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Educational Inequality and Inclusiveness: The Case of Khyber Pakhtunkhwa, Pakistan

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ABSTRACT

It is argued that masses in Pakistan are excluded from the mainstream progress of education resulting in social unrest and adverse state of human development. This paper examines prevailing inequality in and exclusion from education in the Khyber Pakhtunkhwa province of Pakistan, and provides an empirical base for designing an appropriate policy framework to mitigate the underline issues. Towards this end the household-based education and Inequality-adjusted education indices are derived using Foster-López-Calva-Székely (FLS) methodology at the provincial, and district levels from the most recent Pakistan Social and Living Standard Measurement (PSLM) survey 2014-15. The provincial analysis is elaborated at the urban and rural regions as well. The distribution of these indices across households are utilized to measure inequality and inclusiveness coefficients by employing "Atkinson's inequality measure" and "sixty percent of median as threshold of exclusion," respectively. At the district level the impact of economic, social, demographic, and locational factors on inclusiveness of education are also investigated using linear regression. The results demonstrate that KPK households reside on average in low category of actual education level experiencing high inter-regional and intra-regional disparities and exclusions. At the district levels, the inequalities in educational achievement and exclusions are even more pronounced, indicating that aggregated analyses suppress the intra-regional disparities and segregations. Based on these findings, it is asserted that investment in social infrastructure specifically educational, health, and law and order facilities, development of agriculture sector, and eradication of gender discrimination, are important factors to promote inclusive education in the province.

Keywords
Inclusive education, Household-based Education index, Inequality coefficient, Inclusion coefficient, Socioeconomic determinants

JEL Classification
C00, C21, I24, I29

1. Introduction

Inclusive education is listed among the top four sustainable development goals (SDGs) in a recent UNSECO report on sustainable development. It is also considered highly influential towards attaining other SDGs that are aimed at eradicating poverty by 2030

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(UNESCO, 2017). Inclusive education could be derived from the definition of inclusive development by Rauniyar & Kanbur (2010). It is a broad concept that includes enhancement of education level coupled with its equitable distribution in all segments of society, especially the deprived ones. To ensure inclusive education is a world-wide challenge. A substantial proportion of the world population is excluded from the arena of educational achievements (UNESCO, 2017). Masses in Pakistan are also suffering from educational exclusion resulting in social unrest and non-coherence (Burki, et al., 2015; UNDP Pakistan, 2016; UNDP, 2016). Due to its complex socio-political structure Khyber Pakhtunkhwa (KPK), the northernmost province of Pakistan, faces this challenge more hardly than most of its provincial counterparts (Gouleta, 2015).

To raise the level of inclusive education, a comprehensive and regionally integrated plan is required. The foremost steps in this regard are to evaluate the present status of education at all possible administrative levels and to identify the factors influencing inclusive education. The existing literature is unable to serve this purpose adequately. Based on aggregated data, a few studies including Jamal (2016) and Pakistan National Human Development Index Report (NHDIR) (2017) elaborate on the potential level of education (represented by education indices) at the national, provincial, and district levels[1]. However, these studies are unable to provide information about the distributional aspects of educational development including disparities and inclusion, especially at the intra-district level. There is hardly any study that empirically analyze the inclusiveness of education in KPK. Some studies analyze the education system of KPK. Zia uddin and Tahir (2014) has investigated the primary data on the public-school monitoring in KPK. Ahmed & Rashid (2018) in a research study has analyzed the performance of public schools in districts Swat and Lower Dir of KPK. Gouleta (2015) analyzed KPK's educational assessment policies and practices. A comprehensive measurement of inclusive education and analysis of its determinants remains limited for KPK. Health and education are central in building people's physical and mental capacities, and hence any serious inequality of opportunity in these areas will aggravate inequality in their future (Kato, 2014). Keeping in view the significance of the subject matter and the research gap, this study undertakes the task of executing a household-based analysis of educational achievements of KPK at the provincial and district levels. The data used in this study is taken from the latest Pakistan Social and Living Standard Measurement (PSLM) survey 2014-15. The analyses are further extended to urban and rural regions at the provincial levels. This study also examines factors (including economic, social, demographic, and locational factors) influencing inclusiveness of education at the district level. The three underlying aspects of inclusive education: education enhancement, inequality reduction and inclusion of the marginalized are covered in this study by measuring and analyzing household-based education index (I_{IE}), inequality-

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

adjusted education index (I_{IE}), loss due to inequality, and coefficient of inclusiveness. The Classical Linear regression model (CLRM) is employed for analyzing the determinants of all aspects of inclusive education.

KPK is the northernmost province of Pakistan with a privileged geostrategic position and abundant natural and human resources. Majority of the population in KPK resides in rural area and its main economic sources are forestry and agriculture. However, the current level of human development reveals that it could not exploit its advantageous position and abundant resources successfully to construct a shared and resilient society. A number of challenges including influx of Afghan refugees, high incidence of terrorist activities, and a very complex and diversified socio-political structure could be accounted for its low performance (Gouleta, 2015). The picture of education in KPK presents a gloomy outlook. According to Pakistan Education Statistics (2017) KPK currently has about 2.38 million children of the ages of 5 to 16 that are out of schools. Economic Survey of 2016-17 reports that the adult literacy rate in KPK is 53 per cent since 2012, depicting that 47 per cent of adults in the province are illiterate. According to World Development Bank, in 2015 KPK is well ahead of Islamabad Capital Territory, all four provinces, and other regions in the country in term of Gross Intake rate (GIR) (Hunter, 2020). It shows that effort has been started, however, a lot has to be done. As Pakistan NHDR (2017) reports for the same year, the achievement level of KPK in terms of its provincial and district level educational indices depicts that it is just ahead of FATA and Balochistan and falls substantially below the national level, Azad Jammu & Kashmir, Islamabad, and Punjab. The national level and KPK's education indices are 0.538 and 0.49 and these lie in medium and low medium categories, respectively . KPK's overall development level including the standard of living, health, and education reveals that it falls in medium category and is slightly ahead of National level achievements. A comparison of development in three dimensions of human development exhibits that education is the least achieved dimension in KPK. The consequences of low education manifest themselves in lower achievements in other social and economic dimensions. Education can drastically change the growth and development cycle of a region, as established by the East Asian countries during the 1990s (Najam & Bari, 2017).

According to 18th Amendment to the constitution of Pakistan the education has become a provincial subject. Therefore, the provinces should form statutes and articulate educational policies that guarantee the best education system. Despite the fact that government of KPK spends substantially higher on education than any other province in the country and it has passed "Khyber Pakhtunkhwa Right of Children to Free and Compulsory Education Act 2017", province is unable to meet the millennium development goals (MDGs) in education due to high prevalence of extreme poverty (Gouleta, 2015). To emerge as a stable society

in the twenty-first century and to get advantage of its increasing population, KPK must provide a skilled and educated workforce. To achieve this end, serious efforts are required, and a careful examination of present status of inclusive education is necessary to understand the state of the world today. Furthermore, based on these analyses it is imperative to design a new development framework for the future. The foremost step in this regard is to formally and methodically assess the existing status of education and level of its inequality & inclusion. The next step is to inspect the factors influencing inclusive education so that appropriate policies and action plans could be designed.

There are three main segments of this study. First is the empirical assessment of existing level of education and prevailing inter-regional and intra-regional educational inequalities. To achieve this end, household-based I_E and I_{IE} for the year 2014-15 are constructed at the provincial and district levels, using data from PSLM (2014-15) on the lines proposed by Alkire and Foster (2010). Regional indices (rural and urban) are also constructed at the provincial level. The Atkinson's measure of inequality and loss in educational achievements due to this inequality are also estimated. The second segment supplements this analysis by examining the profile of inclusive education at provincial and district levels using a unified measure of inclusion, 'Coefficient of Inclusive education'. It is based on distribution of households' education indices computed in the first segment. Rural and urban coefficients of inclusiveness are also estimated at the provincial level. The third segment comprises of empirical analysis of the prerequisites of inclusive development. To determine the proximate factors that influence inclusive education, district-wise education indices, inequality coefficient and coefficients of inclusive development are regressed on various economic, social, demographic, and locational factors considered to be influential for inclusive development in literature.

The major contributions of this study are: First, it is a leading study in estimating education index at the household level (the smallest possible unit for which required data is available in Pakistan). This study is also credited for being pioneer in constructing household-based provincial and district level education and inequality adjusted education indices for KPK. All the previous works on this subject involve aggregated data at a certain level that suppress the inter-regional variations. Several factors that play a vital role in raising disparities at micro level have remained unaddressed. Second, for the first-time across households' inequalities in education indices at the provincial (overall, rural, and urban) and district levels are estimated for KPK. Third, to our knowledge, it is a seminal work that calculates a unified measure of inclusive education. As a unified measure of inclusive education, coefficient of inclusiveness is an efficient tool for the analysis of its dynamics and determinants. Forth, this study investigates and identifies major economic, social, demographic, and locational determinants of inclusive education at the district level.

This study is also important in the wake of adoption of SDGs and Vision 2030 by Pakistani government, and devolution resulting from Pakistan's 18th Constitutional Amendment. The district level study of inclusive development and its determinants would assist local and provincial governments in identifying areas and sectors that require greater attention, enabling them to allocate resources accordingly. Last but not the least, this study is also expected to generate dialogue and further research to deepen the understanding of the dynamics and key drivers of inclusive education in KPK.

The rest of the paper is organized as follows: Section 2 presents the data sources and research methods utilized in this work. This section also describes the procedures to estimate education indices and their distributional inequality. Section 3 provides analyses of the estimated education indices and their inequality coefficients. Section 4 outlines the estimation of inclusiveness coefficients of education and presents its analysis . Section 5 presents the analyses of determinants of inclusive education. Finally, Section 6 highlights the conclusions of the study and lays out recommendations for policy and future research.

2. Data and Research Methodology

The main data utilized in this study is taken from the latest Pakistan Social and Living Standard Measurement (PSLM) survey 2014-15. It is a district as well as provincial and national level representative survey which covers 78635 households. (Pakistan Bureau of Statistics, 2016). Most of the District-wise data for the determinants of inclusive education is collected from various publications of Pakistan Bureau of Statistics for the years 2014 and 2015. The data about education and health institutions, total area, forest area, cultivated area, road length, registered factories, police stations, and reported crimes for year 2014-15 is collected from KPK development statistics 2015 and 2017. Data about population and sex ratio is collected from Pakistan Census 2017 as these figures are close approximates for year 2014-15. For detail description of data see Table A.1 and A.2 in appendix.

The general methodology utilized here to construct the household-based education index is taken mainly from Lopez-Calva & Ortiz-Juarez (2011). Technical notes for human development reports (2014; 2015) are consulted for details of index construction, inequality measurement, and loss due to inequality. Traditional component of education index are adult literacy and enrollment indicators. However, the household-based calculation of enrollment imposes the problem of missing data in households without children, as enrollment depends on the presence of individuals of school going age. In this work education index is calculated by replacing enrollment with a continuous variable capturing the years of schooling for individuals of or above the age of 7 (the age required to complete the first year of primary education). Using this variable, missing values are avoided by imputing the household *i*'s average schooling to children below the age of 7, under the assumption that children could

achieve at least such average over the course of their lives (Lopez-Calva & Ortiz-Juarez, 2011). Household's achievements are normalized to a score between 0 and 1 using extreme values across country, called the domestic goalposts. Hence education indices are contextualized regarding domestic goalposts to consider the national realities and priorities. Domestic goalposts provide a realistic assessment of the relative educational progress made by households and districts in KPK.

Information about schooling years and adult literacy of a household's members are collected from section 'C' of PSLM 2014-15. To construct schooling index of a household, firstly for each household member of age 7 years or above, an indicator of the years of schooling is computed and is compared it with a minimum value of zero and a maximum value that depends on age. For instance, a 7-year aged person must have 1 year of schooling as maximum; an 8-year aged person must have 2 years of schooling as maximum, and so on up to a maximum of 18 years of schooling which corresponds to individuals aged 24 or above. If a person aged 7 has 2 or more years of schooling, the value would be fixed up to 1; if a person aged 8 has 3 or more years of schooling, it would be fixed up to 2, and so on. The schooling index for individual j in household i (Sci_j) is calculated by normalizing his/her schooling years as:

$$Sci_j = \frac{Sc_j - Sc_{min}}{Sc_{max} - Sc_{min}} \text{ ----------(1)}$$

with Sc_j being the observed years of schooling for individual j, and Sc_{min} and Sc_{max} the reference values. The average of the individual indices is calculated and imputed to children aged below 7 years. The schooling index for household i (Sc_i) is the average of schooling for all the individuals in that household.

In the case of adult literacy, if an adult with or above the age of 15 declared to be able to read and write in any language with comprehension a short simple statement on his/her everyday life, he/she is considered as literate (Anon., 1997). Hence, the adult literacy index is denoted as the proportion of population aged 15 years and older who can read and write with understanding in any language. Household literacy rate (l_i) is then calculated as:

$$L_i = \frac{1}{T}\sum_{j=1}^{m} l_j \text{ ----------(2)}$$

with T being the total number of adults in household i, m the total number of literate adults, and l_j an indicator taking the value of 1 if the adult j is literate, and 0 otherwise. This rate is equivalent to the literacy index.

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

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

To conduct a household-based analysis of educational progress across KPK districts, the first task is to construct education index at household level. At next stage this measure is used to analyze the aggregate level education at provincial and district levels. A household's education index is composed of its adult literacy index and schooling index. Information about adult literacy and schooling years of a household's members are collected from section 'C' of PSLM 2014-15.

For schooling index, at first step data about years of schooling for individuals of or above the age of 7 is collected from three questions. First of these questions is, "what the highest class /level of education is completed?". The answer to this question comprises twenty different categories (classes/levels) with specific value labels. The years of schooling are assigned to each class/level according to educational system prevailing in the country. At second step the schooling index for everyone of or above the age of 7 is calculated by normalizing his/her schooling years by using equation 1. The schooling indices of all the individuals in a household are averaged out to obtain a household's schooling index (Sc_i). To avoid the underestimation of index, all the zero values are replaced by 0.02 under the assumption that individuals have accumulated some learning and experience throughout their lives, regardless of if they have attended school or not. The value of 0.02 is selected arbitrarily keeping in view very low mean years of schooling index in Pakistan i.e. 0.3133 according to Human Development report 2014. Moreover, this number involves no truncation of the distribution as the smallest non-zero observed household's schooling index equals 0.0253.

For adult literacy index, information is collected from the question, "Can this person read & write in any language with understanding?". There is no missing response for this question in case of individuals of age 15 years or above. Household literacy index (L_i) is derived by dividing number of adult literates in a household by its total number of adults and normalizing it by natural goal posts of 0 and 1. For the same reasons outlined in the case of schooling, a minimum level of 0.05 is attached instead of 0 in those households with all illiterate adults. This does not truncate the distribution as smallest observed non-zero adult literacy index is 0.0625.

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

In the present study to estimate the provincial or district level education index and inequality adjusted education index the general means are utilized for aggregation of household education indices based on (Foster, et al., 2005). The inequality in distribution of educational progress across households is captured by an inequality measure suggested by Alkire & Foster (2010). Foster, Lopez-Calva, and Szekely (2005) proposed the use of a general mean or equally distributed equivalent (ede) achievement level for aggregation of achievement (x) to account for inequality in progress/development. The generalized mean can be referred as $\mu_\alpha(x)$, and for a population of size n it is commonly expressed as:

$$\mu_\alpha(x) = \begin{cases} \left(\frac{x_1^\alpha + x_2^\alpha + x_3^\alpha \dots\dots\dots + x_n^\alpha}{n}\right)^{1/\alpha} & if\ \alpha \neq 0 \\ (x_1 \times x_2 \times \dots\dots \times x_n)^{1/n} & if\ \alpha = 0 \end{cases} \quad \text{----------(4)}$$

where α may take any value in the interval (− ∞, + ∞) (Foster, et al., 2013). The general means for α < 1 are generally interpreted as measures of social welfare. The Foster-López-Calva-Székely (FLS) class of indices satisfies all basic axioms of a welfare index including subgroup consistency and distribution sensitivity (Alkire & Foster, 2010; Seth, 2009).

Atkinson used the parameter $\varepsilon = 1 - \alpha \geq 0$ ($\alpha \leq 1$) to index the class of edes; he interpreted ε as an inequality aversion parameter in the aggregation method of achievements (which he considered to be welfare (Alkire & Foster, 2010). The case of ε = 0 yields the index that is based on the arithmetic mean, which is insensitive to inequality in achievements. The value of ε=1 yields index which is obtained by the geometric mean to evaluate achievements. For $\varepsilon > 0$, the inequality adjusted index discounts for inequality within-dimension according to the level of inequality aversion indicated by its associated parameter ε.

In this study the arithmetic mean of households' indices is employed to obtain a provincial or district education index (I_E) without accounting for inequality. It is given as:

$$I_E = (E_1 + E_2 + \cdots + E_n)/n \quad \text{----------(5)}$$

where as E_i is the ith household education index and n is the number of households. To obtain inequality adjusted education index (I_{iE}) at the provincial or district level the households' education indices are aggregated by using geometric mean as:

$$I_{iE} = \sqrt[n]{E_1 \times E_2 \times \dots\dots\dots\dots \times E_n} \quad \text{----------(6)}$$

Atkinson (1970) family of inequality measures is used to capture inequality in underlying distributions of education across households. Atkinson measure of inequality with inequality aversion parameter ε=1 is employed in this research. It can be expressed as:

$$A_E = 1 - \frac{I_{iE}}{I_E} \quad \text{----------(7)}$$

The inequality measure A_E represents the share of per household educational achievement that is wasted because of inequalities in its distribution across households. It is regarded as the percentage loss in potential level of educational achievement or welfare arising due to inequitable distribution.

To compute unified measure of inclusive development at the district and provincial levels method proposed by Suryanarayana (2008) is adopted in this study. The underlying idea is that the growth process under review will be inclusive if it is beneficial for deprived sections of the society. To identify the deprived, this approach compares the achievement of individual units of the society (individuals/ households/ regions) relative to the average achievement of the society. The population having achievement below sixty percent of median achievement of the society is considered as deprived. The same approach is adopted to measure inclusiveness of educational achievement in this study. Thus, the segment of population which is deprived of education is defined regarding a threshold of education index, specified as a function of median education index. The population (households) having E_i below sixty percent of median E_i is considered as deprived. The 60% of median, and 50% of the mean are two commonly used thresholds for relative income deprivation; the former measure is probably the most extensively used measure nowadays (Townsend & Kennedy, 2004). The advantage of this threshold is that it will not change by the rise of incomes in the deprived section unless they cross the median income. (Mack, 2016; Bradshaw & Mayhew, 2011).

In this study the application of this threshold is extended to measure the proportion of households deprived of education. The deprived of education proportion of population is given as:

$$\theta = F(\delta E_{0.5}) = \int_0^{\delta E_{0.5}} f(E)dE \text{----------(8)}$$

where θ = incidence of the deprived (ID), 0<δ< 1. The $E_{0.5}$ represents the households' median education index such that:

$$\int_0^{E_{0.5}} f(E)dE = \frac{1}{2} = \int_{E_{0.5}}^{\infty} f(E)dE \text{----------(9)}$$

The value of δ is kept 0.6. *F* is the cumulative distribution function and $f(E)$ is the density function of 'E_i'. Some important features and implications are as follows:

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

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

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

Assuming society consisting of a homogeneous group with heterogeneity in educational achievement across households, a "Coefficient of Inclusion" is defined by suitable standardization regarding its limits. Inclusion Coefficient (IC) denoted by 'Ψ' is given as:

$$\Psi = 1 - 2\int_0^{\delta E_{0.5}} f(E)\mathrm{d}E \text{----------(10)}$$

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

(i) The value of Ψ tends to the value 0 (unity), when no (all) household (households) with relatively poor educational achievement is (are) participating and hence, benefiting from the mainstream educational progress, implying a state of perfect exclusion (inclusion)

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

The economic and social welfare is not evenly distributed across regions in Pakistan (Jamal, 2016; UNDP Pakistan, 2016), exhibiting a scenario of non-homogeneous society. Consequently, inclusiveness of education in KPK is analyzed in two ways i.e. across the regions (inter-regions) and within the regions (intra-region). Inter-regional inclusion is examined with reference to disparities in median levels education across regions. It is measured by closeness of regional median ($E_{0.5}^R$) to national median $E_{0.5}^M$ (of the national/mainstream population). For a given δ such that $0 < \delta < 1$, there can be two scenarios:

(i) $E_{0.5}^R < \delta E_{0.5}^M$ implies exclusion of the specific region.
(ii) $E_{0.5}^R \geq \delta E_{0.5}^M$ implies inclusion of the specific region.

Intra-regional inclusion is examined in terms of inclusion coefficients (ICs) defined with respect to regional as well as mainstream (provincial) median. Intra-regional inclusion for any given region 'i' is measured with respect to either own median ($E_{0.5}^R$) providing a measure of Ψ_i^R (IC Regional) or mainstream median ($E_{0.5}^M$) providing a measure of Ψ_i^M (IC Mainstream). These two measures are distinct and different for situations when there is inter-regional exclusion; and converge with progressive inter-regional inclusion. IC Regional (Ψ_i^R) measures the extent of inclusion of the bottom half population of the region under review in its own progress. Its limits and properties are the same as discussed for the inclusion coefficient of a homogeneous society. IC Mainstream (Ψ_i^M) measures the extent of inclusion of the population (laying below national median) of concerned region in the progress of the country/ society. The limits for IC Mainstream (Ψ_i^M) are as follows:

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

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

Inclusive education= f (EF, SF, DF, LF) ----------(11)

Economic factors comprise of industrial development (measured by no. of registered factories per hundred thousand of population), agricultural development (measured by percentage of cultivated area), percentage of forest area, and level of physical infrastructure (measured by road density, airport, and railway station) at district level.

Social factors include public education and health facilities, and law & order condition at district level. Public education facilities are proxied by district-wise total number of government schools, high schools, middle schools, primary schools, and colleges per hundred thousand population. District-wise number of government hospitals per hundred thousand population and number of beds in government health institutions per ten thousand population are utilized to proxy public health facilities. Law and order facility are assessed by number of police stations per hundred thousand population at district level.

Demographic factors utilized in this study are the population density, ratio of male to female population (sex ratio), and urbanization (ratio of urban population to total population).

Locational Factor include the dummy variable for divisional capital.

The functional forms of the regression models are given as:

$$I_E = \alpha_1 + \beta_1 \text{ EF} + \gamma_1 \text{ SF} + \delta_1 \text{ DF} + \xi_1 \text{ LF} + \varepsilon_1 \text{ ----------(12)}$$
$$A_E = \alpha_2 + \beta_2 \text{ EF} + \gamma_2 \text{ SF} + \delta_2 \text{ DF} + \xi_2 \text{ LF} + \varepsilon_2 \text{ ----------(13)}$$
$$\Psi_i^M = \alpha_3 + \beta_3 \text{ EF} + \gamma_3 \text{ SF} + \delta_3 \text{ DF} + \xi_3 \text{ LF} + \varepsilon_3 \text{ ----------(14)}$$
$$\Psi_i^R = \alpha_4 + \beta_4 \text{ EF} + \gamma_4 \text{ SF} + \delta_4 \text{ DF} + \xi_4 \text{ LF} + \varepsilon_4 \text{ ----------(15)}$$

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

In this study Classical linear regression model (CLRM) is employed to estimate the above stated equations individually. The SUR could be an appropriate technique for the estimation of this system of equation. However, selection of CLRM to estimate individual equation is based on the two reasons. First, Greene (2005) argues if the set of regressors is same across the two (or more) dependent variables, the outcomes from SUR will be identical to those from OLS (Greene, 2005). Second, the sample size in this study is too small to restore reasonable degrees of freedom in estimating a system of equation with large number of coefficients. To produce robust estimates, possible violations of the assumptions of the CLRM relevant for cross-sectional data are explored. Shapiro-Wilk test is utilized to check the normality of residuals since it is recommended the best choice for testing the normality of data by some researchers (Thode, 2002). To deal with the possibility of heteroskedasticity, robust standard errors (heteroskedasticity-consistent) are utilized as it is a common and popular technique in this respect (Berry, 1993). Multicollinearity is tested by analyzing the Variance Inflation Factor (VIF) that is the most extensively used diagnostic for multicollinearity (Allison, 2012). The data issues pose a serious limitation on testing endogeneity of the model as the appropriate instruments could not be found for the district level data. Therefore, to establish the causality between inclusive education and its determinant is beyond the scope of this study. In this scenario the objective of this work is to identify the significant covariates of inclusive education.

3. Analysis of Education Index and Its Inequalities

For aggregated analysis of educational progress households' education indices are classified in to five categories. These categories/classes of education index are very low, low, medium, high, and very high. The cut-off values for classes of education index are determined by five provincial quintiles of households' education indices following the lines proposed by UNDP (2014). The various categories of household's education index along with their cut off values are given in Table 1. A simple comparison of lowest and highest cut off values reveals substantial disparities in education indices of households. The gap between maximum and minimum cut off for education index it is 0.74. The wide differences in education indices across and within quintiles show the prevalence of high educational disparities across households.

Table 1: Categories of Educational Achievements with Cutoff Values

Categories of Education Index	Cutoff values (Based on Quintiles of I_E)
Very low	Less than 0.19
Low	0.19 to 0.50
Medium	0.51 to 0.69
High	0.70 to 0.93
Very High	greater than 0.93

Source: Authors' Calculations

The estimates of education index (I_E), Inequality-Adjusted education index (I_{iE}), and the estimated percentage losses due to inequalities in educational achievements across households (A_E) in KPK and, its rural and urban regions are exhibited in figure 1. These estimates establish the incidence of low actual educational achievements in KPK and of high disparities across regions. The overall KPK education index reveals that KPK falls in low category of potential educational achievements. There is a substantial urban-rural educational disparity in KPK. The urban households' education index lies in medium category, while rural index falls in low category of educational achievements. The urban households' education index is 1.4 times higher than that of rural households.

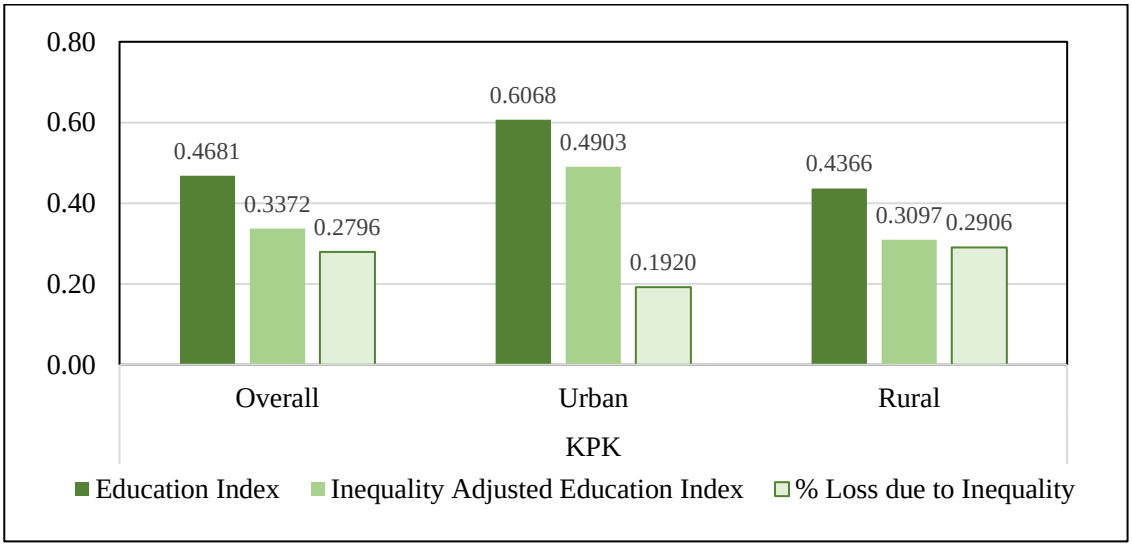

Figure 1: Provincial Education indices and Inequality Measures (Source: Authors' Calculations)

Inequality-Adjusted education index demonstrate that achievement level in education is affected considerably due to inequalities. The loss is substantial with a varied magnitude in different regions. At provincial level, this loss is estimated around 28 percent. The loss due to inequality is markedly high in rural KPK as compared to its urban counter parts.

Table 2: District-wise Education Indices and Inequality Measures

District	Education Index (IE)	Inequality Adjusted Education Index (IiE)	% Loss due to Inequality (AE)	Rank I_E	Rank I_{iE}	Change in rank due to Inequality
Haripur	0.6552	0.5660	0.1362	1	1	0
Karak	0.5650	0.4758	0.1580	3	2	1
Malakand	0.5425	0.4429	0.1836	6	3	3
Abbottabad	0.5970	0.4381	0.2662	2	4	-2
Chitral	0.5345	0.4292	0.1970	7	5	2
Peshawar	0.5462	0.4258	0.2204	5	6	-1
Lower Dir	0.5047	0.4203	0.1672	10	7	3
Mansehra	0.5522	0.4113	0.2552	4	8	-4
Lakki Marwat	0.5057	0.3982	0.2124	9	9	0
Bannu	0.4959	0.3948	0.2038	11	10	1
Nowshera	0.5064	0.3871	0.2356	8	11	-3
Mardan	0.4541	0.3331	0.2664	13	12	1
Kohat	0.4669	0.3295	0.2943	12	13	-1
Charsadda	0.4353	0.3214	0.2617	14	14	0
Swat	0.4319	0.3197	0.2598	15	15	0
Swabi	0.4306	0.3009	0.3014	16	16	0
Tank	0.3807	0.2725	0.2843	18	17	1
D. I. Khan	0.4121	0.2719	0.3401	17	18	-1
Hangu	0.3569	0.2557	0.2836	20	19	1
Upper Dir	0.3584	0.2537	0.2921	19	20	-1
Batagram	0.3341	0.2326	0.3039	21	21	0
Buner	0.3044	0.2096	0.3115	22	22	0
Shangla	0.2975	0.1924	0.3533	23	23	0
Tor Ghar	0.2211	0.1395	0.3694	24	24	0
Kohistan	0.2152	0.1270	0.4099	25	25	0

Source: Authors' Calculations

The district-wise Education indices (I_E), Inequality-Adjusted Education indices (I_{IE}), and coefficients of inequality (A_E) are reported in Table 2. There is no district in KPK with potential education index above the medium level of education index or in very low category. The data reveals that potential education index for most of the KPK districts fall in low category, ten districts are in medium category. Inequality adjustment pulls down all districts' education indices to further in low category or in very low category. The estimated inequality coefficients validate the prevalence of wide disparities within districts. In ranking of both education indices with and without Inequality adjustment; Haripur is at the top. KPK's capital Peshawar is ranked at 4th place in terms of I_E and with inequality adjustment it ranks at 8th place. It is the largest loss of rank among all districts of KPK indicating the intensity of educational inequality in Peshawar. It lies in medium category of education and fall in low category with inequality adjustment. Kohistan is at lowest rank of education in terms of both education indices I_E and I_{iE}. It is preceded by Tor Ghar, Shangla, Buner and Batagram. All these bottom ranked districts are in low category of education and first three of them come down to very low category after accounting for inequality.

Analysis of inequality coefficients reveals that loss due to inequality ranges from the loss of almost 14 percent in Haripur to the substantial loss of 41 percent in Kohistan. In top five districts maximum loss due to in equality is around 27 percent, in contrast the minimum loss in bottom ten districts is around 41 percent. In general, the magnitude of disparities within districts and across districts rises with deterioration of education level. However, considerable disparities are observed in some top ranked districts too. The KPK districts exhibiting very low level of human development are situated in its north and south. It is observed that mostly districts that have natural resource endowment are in low or very low category of human development. In contrast the majority districts with better status of human development and low disparities are either centers of administration, or are home to small industries, or are hub of commerce and trade. It indicates the skewed utilization of public and private funds, underutilization and wastage of natural resources, and the ignored agriculture sector. There are some obvious socio-political factors that could be responsible for adverse human development status in certain regions. In KPK the terrorist activities, Afghan refugees, and armed conflict specifically in southern districts are some of the probable reasons for poor human development situation (Akbar, 2015; Khattak, 2017; Yousaf, 2013). To address these issues further research at regional levels is required.

The distribution of districts in categories of education, according to their education index (I_E) and Inequality-Adjusted education index (I_{IE}) is given in Table 3.

Table 3: Distribution of Districts in Categories of Education Index

Education Category		Districts (According to IE)		Districts (According to IiE)	
		Number	Percentage	Number	Percentage
KPK	Very High	0	0	0	0
	High	0	0	0	0
	Medium	9	36	1	4
	Low	16	64	22	88
	Very Low	0	0	2	8

Source: Authors' Calculations

The findings of this study are comparable with the facts presented by Pakistan NHDR (2017), see Table A.3 in appendix. According to this report most of the KPK districts' education indices falls in low medium or low categories, the same result is established by the present study. Majority of the districts ranks according to the education index (I_E) is almost similar in both studies. The interesting comparison is between the education index (I_E)-wise rank of districts cited by the NHDR and the inequality adjusted Inequality-Adjusted education index (I_{IE})-wise rank given by the present study. The inequality adjustment changes the education ranking of the districts remarkably. For example, Abbottabad that stands first in NHDR in terms of education index slides down to fourth

place with inequality adjustment calculations in the present study. These findings urge for policy measures focused not only to elevate the average educational achievements but also to alleviate the educational inequalities simultaneously.

A mapping of KPK districts' inequality adjusted education and human development indices and their ranks respectively calculated by present study and Pakistan NJDR (2017) is cited in appendix Table A.4. It reveals substantial differences in the level of education and overall human development level in majority of KPK districts. District Karak with *HDI* ranking of 13 and I_{IE} ranking of 2 is showing the highest divergence. At the lowest end for the districts of Shangla, Tor Ghar, and Kohistan this deviation is minimal. The considerable inequalities in districts' *HDI* and I_{IE} suggest that the dimensions of *HDI* are not perfect substitutes of each other.

4. Inclusiveness Analysis of Education

The third important aspect of inclusive education in a society i.e. inclusion of marginalized, is examined by utilizing distribution of households' education indices. To determine the inter-regional inclusion status the median education index for each region is compared to sixty percent of national median education index. The value of national median education index estimated in this study is 0.5714. The comparison demonstrates that overall, urban, and rural regions in KPK are inclusive in mainstream education, see Table 4. Inclusiveness describes that at least some proportion of households in bottom half (below median education index) of these regions have education index that fall in inclusion zone.

Table 4: Provincial Level Estimates of Inter-Regional Inclusion/Exclusion in Terms of Education index

	Education	Median Education Index	Inter-regional Inclusion/Exclusion*
KPK	Overall	0.4707	Inclusion__
	Urban	0.6143	Inclusion
	Rural	0.4306	Inclusion

Source: Authors' Calculations

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

Table 5 displays inter-district inclusion/exclusion in terms of education index in KPK. Out of 25 districts of KPK 18 are exhibiting inter-regional inclusion. Hence, 74 percent and 28 percent of the total KPK districts demonstrates the inter-regional inclusion and exclusion, respectively. The districts with very low median education indices showing exclusion include Hangu, Upper Dir, Batagram, Buner, Shangla, Tor Ghar, and Kohistan. It implies that education index of all households in these districts fall in exclusion zone.

Table 5: District-wise Estimates of Inter-Regional Inclusion/Exclusion in Terms of Education index

District	Median Education Index	Inter-regional Inclusion/Exclusion*
Haripur	0.6788	Inclusion
Abbottabad	0.6667	Inclusion
Mansehra	0.5714	Inclusion
Karak	0.5714	Inclusion
Chitral	0.5556	Inclusion
Malakand	0.5417	Inclusion
Lower Dir	0.5333	Inclusion
Peshawar	0.5333	Inclusion
Lakki Marwat	0.5238	Inclusion
Nowshera	0.5000	Inclusion
Bannu	0.5000	Inclusion
Mardan	0.4675	Inclusion
Kohat	0.4630	Inclusion
Swabi	0.4444	Inclusion
Charsadda	0.4287	Inclusion
Swat	0.4222	Inclusion
Tank	0.3968	Inclusion
D. I. Khan	0.3662	Inclusion
Hangu	0.3353	Exclusion
Upper Dir	0.3333	Exclusion
Batagram	0.2917	Exclusion
Buner	0.2540	Exclusion
Shangla	0.2500	Exclusion
Tor Ghar	0.1444	Exclusion
Kohistan	0.1167	Exclusion

Source: Authors' Calculations

Intra-regional inclusiveness analysis at the provincial and district levels is presented in figures 2 and 3, respectively. The estimate of provincial IC establishes that 75 percent of the lower half of households (with education index below median) in KPK falls in exclusion zone of education, consequently the percentage of inclusion is markedly low. The substantial rural-urban disparities are evident in inclusiveness of education. In urban region mainstream inclusion is more than three times higher than its rural counterpart. In urban region and rural regions respectively, 59 percent and 18 percent of the bottom half of households lie in mainstream inclusion zone. The regional inclusion of rural region is less than two-third of that of the urban region. The IC-regional for rural households and urban households is 56 percent and 34 percent, respectively.

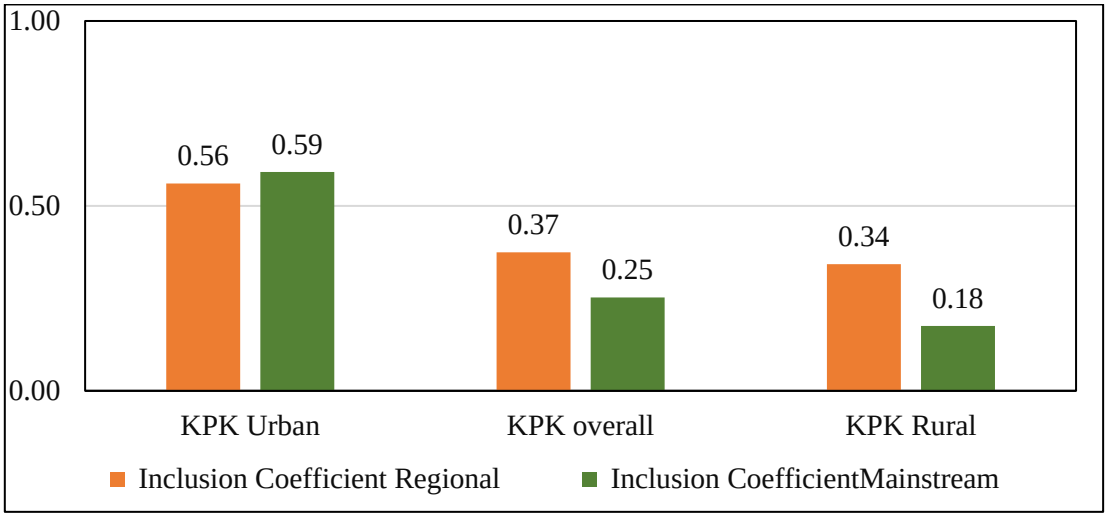

Figure 2: Provincial Level Estimates of Education's Regional and Mainstream Inclusion Coefficients (Source: Authors' Calculations)

The intra district inclusion analysis reveals that in KPK only 2 out of 25 districts are in state of inclusion with respect to IC-mainstream and seven districts with negative IC-mainstream exhibit nearly perfect exclusion. In KPK, Haripur district has the highest level of mainstream inclusion and regional inclusion of 73 percent and 66 percent respectively. The second highest level of mainstream and regional inclusion is exhibited by district Karak for which both measures have the same value of 0.58. Provincial capital Peshawar also exhibit mainstream exclusion with IC-mainstream at 0.43 and IC-regional at 0.50. The districts with the lowest level of inclusion with respect to mainstream education and regional education are Tor Ghar (-47 %) and Kohistan (-45 %), respectively. It shows that education indices of almost 97 percent and 95 percent of households of Tor Ghar and Kohistan falls in exclusion zone of education, respectively.

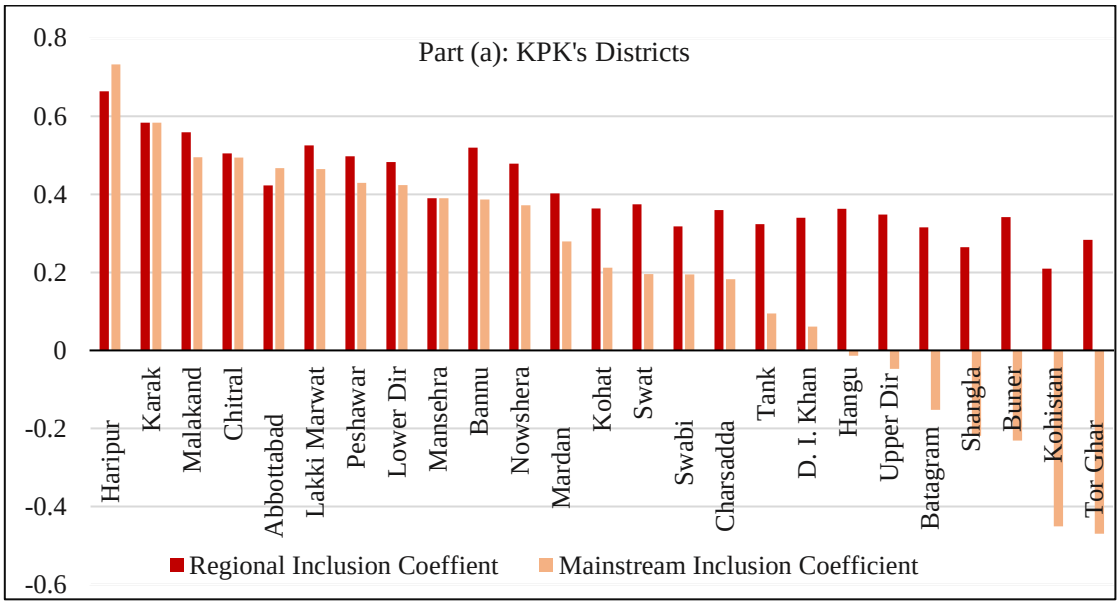

Figure 3: District-wise Regional and Mainstream Inclusion Coefficients of Education
(Source: Authors' Calculations)

5. Analysis of Determinants of Inclusive Development

Analyzing the determining factors of inclusive education is a prerequisite to identify critical areas for optimal utilization of available resources (Oluseye & Gabriel, 2017). One of the objectives of this study is to identify the factors that could ensure and enhance the inclusive education across districts in Pakistan. The district level diagnosis recognizes the most significant local factors that boost or hampers the inclusive education. This analysis provides a base to suggest appropriate policies. The methodology for the analysis is discussed in section 2.

In this regression analysis dependent variables are the indicators of inclusive education estimated by this study and the independent variables are factors that influence these indicators. The individual regression models are estimated for indicators of inclusive education representing its three aspects including education index, inequality coefficient, and inclusiveness coefficients (mainstream & regional). A set of 18 variables mentioned in section 2 is initially selected to include in regression analysis. The descriptive statistics of these regression variables are cited in Tables A.1 and A.2 in appendix. The descriptive analysis shows high variability in the regressors, it improves the precision with which the parameters are estimated (Anon., 2016).

The four regression models presented by equations 12-15 are estimated in this study by utilizing Stata 13. The assumptions of CLRM vital for cross-sectional data are identified

and are taken care of to generate robust estimates of regression coefficients. The robust standard errors are used to address the probable prevalence of heteroscedasticity (Williams, 2015). To estimate a parsimonious CLRMs for the education index, inequality coefficient, IC-mainstream, IC-regional are estimated by including different subsets of independent variables from initially selected 17 variables. To control for high multicollinearity and to restore degree of freedom final models are selected on the basis of VIF values, overall significance of the model, and the model selection criteria of Akaike and Schwarz. In these selected models individual and mean VIFs are less than 2.5 and residuals are approximately normal and homoskedastic. The estimated regression models are reported in Table 6.

The regression results demonstrate that being divisional headquarter, public investment in social infrastructure, eradication of gender bias, development of agriculture sector, and urbanization are the significant determinants of one or more aspects of inclusive education in districts of KPK. The public expenditure on health and education have a significant impact on all aspects of inclusive education. The impact of physical infrastructure (road density) is found to be statistically insignificant for all aspects of inclusive education.

According to analysis the inequality coefficients of districts which are divisional headquarters are significantly high. It implies that in administrative centers the proportions of households excluded from mainstream of educational achievement is higher than other districts. The regression results provide an empirical evidence for the strong role of social infrastructure to ensure a higher level of inclusive education. It is asserted by regression finding that total number of government /government high schools (an indicator of public education facilities) has a substantial and statistically significant effect on all indicators of inclusive development. The substantial effect of public spending on education provide an empirical evidence for multiplicity of benefits that investment in education yields (Mitra, 2011). This finding leads to the policy recommendation of keeping education at the highest priority in development agenda. The regression results revealed that impact of number of hospital beds (an indicator of public health facilities) is statistically significant on all aspects of inclusive education in KPK districts. These findings are in line with the existing studies that witness the positive significant role of public health facility (James, 2016). The police stations as institutions for safeguarding law and order in the society are also found to be a significant factor of mainstream inclusive education. A noticeably clear picture of relationship between education status and sex ratio (gender discrimination) is portrayed from present analysis. The negative impact of high sex ratio on educational achievements leads to lower inclusive education. It signifies that female inclusiveness is a key prerequisite for inclusive education. It is depicted by regression results that cultivated area has a statistically significant positive effect on education index. A larger percentage of cultivated area leads to higher educational achievement.

Table 6: Regression Models for Determinants of Inclusive Education

Regressand / Regressor	Education Index	Inequality Coefficient	IC-Mainstream	IC-Regional
District HQ	-0.0211	0.0460**	-0.0659	-0.0479
	(0.0320)	(0.0186)	(0.0641)	(0.0315)
Urbanization	0.0038*	-0.0005	0.0074	0.0007
	(0.0020)	(0.0010)	(0.0045)	(0.0017)
Sex ratio	-0.0046*	0.0004	0.0034	0.0002
	(0.0024)	(0.0014)	(0.0064)	(0.0028)
Govt. schools	0.0018**	———	———	———
	(0.0009)			
Govt. High Schools	———	-0.0145***	0.0782***	0.0212**
		(0.0043)	(0.0160)	(0.0096)
Beds in Govt.	0.0168**	-0.0090**	0.0351***	0.0146**
Health Institutes	(0.0069)	(0.0041)	(0.0132)	(0.0070)
Cultivated area	2.6688**	-0.3584	1.7009	0.8350
	(1.1347)	(.6693)	(2.7991)	(1.2751)
Road Density	-0.0013	(-0.0010)	0.0022	0.0011
	(0.0014)	(0.0009)	(0.0038)	(0.0015)
Police Stations	-0.0398	0.0398	-0.2345**	-0.0454
	(0.0465)	(0.0247)	(.1028)	(0.0523)
Constant	0.5892	0.3693	-0.8752	0.1414
	(0.2584)	(0.1530)	(0.7379)	(0.3021)
R-Squared	0.7215	0.7540	0.8055	0.6365
F value	12.77***	15.55 ***	21.41***	11.37***
RMSE	0.0738	0.0413	0.1726	0.0816

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

6. Conclusions and Recommendations

This paper provides an empirical study of the education inclusiveness in the province of Khyber Pakhtunkhwa (KPK) in Pakistan based on data from the most recent Pakistan Social and Living Standard Measurement (PSLM) survey 2014-15. It finds that in general, the magnitude of disparities and exclusion within districts and across districts in KPK rises with deterioration of education status. However, considerable disparities and/or exclusion in some top ranked districts are also observed. It is noted that mostly districts that are in low or very low category of education index are rich in any one or more than one natural resource endowment including minerals, forests, and cultivable lands. In contrast the majority districts with better status of education, low disparities, and high inclusion are either centers of administration, or home to small industries, or hub of commerce and trade. It points out

to the skewed utilization of public and private funds, underutilization and wastage of natural resources, and the ignored agriculture sector.

To achieve a higher level of inclusive education, the regions with different status of education and different hindering factors require different strategies. The policies must be formulated keeping in view all the aspects of inclusive education. The status of inclusive education of a region must be one of the criteria of allocating public funds. In the regions that are at a very low level of education, it is more important to get educational growth acceleration, as the inclusivity of education may have to come later. For the regions with higher level of education accompanied with high disparities and exclusions, a progressive taxation policy would be more effective. For the regions exhibiting high level of education and lower inclusion, it is vital to facilitate the emergence of inclusive institutions. The education policies must be designed that target the balance of educational achievements in urban and rural areas of KPK.

A comparison of KPK districts' human development estimates from Pakistan NHDR (2017) and inequality adjusted education level estimated by present study suggests that the dimensions of human development are not perfect substitutes of each other. These results suggest formulating public policies that focus on balanced development in all the dimensions of human development.

It is recommended to allocate reasonable percentage of provincial and local bodies budget for the enhancement of quantity and quality of social infrastructure (specifically basic education, health, and law and order). Based on highly significant negative impact of sex ratio (utilized as an indicator of gender discrimination) on inclusive education it is recommended to formulate effective policies for elimination of gender bias at all levels. The increasing trends of urbanization in KPK and the empirical evidence of its positive significant impact on inclusive education in this study imply that policies must be formulated to control these factors so that their negative effect could be avoided in the long run as well. As a major proportion of population in KPK is dependent on agriculture sector, its development must be at top priority in inclusive education agenda. A policy framework must be designed for uplifting and mechanizing agriculture sector. To reform the police department is also one of the important implications of the present analysis.

There are some major limitations of this study that must be acknowledged. Some important economic factors of inclusive development could not be included in the analysis due to unavailability of data at the district level. For many indicators the available data is not standardized across provinces. It is suggested to formulate policy for collection and standardization of data about macroeconomic indicators at provincial, districts, and sub-district level.

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

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APPENDIX

Table A.1: Descriptive Statistics of Variables in regression analysis of Inclusive Development

Variable	Mean	Minimum	Maximum	S.D.
Education Index (IE)	0.4442	0.2152	0.6552	0.1119
Inequality coefficient (AE)	0.2627	0.1362	0.4099	0.0666
IC-Mainstream	0.1950	-0.4699	0.7327	0.3131
IC-Regional	0.4094	0.2095	0.6642	0.1083
Forest density (percentage)	33.4716	0.0000	86.946	25.739
Population density (per sq. km)	676.3255	30.1254	3396.24	678.29
Urban Population (Percentage)	13.0295	0.0000	46.1468	11.168
Sex ratio (Male to female)	102.2356	92.6900	124.360	5.5109
Total No. of Govt. Schools	104.7996	30.8497	181.509	34.034
No. of Govt. Primary schools	87.4001	23.9630	150.017	29.933
No. of Govt. Middle schools	9.7419	3.6073	19.0003	3.1487
No. of Govt. High schools	7.6576	2.9172	16.3179	2.8099
No. of Colleges	1.8197	0.0000	2.8317	0.7508
No. of Hospitals	0.6377	0.0000	1.7503	0.3589
No. of beds in Govt. Health Institutions	5.2704	0.0000	12.4336	2.8171
Cultivated area	0.0311	0.0000	0.0736	0.0201
No. of Factories	6.0789	0.0000	21.5085	6.5550
Road density (per sq. km)	29.7069	5.5793	71.3936	15.955
No. of Police stations	1.1245	0.5927	2.6824	0.4616

Note: Number of schools, hospitals, factories and police stations are reported as per hundred thousand of population, and cultivated area is reported as a percentage of total area.

Table A.2: Frequency Distribution of Categorical Determinants of Inclusive Development

Variable	Frequency	Relative Frequency
Divisional Headquarter		
No	20	80
Yes	5	20
Railway Station		
No	11	44
Yes	14	56
Airport		
No	4	16
Yes	21	84

Table A.3: Comparative Analysis of Education Indices of KPK Districts

District	Inequality Adjusted Education Index (I_{IE})	Education Index (I_E)	
	Present Study	Present Study	Pakistan NHDR 2017
Haripur	0.5660	0.6552	0.6367
Karak	0.4758	0.5650	0.5567
Malakand	0.4429	0.5425	0.5750
Abbottabad	0.4381	0.5970	0.6400
Chitral	0.4292	0.5345	0.5500
Peshawar	0.4258	0.5462	0.5833
Lower Dir	0.4203	0.5047	0.5033
Mansehra	0.4113	0.5522	0.5500
Lakki Marwat	0.3982	0.5057	0.5117
Bannu	0.3948	0.4959	0.5133
Nowshera	0.3871	0.5064	0.5033
Mardan	0.3331	0.4541	0.5117
Kohat	0.3295	0.4669	0.4950
Charsadda	0.3214	0.4353	0.4683
Swat	0.3197	0.4319	0.4600
Swabi	0.3009	0.4306	0.4817
Tank	0.2725	0.3807	0.4000
D. I. Khan	0.2719	0.4121	0.4033
Hangu	0.2557	0.3569	0.3850
Upper Dir	0.2537	0.3584	0.3600
Batagram	0.2326	0.3341	0.3533
Buner	0.2096	0.3044	0.3717
Shangla	0.1924	0.2975	0.3083
Tor Ghar	0.1395	0.2211	0.2483
Kohistan	0.1270	0.2152	0.2483

Source: Authors' calculations and National Human Development Index Report (2017)

Table A.4: A Mapping of KPK Districts' Human Development Indices & Education Indices

District	Present Study		Pakistan NHDR 2017		Difference in I_{IE} & *HDI* Ranks
	Inequality Adjusted Education Index (I_{IE})	Rank	*HDI*	Rank	
Haripur	0.5660	1	0.732	3	-2
Karak	0.4758	2	0.615	13	-11
Malakand	0.4429	3	0.69	6	-3
Abbottabad	0.4381	4	0.761	1	3
Chitral	0.4292	5	0.674	8	-3
Peshawar	0.4258	6	0.756	2	4
Lower Dir	0.4203	7	0.6	15	-8
Mansehra	0.4113	8	0.676	7	1
Lakki Marwat	0.3982	9	0.577	17	-8
Bannu	0.3948	10	0.613	14	-4
Nowshera	0.3871	11	0.697	5	6
Mardan	0.3331	12	0.703	4	8
Kohat	0.3295	13	0.666	9	4
Charsadda	0.3214	14	0.65	11	3
Swat	0.3197	15	0.618	12	3
Swabi	0.3009	16	0.654	10	6
Tank	0.2725	17	0.459	21	-4
D. I. Khan	0.2719	18	0.496	20	-2
Hangu	0.2557	19	0.594	16	3
Upper Dir	0.2537	20	0.375	23	-3
Batagram	0.2326	21	0.505	19	2
Buner	0.2096	22	0.528	18	4
Shangla	0.1924	23	0.438	22	1
Tor Ghar	0.1395	24	0.24	24	0
Kohistan	0.1270	25	0.229	25	0

Source: Authors' calculations and Pakistan National Human Development Index Report (2017)