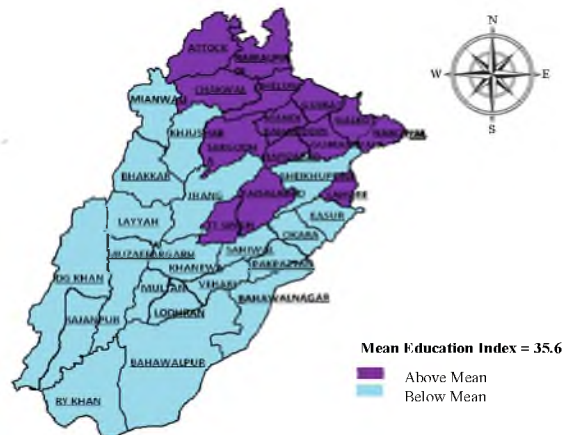
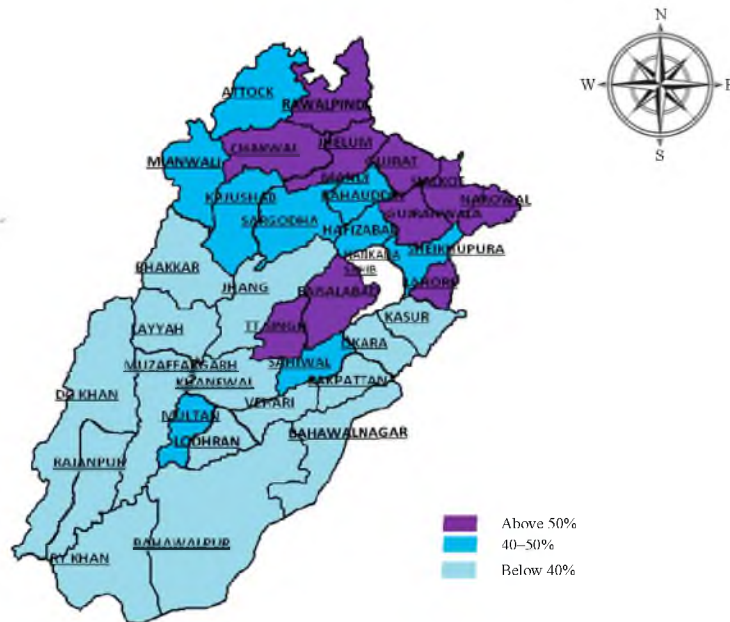


Fig. 14. Literacy Rate for Punjab 1998 Census

6. FURTHER THOUGHTS AND CONSTRAINTS

Based on the observations and results, very interesting concerns arise. The projections show that districts have the possibility of attaining a higher education index in the future but this does not necessarily indicate that universal primary education will be achieved by any target year. If it is possible to achieve universal primary education by a target year, then a certain growth would need to be sustained and once more, it may not be realistic to sustain the growth rate required. Perhaps hopes become too high by observing the growth in the EI in the last ten years. This encouraging growth could possibly be due to the very low initial state of education in these districts. Also, as the 1998–2008 comparison shows a persistent pattern, it is possible that regardless of the fast growth in western and southern districts, the “catch-up” will never truly take place due to institutional, geographical and economical differences. This implies that the education status of western and southern districts may be at or close to its peak. It is also important to keep in mind that the education index itself has drawbacks. The Education Index remains a measure of average achievement and conceals disparities. It does not capture other economic, social, cultural aspects that shape the demand and supply of education across regions. Hence, completely relying on the EI for policymaking is not a proper solution to the inherent issues in the education system of Punjab.

Regardless of the various uncertainties that arise, it is clear that primary enrolment has significantly increased over the decade and thus pulled up education levels. For further development of secondary and tertiary schooling, the incentive structure of families and children based on geographic location needs to be evaluated and targeted. Within areas of Punjab and the rest of Pakistan, rural/urban and male/female and other district level influences need to be reconsidered for better policies.

7. CONCLUSION

Considering education indices from different angles is only a window into the numerous issues which need to be improved. A district-level analysis alone can help identify districts and their relative weaknesses. In order to carry the evaluation further, it is important to use data for a more in depth tehsil-wise analysis of each district. The same district case extensions can shed light on the differences between tehsils within a district. This presents a wonderful opportunity to establish further vulnerabilities of a district. Many problems exist that are associated with supply and demand for education at different levels, rural/urban areas and between different genders. In reality, attempts have been made through various policies to alleviate supply and demand side hindrances. However, very few policies are actually assessed post implementation for improvement purposes. Therefore, it is important to see that along with implementation, continuous reevaluation and readjustment is key to true development in the education sector across Punjab and Pakistan.

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Comments

The paper addresses an important area of human development—status of education—that determines the economic and social well-being of people. This study attempts to assess the educational progress at district level in Punjab during the period 1998-2008. Literacy rates and enrolment rates are widely used indicators to measure progress in education which requires accurate and reliable data on education by levels, age, and other related characteristics. Using two methods of weighting schemes, the author has calculated a composite Education Index (EI) estimated from data on literacy and combined gross enrolment rates (primary, secondary and tertiary) drawn from the 1998 census, Punjab Development Statistics 1998, and the Multiple Cluster Survey (MICS), 2008 to evaluate educational progress in Punjab—a province with a relatively better education profile than the other provinces.

The study provides some useful insights into progress achieved in education during the decade of 1998-2008 at district level—the information needed for policy direction and financial allocations and can help identify districts in need of further evaluation. The results presented through GIS mapping have their own value in terms of giving ‘at a glance’ picture at district level variations and get clear message for further actions.

Different approaches and methods have been used to measure human development, its ranking and educational development, each having its own merits and limitations. The Education Index (EI) used in the study to measure the spread and variability in education also has limitations as it gives only an aggregate picture of the state of education concealing the large urban-rural and gender gaps and related issues. Moreover, the weighting schemes used to measure the index is subject to inherent biases in the data used on literacy and enrolments. Gross enrolment rates used in measuring Education Index are likely to be overestimates of actual school attendance by level and specific age as has been observed in enrolment data collected from surveys and many studies done on enrolment data analysis. Moreover, the census and survey data on enrolments has its own limitations for making comparisons owing to their different methodologies and concepts used for education data, and may have questions on the reliability of the data from two different sources which have not been discussed by the author in the analysis and interpretation of results.

The findings show that patterns of education progress for districts have not changed much during the period 1998-2008 and this has been attributed to small variation in education over the years—a reason not sufficient enough to explain the district level education pattern as educational attainment is affected by a number of supply and

demand factors. Moreover, owing to the lagging position of girls in educational attainment in Pakistan—a factor affecting the overall education progress including Punjab province—it would be useful to have a gender analysis of data and assess the order of education and prevailing gaps constraining further progress. Overall, the analysis presented does not give enough information for specific policy interventions except for getting the picture at aggregate level.

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