

*National College of Business
Administration & Economics
Lahore*



**AN ANALYSIS OF INEQUALITY OF
OPPORTUNITIES OF EDUCATION
IN PAKISTAN**

BY

SAEEDA TUBA BUKHARI

**MASTER OF PHILOSOPHY
IN
ECONOMICS**

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AN ANALYSIS OF INEQUALITY OF OPPORTUNITIES OF EDUCATION IN PAKISTAN

BY

Saeeda Tuba Bukhari

**A dissertation submitted to
Faculty of Social Sciences**

**In Partial Fulfillment of the
Requirements for the Degree of**

**MASTER OF PHILOSOPHY
IN
ECONOMICS**

September, 2023



***In the name of ALLAH,
The Most Beneficial,
The Most Merciful,***

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Dissertation Committee:

Chairman

Member

Member

DECLARATION

It is to declare that this research work has not been submitted for obtaining similar degree from any other university/college.

SAEEDA TUBA BUKHARI
September, 2023

DEDICATED

TO

MY BELOVED

PARENTS

&

BROTHERS

*For Their Endless Love,
Support and Encouragement*

ACKNOWLEDGEMENT

All our gratitude and praise to the Almighty Allah, who has endowed us with the understanding and wisdom necessary to choose the true road and arrive at the destination. I want to express my sincere gratitude to a few wonderful people who have supported and encouraged me just by being available.

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RESEARCH COMPLETION CERTIFICATE

Certified that the research work contained in this thesis entitled “**An Analysis of Inequality of Opportunities of Education In Pakistan**” has been carried out and completed by **Ms. Saeeda Tuba Bukhari** under my supervision during her **M.Phil. Economics** Programme.

(Dr. Zahid Pervaiz)
Supervisor

SUMMARY

This study has examined the role of inequality of opportunities of education in Pakistan by using Human Opportunity Index (HOI). The marginal contribution of the circumstances has also been estimated using the Shapley decomposition method. Datasets for 2019–20 and 2008–09 of the Pakistan Social & Living Standard Measurement (PSLM) survey have been used for the purpose of analyzing household data. In contrast to family background variables including child gender, household head gender, parental education, parental occupation, region, and province, which have been regarded as circumstances variables, the study has examined child education enrollment (age: 4-18) and education attainment (age: 25 and above) as education opportunities. Furthermore, this study has compared the most recent year's decomposition data (2019–20) with the previously selected survey year (2008–09) and identified the key contributing factors that have an impact on Pakistan's educational attainment inequalities of opportunity.

The Inequality of Opportunities of Education model has been further categorized into two categories. These models are termed as Inequality of Opportunities of Child Education Enrollment and Inequality of Opportunities of Education Attainment.

Inequality of Opportunities of Child Education Enrollment Model has been further categorized into five categories: no or less than primary education, primary, middle, secondary, and high secondary education enrollment. Inequality of Opportunities of Education Attainment Model has been further categorized into seven categories: no or less than primary education, primary, middle, secondary, high secondary, bachelor, and higher education attainment. Circumstances for both opportunities have been measured by gender of household head, child gender, parental education, parental occupation, region of residence and province.

The results of the Inequality of Opportunities of Child Education Enrollment revealed a slight rise in primary, secondary, and upper secondary enrolment rates over the period of a decade. The HOI also increased over the period of decade by approximately 11%, and the dissimilarity index revealed that educational equality declined throughout Pakistan. Punjab showed some improvement in declining inequality of opportunity of education to some extent however the situation in Sindh and Baluchistan is worse.

Apart from Baluchistan and KPK, where the child's gender was the second most important factor behind region of residence in the year 2008–09, the findings of the decomposition of Inequality of Opportunities of Child Education Enrollment showed that the education of the mother and region of residence were the two biggest contributors to the Inequality of Opportunity of Child Education Enrollment. The two contributors that were most strongly related to the inequality of opportunity for enrolment in education in 2019–20 were the region of residence and the mother's education.

Results from the HOI, Coverage rate, and D-index of inequality of opportunities of education attainment (age: 25 and above) for the two time periods 2008-09 and 2019-20 showed that while opportunities have become more unequal over time, they have also decreased by 0.3 percent. All provinces display a decline in HOI and coverage rates, with the exception of Baluchistan, which shows a steady rise in percentage. It is disappointing to observe that during the past ten years, primary education attainment inequalities in Pakistan have gotten worse.

Like other educational measures, the country's secondary education attainment has not increased. HOI decreased by 0.1 percent, and coverage decreased by 1.3 percent nationally. The highest levels of inequality were seen in Punjab, where the inequality increased by 3.5%. The levels of primary and secondary education are also falling, as is the educational attainment of bachelors. The coverage rate fell by 4.4 percent, and the overall HOI rate dropped by 2.7 percent. The worst situation is in Sindh, where the HOI rate has decreased by 5% and the coverage rate has decreased by 6.6%. Like high secondary education attainment, higher education attainment improved coverage rates and HOI rates. The area of residence and then the gender of the household head were the main determinants of educational inequality of opportunities at the national and Punjab levels in 2008–09. In Sindh, the parents' education played a significant role. In KPK, the household head's gender and the child's gender were the main factors influencing educational opportunity inequalities, whereas in Baluchistan, the father's work was the main factor. In the Punjab and Sindh, parental education took precedence over home region at the national level in the academic year 2019–20. In KPK, the occupation of the father and the gender of the household head have become major contributors to the inequality of educational opportunity, in contrast to Baluchistan where the gender of the child has become the key determinant. Every piece of information indicated that Pakistan's educational situation was rapidly deteriorating.

LIST OF ABBREVIATIONS

EOP	Equality Of Opportunities
IOP	Inequality Of Opportunities
PSLM	Pakistan Social & Living Standard Measurement
HOI	Human Opportunity Index
GER	Gross Enrollment Rates
NER	Net Enrollment Rates
UNICEF	United Nations International Children's Emergency Fund
EFA	Education For All
PISA	Program For International Student Assessment
CEDUE	Child Education Enrollment
EDUATT	Education Attainment
FEDU	Father's Education
MEDU	Mother's Education
FOCC	Father's Occupation
MOCC	Mother's Occupation
CHDG	Child Gender
HHHG	Household Head's Gender
MDG'S	Millennium Development Goals
SDG'S	Sustainable Development Goals

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Education serves as the backbone of a nation's progress and prosperity. It is a fundamental building block that empowers individuals, strengthens communities, and drives economic growth. The importance of education in a country cannot be overstated, as it plays a pivotal role in shaping the present and future of its citizens. A well-developed and accessible education system equips individuals with knowledge, critical thinking skills, and the ability to adapt to a rapidly changing world.

Due to disparities in opportunities, individuals might have a wide range of income outcomes. Individuals' chances of achieving a particular social status are determined by their family background and social status (Rawls, 1971).

Amartya Sen's capability framework in the late 1970's carried a new way of thinking about individual's well-being and its dimension. Although this relationship appears to be highly dependent on "contingent circumstances" such as the individual's age, gender, region, family background, and disability. This framework makes the argument that having equal income shouldn't be the target because most people cannot transform income into freedom and happiness in an equal way (Sen, 1985, 1988).

Similarly, John Roemer sparked a lively debate in his book *Equality of Opportunity* (1998) on the subject by stating that individuals should not be held responsible for conditions that are simply beyond their control (such as gender or race). Inequality in outcomes should only represent inequalities caused by individual choices, such as effort. He discussed the outcomes as advantages and distinguished between the inequality in advantages that are due to the "circumstances" and inequality in advantages that are due to the "effort" (Roemer, 1998).

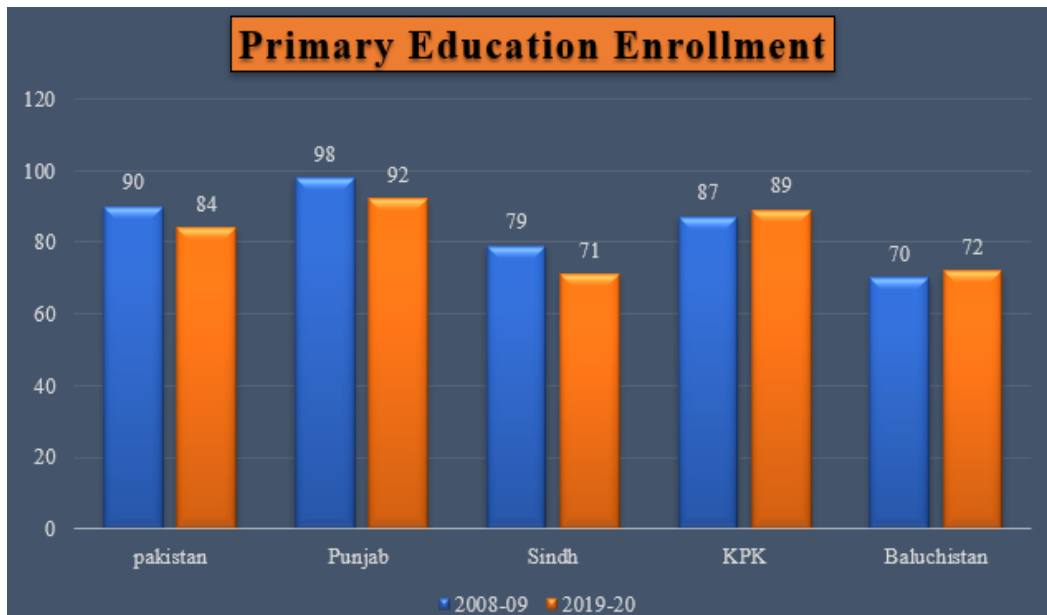
Circumstances are those exogenous factors that play a part in determining an outcome such as education attainment and are beyond the control of an individual like gender, region, race, parental education, parental occupation etc. Whereas efforts are the factors that are in control of individuals such as choice between leisure and work, choice of profession, period of working hours, investment in education and investment in health (Dworkin, 1981; Roemer,

1993; Roemer, 1998). Several opportunities have been considered in the literature on inequality of opportunities; among which inequality of income and consumption are the most studied opportunities (Ferreira and Gignoux, 2011) while the second most studied advantage is educational attainment (Ferreira et al., 2010; Salehi-isfahani et al., 2014; Tansel, 2015).

Education is considered as one of the most important aspects in achieving economic and social mobility. Additionally, it promotes upward socioeconomic mobility and is crucial for achieving other objectives, such as ending the cycle of poverty. Education contributes to the lowering of economic disparities: one more year of school is correlated with a 1.4 percentage point decline in the Gini coefficient (UN, 2017).

Since the inception in 1947, state of education in Pakistan is not satisfactory and the sector is neglected by policy makers. The illiteracy rate in Pakistan calls for critical attention. The literacy rate of Pakistan in 2020 was 62.3% which mean that an estimated population of 60 million is illiterate in the country. In the Economic Survey of Pakistan (2021-22), the literacy rate of Pakistan was reported to be 60.7%. This figure represents the percentage of individuals aged 10 years and above.

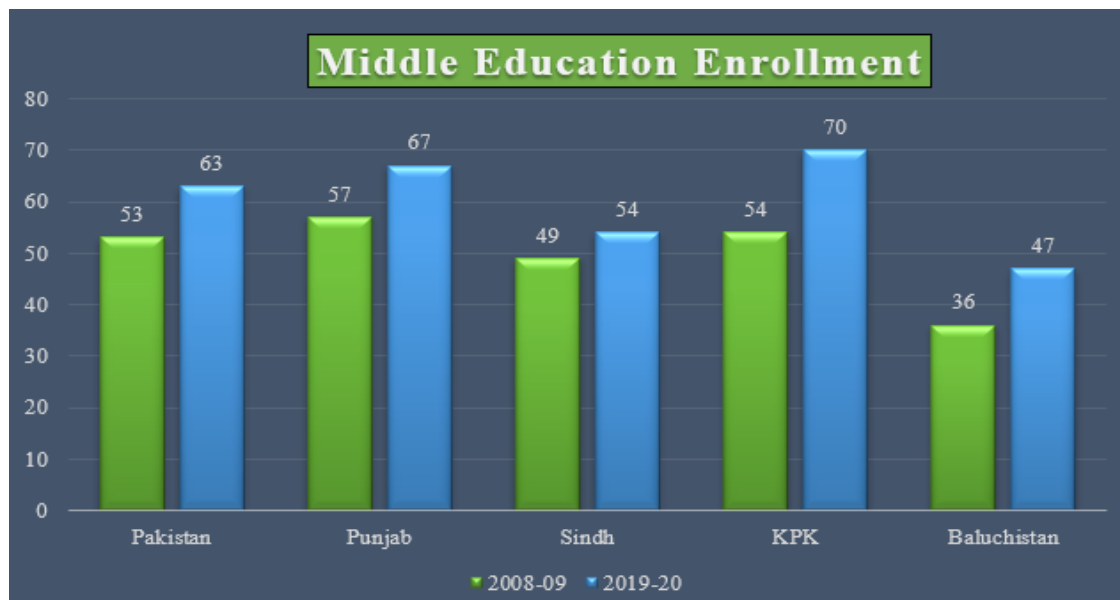
According to MDGs, Pakistan, was supposed to attain 100 percent primary school enrollment and completion (up to grade five) and 88% literacy rate by 2015, but according to Economic Survey of Pakistan (2015-16), at the national level, the Gross Enrollment Rates (GER) and Net Enrollment Rates (NER) at the primary level were 89 percent and 57 percent respectively. Pakistan could not achieve MDGs due to widespread regional and gender disparities. There may be a number of reasons for lower education level and not attaining MDGs which are linked to education sectors. At the start of 2016, the Millennium Development Goals (MDGs) have been replaced by The United Nations (UN) Sustainable Development Goals (SDGs). Pakistan, along with other countries of world has signed the Sustainable Development Goals Agenda 2030. By 2030, the 4th goal of SDGs is to ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes.



Author's own calculation by using PSLM survey data (2008-09 and 2019-20)

Figure 1.1: Primary Education Gross Enrollment in Percentage (2008-09 and 2019-20)

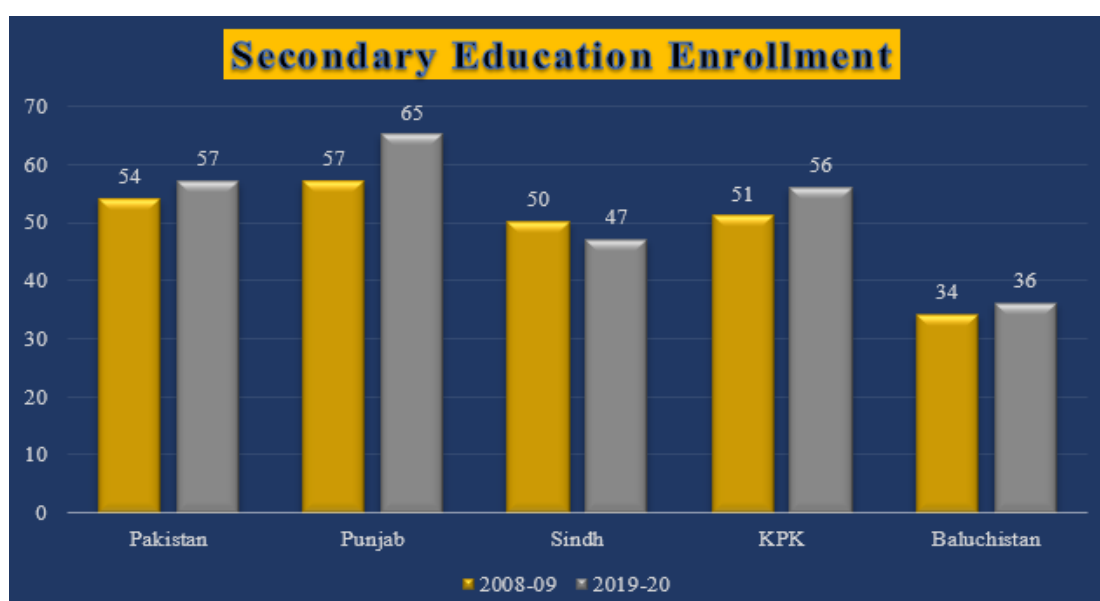
The primary enrolment ratio at national level is 84 percent in 2019-20 as compared to 90 percent in 2008-09. Furthermore, the provincial picture shows that Punjab with 92 percent is at top in 2019-20 as compared to 98 percent in 2008-09. Sindh is at bottom with 71 percent in 2019-20 as compared to 79 percent in 2008-09 however, KPK and Baluchistan show some better ratios as 89 and 72 percent in 2019-20 as compared to 87 and 70 percent in 2008-09 respectively.



Author's own calculation by using PSLM survey data (2008-09 and 2019-20)

Figure 1.2: Middle Education Gross Enrollment in Percentage (2008-09 and 2019-20)

The middle education enrolment ratio at national level is 63 percent in 2019-20 as compared to 53 percent in 2008-09. Furthermore, the provincial situation shows an increasing trend. In Punjab middle education enrollment is 67 percent as compared to 57 percent in 2008-09. Whereas in Sindh the middle education enrolment is 54 percent as compared to 49 percent in 2008-09. Khyber Pakhtunkhwa is at top with 70 percent in 2019-20 as compared to 54 percent in 2008-09 among all provinces. However, Baluchistan with 47 percent is at bottom in 2019-20 as compared to 43 percent in 2008-09.



Author's own calculation by using PSLM survey data (2008-09 and 2019-20)

Figure 1.3: Secondary Education Gross Enrollment in Percentage (2008-09 and 2019-20)

The secondary enrollment rate improves to 57 percent in 2019-20 as compared to 54 percent in 2008-09 at national level. Moreover, Punjab is at top with 65 percent in 2019-20 as compared to 2008-09 and Baluchistan shows lowest ratio with 36 percent in 2019-20 as compared to 34 percent in 2008-09. However, Sindh shows a declining trend with 47 percent in 2019-20 as compared to 50 percent in 2008-09. KPK shows 56 percent as compared to 51 percent in 2008-09.

The PSLM survey indicates that educational data results from a decade ago show both marginal improvements and declines in certain provinces. Therefore, it is highly advisable for the government to prioritize the establishment of a high-quality, fair, and widely accessible education system. At the international level, many researchers have concentrated on inequality of

opportunities of income or consumption but literature on inequality of opportunity of education is limited.

At national level, plenty of studies have been conducted on educational attainment, child education enrollment, educational inequality, inequality of opportunities, (Newman, 2012; Iqbal et al, 2020; Nizamni and Waheed, 2020; Akram and Pervaiz, 2021; Ahmad and Jan, 2021,) but unfortunately, literature on unequal opportunities for education is limited in Pakistan. Circumstances highly affect a child's education attainment. Ample of studies at the international level demonstrated that parental education, their occupation, gender of child, region of residence and gender of head of family plays significant role to attain equitable education of a child (Ferreira and Gignoux, 2011; Gamboa and Waltenberg, 2012; Salehi-isfahani et al., 2014; Tansel, 2015; Assaad et al, 2019).

This study has investigated the role of inequality of opportunities of education in Pakistan by using Human Opportunity Index (HOI). Furthermore, Shapley decomposition technique has been used to estimate the marginal contribution of circumstances. For the purpose household data of Pakistan Social & Living Standard Measurement (PSLM) survey datasets for 2019-20 and 2008-09 has been utilized. The study has analyzed child education enrollment and education attainment level as outcome variable\opportunities whereas, family background variables like gender of child, gender of head of household, parental education, parental occupation, region, and province has taken as circumstances variables.

1.2 PROBLEM STATEMENT

According to the statistics reported by Pakistan Social and Living Standards Measurement (PSLM) survey report (2019-20), the situation of education in Pakistan is a serious matter of concern. More than 55 million individuals aged 10 years and older are unable to read and write. Additionally, there are approximately 7 million children between the ages of 5 to 9 who are not attending school. One troubling aspect of this issue is that in rural areas, over 52% of girls are not enrolled in educational institutions. Furthermore, the country is struggling with a significant issue of female illiteracy, with an alarming statistic revealing that around 67% of Pakistani women lack fundamental literacy skills. One reason of such deplorable situation is the lack of availability of equal opportunities of education to all segments of the society. There are few studies conducted by the researchers on the issue of inequality of opportunities in Pakistan.

Newman (2012) analyzed the inequality of opportunities in Pakistan. For the purpose, the study used household data of Pakistan Social and Living Standard Measurement Surveys for two time periods (1998–1999 and 2007–2008). The study used basic infrastructure, school enrollment, immunization rates, and maternal health as outcome variables. The study employed HOI to evaluate inequality of opportunities. Shehzadi et al. (2012) conducted a study on inequality of opportunities in urban Punjab, utilizing data from the Pakistan Social and Living Standards Measurement Survey (PSLM) for the year 2005–06. They used the methodology introduced by Roemer (1998) to examine the inequality of opportunities in Pakistan. Shaheen et al. (2016) conducted a study to examine changes in inequality of opportunities over time in Pakistan. They applied Roemer's methodology and utilized data from the Pakistan Social and Living Standard Measurement Surveys (PSLM) for time period (2005–06 and 2010–11). In their analysis, they considered per capita income and household labor earnings as outcome and a set of variables as circumstances, including the education levels of father and mother, the occupation of father, the region of residence, and gender. These circumstances were used to assess how these factors influenced economic outcomes. The study also provided insights into changing patterns of inequality of opportunities in Pakistan over the time.

Pervaiz and Akram (2018) estimated inequality of opportunities in Punjab, Pakistan, using a non-parametric approach. Household-level data from the Multiple Indicator Cluster Survey (MICS) 2014 was analyzed for this purpose. Household head's income was taken as the outcome variable, and three parental characteristics of the household head were used as circumstances. These characteristics included the region of residence, wealth status, and education level of the household head's father. The study highlighted the significance of circumstances for the earnings of individuals and emphasized the need for compensatory government policies to address the problem of inequality of opportunities in Punjab, Pakistan. Nizamani and Waheed (2020) examined the inequality in opportunities among children in Pakistan at the provincial level. The study used two sets of PSLM survey (2004–2005 and 2014–2015) for measuring HOI. It also applied Shapley Decomposition technique to estimate contribution of circumstances in different outcome variables like health, education and facilities of sanitation and clean drinking water.

Present study is an attempt to analyze the inequality of opportunities of education in Pakistan by utilizing latest household level data of PSLM 2019–2020. It has also utilized data of PSLM 2008–2009 to compare the situation of inequality of opportunities of education over time. Marginal effects of

circumstances have also been calculated at two points of times to compare the situation of opportunities of education in Pakistan. This study primarily focused on school enrollment (ages 4 to 18) and educational attainment (ages 25 and above) as outcome variables. This study's novelty lies in its specific focus on educational opportunities, comparative analysis over time and a comprehensive comparative analysis of marginal contributions of circumstances using shapely decomposition technique.

1.3 RESEARCH QUESTIONS

The study is going to answer the following research questions:

- What is the prevalence of inequality of opportunities of education enrollment in Pakistan?
- What is the prevalence of inequality of opportunities of education attainment in Pakistan?
- What is the marginal contribution of circumstances for inequality of opportunities of education enrollment in Pakistan?
- What is the marginal contribution of circumstances for inequality of opportunities of education attainment in Pakistan?
- Compare the prevalence and marginal contribution of inequality of opportunities of education attainment and enrollment between two time periods: 2008-09 and 2019-20, respectively.

1.4 OBJECTIVES OF THE STUDY

The study has following objectives:

- To investigate the prevalence of inequality of opportunities of education enrollment in Pakistan?
- To investigate the prevalence of inequality of opportunities of education attainment in Pakistan?
- To investigate the marginal contribution of circumstances for inequality of opportunities of education enrollment in Pakistan?

- To investigate the marginal contribution of circumstances for inequality of opportunities of education attainment in Pakistan?
- To compare the prevalence and marginal contribution of circumstances in the inequality of opportunities for education enrollment in Pakistan between the years 2008-09 and 2019-20.
- To compare the prevalence and marginal contribution of circumstances in the inequality of opportunities for education attainment in Pakistan between the years 2008-09 and 2019-20.

1.5 NOVELTY

The educational system of a country plays a pivotal role in shaping both individuals and societies, however the role of parental care and guidance is also crucial in shaping individual paths. It is widely recognized as one of the most influential factors in determining economic and social mobility, exerting a significant impact on the trajectories of individuals' lives. There are ample studies conducted by the scholars on the topic of inequality of opportunity and inequality of education in Pakistan (Sarwar et al., 2021; Nizamani and Waheed, 2021; Akram and Pervaiz, 2021; Pervaiz and Akram, 2018; Shaheen et al., 2016; Newman, 2012).

Newman (2012) examined the children's opportunities in Pakistan at two points in time (1998-99 and 2007-08) to assess progress over a decade, with a focus on education, basic infrastructure, immunization rates, and maternal health opportunities. The study employed HOI to examine the different opportunities and inequalities. While this study focuses exclusively on the inequality of educational opportunities in Pakistan, examining both enrollment (age: 4-18) and education attainment (age: 25 and above) and categorizing them into specific levels. The study used more recent data (2019-20 and 2008-09) and employed the Shapley decomposition method to identify key contributing factors to educational inequality.

Nizamani and Waheed (2020) investigated the inequality of opportunities among children in Pakistan at a provincial level for two sets of household data from 2004-2005 and 2014-2015. It measured seventeen opportunities from education, health, and infrastructure indicators and applied HOI and Shapley Decomposition. Whereas his study specifically focused on education opportunities and analyzed child education enrolment (age: 4-18) and education attainment (age: 25 and above). It compared data from 2019-20 with data from

2008-09 to understand changes in inequality of educational opportunities. The study further categorizes education enrollment and attainment into several levels, providing a comprehensive analysis of different stages of education. This study's novelty lies in its specific focus on educational opportunities, comparative analysis over time, and the identification of key contributing factors to educational inequality in Pakistan. Its findings add valuable insights to the ongoing efforts to address educational disparities and improve opportunities for children in the country. The findings of this study can serve as a foundation for future research on the topic of educational inequality of opportunities in Pakistan.

1.6 ORGANIZATION OF THE STUDY

In addition to the first introduction chapter, Chapter 2 provides a review of the literature. Theoretical framework and methodology are shown in Chapter 3. The discussion of empirical findings is covered in Chapter 4. The study is summarized, conclusions are drawn, and recommendations are made in Chapter 5 based on the key findings.

CHAPTER 2

LITERATURE REVIEW

Rawls (1971) and Sen (1988) claimed that equality of opportunity (EOP) is attained when people's opportunities for social positions are less affected by family background and social class.

While both Rawls and Sen address the concept of equality of opportunities, they approach it from different angles and emphasize distinct aspects. Rawls primarily focuses on fair distribution and equalizing opportunities, whereas Sen places greater emphasis on individual capabilities and functioning within a broader framework of justice. According to Amartya Sen, EOP is accomplished when nourishment, health, happiness, self-respect, are equal for all the persons. There is enormous literature available on inequality of opportunity and this concept got recognition in research after the work of Roemer (1993; 1998; 2002; 2004; 2006, 2013). Numerous researchers, both domestically and internationally, have conducted various studies on inequality of circumstances and inequality of efforts, drawing inspiration from the work of Roemer. These studies have utilized both parametric and non-parametric approaches to explore the topic. While there is a significant body of international research on inequality of educational attainment opportunities, the literature on this subject is scarce at the national level, based on my limited knowledge.

Marrero et al. (2022) evaluated inequality of opportunity in terms of educational achievement in 17 Western European countries. The study applied parametric approach and used micro data from the 2018 Program for International Student Assessment (PISA). PISA measures the educational performance of students about 15 years old in the three basic areas (mathematics, science and reading) and some additional information about students' socioeconomic condition and school environment. The study used a set of circumstances such as gender, immigrant status, socio-economic and cultural status of the parents, school ownership or characteristics of school peers. The study found that there is on average 32 % inequality of opportunity in educational achievement of total educational inequality in Western Europe, with large variation across countries. Dissimilarities in households' cultural environment and in parental occupation play a wider role, with school's characteristics being also relevant in Central Europe. The study further estimated the role of channeling variables in translating dissimilarities in circumstances into different educational achievements. This study suggested

policymakers with key insights to design educational interventions to effectively increase educational and social opportunities across European countries.

Anwar et al. (2022) investigated a quantitative study on educational disparity among families living in Baluchistan (Pakistan) on the Basis of Gender. The study emphasized the educational discrimination against girls in Baluchistan and Khyber Pakhtoon Khwa. The two hundred respondents were chosen from (Arts faculty) of all the degree colleges through probability simple random sampling. The outcomes revealed that due to male dominant society and their authority to take decisions regarding females, families do not pay attention and concentration on girls' education.

Hendy and Mimoune (2021) investigated a study on inequality of opportunity in education in Jordan. The study used data from the Household Expenditure and Income Surveys (HIES) for the years 2008, 2010, 2013 and 2017. The study evaluated educational levels of children and youth (age 6-25) as dependent variable and gender, parental educational level, household wealth, and area of residence as circumstances variables. The study found that inequality in education opportunities at the completed primary level for youth was high and for secondary completion rates, wide inequality gaps persisted between 2008 and 2013, but then sharply fell in 2017. The study found that family wealth was among the most important determinants for the opportunity of attending or completing an educational level over time, followed by the parents' level of education, more specifically the mothers.

Asadullah et al. (2021) measured educational inequality of opportunity in context of pupil's effort in Bangladesh. The study estimated the dissimilarity between effort and other factors, such as family background, matters for correcting policies and normative reasons when we appeal to inequality of opportunity. The study used survey data from "Quality of Secondary School Madrasah Education in Bangladesh". The analysis was consisting of decomposition of the predicted variance of student of 8 class performance in mathematics and English and subgroup based on parametric estimates of educational production functions. The study used methodology consists of a parametric estimation strategy and a decomposition of the predicted variance of student performance by source and by subgroups. The study found that Pupils' effort, preferences, and talents contributed between 31% and 40% of the total predicted variances in performance scores. The contribution of overall effort fell by 10% when the correlation between effort and circumstances is considered.

Akram et al. (2021) measured temporal and spatial variations in income inequality and education inequality across the districts of (Punjab) Pakistan and

further, investigated the relationship between income inequality and education inequality. The study utilized data of Multiple Indicator Cluster Survey (MICS) for two surveys, 2007-08 and 2014. The study used gini coefficients of household's income and school attainments for the measurement of income inequality and education inequality. The results of this study revealed that income inequality had risen in 23 districts while it had decreased in 12 districts. The study found that educational inequality had a decreasing trend during the selected period in all districts except Dera Ghazi Khan. The study also found that school attainment as measured by mean years of schooling was negatively while income inequality was positively linked with education inequality.

Nizamani and Waheed (2020) investigated a study to deduct inequality of opportunities among children in Pakistan. The study used two datasets of PSLM survey (2004-2005 and 2014-2015). The study utilized Human Opportunity Index (HOI) and Shapley Decomposition to measure the access to basic services in the country and chose a total of seventeen opportunities from education, health, and infrastructure indicators. The Shapley Decomposition was used for the decomposition of the Dissimilarity index. The outcomes of the study showed that access to these basic services is discriminatory and low on all Pakistan level. The HOI for education indicators has deteriorated all over Pakistan especially in the province of Sindh due to low literacy rates of head of the household of a child. The infrastructure indicators and the state of education in the province of Baluchistan are the worst. The most influencing circumstances variables for the unequal access to the services are region, education of head of the household and income of the household. Pakistan is far away from universal coverage of health facilities.

Ahmed et al (2020) investigated unequal opportunity of education in Sudan. For this purpose, the study used Multiple Indicators Cluster Survey (2014). Educational attainment and school attendance were taken as dependent variables. The study employed literacy rate for school attendance and highest level attained by the respondents above 25 years old for educational attainment. Gender, household wealth, residential areas, head of household education, and region of residence were used as circumstances variables. Ordered logistic and dissimilarity index were used to assess the unequal opportunity of educational attainment and the Human Opportunity Index for school attendance. The results revealed that circumstance variables were responsible for mass inequality in Sudan. Household wealth was responsible for the largest share, followed by the education level of household heads, then residential areas. 51.3% was the total coverage of school attendance and approximately 14% of the chances were distributed unequally. The study suggested effective policies based on spatial

reallocation of educational resources and to apply more comprehensive plans that incorporate poverty reduction policies.

Iqbal et al. (2020) conducted the study to explore the socioeconomic determinants of child educational attainment in Pakistan. The study used the dataset of Pakistan Social and Living Standards Measurement (PSLM) 2013-14. The study considered the children of age 5-18 years who ever attended any or currently attending any educational institution as dependent variables. Whereas, child gender, age, parental education, household head's gender and age, household income and assets, distance from home to school, region, province, school fees and school type as circumstances variables. The study employed the Censored Ordered Probit model. The results at aggregate level revealed that child's gender, child's age, age of household's head; parental education, household assets and availability of private schools positively affect child educational attainment in Pakistan. The results of gender specific analysis indicated that income of the household, region of residence (urban) and annual school fee are the main factors causing gender disparity.

Zulu (2020) estimated inequality of opportunity of education in Eswatini. The study applied "ex-ante" approach on Multiple Indicator Cluster and Demographic and Housing Surveys. The study identified potential sources of inequality at all levels of the general education system in Eswatini. According to findings of the study, approximately 23.7% circumstances account for a low portion of the variance in learner attainment. This measure is higher for learners aged 15 to 18 years. Increasing unequal circumstances on educational attainment linked with learner's growth. Furthermore, family background variables like household wealth and education of household head are the main factors of inequality of opportunity. The study suggested that equal and fair opportunity policies are necessary at all levels of the general education system in Eswatini.

Prieto et al. (2018) investigated a case study of Florida, US, to estimate the inequality of opportunity to access the quality basic education. The Human Opportunity Index was estimated, using enrollment and admission data from a case study in a large school district in the US as dependent variables for the time 2015/2016. The child characteristics such as gender, geography, race, disability; household characteristics such as parent's employment home language, student's ability to get lunch; location and school assigned characteristics such as admission criteria were used as circumstances variables. The Shapley decomposition method was applied to capture the contribution of each circumstance to inequality of opportunity. Findings showed that the HOI can examine existing admission policies and identify inequality problems. Furthermore, the analysis of the contribution of each circumstance group

revealed admission criteria that have the potential to harm the educational opportunities for children.

Krafft and Alawode (2018) estimated a study on inequality of opportunity in higher education. This study evaluated the determinants of attaining higher education in Egypt, Jordan, and Tunisia and measured the extent and drivers of inequality of opportunity. The study found high inequality in Egypt and Tunisia, however, moderate in Jordan. Socio-economic characteristics of family were proved to be the major driver of inequality in all three countries. Family characteristics affected attainment even after accounting for test scores.

Arshed et al. (2018) conducted a study on Education Enrollment Level and Income Inequality, a case of SAARC economies. The study was based on the idea that education forms a quadratic relationship with income inequality. The study used panel co-integration approach followed up with fully modified OLS model on the panel data for 1990 – 2015. The results illustrated that initially primary and secondary enrollment increases inequality while tertiary enrollment decreases it. However, after a certain threshold level of enrollment (76% for primary, 42% for secondary and 7% for tertiary), they had reverse effect. Thus, it made inverted U shape for primary and secondary enrollment and U shape for tertiary enrollment. Hence education showed diminishing marginal return effect. India, Sri Lanka, Maldives, and Nepal had high enough education enrollments to cause a negative effect on income inequality among all the SAARC economies.

Pervaiz and Akram (2018) investigated inequality of opportunities in Pakistan by using non-parametric approach. The study used household level data of Multiple Indicator Cluster Survey 2014 of province Punjab. The study chose Household head's income as an outcome and three parental characteristics of household head (region of residence, wealth status and education level of household head's father) as circumstances. The results indicated that up to 28% variation in income is due to the differences of circumstances. Among different circumstances, a father's education has the most significant contribution in explaining the variation of income of household heads. The study highlighted the significance and need of compensatory government policies to cope with the problem of inequality of opportunities in Punjab (Pakistan).

Peragine et al. (2015) assessed equality of opportunity in educational achievement in Arab countries that included Jordan, Qatar, Tunisia, and United Arab Emirates (UAE). The analysis used survey data of the program PISA (Program for International Student Assessment) for three surveys (2006-2009-2012) and estimated ex-ante inequality of opportunity by using the Mean

Logarithmic Deviation (MLD) index. The study estimated educational achievement using students' test scores in math, science and reading. The study took circumstances as gender, parental background characteristics. The results suggested that among the studied countries, Qatar had the lowest IOP while the UAE was amongst the most unequal countries despite having the best overall performance in test scores. Jordan results showed the highest relative IOP in reading in all years considered.

Tansel (2015) investigated inequality of opportunity in educational achievements in Turkey over time. The study used test scores of PISA in mathematics, science and reading of 15-year-old students from 2003 to 2012. The study estimated the effect of circumstances children are born into on their academic achievement as evidenced in their PISA test scores. The study found that inequality of opportunity was a large part of the inequality of educational achievement in Turkey and inequality of opportunity in educational achievement showed a slightly decreasing trend over time in Turkey. The study further found that the family background variables were the most important determinants of the inequality in educational achievement which is a consistent pattern over time.

El-Kogali and Krafft (2015) observed the inequality of investment in initial childhood development in MENA countries counting education, health, and nutrition. According to the finding IOP in educational attainment starts even before primary education. While some countries such as Jordan, Egypt, and Tunisia have achieved universal primary enrollment.

Hashemi and Intini (2015) compared the inequality of opportunity for educational achievement in eleven Arab countries. The study used student's mathematics and science test scores and student test scores in reading described by the Program for International Students Assessment between 1999 and 2012. The results verified the earlier finding in the literature and concluded that unequal opportunities in most Arab countries are high, and in many countries, it has been deteriorating for years. Although, there has been slight improvement in recent years in a few cases. However, high IOP remained a challenging issue in the Arab region.

Gamboa and Waltenberg (2015) conducted a study on inequality of opportunity in education by combining information on coverage and achievement in PISA. This study has concentrated on intergroup gaps in access to a given level of studies and on intergroup gaps in educational achievement. This study argued that both aspects are important and connected. Therefore, these should be measured simultaneously. This study has combined these two

aspects (access and achievement) into a composite index of equality of opportunity in education. This study employed PISA data from 2006-2009 for a selected set of countries, rank reversals were observed with respect to orderings based upon a single dimension. The index could be generalized to include further dimensions, such as average scores or dissimilarity in access.

Ferreira and Gignoux (2014) proposed a study on the measurement of education inequality. The study used two dependent variables, educational achievement and education inequality and a set of circumstances variables such as gender, parental education, father's occupation, language, migration status, availability of books at home, durables owned by the households, cultural items owned, and the location. The study estimated inequality in educational achievement and opportunity by using two broad kinds of survey data by applying standardized variance test. The first is the complete set of PISA surveys, for all 57 countries that joined in the 2006 round. The second is a group of four household surveys, for Brazil, Indonesia, Mexico, and Turkey. For the purpose, the study took test scores of readings, mathematics, and science of fifteen-year-olds students, enrolled in any educational institution and attending grade 7 or higher. Inequality of opportunity accounts for up to 35 percent of all disparities in educational achievement. Europe, Latin America, Asia, Scandinavia, and North America had the greater disparities. It is uncorrelated with average educational achievement and had negative correlation with per capita gross domestic product. It correlated negatively with the primary schooling spending, and positively with tracking in secondary schools.

Salehi-Isfahani et al. (2014) determined IOP for educational achievement on eight Middle East and North Africa (MENA) countries using the Trends in International Mathematics and Science Study (TIMSS). By parametric and non-parametric methods, the study explore that Jordan and Tunisia had comparable IOP, while Egypt agonized from predominantly high IOP, even when compared to high rates of inequality in Latin American countries. By observing previous similar studies using TIMSS since 1999 additionally, the authors claimed that family background and socioeconomic characteristics are the most drastic factors that contribute to educational inequality in the region.

Newman (2012) examined children's opportunities in Pakistan over a decade, focusing on education, basic infrastructure, immunization rates, and maternal health. Results indicated overall improvement in coverage and equality for education and infrastructure, but increased inequality in maternal health. While education HOI showed promise, it remained relatively low compared to Latin American countries. The paper encouraged further research and analysis

at provincial and district levels to address emerging inequalities and ensure greater equality of opportunity for all children in Pakistan.

Natkhov and Kozina (2012) estimated inequality of opportunity in educational achievement in Turkey. The study used the 2009 PISA data by applying parametric method and the R-square from the regression of test scores on circumstances variables. The study found that inequality of opportunity index in Turkey in 2009 was about 30 percent in mathematics, 24 percent in science and 31 percent in reading. With the index figure in mathematics Turkey ranked number 10 as the most unequal in a sample of 72 countries. The study further illustrated that the country with the most unequal opportunities (with 35 percent) based on its mathematics test scores was Panama whereas Azerbaijan was having the least unequal opportunities (with 4.8 percent) based on its mathematics test scores.

Martins and Veiga (2010) decomposed IOP in mathematics achievement for the OECD Program for International Student Assessment (PISA) in 15 European countries using the 2003 micro data. The finding showed that the inequality in students' socioeconomic factors defined between 15% and 35% of the inequality of the results. The findings showed that inequality was higher in Germany, Greece, Great Britain, Belgium, and Portugal and was lower in Sweden and Finland. Socioeconomic factors represent between 14.9% and 34.6% of the overall inequality in education.

Schütz et al. (2008) first conducted a study for 54 countries worldwide on the level of IOP in primary and secondary education. The study used data from the Trends in International Mathematics and Science Study (TIMSS) and the Progress in International Reading Literacy Study (PIRLS) from 1995 and 1998 respectively. They estimated the impact of socioeconomic status measured through the number of books in the household on the performance of students. The regression model expected that late tracking and a long pre-school cycle were valuable for equality, whereas pre-school enrollment was unfavorable at low levels of enrollment and favorable at higher levels. They afterward explored the relationship between IOP and certain institutional characteristics or educational policies of educational systems.

To explore the inequality of opportunity in higher education, Sewell (1971) conducted a study of high school students in Wisconsin. He contended that the main factor determining students' ability is their socioeconomic background imitated by their household income, their place of birth, their parents' education, and employment. The integrated model recognized in the literature as the "Wisconsin Model of Status Attainment." This model helped

further research on education and social mobility, by defining how the student's circumstances possibly will influence their educational attainment and their future outcomes.

Becker (1965) extended the human capital model of child educational attainment into the household production model and claimed that the process of educational attainment is an aspect of household behavior rather than individual behaviors. In this approach, child educational attainment was considered as a commodity in the household utility function, and the household was like a production unit generating some utility for its members by using some household inputs like time and family characteristics and market inputs like school quality. The children's outcomes may be affected directly by parent's decisions through the amount and nature of resource allocated through the decisions regarding family structure or location where children are growing up.

CHAPTER 3

THEORETICAL FRAMEWORK AND METHODOLOGY

3.1 THEORETICAL FRAMEWORK

Equality of opportunity has traditionally been viewed as the absence of impediments to accessing education, positions, and occupations. Amartya Sen's capability approach focuses on individuals' capabilities and freedoms to lead lives they value. Inequality of opportunities can be viewed as a limitation on individuals' capabilities due to unequal access to education, healthcare, and other essential resources. Rawls' equality of opportunity framework is rooted in the fair distribution of resources and opportunities, with a focus on addressing the needs of the least advantaged members of society.

By drawing on prior philosophical works developed by Rawls (1971), Sen (1981,85), Dworkin (1981), Cohen (1989), and Arneson (1989); John Roemer in his influential book "Equality of Opportunity," published in 1998, offers a comprehensive and analytical framework for understanding and evaluating the concept of equality of opportunity. Roemer introduces the concept of "circumstances" as the starting point for analyzing equality of opportunity. He described circumstances, on the one hand, as variables over which people have no influence, such as gender, age, and parental education. Circumstances are factors that are not under an individual's control such ethnicity, area, gender, and parental socioeconomic status. The term "inequality of opportunities" refers to inequality that resulted from differences in individual's circumstances. As a result, individuals with diverse circumstances are likely to experience life differently. On the other side, variables that an individual may influence, such as the length of study or academic achievement, are referred to as "Efforts" (Brunori, 2016).

The range of opportunities may change depending on the country's situation. The Human Opportunity Index was developed by the World Bank to assess how children's and youths' access to necessities including education, water, power, sanitation, and the Internet is impacted by factors outside of their control. The wellbeing function developed by Amartya Sen (1976) was modified by Paes de Barros et al. (2008) to formulate the HOI. This index considers the uneven distribution of a service's (education) coverage and its average coverage. (World Bank, <https://>). Pakistan is a developing nation with significant disparity of educational opportunities. As a result, people from different social groups do

not have access to equal educational opportunities. It is a widely recognized and extensively studied fact that universal education fosters economic growth. (UNICEF, 2015). Education enhances quality of life and is essential to promoting intergroup tolerance. As a result, societies become more peaceful.

Using the conceptualizations proposed by Roemer (1998; 2006), the study has used two educational opportunities (enrollment and attainment), and a set of circumstances variables to analyze the inequality of opportunities of education in Pakistan.

3.1.1 Theoretical Framework of Inequality of Opportunities in Pakistan

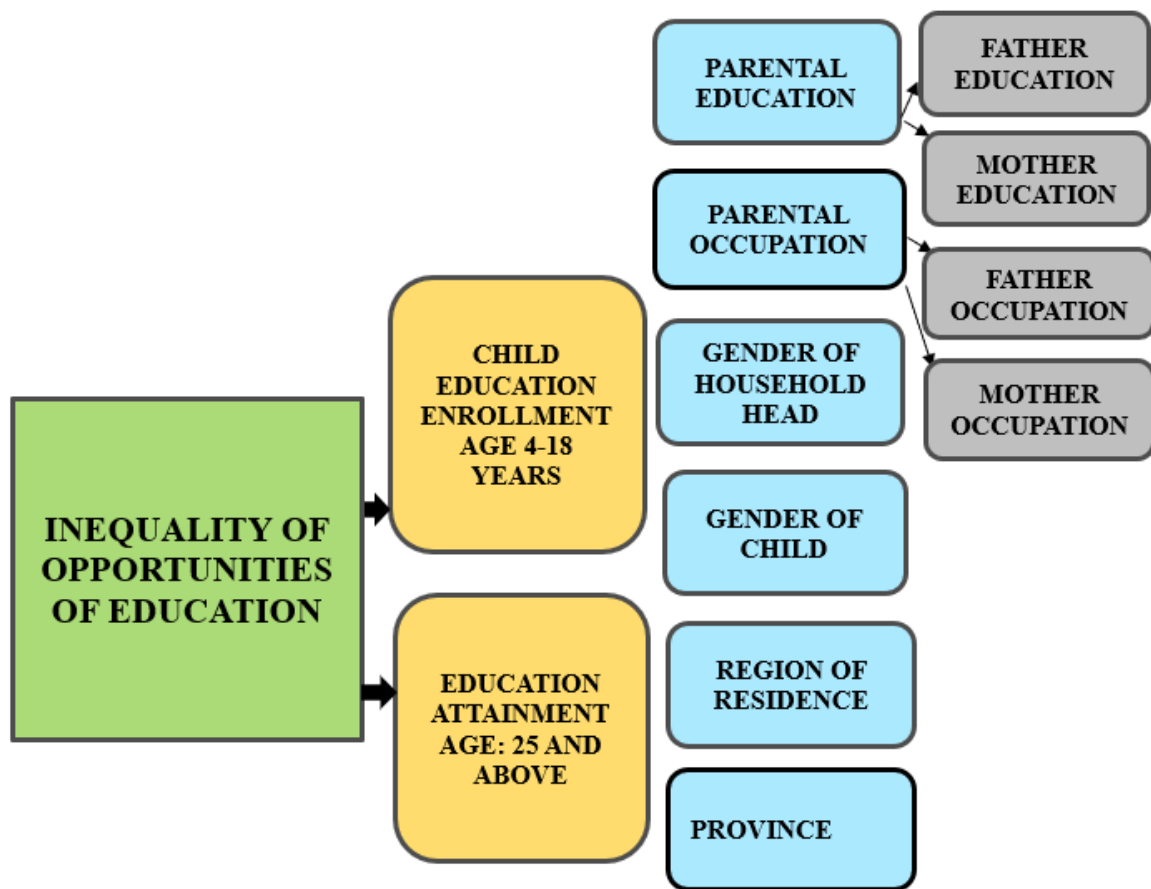


Figure 3.1.1: Theoretical Model of the Study

To analyze the inequality of opportunities of education, the following model is used. The model consists of educational opportunities and a set of circumstances.

In logistic regression, the use of 1 and 0 for multiple categories is a way to represent categorical variables through binary encoding. This technique is known as "one-hot encoding." The purpose of using 1 and 0 is to create binary indicator variables for each category of a categorical variable. Each category is represented by a separate binary variable, where a value of 1 indicates the presence of that category and a value of 0 indicates the absence of that category

3.1.2 Theoretical Framework of Opportunities

Table 3.1
Education Opportunities

Child Education Enrollment	No or less than primary education=1, 0 otherwise
	Primary education=2, 0 otherwise
	Middle education=3, 0 otherwise
	Secondary education=4, 0 otherwise
	Higher secondary education=5, 0 otherwise
Education Attainment	No or less than primary education=1, 0 otherwise
	Primary education=2, 0 otherwise
	Middle education=3, 0 otherwise
	Secondary education=4, 0 otherwise
	Higher secondary education=5, 0 otherwise
	Bachelor education =6, 0 otherwise
	Higher education education=7, 0 otherwise

3.1.3 Theoretical Framework of Circumstances

The uncontrolled socioeconomic background of a child is called circumstances. The circumstances for inequality of opportunities of education are given in table below. Chapter 3 provides an in-depth discussion of the specific categories involved in these circumstances.

Table 3.2
Circumstances

Circumstances	Description
Father's Education	Father's education is categorized into seven distinct categories.
Mother's Education	Mother's education is categorized into seven distinct categories.
Father's Occupation	Father's occupation is categorized into six distinct categories.
Mother's Occupation	Mother's occupation is categorized into six distinct categories
Hhh Gender	Household head's gender is a dummy variable (male-1, 0- female).
Child Gender	Child's gender is a dummy variable (male-1, 0- female).
Region	Household region of resident: urban \ rural (urban- 1, 0- rural)
Province	Province of household: (1- Punjab, 2- Sindh, 3- Baluchistan, 4- KPK)

3.1.4 Data Source

The study used Pakistan Social and Living Standard Measurement Survey (PSLM) for two datasets 2019-20 and 2008-09. The PSLM Survey is one of the main surveys for observing individual and household characteristics. It provides a set of representatives, population-based estimates of social indicators and their progress under MDGs. The PSLM Survey, 2008-09, is the 5th round of survey. During this round, 75,188 households were covered across urban and rural communities. The PSLM, 2019-20 is the 12th round of a series of surveys, started in 2004. The Field activities of the 12th round of PSLM Surveys were carried out from October 2019 to March 2020 and designed for 6500 blocks to cover 195000 households. The survey focused on the educational key indicator covered under the context of MDGs and SDGs.

3.2 METHODOLOGY

The study has used Human Opportunity Index (HOI) and Shapley decomposition technique by using Pakistan Social and Living Standard Measurement Survey (PSLM) for two datasets 2019-20 and 2008-09. The Human Opportunity Index (HOI), created by the World Bank in 2006. This index is a modification of Amartya Sen's (1976) welfare function. Barros et al. used it in 2009 across Latin America and the Caribbean to determine children's access to basic services. This index calculates how socioeconomic and demographic factors affect access to basic services and inequality of opportunity.

3.2.1 Human Opportunity Index

HOI was first demonstrated by Barros and Ferreira (2009). HOI measures how far a society is from universal provision of basic services and goods, such as education? (Newman, 2012). HOI is a useful instrument for putting the equal opportunity principle into practice. HOI consists of a composite measure that is jointly determined by two components. First the HOI measures the average coverage of fundamental opportunities. The second component is the dissimilarity index which is measured as the inequality between the distributions of opportunity based on circumstances called D-index. An increase in the index may indicate either increased coverage or more equitable distribution of that service (Nizamani and Waheed, 2019; World Bank, [https](https://)).

$$HOI = C (1 - D)$$

The HOI ranges from 0-100, 0 refers to high inequality and 100 refers to universal access.

‘C’ is the coverage that denotes the percentage of individuals that have access to the opportunities of education.

‘D’ is the dissimilarity index that evaluates the dissimilarity in access to education for groups defined by circumstances.

D ranges from 0-1 (0-100 in percentage), D = 0 refers to perfect equality of opportunity. The greater the variation, the higher the inequality of opportunity.

Given the circumstances of an individual ‘I’, ‘Pi’ is the predicted probability of access to education, estimated by logistic regressions.

Conditional probabilities of an individual's access to education given his or her circumstances are required for the construction of HOI. This was used with the use of a logistic regression, which has linear parameters. Using survey data

$\ln(P[(E = 1|X = (X_1, X_2, X_3, \dots, X_m)])$, logistic regression is fitted to a set of independent variables X (circumstances) to determine how equally these opportunities are allocated.

$$\ln\left(\frac{P[(E = 1|X = (X_1, X_2, X_3, \dots, X_m)]}{1 - P[(E = 1|X = (X_1, X_2, X_3, \dots, X_m)]}\right) = \sum_{k=1}^m X_k \beta_k$$

Here, X_k stands for the row vector of conditions in the k-dimension, so $X = (X_1, X_2, X_3, \dots, X_m)$ and $\beta_k = (\beta_1, \beta_2, \beta_3, \dots, \beta_m)$ corresponds to a column for parameters. One can calculate the parameters β_k , using logistic regression, where m is the sample size.

After obtaining the estimates through logistic regression, we used the odds-ratio to determine the likelihood that everyone is having the chance to access education.

$$P_i = \frac{\exp(X_i \beta_i)}{1 + \exp(X_i \beta_i)}$$

After all, using the predicted probabilities P_i and sample weights W_i , calculate the coverage rate C, followed by the D-index and HOI:

$$C = \sum_{i=1}^n W_i P_i$$

‘C’ is the average coverage rate.

‘n’ is the number of circumstances groups.

‘ W_i ’ is the share of group ‘i’ in the total population where $w_i = \frac{1}{n}$

‘ P_i ’ is the coverage rate of each group of circumstance.

$$D = \frac{1}{2C} \sum_{i=1}^n W_i |C - P_i|$$

Lastly, the final step is to calculate Human Opportunity Index by using the formula:

$$HOI = C (1 - D)$$

When $C = 1$, the coverage is universal. When $C < 1$, it indicates how far society should move forward to reach universal coverage i.e., $C = 1$.

Firstly, HOI is recognized as an equality-sensitive coverage rate. Inequality and HOI have a negative relationship. If inequality in the chosen opportunities increases, the value of HOI decreases. Furthermore, the HOI also depends on a set of circumstances. Any change in the circumstance groups will affect the dissimilarity index, which in turn affects the HOI. Moreover, the HOI has a positive relationship with coverage rate. If coverage for one circumstance group increases, HOI also increases. The coverage rates of all circumstance groups and the HOI increase by the same proportion. The HOI is always equal to or lower than the coverage rate. Lastly, modifications in the human opportunity index can be interpreted as either a change in the coverage rate or a change in the opportunity inequality index.

3.2.2 Shapley Decomposition

Decomposition is the next part of this study once the Coverage and Dissimilarity index is obtained by Shapley decomposition (Shapley 1953; Rongve (1995); Chantreuil and Trannoy (1997) Shorrocks 2013). This approach allows the identification of the marginal contribution of each circumstance to inequality in access to opportunities. The coverage in the formula can simply be attained by number of people who have the access to an opportunity divided by the total population however the D –index, is dependent on the set of circumstances selected for the model. The D – index value increase with each additional circumstance.

The impact of an additional circumstance F can be seen as

$$DF = \sum_{S \subseteq N/\{F\}} \frac{|S|! (n - |S| - 1)!}{n!} [D(S \cup \{F\}) - D(S)]$$

Where ‘ N ’ denotes the set of the circumstances that has a total number of ‘ n ’ circumstances. ‘ S ’ is the subset of the set ‘ N ’ without the circumstance ‘ F ’. $D(S)$ is index of dissimilarity estimated with the group of ‘ S ’ circumstances

while $D(S \cup \{F\})$ is the D- index of the circumstance's 'S' with circumstance 'F'.

To define the contribution of the additional circumstance F in D-index:

$$MF = DF \setminus D(N)$$

The collection of contributions from all chosen circumstances adds up to 100% when using the Shapley decomposition. We examined and decomposed inequities using Stata's `hoi` and `hoishapley` commands (Azevedo et al., 2012). We analyzed the data using Stata version 14.

3.2.3 Brief Description of Variables

3.2.3.1 Educational Opportunities

Education enrollment and educational attainment are used as educational opportunities of study. These are categorical variables having distinct categories. One-hot encoding technique has been used for these categories.

3.2.3.2 Child Education Enrollment: CEDUE

$$CEDUE = F \left[\begin{array}{l} FEDU, MEDU, FOCC, MOCC, CHDG, \\ HHHG, REGION, PROVINCE \end{array} \right]$$

Which grade child is currently attending? Age: (4-18)

If no education or less than primary = 1, 0 otherwise: (class 0-4)

If primary = 2, 0 otherwise: (class 5)

If middle = 3, 0 otherwise: (class 6-8)

If secondary = 4, 0 otherwise: (class 9-10)

If higher secondary = 5, 0 otherwise: (class 11-12)

3.2.3.3 Education Attainment: EDUATT

$$EDUATT = F \left[\begin{array}{l} FEDU, MEDU, FOCC, MOCC, CHDG, \\ HHHG, REGION, PROVINCE \end{array} \right]$$

What maximum education achieved? Age: (25 and above)

If no education or less than primary = 1, 0 otherwise

If primary = 2, 0 otherwise

If middle = 3, 0 otherwise

If secondary = 4, 0 otherwise

If above secondary = 5, 0 otherwise

If bachelor = 6, 0 otherwise

If higher education =7, 0 otherwise

3.2.4 Circumstances

Parental education and parental occupation, gender of child, gender of household head, region of residence and province are the circumstances used for educational opportunities. One-hot encoding technique has been used for these categories.

3.2.4.1 Father's Education: FEDU

Father's education has been divided into seven categories.

If no education or less than primary = 1, 0 otherwise

If primary = 2, 0 otherwise

If middle = 3, 0 otherwise

If secondary = 4, 0 otherwise

If above secondary = 5, 0 otherwise

If bachelor = 6, 0 otherwise

If higher education =7, 0 otherwise

3.2.4.2 Mother's Education: MEDU

Mother's education has been divided into seven categories.

If no education or less than primary = 1, 0 otherwise

If primary = 2, 0 otherwise

If middle = 3, 0 otherwise

If secondary = 4, 0 otherwise

If above secondary = 5, 0 otherwise

If bachelor = 6, 0 otherwise

If higher education = 7, 0 otherwise

3.2.4.3 Father's Occupation: FOCC

Father's occupation has been divided into six categories.

- **Non Agriculture**

If daily wagers = 1, 0 otherwise

If self-employed = 2, 0 otherwise

If paid employee = 3, 0 otherwise

- **Agriculture**

If own cultivator = 4, 0 otherwise

If sharecropper = 5, 0 otherwise

If Livestock = 6, 0 otherwise

3.2.4.4 Mother's Occupation: MOCC

Mother's occupation has been divided into six categories.

- **Non agriculture**

If daily wagers = 1, 0 otherwise

If self-employed = 2, 0 otherwise

If paid employee = 3, 0 otherwise

- **Agriculture**

If own cultivator = 4, 0 otherwise

If sharecropper = 5, 0 otherwise

If Livestock = 6, 0 otherwise

3.2.4.5 Gender of Child: CHDG

Gender of child is a dummy variable. Male is used as reference category.

If male = 1

If female = 0

3.2.4.6 Region Of Residence: REGION

Region of residence is a dummy variable. Urban region is used as reference category.

If urban = 1

If rural = 0

3.2.4.7 Gender of the Head of Household: HHHG

The gender of the head of household is a dummy variable. Male is used as reference category.

If male = 1

If female = 0

3.2.4.8 Province

The province circumstance has been divided into four categories.

If Punjab = 1, 0 otherwise

If Sindh = 2, 0 otherwise

If Baluchistan = 3, 0 otherwise

If KPK = 4, 0 otherwise

In logistic regression, "one-hot encoding" is a technique used to represent categorical variables with multiple categories as binary variables. It is especially useful when dealing with categorical data that cannot be directly used in the logistic regression model since it requires numerical inputs.

Suppose we have a categorical variable, such as "Color," with three categories: Red, Blue, and Green. Instead of directly using the "Color" categories, we create binary indicator variables for each category. For three categories, we will create three binary variables. Each binary variable corresponds to one category and is set to 1 if the observation belongs to that category and 0 otherwise. If an observation is Red, the "Red" binary variable will be set to 1, and "Blue" and "Green" will be set to 0. One-hot encoding is a powerful technique that allows us to incorporate categorical variables with multiple categories into the logistic regression model. It transforms qualitative data into a format that can be effectively used for predictive modeling tasks.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 DESCRIPTIVE STATISTICS OF CHILD EDUCATION ENROLLMENT (AGE: 4-18 YEARS)

To begin with, Table 4.1 represents descriptive statistics of education enrollment (age 4-18 years) for both surveys (2008-09 and 2019- 20). In addition, it shows percentages of each circumstance variable with total sample size.

By focusing on the children's education enrollment, the percentage of children with less than primary education has slightly decreased from 54.24% in 2008 to 47.61% in 2019. Whereas the percentages of primary, middle, secondary and high secondary education have slightly increased. For 2008, the total sample size is 118,223 among which 40.70% are girls and 59.30% are boys. For 2019, the total sample size is 178,112 among which 42.86% are girls and 57.14% are boys. The households are mostly headed by male heads for both surveys round.

The father's education percentage for secondary education remained high among all other categories over the 10 years period. By focusing on mother's education, the percentage for primary education is 48.84% in 2008, whereas in 2019, the percentage for middle education is 81.66%. The percentage of households living in Punjab province is 43.08% in 2008 and 52.69% in 2019, for Sindh the percentages are 23.69% in 2008 and 17.27% in 2019, for Baluchistan the percentages are 14.09% in 2008 and 7.71% in 2019, while for KPK the percentages are 19.14% in 2008 and 22.33% in 2019.

The parent's occupation is categorized in seven distinct categories. By considering father's occupation, the percentages for paid employees and self-employed remain high among all other categories for both survey rounds respectively. The percentages for mother's occupation are high for contract cultivator in 2008 while in 2019, the percentage of sharecropper is high among all other categories.

Table 4.1
Descriptive Statistics of Child Education Enrollment
(Age: 4-18 Years) by Year of Survey (2008-09 and 2019-20)

Education Enrollment	2008-09		2019-20	
	Frequency (Number of Individuals)	Percentage	Frequency (Number of Individuals)	Percentage
No or less than primary	64,130	54.24	84,806	47.61
Primary	10,894	9.21	17,973	10.09
Middle	23,500	19.88	39,212	22.02
Secondary	13,676	11.57	23,667	13.29
High secondary	6,023	5.09	12,454	6.99
Total	118,223	100.00	178,112	100.00
Circumstances				
Gender of the Household Head				
Female	8,285	7.01	17,789	9.99
Male=1	109,938	92.99	160,323	90.01
Total	118,223	100.00	178,112	100.00
Child Gender				
Female	48,119	40.70	76,336	42.86
Male=1	70,104	59.30	101,776	57.14
Total	118,223	100.00	178,112	100.00
Region of Residence				
Urban =1	71,512	60.49	56,332	31.63
Rural	46,711	39.51	121,780	68.37
Total	118,223	100.00	178,112	100.00

Father's Education	Frequency (Number of Individuals)	Percentage	Frequency (Number of Individuals)	Percentage
No or less than primary	4,714	3.99	5,688	3.19
Primary	15,600	13.20	19,846	11.14
Middle	13,181	11.15	24,694	13.86
Secondary	63,934	54.08	98,769	55.45
High secondary or less than bachelor	6,246	5.28	12,922	7.26
Bachelor	10,163	8.60	8,380	4.70
Higher Education	4,385	3.71	7,811	4.39
Total	118,223	100.00	178,110	100.00
Mother's Education				
No or less than Primary	33,512	28.35	2,686	1.51
Primary	57,738	48.84	9,910	5.56
Middle	11,281	9.54	145,441	81.66
Secondary	9,517	8.05	10,278	5.77
High secondary or less than Bachelor	3,177	2.69	4,875	2.74
Bachelor	2,240	1.89	2,871	1.61
Higher Education	758	0.64	2,049	1.15
Total	118,223	100.00	178,110	100.00
Province				
Punjab	50,928	43.08	93,840	52.69
Sindh	28,006	23.69	30,768	17.27
Baluchistan	16,659	14.09	13,736	7.71
KPK	22,630	19.14	39,768	22.33
Total	118,223	100.00	178,110	100.00

Father's Education	Frequency (Number of Individuals)	Percentage	Frequency (Number of Individuals)	Percentage
Non-Agriculture				
Paid Employee	48,577	41.09	71,038	39.88
Self Employed	45,019	38.08	69,316	38.92
Entrepreneur	600	0.51	4,210	2.36
Agriculture				
Own cultivator	16,080	13.60	20,070	11.27
Sharecropper	4,167	3.52	6,180	3.47
Contract Cultivator	1,917	1.62	3,622	2.03
Livestock	1,863	1.58	3,674	2.06
Total	118,223	100.00	178,110	100.00
Mother's Occupation				
Non-Agriculture				
Paid Employee	2,275	1.92	3,733	2.10
Self Employed	454	0.38	1,062	0.60
Entrepreneur	2	0.00	45	0.03
Agriculture				
Own cultivator	107	0.09	444	0.25
Sharecropper	5	0.00	171,374	96.22
Contract Cultivator	114,975	97.25	21	0.01
Livestock	405	0.34	1,431	0.80
Total	118,223	100.00	178,110	100.00

4.2 DESCRIPTIVE STATISTICS OF EDUCATION ATTAINMENT (AGE 25 AND ABOVE)

Table 4.2 represents descriptive statistics (percentages) of education attainment (age25 and above) for both surveys (2008-09 and 2019- 20). In addition, it shows percentages of each circumstance variable with total sample size.

By focusing on the education attainment, the percentage of secondary education remains high as 47.71% in 2008 and 46.46% in 2019. The overall education data shows stagnant and decreasing trends when comparing with previous years. For 2008, the total sample size is 22,227 among which 16.46% are girls and 83.54% are boys. For 2019, the total sample size is 87,427 among which 17.15% are girls and 82.85% are boys. The households are mostly headed by male heads for both surveys round as male household' head percentage is 84.23%.

The father's education percentage for secondary education remain high among all other categories over the 10 years period as 66.03% in 2008 and 67.08% in 2019. By focusing on mother's education, the percentage for middle education is 82.17% in 2008, whereas in 2019, the percentage for secondary education is 76.99%. The percentage of households living in Punjab province is 44.86% in 2008 and 53.44% in 2019, for Sindh the percentages are 20.95% in 2008 and 12.88% in 2019, for Baluchistan the percentages are 14.83% in 2008 and 7.21% in 2019, while for KPK the percentages are 19.36% in 2008 and 26.47% in 2019.

By considering father's occupation, the percentages for self-employed remain high among all other categories for both surveys round respectively. The percentages for mother's occupation are high for contract cultivator in 2008 while in 2019, the percentage of own cultivator is high among all other categories.

Table 4.2
Descriptive Statistics of Education Attainment by Year of Survey
(2008-09 and 2019-20) (Age 25 and Above)

Education Attainment	2008-09		2019-20	
	Frequency (Number of individuals)	Percentage	Frequency (Number of individuals)	Percentage
No or less than Primary	773	3.48	3,089	3.53
Primary	2,231	10.04	8,098	9.26
Middle	3,082	13.87	13,437	15.37
Secondary	10,604	47.71	40,616	46.46
High Secondary	1,787	8.04	8,250	9.44
Bachelor	2,543	11.44	6,147	7.03
Higher Education	1,207	5.43	7,790	8.91
Total	22,227	100.00	87,427	100.00
Circumstances				
Gender of the Household Head				
Female	3,505	15.77	8,101	9.27
Male=1	18,722	84.23	79,326	90.73
Total	22,227	100.00	87,427	100.00
Child gender				
Female	3,658	16.46	14,995	17.15
Male=1	18,569	83.54	72,432	82.85
Total	22,227	100.00	87,427	100.00
Region of residence	Frequency (Number of individuals)	percentage	Frequency (Number of individuals)	Percentage
Urban =1	9,317	41.92	28,100	32.14
Rural	12,910	58.08	59,327	67.86
Total	22,227	100.00	87,427	100.00

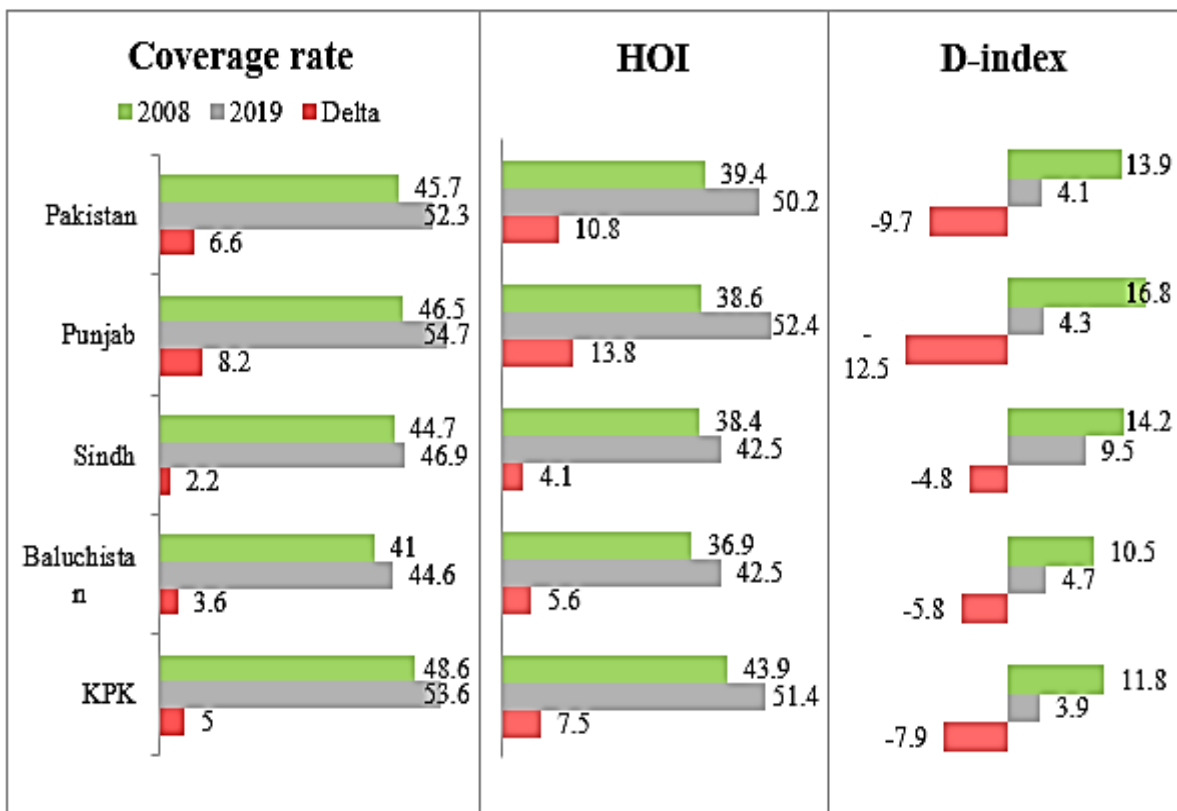
Father's Education	Frequency (Number of Individuals)	percentage	Frequency (Number of Individuals)	Percentage
No or less than Primary	774	3.84	2,890	3.31
Primary	2,518	11.33	7,894	9.03
Middle	1,938	8.72	8,731	9.99
Secondary	14,676	66.03	58,643	67.08
High Secondary or less than Bachelor	633	2.85	3,737	4.27
Bachelor	1,092	4.91	2,718	3.11
Higher Education	596	2.68	2,814	3.22
Total	22,227	100.00	87,427	100.00
Mother's Education				
No or less than primary	353	1.59	1,370	1.57
Primary	1,477	6.65	5,289	6.05
Middle	18,265	82.17	4,682	5.36
Secondary	1,211	5.45	67,311	76.99
High secondary or less than bachelor	376	1.69	3,360	3.84
Bachelor	360	1.62	2,811	3.22
Higher education	185	0.83	2,604	2.98
Total	22,227	100.00	87,427	100.00
Province	Frequency (Number of Individuals)	Percentage	Frequency (Number of Individuals)	Percentage
Punjab	9,971	44.86	46,724	53.44
Sindh	4,656	20.95	11,259	12.88
Baluchistan	3,297	14.83	6,300	7.21
KPK	4,303	19.36	23,144	26.47
Total	22,227	100.00	87,427	100.00

Father's Education	Frequency (Number of Individuals)	percentage	Frequency (Number of Individuals)	Percentage
Non-Agriculture				
Paid Employee	3,833	17.24	15,601	17.84
Self Employed	12,780	57.50	51,066	58.41
Entrepreneur	128	0.58	1,400	1.60
Agriculture				
Own Cultivator	3,736	16.81	12,286	14.05
Sharecropper	729	3.28	2,755	3.15
Contract Cultivator	421	1.89	1,834	2.10
Livestock	600	2.70	2,485	2.84
Total	22,227	100.00	87,427	100.00
Father's Occupation	Frequency (Number of Individuals)	Percentage	Frequency (Number of Individuals)	Percentage
Non-Agriculture				
Paid employee	456	2.05	2,499	2.86
Self employed	129	0.58	569	0.65
Entrepreneur	0	0.00	53	0.06
Agriculture				
Own Cultivator	51	0.23	81,251	92.94
Sharecropper	3	0.01	2,632	3.01
Contract Cultivator	21,444	96.48	11	0.01
Livestock	144	0.65	412	0.47
Total	22,227	100.00	87,427	100.00

4.3 RESULTS OF HOI, COVERAGE RATE AND DISSIMILARITY INDEX OF CHILD EDUCATION ENROLLMENT

4.3.1 Child Education Enrollment

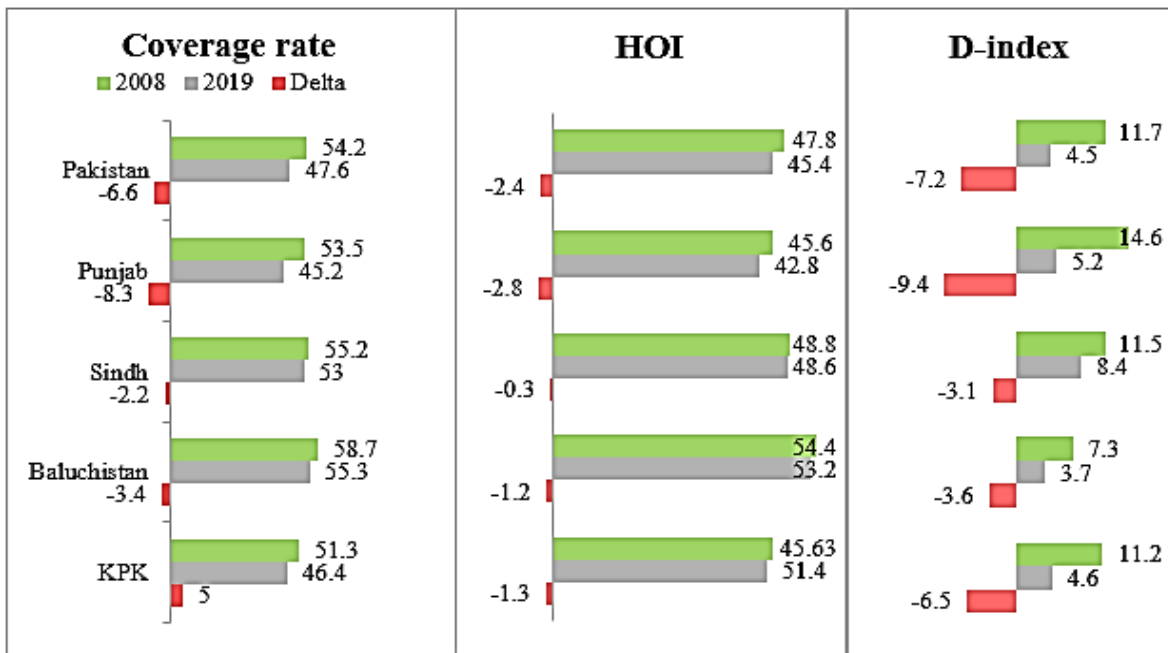
Figure 4.1 to 4.1.5 represent the Coverage rate, HOI, and D-index for the time period 2008-09 and 2019-20 along with the changes transpired in them for education enrollment in Pakistan. Figure 4.2 to 4.2.7 represent the Coverage rate, HOI and D-index for the time period 2008-09 and 2019-20 along with the changes transpired in them for education attainment in Pakistan.



Source: Author's own calculation.

Figure 4.1: Education Enrollment in Pakistan (Age: 4-18) Coverage Rate, HOI, and D-Index

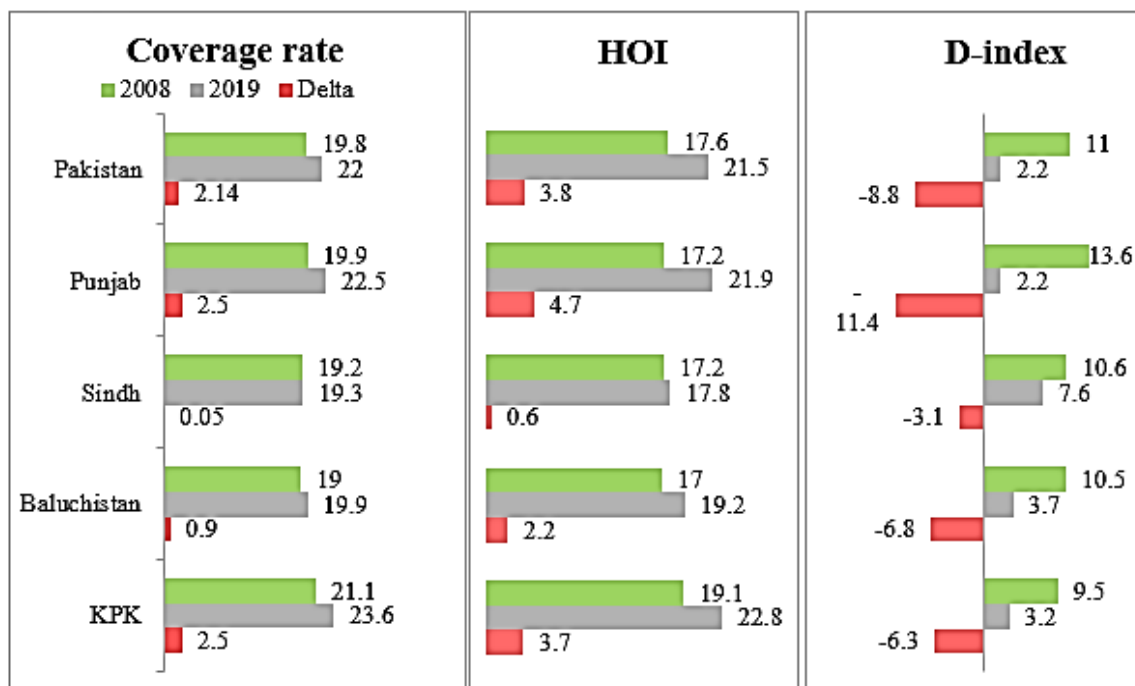
The results show an increase in coverage rate and HOI while decrease in D-index value of child education enrollment all over Pakistan. Since the coverage rate has increased in the mentioned decade, it shows that human opportunities of education enrollment have increased about 11 percent. In Punjab human opportunities of education enrollment have increased about 14 percent while in Baluchistan HOI has just increased about 5 percent. Inequality of opportunity of education has reduced all over Pakistan.



Source: Author's Own Calculation.

Figure 4.1.1: No or less than Primary Education Enrollment in Pakistan (Class 0-4) Coverage Rate, HOI, and D-Index

Figure 4.1.1 represents the structure of less than primary education enrollment all over the Pakistan. It is disheartening to notice decrease in both HOI and the coverage rate all over Pakistan in this time period.



Source: Author's own calculation.

Figure 4.1.2: Middle Education Enrollement in Pakistan (Class 6-8) Coverage Rate, HOI, and D-Index

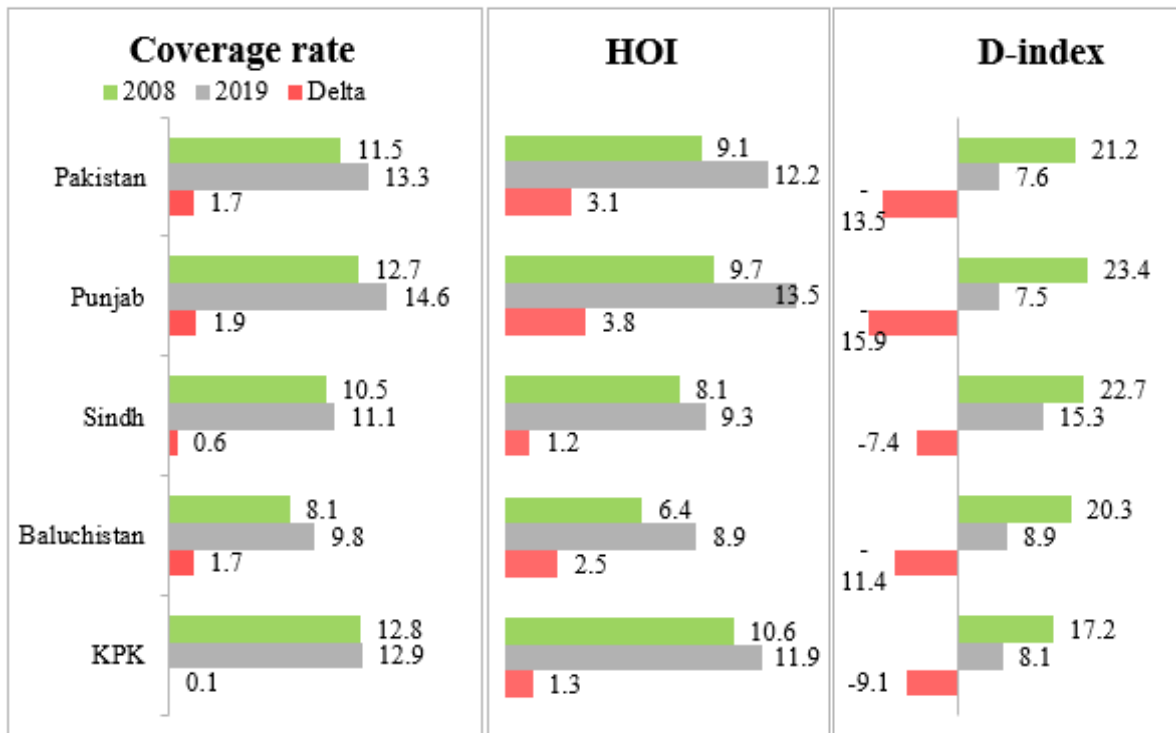
Figure 4.1.2 represents the results of HOI, coverage rate and D-index of primary education enrollment in Pakistan. The primary enrollment situation is not encouraging. The results show slight increase in coverage rate and HOI all over Pakistan which are not up to the mark as human opportunities of primary education enrollment have increased just 1 percent. Among all other provinces, Baluchistan showed the worst picture.



Source: Author's own calculation.

Figure 4.1.3: Primary Education Enrollment in Pakistan (Class-5) Coverage Rate, HOI, and D-Index

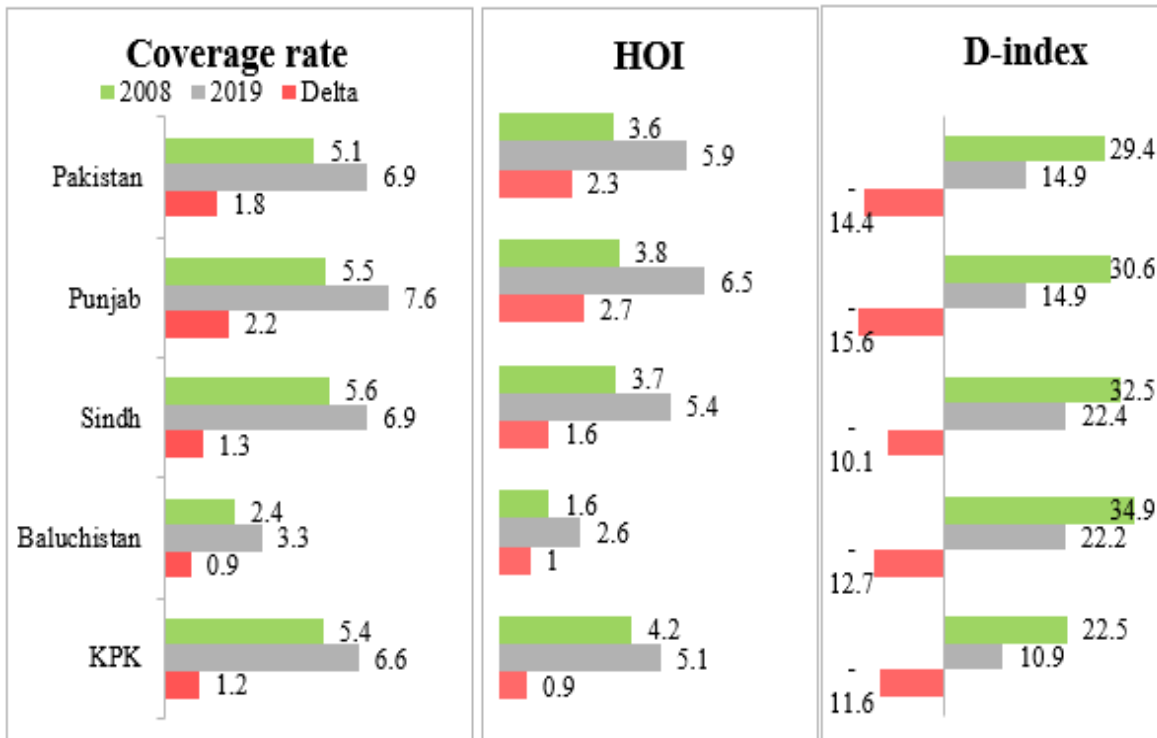
Like the primary education enrollment, middle education enrollment is also showing dissatisfactory situation. Although, there is slight increase in both HOI and coverage rates in 2019-20 than 2008-09 results but still the middle education enrollment situation is not satisfactory.



Source: Author's own calculation

Figure 4.1.4: Secondary Education Enrollment in Pakistan (Class 9-10) Coverage Rate, HOI, and D-index

Just like all other education indicators Figure 4.1.4 and 4.1.5 also describe the daunting picture of secondary and high secondary education enrollment all over Pakistan. Human opportunities of secondary education enrollment in all over Pakistan have just 3 percent increased while only 2 percent at high secondary education enrollment within last decade. Punjab showed a somewhat better percentage in both secondary and high secondary education enrollment. The lowest increase in HOI of secondary education enrollment was in Sindh while lowest HOI of high secondary education enrollment was shown in KPK. The situation of inequality has become worse.

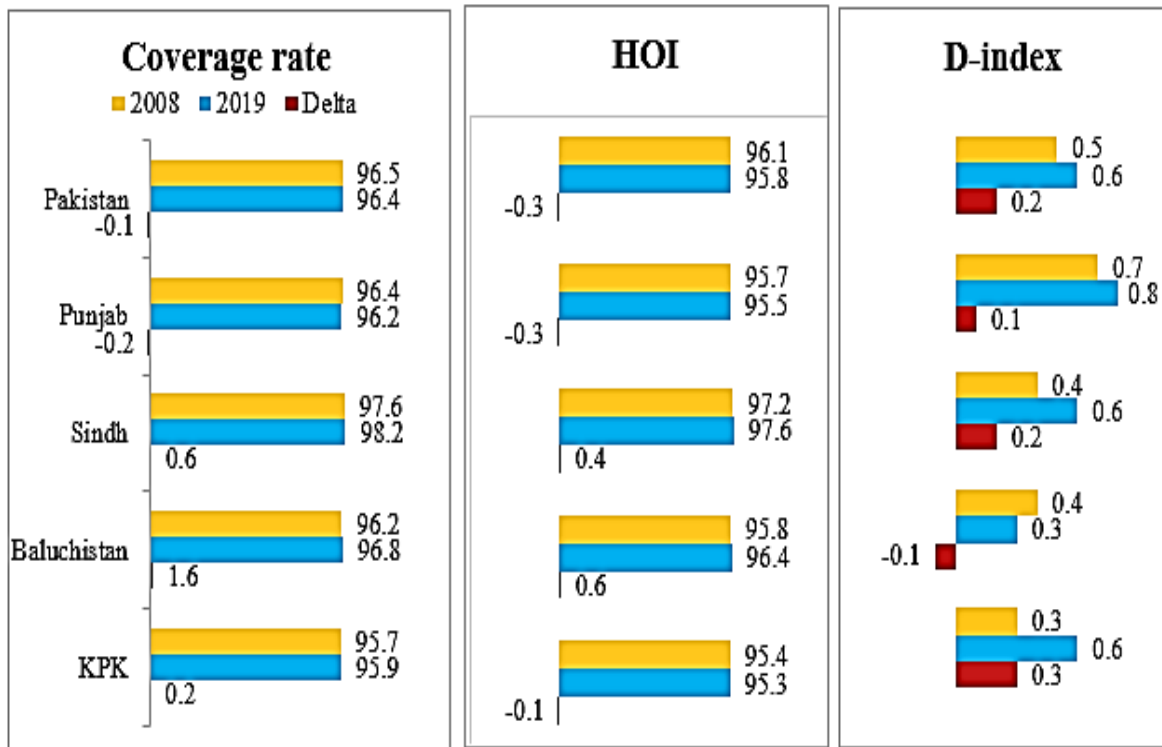


Source: Author's own calculation

Figure 4.1.5: High Secondary Education Enrollment in Pakistan (Class 11-12) Coverage Rate, HOI, and D-Index

The education enrollment situation in all over Pakistan is alarming. Although all indicators of education enrollment have showed some increasing percentage of HOI and coverage rate in 2019 as compared to 2008, but these percentages are unsatisfying.

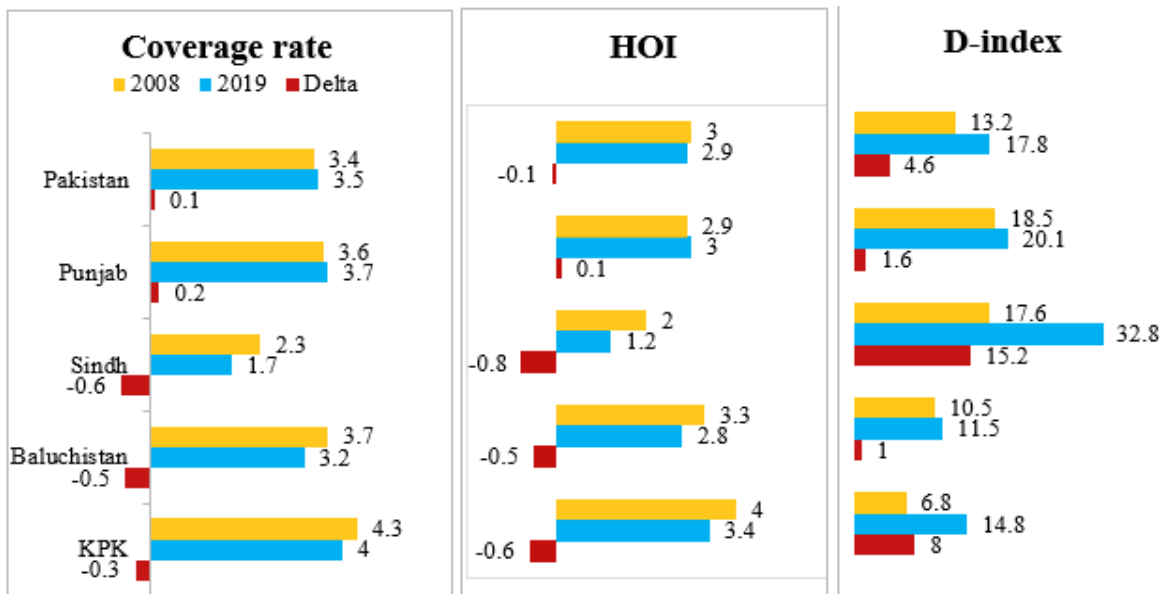
4.4 RESULTS OF HOI, COVERAGE RATE AND DISSIMILARITY INDEX OF EDUCATION ATTAINMENT



Source: Author's own calculation

Figure 4.2: Education Attainment in Pakistan (Age: 25 and above) Coverage Rate, HOI and D-Index

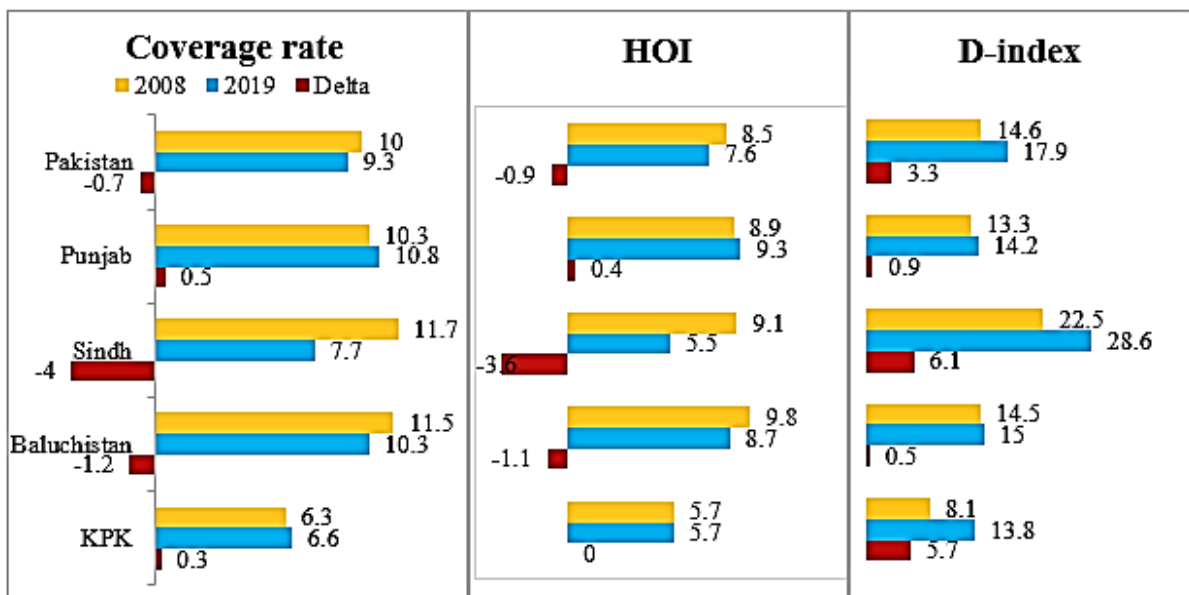
Figures 4.2- 4.2.7 represents the HOI, Coverage rate and D-index of education attainment(age: 25 and above) and its further indicators all over Pakistan for two time periods 2008-09 and 2019-20. Moreover, changes transpired during the decade have also calculated. The education attainment opportunities have decreased 0.3 percent and inequality of opportunities have slightly decreased by the time. All provinces show decline in HOI and coverage rates except Baluchistan as it shows slightly increasing percentage.



Source: Author's own calculation

Figure 4.2.1: No or Less than primary Education Attainment in Pakistan (Age: 25 and above) Coverage Rate, HOI and D-Index

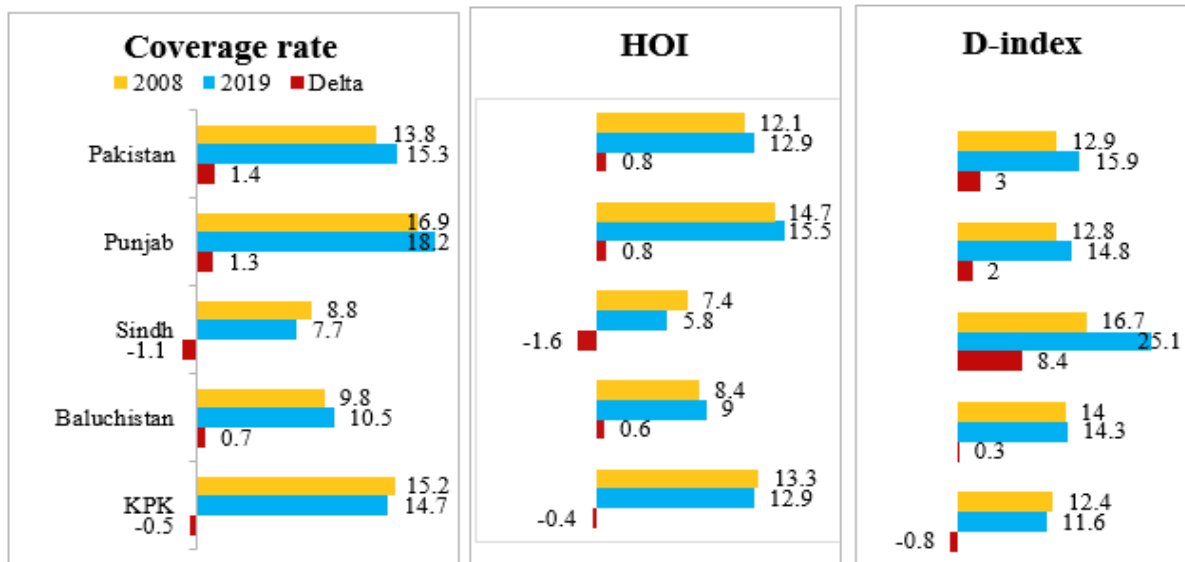
Figure 4.2.1 examined that HOI of less than primary education attainment opportunities has decreased all over Pakistan from 2008 to 2019 while inequality of education attainment opportunities has decreased. Sindh and KPK showed some better picture of inequalities as their d-index values have increased 15% and 8% respectively.



Source: Author's own calculation

Figure 4.2.2: Primary Education Attainment in Pakistan (Age: 25 and above) Coverage Rate, HOI and D-Index

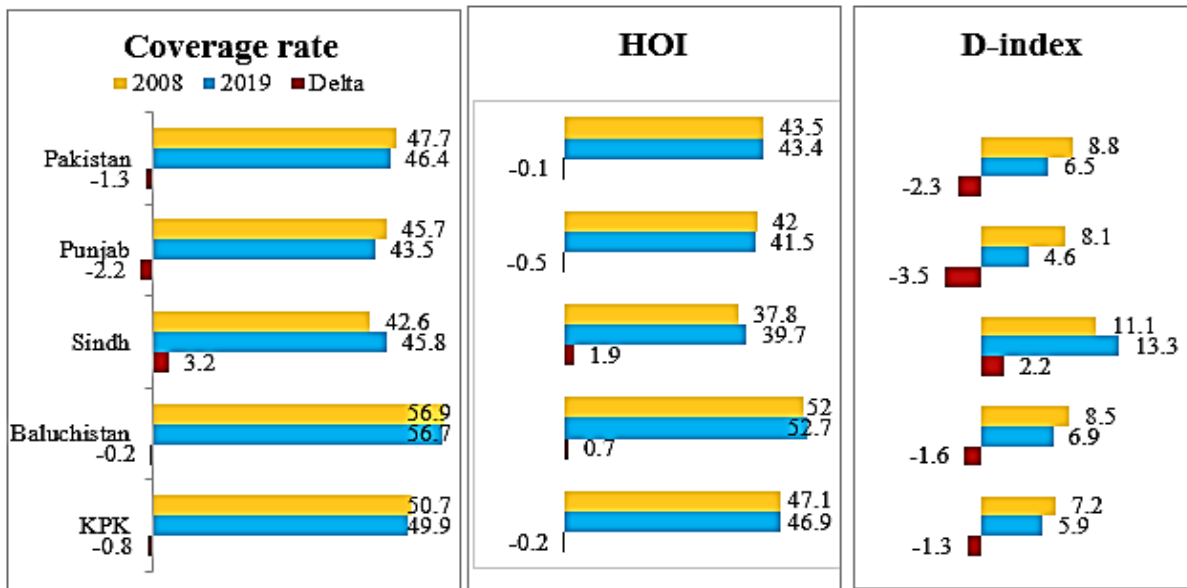
It is very disappointing to note that inequalities of primary education attainment have increased in the mention decade in Pakistan. HOI of primary education attainment has decreased all over Pakistan except Punjab as it has slightly increasing percentage. Just like less than primary education attainment, inequality of opportunities of primary education attainment are high in Sindh as its d-index value is almost 6 percent higher among all provinces.



Source: Author's own calculation

Figure 4.2.3: Middle Education Attainment in Pakistan (Age: 25 and above) Coverage Rate, HOI and D-Index

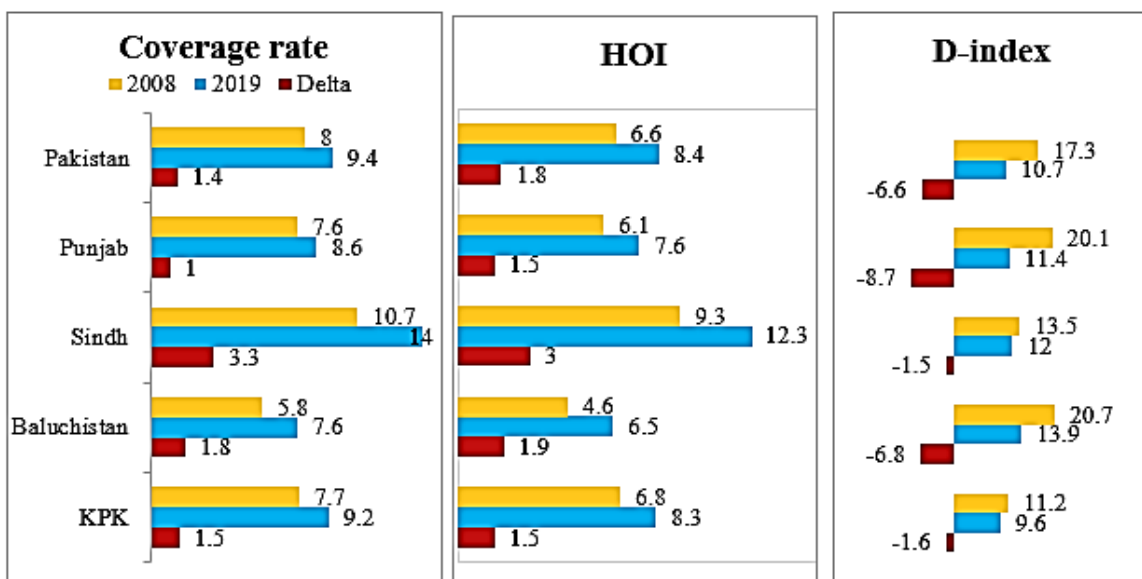
Figure 4.2.3 represents middle education attainment opportunities in Pakistan for two time periods 2008-09 and 2019-20. HOI value of middle education attainment has slightly increased (0.8%) in this decade in Pakistan. Punjab and Baluchistan have somewhat better increasing coverage rate as 1.3 and 0.7 percent respectively. Inequality of opportunities of middle education attainment has decreased in Sindh up to 8 percent.



Source: Author's own calculation

Figure 4.2.4: Secondary Education Attainment in Pakistan (Age: 25 and above) Coverage Rate, HOI and D-Index

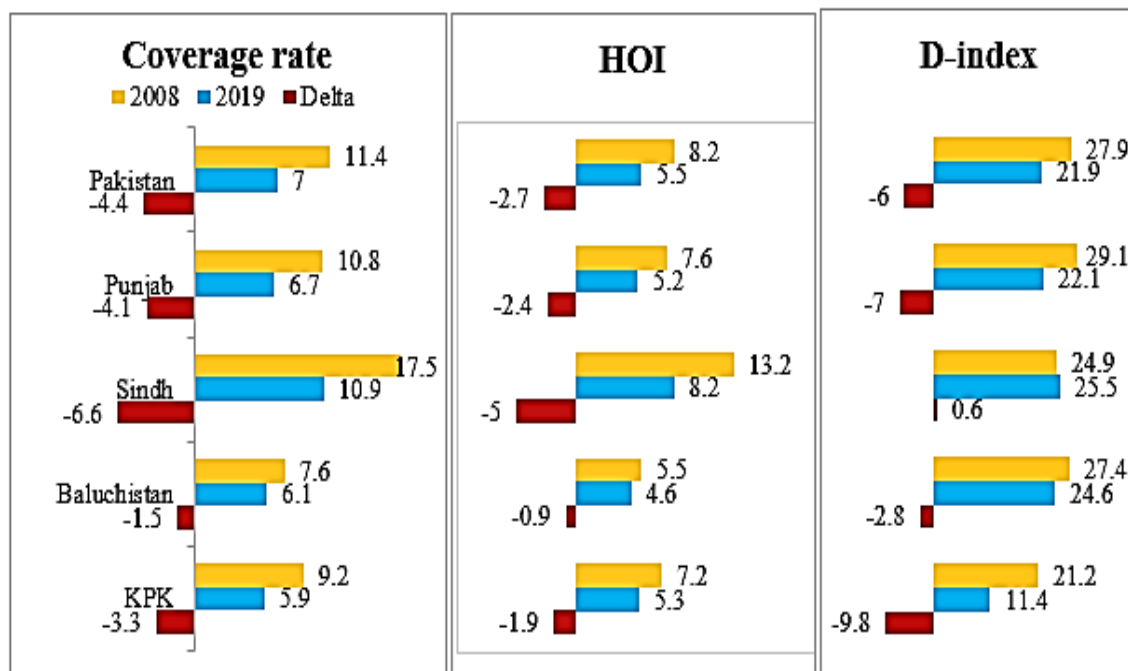
Figure 4.2.4 represents the structure of secondary education attainment in Pakistan. Like previous education indicators, this indicator has not improved in the country. There is a decrease of 0.1 percent in HOI and 1.3 percent in coverage on the national level. The worst inequality can be observed in the case of Punjab with a decrease of 3.5 percent in the D-index. The results demonstrate that Pakistan is experiencing difficulties providing universal education, and that the country's educational supply has steadily decreased.



Source: Author's own calculation

Figure 4.2.5: High Secondary Education Attainment in Pakistan (Age: 25 and above) Coverage Rate, HOI and D-Index

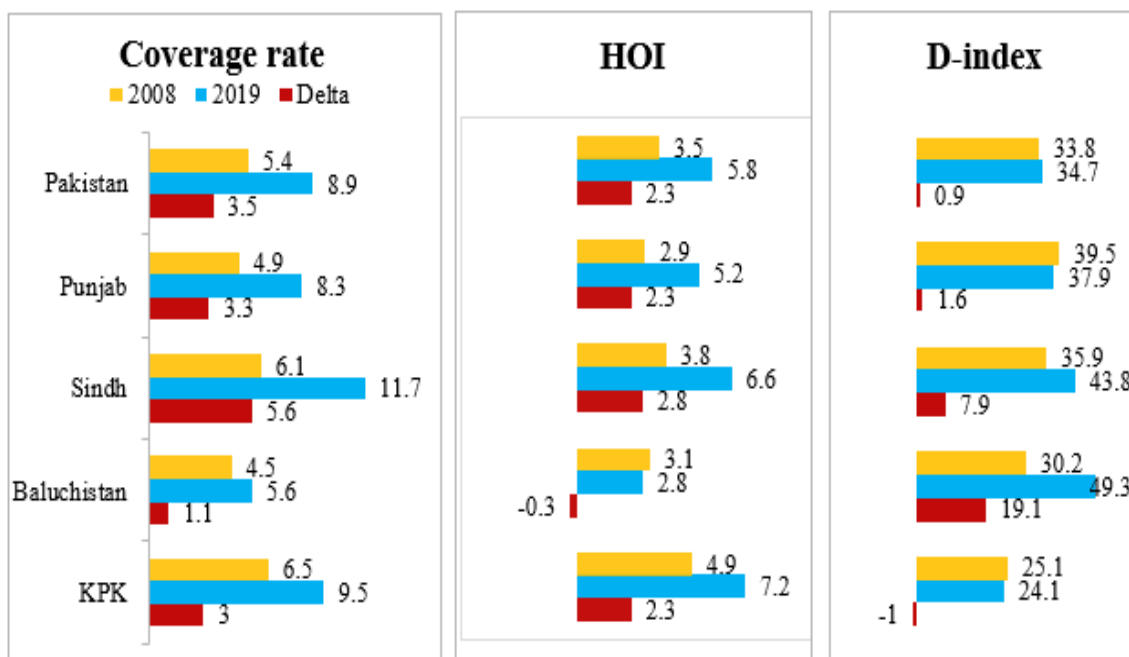
The higher secondary education indicator shows a better picture. The overall increase in the HOI is 1.8 percent and 1.4 percent in coverage rate. The best improvement among all provinces can be seen in the province of Sindh with a positive change of 3 percent with a 3.3 percent coverage rate. Despite the improvement at high secondary level, all the provinces must struggle hard to achieve the universal coverage rate.



Source: Author's own calculation

Figure 4.2.6: Bachelor Education Attainment in Pakistan (Age: 25 and above) Coverage Rate, HOI and D-Index

The Figure 4.2.6 represents the opportunities of Bachelor education attainment level in Pakistan. Like the primary and secondary attainment levels, bachelor attainment also shows decline. There is a 2.7 percent decline in overall HOI rate and 4.4 percent in the coverage rate. The worst condition is in Sindh with a 5 percent decline in HOI rate and 6.6 percent in the coverage rate. Figure 4.2.7 represents the higher education attainment opportunities in Pakistan. Like the high secondary education attainment, higher education attainment also shows improvement in the coverage rates and HOI rate. Pakistan is in the situation of education emergency as all indicators show steady decline.



Source: Author's own calculation

Figure 4.2.7: Higher Education Attainment in Pakistan (Age: 25 and above) Coverage Rate, HOI and D-Index

4.5 RELATIVE CONTRIBUTIONS OF CIRCUMSTANCES IN DETERMINING THE INEQUALITY OF OPPORTUNITIES OF EDUCATION IN PAKISTAN

The Coverage and Dissimilarity index is calculated using the Barros et al. (2009) methodology before the decomposition. The decomposition method used in this study to assess how a situation contributes to the unequal distribution of opportunities is Shapley decomposition. The D-index is dependent on the set of circumstances picked for the model; however, the formula's coverage may be computed by dividing the population's access to opportunities by the number of people. When additional circumstances are present, the D-index's value increases.

4.5.1 Decomposition of Inequality in Education Enrollment (Age: 4-18) In Pakistan

Figures 4.3-4.3.5 demonstrate the Shapley decomposition results for all chosen circumstances, first at the national level and then separately for each of Pakistan's four provinces. Each figure has been divided into two time periods 2008-2009 and 2019-20 to enable the detection of any changes in the factors

contributing to inequality of opportunities of education over the span of the decade.

Table 4.3 reveals that in 2008-09, region of residence contributed 15.86 percentage points to the overall inequality in education enrolment in Pakistan. By 2019-20, this contribution increased significantly to 45.66 percentage points. The substantial rise in region-related inequality suggests that children's access to education opportunities became more uneven across different regions of the country over the examined period. In 2008-09, household head gender contributed 1.23 percentage points to the overall inequality in education enrollment. In 2019-20, this contribution rose to 7.37 percentage points. The increase in household head gender-related inequality indicates that education enrollment opportunities for children were influenced more significantly by the gender of the household head in 2019-20 than in the earlier period.

In 2008-09, child gender contributed 3.02 percentage points to the overall inequality in education enrollment.

In 2019-20, this contribution decreased to 1.86 percentage points. The decline in child gender related inequality suggests some improvement in reducing gender disparities in education enrollment, except in KPK, where the contribution of child gender to inequality increased substantially. In 2008-09, father's occupation contributed 1.13 percentage points to the overall inequality in education enrollment. By 2019-20, this contribution slightly increased to 1.26 percentage points. The relatively small change in father's occupation-related inequality indicates that the role of the father's occupation in influencing education enrollment opportunities remained relatively stable over time. In 2008-09, mother's occupation contributed 1.87 percentage points to the overall inequality in education enrollment. In 2019-20, this contribution rose to 6.34 percentage points. The significant increase in mother's occupation-related inequality suggests a stronger influence of the mother's occupation on education enrollment opportunities in 2019-20. In 2008-09, father's education contributed 3.72 percentage points to the overall inequality in education enrollment. By 2019-20, this contribution increased to 11.11 percentage points. The considerable rise in father's education-related inequality indicates that the education level of fathers played a more prominent role in shaping education enrollment opportunities for children in 2019-20. In 2008-09, mother's education contributed a substantial 73.14 percentage points to the overall inequality in education enrollment. However, by 2019-20, this contribution decreased significantly to 22.37 percentage points. The drastic reduction in mother's education-related inequality suggests a notable improvement in

reducing the impact of the mother's education on education enrollment opportunities for children in Pakistan.

In conclusion, the Shapley decomposition results highlight changes in the contribution of various factors to the overall inequality in education enrollment in Pakistan over time. Notably, the region of residence, mother's occupation, and father's education played significant roles in increasing inequality. However, efforts to reduce gender disparities and focus on maternal education have led to notable improvements in reducing inequality in education enrollment opportunities for children in the country.

Table 4.3
Decomposition of Inequality of Education Enrollment (Age: 4-18)
In Pakistan (Percentages Explained By Each Variable)

	Year	Pakistan	Punjab	Sindh	Baluchistan	KPK
Region of Residence	2008-09	15.86	13.27	22.2	15.8	9.76
	2019-20	45.66	39.58	56.56	35.19	13.97
Hh head Gender	2008-09	1.23	2.11	0.67	0.59	1.63
	2019-20	7.37	6.83	1.32	2.22	3.76
Child Gender	2008-09	3.02	0.54	2.91	16.85	12.7
	2019-20	1.86	2.96	2.71	27.71	39.39
Father's Occupation	2008-09	1.13	0.16	6.14	2.49	3.35
	2019-20	1.26	7.25	9.58	10.41	12.97
Mother's Occupation	2008-09	1.87	2.11	1.51	1.50	1.92
	2019-20	6.34	7.36	1.64	2.34	4.28
Father's Education	2008-09	3.72	2.89	5.01	5.99	3.28
	2019-20	11.11	14.11	15.17	14.78	12.79
Mother's Education	2008-09	73.14	78.89	61.54	56.71	67.33
	2019-20	22.37	21.07	13.00	7.33	12.82

Source: Author's own calculation

Table 4.3.1
Decomposition of Inequality of Opportunities of No or
Less than Primary Education Enrollment (Class 0-4)
In Pakistan (Percentages Explained By Each Variable)

	Year	Pakistan	Punjab	Sindh	Baluchistan	KPK
Region of Residence	2008-09	10.84	9.79	15.94	10.46	6.74
	2019-20	45.66	39.58	56.56	35.19	13.97
Hh head Gender	2008-09	0.87	1.59	0.52	0.38	1.34
	2019-20	7.37	6.83	1.32	2.22	3.75
Child Gender	2008-09	2.09	0.94	2.33	10.32	8.24
	2019-20	1.86	2.96	2.71	27.71	39.39
Father's Occupation	2008-09	8.84	5.37	8.75	20.12	10.46
	2019-20	1.26	7.25	9.58	10.41	12.97
Mother's Occupation	2008-09	2.07	2.38	1.35	1.36	1.94
	2019-20	6.34	7.36	1.64	2.34	4.28
Father's Education	2008-09	5.35	4.4	8.57	6.57	4.56
	2019-20	15.11	14.91	15.17	14.78	12.79
Mother's Education	2008-09	69.92	75.50	62.52	50.76	66.71
	2019-20	22.37	21.07	13.00	7.33	12.82

Source: Author's own calculation

Table 4.3.1 demonstrates that in the year 2008-09, the regional distribution of households explained about 10.84% of the change in the inequality of educational opportunities for no or less than primary education enrollment. This suggests that differences in educational opportunities across regions contributed to approximately 10.84% of the overall inequality during that time period.

Whereas in 2019-20, the impact of regional distribution increased significantly, explaining about 45.66% of the change in the inequality of opportunities. This indicates that regional disparities in educational opportunities became much more influential in driving over all inequality during this period compared to 2008-09. In 2008-09, the gender of the household head had a relatively minor impact, explaining around 0.87% of the change in the inequality of educational opportunities.

However, in 2019-20, the impact of household head gender increased significantly to approximately 7.37% of the change. This suggests that the gender of household heads played a much more important role in contributing to inequality in educational opportunities during this period compared to the previous one. In 2008-09, the gender distribution of children in households accounted for approximately 2.09% of the change in the inequality of educational opportunities.

In 2019-20, the impact of child gender decreased slightly to about 1.86% of the change. This indicates that the influence of child gender on educational opportunities inequality became slightly less significant during this period compared to the previous one.

In 2008-09, the distribution of fathers' occupations explained about 8.84% of the change in the inequality of educational opportunities. In 2019-20, the impact of father's occupation decreased substantially to around 1.26% of the change. This suggests that the role of father's occupation in contributing to educational opportunities inequality became much less significant during this period compared to 2008-09. In 2008-09, the distribution of mothers' occupations accounted for approximately 2.07% of the change in the inequality of educational opportunities.

In 2019-20, the impact of mother's occupation increased to about 6.34% of the change. This indicates that the role of mother's occupation in contributing to inequality in educational opportunities became more pronounced during this period compared to the previous one. In 2008-09, the education levels of fathers explained around 5.35% of the change in the inequality of educational opportunities. In 2019-20, the impact of father's education significantly increased to approximately 15.11% of the change. This suggests that the education level of fathers became much more influential in driving inequality in educational opportunities during this period compared to the previous one. In 2008-09, the education levels of mothers played a substantial role, explaining about 69.92% of the change in the inequality of educational opportunities. This indicates that maternal education was a dominant factor in contributing to educational opportunities inequality during that time period. In 2019-20, the impact of mother's education decreased to about 22.37% of the change. While it remains significant, this decrease suggests that other factors may have become more influential in driving inequality in educational opportunities during this period compared to the previous one.

Table 4.3.2
Decomposition of Inequality of Opportunities of Primary Education Enrollment (class 5) in Pakistan (Percentages Explained by each Variable)

	Year	Pakistan	Punjab	Sindh	Baluchistan	KPK
Region of Residence	2008-09	29.88	6.25	21.88	51.08	32.95
	2019-20	41.31	38.14	11.22	23.05	14.75
Hh head Gender	2008-09	0.33	6.25	3.76	2.17	2.27
	2019-20	0.26	2.91	2.32	12.41	12.78
Child Gender	2008-09	8.66	4.77	8.00	1.50	18.09
	2019-20	3.65	4.12	18.43	8.11	20.73
Father's Occupation	2008-09	6.40	0.63	14.18	17.98	6.56
	2019-20	1.74	2.46	12.56	3.36	3.51
Mother's Occupation	2008-09	4.12	5.13	3.76	0.51	1.95
	2019-20	2.52	2.83	2.75	5.83	1.60
Father's Education	2008-09	6.50	15.8	9.87	1.47	8.36
	2019-20	17.21	17.82	21.06	7.92	19.32
Mother's Education	2008-09	44.07	61.12	38.53	25.26	29.00
	2019-20	33.29	31.72	31.64	39.31	27.28

Source: Author's own calculation

Table 4.3.2 explain that in year (2008-09), the impact of regional distribution on inequality of opportunities in primary education enrollment was highest in Baluchistan (51.08%), followed by KPK (32.95%), Sindh (21.88%), Punjab (6.25%), and Pakistan as a whole (29.88%).

In Year (2019-20), the regional impact on inequality of opportunities decreased in all provinces except Punjab and Pakistan as a whole. The highest impact was observed in Punjab (38.14%), and Pakistan (41.31%) followed by Baluchistan (23.05%), KPK (14.75%), Sindh (11.22%).

In 2008-09, the gender of the household head had a minor impact, contributing to about 0.33% of the inequality of opportunities in primary education enrollment. In 2019-20, the impact of household head gender decreased slightly to about 0.26% of the inequality of opportunities. This suggests that the gender of household heads had a relatively small and consistent

impact in driving inequality in primary education enrollment across all provinces. In Year 2008-09, the impact of child gender was highest in KPK (18.09%), followed by Baluchistan (10.32%), Sindh (8.00%), Punjab (4.77%), and Pakistan as a whole (8.66%). While in Year 2019-20, the impact of child gender decreased in all provinces. The highest impact was observed in KPK (20.73%), followed by Baluchistan (18.43%), Sindh (2.71%), Punjab (4.12%), and Pakistan (3.65%).

In Year 2008-09, the impact of father's occupation on inequality of opportunities in primary education enrollment was highest in Baluchistan (17.98%), followed by Sindh (14.18%), Punjab (0.63%), KPK (6.56%), and Pakistan as a whole (6.40%). While in Year 2019-20, the impact of father's occupation decreased in all provinces. The highest impact was observed in Sindh (12.56%), followed by Baluchistan (3.36%), KPK (3.51%), Punjab (2.46%), and Pakistan (1.74%). This suggests that the role of father's occupation in driving inequality in primary education enrollment became less significant during this period. In Year 2008-09, the impact of mother's occupation was highest in Baluchistan (5.13%), followed by Punjab (4.12%), Sindh (3.76%), Pakistan as a whole (4.12%), and KPK (0.51%). In Year 2019-20, the impact of mother's occupation decreased in all provinces. The highest impact was observed in KPK (5.83%), followed by Sindh (2.75%), Baluchistan (1.60%), Punjab (2.83%), and Pakistan (2.52%). This indicates that the role of mother's occupation in driving inequality in primary education enrollment also became less significant during this period.

In Year 2008-09, the impact of father's education on inequality of opportunities in primary education enrollment was highest in Punjab (15.8%), followed by Sindh (9.87%), KPK (8.36%), Pakistan as a whole (6.50%), and Baluchistan (1.47%). However, in Year 2019-20, the impact of father's education increased in all provinces. The highest impact was observed in Sindh (21.06%), followed by KPK (19.32%), Punjab (17.82%), Baluchistan (7.92%), and Pakistan (17.21%). This suggests that the education level of fathers became more influential in driving inequality in primary education enrollment during this period. In Year 2008-09, the impact of mother's education was highest in Punjab (61.12%), followed by Sindh (38.53%), Pakistan as a whole (44.07%), Baluchistan (25.26%), and KPK (29.00%). This indicates that mother's education was a dominant factor in driving inequality in primary education enrollment during that time period. In Year 2019-20, the impact of mother's education decreased in all provinces. The highest impact was observed in KPK (39.31%), followed by Punjab (31.72%), Sindh (31.64%), Baluchistan (27.28%), and Pakistan (33.29%). While it remains significant, this decrease suggests that other factors may have become more influential in shaping

inequality in primary education enrollment during this period compared to the previous one.

In both years, Baluchistan consistently had the highest impact of region of residence on inequality of primary education enrollment opportunities. Sindh had the second-highest impact in year 2008-09, but its impact decreased significantly in year 2019-20, making Punjab the province with the second-highest impact. KPK had the highest impact of child gender in both years, indicating that child gender played a more significant role in driving inequality of primary education enrollment opportunities in KPK compared to other provinces. The impact of father's occupation was highest in Baluchistan in year 2008-09 but decreased significantly in year 2019-20, making Sindh the province with the highest impact of father's occupation.

KPK had the highest impact of mother's occupation in both years, suggesting that mother's occupation had a more pronounced effect on inequality of primary education enrollment opportunities in KPK. Punjab consistently had the highest impact of father's education and mother's education on inequality of primary education enrollment opportunities in both years.

These findings provide valuable insights into how different factors contribute to the inequality of opportunities in primary education enrollment across different provinces in Pakistan and how their impacts have changed over time. The results highlight the variations in the drivers of educational inequality in different regions and underscore the importance of targeted policies to address these disparities and improve access to quality education for all.

Table 4.3.3
Decomposition of Inequality of Opportunities of
Middle Education Enrollment (Class 6-8) in Pakistan
(Percentages Explained by each Variable)

	Year	Pakistan	Punjab	Sindh	Baluchistan	KPK
Region of residence	2008-09	10.89	7.01	20.98	10.38	8.93
	2019-20	51.43	56.53	69.53	34.65	4.54
Hh head gender	2008-09	0.60	1.91	0.41	2.67	3.27
	2019-20	26.68	20.36	1.15	1.83	2.11
Child gender	2008-09	4.96	0.61	5.86	31.07	10.63
	2019-20	6.82	7.14	2.80	13.31	64.53
Father's occupation	2008-09	0.89	1.78	9.48	5.75	4.22
	2019-20	1.66	9.78	10.51	26.78	20.27
Mother's occupation	2008-09	1.89	2.49	1.24	1.10	2.01
	2019-20	4.67	3.73	2.50	1.25	2.94
Father's education	2008-09	2.17	1.20	3.59	2.85	2.33
	2019-20	6.39	1.60	10.28	17.74	4.73
Mother's education	2008-09	78.56	84.97	58.41	45.71	68.58
	2019-20	2.32	0.83	3.21	4.42	0.85

Source: Author's own calculation

Table 4.3.3 evaluates that in 2008-09, the impact of regional distribution on inequality of opportunities in middle education enrollment was highest in Sindh (20.98%), followed by Baluchistan (10.38%), Pakistan as a whole (10.89%), Punjab (7.01%), and KPK (8.93%). While in 2019-20, the regional impact on inequality of opportunities increased significantly in all provinces. The highest impact was observed in Sindh (69.53%), followed by Punjab (56.53%), Pakistan (51.43%), Baluchistan (34.65%), and KPK (4.54%). In 2008-09, the impact of household head gender on inequality of opportunities in middle education enrollment was highest in KPK (3.27%), followed by Punjab (1.91%), Sindh (0.41%), Pakistan as a whole (0.60%), and Baluchistan (2.67%). Whereas in 2019-20, the impact of household head gender increased significantly in all provinces. The highest impact was observed in Punjab (26.68%), followed by KPK (20.36%), Baluchistan (1.83%), Pakistan (1.15%), and Sindh (2.11%). In 2008-09, the impact of child gender was highest in

Baluchistan (31.07%), followed by KPK (10.63%), Sindh (5.86%), Punjab (0.61%), and Pakistan as a whole (4.96%). In 2019-20, the impact of child gender increased significantly in KPK (64.53%), followed by Baluchistan (13.31%), Sindh (2.80%), Pakistan (6.82%), and Punjab (7.14%).

In both years, the impact of father and mother's occupation and mother's education on inequality of opportunities in middle education enrollment was relatively low and consistent across all provinces.

In 2008-09, the impact of mother's education was highest in Punjab (84.97%), followed by Baluchistan (68.58%), Sindh (58.41%), Pakistan as a whole (78.56%), and KPK (45.71%). Whereas in 2019-20, the impact of mother's education decreased significantly in all provinces. The highest impact was observed in Baluchistan (4.42%), followed by Sindh (3.21%), Punjab (2.32%), Pakistan (2.32%), and KPK (0.85%).

In both years, Sindh consistently had the highest impact of regional distribution on inequality of middle education enrollment opportunities, indicating that regional disparities played a significant role in shaping educational opportunities in this region. The impact of household head gender increased significantly in Punjab, KPK, and Baluchistan in 2019-20, while it remained relatively low and consistent in Sindh and Pakistan as a whole.

Baluchistan consistently had the highest impact of child gender in both years, suggesting that child gender had a more pronounced effect on inequality of middle education enrollment opportunities in this province.

The impact of mother's education was highest in Punjab in 2008-09, but it decreased significantly in all provinces in 2019-20. Baluchistan had the highest impact of mother's education in 2019-20.

The impact of father's occupation and father's education showed variations across provinces, but their contributions to inequality of opportunities in middle education enrollment were relatively low compared to other factors.

Table 4.3.4
Decomposition of Inequality of Opportunities of Secondary
Education Enrollment (Class 9-10) in Pakistan
(Percentages Explained by each Variable)

	Year	Pakistan	Punjab	Sindh	Baluchistan	KPK
Region of residence	2008-09	17.59	12.11	24.41	37.23	10.87
	2019-20	48.51	42.84	59.73	26.07	18.34
Hh head gender	2008-09	1.82	2.49	0.34	2.41	2.83
	2019-20	5.39	7.06	1.61	3.61	6.38
Child gender	2008-09	1.94	2.41	0.09	6.89	9.18
	2019-20	5.95	1.45	2.25	42.89	39.11
Father's occupation	2008-09	0.93	0.07	6.70	2.36	2.65
	2019-20	2.04	7.25	10.78	2.64	8.08
Mother's occupation	2008-09	2.40	2.20	2.51	1.76	2.56
	2019-20	4.47	6.28	0.75	1.63	2.04
Father's education	2008-09	3.28	3.22	4.37	8.60	1.95
	2019-20	11.28	12.33	13.83	10.36	11.21
Mother's education	2008-09	72.01	77.47	61.56	40.73	69.93
	2019-20	22.33	22.76	11.04	12.79	14.82

Source: Author's own calculation

Table 4.3.4 indicated that in 2008-09, the impact of regional distribution on inequality of opportunities in secondary education enrollment was highest in Baluchistan (37.23%), followed by Sindh (24.41%), Pakistan as a whole (17.59%), Punjab (12.11%), and KPK (10.87%). In 2019-20, the regional impact on inequality of opportunities decreased in all provinces. The highest impact was observed in Sindh (59.73%), followed by Punjab (42.84%), Pakistan (48.51%), Baluchistan (26.07%), and KPK (18.34%).

In both years, the impact of household head gender on inequality of opportunities in secondary education enrollment was relatively low and consistent across all provinces. In 2008-09, the impact of child gender was highest in Baluchistan (9.18%), followed by KPK (6.89%), Punjab (2.41%), Pakistan as a whole (1.94%), and Sindh (0.09%). In 2019-20, the impact of child gender increased significantly in Baluchistan (42.89%) and KPK (39.11%),

while it remained relatively low and consistent in the other provinces. In both years, the impact of mother and father's occupation on inequality of opportunities in secondary education enrollment was relatively low and consistent across all provinces.

In 2008-09, the impact of father's education was highest in Baluchistan (8.60%), followed by Sindh (4.37%), Punjab (3.22%), Pakistan as a whole (3.28%), and KPK (1.95%). While in 2019-20, the impact of father's education was highest in Punjab (12.33%), followed by KPK (11.21%), Pakistan (11.28%), Sindh (13.83%), and Baluchistan (10.36%).

In 2008-09, the impact of mother's education was highest in Punjab (77.47%), followed by Sindh (61.56%), Pakistan as a whole (72.01%), Baluchistan (40.73%), and KPK (69.93%). In 2019-20, the impact of mother's education decreased significantly in all provinces. The highest impact was observed in Punjab (22.76%), followed by Sindh (11.04%), Pakistan (22.33%), Baluchistan (12.79%), and KPK (14.82%).

In both years, Sindh consistently had the highest impact of regional distribution on inequality of secondary education enrollment opportunities, indicating that regional disparities played a significant role in shaping educational opportunities in this province.

Baluchistan consistently had the highest impact of child gender in both years, suggesting that child gender had a more pronounced effect on inequality of secondary education enrollment opportunities in this province. Punjab had the highest impact of father's education in 2019-20, while it was Baluchistan in 2008-09.

The impact of mother's education was highest in Punjab in 2008-09 but decreased significantly in all provinces in 2019-20. Baluchistan had the highest impact of mother's education in 2019-20.

Table 4.3.5
Decomposition of Inequality of Opportunities of High Secondary
Education Enrollment (Class 11-12) in Pakistan
(Percentages Explained By Each Variable)

	Year	Pakistan	Punjab	Sindh	Baluchistan	KPK
Region of residence	2008-09	29.49	26.79	24.74	47.41	25.56
	2019-20	36.72	27.54	36.98	41.50	16.22
Hh head gender	2008-09	1.02	0.53	0.58	0.73	0.11
	2019-20	0.44	1.40	1.42	3.87	14.25
Child gender	2008-09	0.15	3.78	2.08	7.48	6.58
	2019-20	4.64	9.94	0.59	23.42	11.67
Father's occupation	2008-09	4.11	2.36	7.53	8.97	0.56
	2019-20	0.77	4.62	5.16	2.24	2.38
Mother's occupation	2008-09	2.87	2.67	1.92	1.90	3.01
	2019-20	6.18	6.38	2.12	4.54	5.83
Father's education	2008-09	10.36	8.30	13.48	5.07	16.16
	2019-20	22.13	23.97	26.99	14.93	26.78
Mother's education	2008-09	51.98	55.54	49.65	28.42	47.99
	2019-20	29.10	26.11	26.71	9.47	22.84

Source: Author's own calculation

Table 4.3.5 shows that in 2008-09, the impact of regional distribution on inequality of opportunities in high secondary education enrollment was highest in Baluchistan (47.41%), followed by Sindh (24.74%), Pakistan as a whole (29.49%), Punjab (26.79%), and KPK (25.56%).

In 2019-20, the regional impact on inequality of opportunities decreased in all provinces. The highest impact was observed in Baluchistan (41.50%), followed by Sindh (36.98%), Pakistan (36.72%), Punjab (27.54%), and KPK (16.22%). In both years, the impact of household head gender on inequality of opportunities in high secondary education enrollment was relatively low and consistent across all provinces.

In 2008-09, the impact of child gender was highest in Baluchistan (7.48%), followed by KPK (6.58%), Punjab (3.78%), Sindh (2.08%), and

Pakistan as a whole (0.15%). In 2019-20, the impact of child gender increased significantly in Punjab (9.94%), KPK (11.67%), and Baluchistan (23.42%), while it remained relatively low and consistent in the other provinces.

In both years, the impact of mother and father's occupation on inequality of opportunities in high secondary education enrollment was relatively low and consistent across all provinces.

In 2008-09, the impact of father's education was highest in Punjab (16.16%), followed by Sindh (13.48%), Pakistan as a whole (10.36%), KPK (5.07%), and Baluchistan (8.30%). In 2019-20, the impact of father's education was highest in Sindh (26.99%), followed by Punjab (26.78%), Pakistan (22.13%), KPK (14.93%), and Baluchistan (23.97%).

In 2008-09, the impact of mother's education was highest in Punjab (55.54%), followed by Sindh (49.65%), Pakistan as a whole (51.98%), KPK (28.42%), and Baluchistan (47.99%). In 2019-20, the impact of mother's education was highest in Sindh (26.71%), followed by Punjab (26.11%), Pakistan (29.10%), Baluchistan (9.47%), and KPK (22.84%).

In both years, Baluchistan consistently had the highest impact of regional distribution on inequality of high secondary education enrollment opportunities, indicating that regional disparities played a significant role in shaping educational opportunities in this province.

Baluchistan also consistently had the highest impact of child gender in both years, suggesting that child gender had a more pronounced effect on inequality of high secondary education enrollment opportunities in this province. Punjab had the highest impact of father's education in 2019-20.

In both years, Punjab consistently had the highest impact of mother's education on inequality of opportunities in high secondary education enrollment, indicating the importance of maternal education in shaping educational opportunities in this province.

4.5.2 Decomposition of Inequality of Opportunities of Education Attainment (Age: 25 and Above) in Pakistan

The Shapley decomposition results are summarized in Figures 4.4 to 4.4.7, first at the national level and then separately for each of Pakistan's four provinces. To enable the detection of any changes in the factors influencing

inequality of opportunities of educational attainment over the span of a decade, each figure has been separated into two time periods 2008–2009 and 2019–20.

Table 4.4
Decomposition of Inequality of Opportunities of Education Attainment (Age:25 and Above) in Pakistan (Percentages Explained by each Variable)

	Year	Pakistan	Punjab	Sindh	Baluchistan	KPK
Region of Residence	2008-09	34.99	41.21	3.23	5.17	15.83
	2019-20	11.17	12.06	1.84	18.66	1.20
Hh head Gender	2008-09	15.72	14.85	4.79	12.14	28.85
	2019-20	1.54	0.11	1.19	10.68	8.43
Child Gender	2008-09	12.65	11.28	7.64	14.09	16.97
	2019-20	12.71	11.95	2.46	50.33	20.71
Father's Occupation	2008-09	7.76	11.44	16.96	48.25	10.99
	2019-20	10.98	5.56	0.64	2.29	31.68
Mother's Occupation	2008-09	0.82	0.19	2.42	1.19	4.23
	2019-20	1.89	1.55	0.96	0.14	4.01
Father's Education	2008-09	14.42	13.57	38.91	1.33	12.44
	2019-20	29.55	30.31	48.95	6.77	22.78
Mother's Education	2008-09	13.65	7.45	26.03	17.80	10.67
	2019-20	32.13	38.44	43.92	11.11	11.17

Source: Author's own calculation.

Table 4.4 demonstrate that in 2008-09, the impact of regional distribution on inequality of opportunities in education attainment was highest in Punjab (41.21%), followed by KPK (15.83%), Pakistan as a whole (34.99%), Baluchistan (5.17%), and Sindh (3.23%). While in 2019-20, the regional impact on inequality of opportunities decreased significantly in all provinces. The highest impact was observed in Punjab (12.06%), followed by KPK (1.20%), Pakistan (11.17%), Baluchistan (18.66%), and Sindh (1.84%). In 2008-09, the impact of household head gender on inequality of opportunities in education attainment was highest in KPK (28.85%), followed by Punjab (14.85%), Baluchistan (12.14%), Pakistan as a whole (15.72%), and Sindh (4.79%). In 2019-20, the impact of household head gender decreased significantly in all

provinces. The highest impact was observed in KPK (8.43%), followed by Punjab (1.54%), Pakistan (1.19%), Sindh (1.19%), and Baluchistan (10.68%).

In 2008-09, the impact of child gender was highest in KPK (16.97%), followed by Baluchistan (14.09%), Pakistan as a whole (12.65%), Punjab (11.28%), and Sindh (7.64%). In 2019-20, the impact of child gender increased in Baluchistan (50.33%) and KPK (20.71%), while it remained relatively low and consistent in the other provinces. In 2008-09, the impact of father's occupation was highest in Baluchistan (48.25%), followed by KPK (10.99%), Punjab (11.44%), Pakistan as a whole (7.76%), and Sindh (16.96%). In 2019-20, the impact of father's occupation increased significantly in KPK (31.68%), while it decreased in all other provinces.

In both years, the impact of mother's occupation on inequality of opportunities in education attainment was relatively low across all provinces. In 2008-09, the impact of father's education was highest in Sindh (38.91%), followed by Punjab (13.57%), Pakistan as a whole (14.42%), Baluchistan (1.33%), and KPK (12.44%). In 2019-20, the impact of father's education was highest in Sindh (48.95%), followed by Punjab (30.31%), Pakistan (29.55%), KPK (22.78%), and Baluchistan (6.77%).

In 2008-09, the impact of mother's education was highest in Sindh (26.03%), followed by Punjab (7.45%), Pakistan as a whole (13.65%), Baluchistan (17.80%), and KPK (10.67%). In 2019-20, the impact of mother's education was highest in Sindh (43.92%), followed by Punjab (38.44%), Pakistan (32.13%), KPK (11.17%), and Baluchistan (11.11%).

In both years, Punjab consistently had the highest impact of regional distribution on inequality of education attainment opportunities, indicating that regional disparities played a significant role in shaping educational opportunities in this province. Punjab consistently had the highest regional distribution-related influence on educational attainment opportunities in both years, demonstrating that regional inequalities were a major factor in determining educational opportunities in this province. In both years, KPK continuously had the highest gender impact of the household head, indicating that in this province, the gender of the household head had a more significant impact on the inequality of educational opportunities.

Baluchistan experienced the greatest effects of child gender in both years, showing that in this province, the disparity in educational chances was more significant as a result of child gender.

Baluchistan experienced the greatest father's occupation impact in both years, indicating that the father's occupation had a greater effect on educational attainment inequality.

Table 4.4.1
Decomposition of Inequality of Opportunities of No or Less than
Primary Education Attainment (Age: 25 and above) in Pakistan
(Percentages Explained by each Variable)

	Year	Pakistan	Punjab	Sindh	Baluchistan	KPK
Region of Residence	2008-09	34.99	41.21	3.23	5.17	5.83
	2019-20	11.17	12.06	1.84	18.66	1.20
Hh head Gender	2008-09	15.72	14.85	4.79	12.14	28.85
	2019-20	1.54	0.11	1.9	10.68	8.43
Child Gender	2008-09	12.65	11.28	7.64	14.09	16.97
	2019-20	12.71	11.95	2.46	50.33	20.71
Father's Occupation	2008-09	7.76	11.44	16.96	48.25	10.99
	2019-20	10.98	5.56	0.64	2.29	31.68
Mother's Occupation	2008-09	0.82	0.19	2.42	1.19	4.23
	2019-20	1.89	1.55	0.96	0.14	4.01
Father's Education	2008-09	14.42	13.57	38.91	1.33	12.44
	2019-20	29.55	30.31	48.95	6.77	22.78
Mother's Education	2008-09	13.95	7.45	26.03	17.80	10.67
	2019-20	32.13	38.44	43.92	11.11	11.17

Source: Author's own calculation

Table 4.4.1 analyze that in 2008-09, the influence of regional distribution on inequality of opportunities in no or less than primary education attainment was highest in Punjab (41.21%), followed by Baluchistan (5.17%), Pakistan as a whole (34.99%), KPK (5.83%), and Sindh (3.23%). In 2019-20, the regional impact on inequality of opportunities decreased significantly in all provinces. The highest impact was observed in Baluchistan (18.66%), followed by Punjab (12.06%), over all Pakistan (11.17%), Sindh (1.84%), and KPK (1.20%). In 2008-09, the impact of household head gender on inequality of opportunities in no or less than primary education attainment was highest in KPK (28.85%),

followed by Punjab (14.85%), Baluchistan (12.14%), Pakistan as a whole (15.72%), and Sindh (4.79%). In 2019-20, the impact of household head gender decreased significantly in all provinces. The highest impact was observed in Baluchistan (10.68%), followed by KPK (8.43%), Pakistan (1.19%), Sindh (1.90%), and Punjab (1.54%). In 2008-09, the impact of child gender was highest in KPK (16.97%), followed by Baluchistan (14.09%), Pakistan as a whole (12.65%), Punjab (11.28%), and Sindh (7.64%). In 2019-20, the impact of child gender increased significantly in Baluchistan (50.33%) and KPK (20.71%), while it remained relatively low and consistent in the other provinces.

In 2008-09, the impact of father's occupation was highest in Baluchistan (48.25%), followed by KPK (10.99%), Punjab (11.44%), Pakistan as a whole (7.76%), and Sindh (16.96%). In 2019-20, the impact of father's occupation increased significantly in KPK (31.68%), while it decreased in all other provinces. In both years, the impact of mother's occupation on inequality of opportunities in no or less than primary education attainment was relatively low and consistent across all provinces, ranging from about 0.14% to 4.23%.

In 2008-09, the impact of father's education was highest in Sindh (38.91%), followed by Punjab (13.57%), Pakistan as a whole (14.42%), KPK (12.44%), and Baluchistan (1.33%). In 2019-20, the impact of father's education was highest in Sindh (48.95%), followed by Punjab (30.31%), Pakistan (29.55%), KPK (22.78%), and Baluchistan (6.77%).

In 2008-09, the impact of mother's education was highest in Sindh (26.03%), followed by Punjab (7.45%), Pakistan as a whole (13.95%), Baluchistan (17.80%), and KPK (10.67%). In 2019-20, the impact of mother's education was highest in Sindh (43.92%), followed by Punjab (38.44%), Pakistan (32.13%), KPK (11.17%), and Baluchistan (11.11%).

In both years, Punjab consistently had the highest impact of regional distribution on inequality of no or less than primary education attainment opportunities, indicating that regional disparities played a significant role in shaping educational opportunities in this province. During both years, KPK consistently demonstrated the highest impact of household head gender, implying that the gender of the household head had a more prominent effect on inequality of no or less than primary education attainment opportunities in this province. In both years, Baluchistan consistently displayed the most substantial impact of child gender, underscoring the pronounced effect of gender on education attainment opportunities in this province.

Similarly, Baluchistan consistently showed the highest impact of father's occupation in both years, indicating that the occupation of the father had a more pronounced influence on inequality of no or less than primary education attainment opportunities in this province. Across both years, Sindh consistently portrayed the highest impact of father's education and mother's education, emphasizing the significance of parental education in shaping educational opportunities in this province.

Table 4.4.2
Decomposition of Inequality of Opportunities of
Primary Education Attainment (Age:25 and above)
in Pakistan (Percentages Explained by each Variable)

	Year	Pakistan	Punjab	Sindh	Baluchistan	KPK
Region of Residence	2008-09	31.55	47.24	56.30	44.71	42.28
	2019-20	19.24	24.37	32.99	21.94	6.43
Hh head Gender	2008-09	2.99	0.88	1.69	28.86	6.29
	2019-20	0.43	2.56	0.75	0.54	10.28
Child Gender	2008-09	6.80	2.65	4.26	25.20	19.89
	2019-20	1.34	1.57	1.11	0.24	5.97
Father's Occupation	2008-09	7.83	1.79	13.25	1.27	2.56
	2019-20	10.18	2.13	13.86	34.02	22.59
Mother's Occupation	2008-09	1.05	1.97	0.49	0.96	5.03
	2019-20	1.92	2.61	0.87	4.45	7.08
Father's Education	2008-09	31.63	28.42	16.55	2.48	17.64
	2019-20	28.06	21.26	25.83	12.53	29.58
Mother's education	2008-09	18.13	17.03	7.44	0.50	6.28
	2019-20	38.83	45.48	24.57	26.27	18.03

Source: Author's own calculation

Table 4.4.2 reveals that in the year 2008-09, the impact of regional distribution on inequality of primary education attainment opportunities was highest in Sindh (56.30%), followed by Punjab (47.24%), Pakistan as a whole (31.55%), Baluchistan (44.71%), and KPK (42.28%). Whereas in 2019-20, the regional impact on inequality decreased in all provinces. The highest impact was

observed in Sindh (32.99%), followed by Punjab (24.37%), Pakistan (19.24%), Baluchistan (21.94%), and KPK (6.43%). In 2008-09, the impact of household head gender on inequality of primary education attainment opportunities was highest in Baluchistan (28.86%), followed by KPK (6.29%), Sindh (1.69%), Pakistan as a whole (2.99%), and Punjab (0.88%). In 2019-20, the impact of household head gender increased in Punjab (2.56%) and decreased in the other provinces. The highest impact was observed in Baluchistan (10.28%), followed by Punjab (0.43%), Sindh (0.75%), Pakistan (2.56%), and KPK (0.54%).

In 2008-09, the impact of child gender was highest in Baluchistan (25.20%), followed by KPK (19.89%), Pakistan as a whole (6.80%), Sindh (4.26%), and Punjab (2.65%). In 2019-20, the impact of child gender increased in KPK (5.97%) and decreased in the other provinces. The highest impact was observed in KPK (5.97%), followed by Baluchistan (1.34%), Sindh (1.11%), Punjab (1.57%), and Pakistan (0.24%). In 2008-09, the impact of father's occupation was highest in Sindh (13.25%), followed by KPK (2.56%), Pakistan as a whole (7.83%), Punjab (1.79%), and Baluchistan (1.27%). In 2019-20, the impact of father's occupation increased in Baluchistan (34.02%) and decreased in Punjab (2.13%) and KPK (22.59%). It remained relatively low in Sindh (13.86%) and Pakistan (10.18%).

In both years, the impact of mother's occupation on inequality of primary education attainment opportunities was relatively low across all provinces. In 2008-09, the impact of father's education was highest in Punjab (28.42%), followed by Sindh (16.55%), Pakistan as a whole (31.63%), KPK (17.64%), and Baluchistan (2.48%). In 2019-20, the impact of father's education was highest in KPK (29.58%), followed by Punjab (21.26%), Pakistan (28.06%), Sindh (25.83%), and Baluchistan (12.53%). In 2008-09, the impact of mother's education was highest in Punjab (17.03%), followed by Sindh (7.44%), Pakistan as a whole (18.13%), Baluchistan (0.50%), and KPK (6.28%). In 2019-20, the impact of mother's education was highest in Sindh (45.48%), followed by Punjab (38.83%), Pakistan (26.27%), KPK (18.03%), and Baluchistan (24.57%).

In 2008-09, Sindh had the highest impact of regional distribution on inequality of primary education attainment opportunities, while in 2019-20, Sindh still had the highest impact, but it decreased significantly. Regarding household head gender, Baluchistan had the most pronounced effect on inequality in 2008-09, while Punjab and KPK showed the highest impact in 2019-20. This indicates that the gender of the household head had varying degrees of influence on educational opportunities in different provinces over time. Child gender had a substantial impact on educational inequality in

Baluchistan for both years, emphasizing the significance of addressing gender-related disparities in education in this province. The occupation of the father demonstrated noteworthy effects on educational opportunities in Sindh and Baluchistan, while KPK had the highest impact in 2019-20. This highlights the role of paternal occupation in influencing education attainment opportunities in these provinces. Mother's occupation had relatively low and consistent impacts across all provinces and years, suggesting its limited influence on educational inequality. Regarding parental education, Sindh consistently exhibited the highest impact of both father's and mother's education on inequality in primary education attainment. This underscores the importance of addressing parental education levels to improve educational opportunities in this province.

Table 4.4.3
Decomposition of Inequality of Opportunities of Middle
Education Attainment (Age:25 and Above) in Pakistan
(Percentages Explained By Each Variable)

	Year	Pakistan	Punjab	Sindh	Baluchistan	KPK
Region of Residence	2008-09	5.73	10.02	8.21	0.97	11.96
	2019-20	6.67	8.30	23.69	9.91	0.34
Hh head Gender	2008-09	24.73	25.63	3.26	26.85	39.58
	2019-20	0.71	0.94	3.03	5.18	1.63
Child Gender	2008-09	11.52	12.00	8.44	6.08	21.77
	2019-20	38.92	40.91	23.11	13.33	54.58
Father's Occupation	2008-09	6.8	2.19	14.53	48.54	1.71
	2019-20	2.75	2.86	2.65	37.74	6.28
Mother's Occupation	2008-09	0.55	1.13	1.19	3.07	0.71
	2019-20	2.81	3.53	0.59	0.41	1.91
Father's Education	2008-09	38.87	37.47	49.23	12.78	22.19
	2019-20	29.47	24.48	29.94	21.09	22.12
Mother's Education	2008-09	11.77	11.53	15.13	1.69	2.06
	2019-20	18.66	18.97	16.97	12.33	13.12

Source: Author's own calculation

Table 4.4.3 demonstrates that in 2008-09, KPK had the highest impact of regional distribution on inequality in middle education attainment, followed by Punjab, Sindh, Pakistan as a whole, and Baluchistan. In 2019-20, Sindh had the highest impact of regional distribution on inequality, followed by KPK, Baluchistan, Pakistan, and Punjab. In 2008-09, KPK had the highest impact of household head gender on inequality in middle education attainment, followed by Punjab, Sindh, Baluchistan, and Pakistan. In 2019-20, Punjab had the highest impact of household head gender on inequality, followed by Sindh, Baluchistan, KPK, and Pakistan.

In 2008-09, KPK had the highest impact of child gender on inequality in middle education attainment, followed by Punjab, Sindh, Baluchistan, and Pakistan. In 2019-20, KPK had the highest impact of child gender, followed by Punjab, Sindh, Baluchistan, and Pakistan.

In 2008-09, Baluchistan had the highest impact of father's occupation on inequality in middle education attainment, followed by KPK, Sindh, Pakistan, and Punjab. In 2019-20, Baluchistan had the highest impact of father's occupation, followed by KPK, Sindh, Punjab, and Pakistan. In both years, Baluchistan consistently had the highest impact of mother's occupation on inequality in middle education attainment, followed by KPK, Sindh, Pakistan, and Punjab.

In 2008-09, Sindh had the highest impact of father's education on inequality in middle education attainment, followed by Punjab, Pakistan, KPK, and Baluchistan. In 2019-20, KPK had the highest impact of father's education, followed by Punjab, Pakistan, Sindh, and Baluchistan. In 2008-09, Sindh had the highest impact of mother's education on inequality in middle education attainment, followed by Punjab, Pakistan, KPK, and Baluchistan. In 2019-20, Sindh had the highest impact of mother's education, followed by Punjab, Pakistan, KPK, and Baluchistan. In summary, the results suggest that the impact of various factors on inequality in middle education attainment varies across provinces and years. Regional disparities, household head gender, child gender, father's occupation, mother's occupation, father's education, and mother's education all play significant roles in shaping educational opportunities at the middle education level in different provinces of Pakistan.

Table 4.4.4
Decomposition of Inequality of Opportunities of Secondary
Education Attainment (Age: 25 and Above) in Pakistan
(Percentages Explained by each Variable)

	Year	Pakistan	Punjab	Sindh	Baluchistan	KPK
Region of Residence	2008-09	48.51	42.84	59.73	26.07	18.34
	2019-20	53.66	54.80	50.73	51.51	19.69
Hh head Gender	2008-09	5.39	7.06	1.61	3.61	6.38
	2019-20	0.16	2.09	0.65	0.70	1.83
Child Gender	2008-09	5.95	1.45	2.25	42.89	39.11
	2019-20	13.61	8.50	4.40	4.27	57.23
Father's Occupation	2008-09	2.04	7.25	10.78	2.64	8.08
	2019-20	10.67	10.99	9.60	26.24	4.40
Mother's Occupation	2008-09	4.47	6.28	0.75	1.63	2.04
	2019-20	4.29	5.79	1.21	6.66	4.43
Father's Education	2008-09	11.28	12.33	13.83	10.36	11.21
	2019-20	8.49	3.68	22.43	9.62	7.43
Mother's Education	2008-09	22.33	22.76	11.04	12.79	14.82
	2019-20	9.09	14.12	10.96	0.97	4.98

Source: Author's own calculation

Table 4.4.4 evaluates that in 2008-09, Sindh had the highest impact on inequality in secondary education attainment (59.73%), followed by Punjab (42.84%), Pakistan (48.51%), KPK (18.34%), and Baluchistan (26.07%). In 2019-20, Punjab had the highest impact on inequality (54.80%), followed by Pakistan (53.66%), Sindh (50.73%), Baluchistan (51.51%), and KPK (19.69%).

In 2008-09, KPK had the highest impact of household head gender on inequality (6.38%), followed by Punjab (7.06%), Pakistan (5.39%), Sindh (1.61%), and Baluchistan (3.61%). In 2019-20, Punjab had the highest impact of household head gender (2.09%), followed by KPK (1.83%), Sindh (0.65%), Baluchistan (0.70%), and Pakistan (0.16%). In both years, Baluchistan consistently had the highest impact of child gender on inequality (42.89% in

2008-09 and 57.23% in 2019-20), followed by KPK, Punjab, Sindh, and Pakistan.

In 2008-09, Baluchistan had the highest impact of father's occupation on inequality (10.78%), followed by KPK (8.08%), Punjab (7.25%), Pakistan (2.04%), and Sindh (2.64%). In 2019-20, KPK had the highest impact of father's occupation (26.24%), followed by Baluchistan (10.99%), Punjab (10.67%), Sindh (9.60%), and Pakistan (4.40%). In both years, KPK consistently had the highest impact of mother's occupation on inequality (6.28% in 2008-09 and 4.43% in 2019-20).

In 2008-09, Sindh had the highest impact of father's education on inequality (13.83%), followed by Punjab (12.33%), KPK (11.21%), Pakistan (11.28%), and Baluchistan (10.36%).

In 2019-20, Sindh had the highest impact of father's education (22.43%), followed by Punjab (8.49%), KPK (7.43%), Baluchistan (9.62%), and Pakistan (3.68%).

In 2008-09, Punjab had the highest impact of mother's education on inequality (22.76%), followed by Sindh (22.33%), Baluchistan (12.79%), Pakistan (11.04%), and KPK (14.82%). In 2019-20, Sindh had the highest impact of mother's education (14.12%), followed by Punjab (9.09%), Baluchistan (0.97%), KPK (4.98%), and Pakistan (10.96%). Overall, these results highlight the disparities in secondary education attainment opportunities across provinces and the varying contributions of different factors to the overall inequality in Pakistan. The findings suggest that addressing regional disparities, household head gender, child gender, parental occupations, and parental education is essential to promoting more equitable access to secondary education in the country.

Table 4.4.5
Decomposition of Inequality of Opportunities of High
Secondary Education Attainment (Age:25 and Above)
in Pakistan (Percentages Explained By Each Variable)

	Year	Pakistan	Punjab	Sindh	Baluchistan	KPK
Region of Residence	2008-09	69.51	69.85	53.77	50.58	45.75
	2019-20	54.69	62.09	49.43	11.32	4.46
Hh Head Gender	2008-09	0.71	1.54	9.67	0.96	6.23
	2019-20	0.53	1.08	7.76	0.22	2.53
Child Gender	2008-09	0.16	1.61	5.26	0.94	1.69
	2019-20	12.03	2.28	19.76	33.45	48.93
Father's Occupation	2008-09	20.82	11.97	25.05	37.77	30.37
	2019-20	19.37	11.56	18.91	35.88	36.47
Mother's Occupation	2008-09	1.11	1.74	3.41	0.27	1.46
	2019-20	0.65	1.03	2.49	3.36	0.33
Father's Education	2008-09	5.25	9.52	2.41	8.45	13.20
	2019-20	1.98	1.23	0.51	11.96	4.46
Mother's Education	2008-09	2.42	3.76	0.41	1.01	1.27
	2019-20	10.73	20.71	1.13	3.77	2.79

Source: Author's own calculation

Table 4.4.5 examined that in the year 2008-09, Punjab had the highest impact on inequality in high secondary education attainment (69.85%), followed by Pakistan (69.51%), Sindh (53.77%), Baluchistan (50.58%), and KPK (45.75%). In 2019-20, Punjab still had the highest impact on inequality (62.09%), followed by Pakistan (54.69%), Sindh (49.43%), Baluchistan (11.32%), and KPK (4.46%).

In both years, Baluchistan consistently had the highest impact of household head gender on inequality (9.67% in 2008-09 and 7.76% in 2019-20). In 2008-09, Baluchistan had the highest impact of child gender on inequality (5.26%). In 2019-20, KPK had the highest impact of child gender (48.93%), followed by Baluchistan, Sindh, Punjab, and Pakistan. In 2008-09, Baluchistan had the highest impact of father's occupation on inequality (37.77%). In 2019-20, Baluchistan still had the highest impact of father's occupation (36.47%).

In both years, Baluchistan consistently had the highest impact of mother's occupation on inequality (3.41% in 2008-09 and 3.36% in 2019-20). In 2008-09, Sindh had the highest impact of father's education on inequality (8.45%). In 2019-20, Punjab had the highest impact of father's education (11.96%), followed by Sindh, KPK, Pakistan, and Baluchistan. In 2008-09, Punjab had the highest impact of mother's education on inequality (3.76%). In 2019-20, Sindh had the highest impact of mother's education (20.71%).

Overall, the results highlight significant disparities in high secondary education attainment opportunities across provinces and the varying contributions of different factors to the overall inequality in Pakistan. The findings underscore the importance of addressing regional disparities, household head gender, child gender, parental occupations, and parental education to promote more equitable access to high secondary education in the country.

Table 4.4.6
Decomposition of Inequality of Opportunities of Bachelor Education Attainment (Age: 25 and Above) in Pakistan
(Percentages Explained by each Variable)

	Year	Pakistan	Punjab	Sindh	Baluchistan	KPK
Region of Residence	2008-09	52.11	46.97	37.04	60.87	54.72
	2019-20	44.69	33.46	37.82	58.67	22.67
Hh head Gender	2008-09	1.97	4.34	1.12	0.12	0.93
	2019-20	0.85	1.54	0.69	0.11	8.07
Child Gender	2008-09	2.98	4.62	2.17	1.45	1.55
	2019-20	6.73	13.23	2.78	6.64	8.58
Father's Occupation	2008-09	13.18	9.61	14.88	26.37	13.42
	2019-20	10.35	7.96	8.57	23.15	22.83
Mother's Occupation	2008-09	0.33	0.65	0.92	2.96	0.27
	2019-20	3.05	2.96	1.72	4.21	6.72
Father's Education	2008-09	19.05	19.75	30.05	5.18	25.23
	2019-20	13.85	12.62	29.71	2.48	15.19
Mother's Education	2008-09	10.33	14.05	13.81	3.01	3.85
	2019-20	20.45	28.19	18.69	4.73	15.91

Source: Author's own calculation

Table 4.4.6 evaluates that in 2008-09, Baluchistan had the highest impact on inequality in bachelor education attainment (60.87%) whereas, in 2019-20, Baluchistan still had the highest impact on inequality (58.67%). In 2008-09, Punjab had the highest impact of household head gender on inequality (4.34%). In 2019-20, KPK had the highest impact of household head gender (8.07%).

In both years, KPK consistently had the highest impact of child gender on inequality (6.73% in 2019-20 and 13.23% in 2008-09). In 2008-09, Baluchistan had the highest impact of father's occupation on inequality (26.37%). In 2019-20, KPK had the highest impact of father's occupation (22.83%), followed by Baluchistan, Sindh, Punjab, and Pakistan.

In 2008-09, Baluchistan had the highest impact of mother's occupation on inequality (2.96%). In 2019-20, KPK had the highest impact of mother's occupation (6.72%). In 2008-09, Sindh had the highest impact of father's education on inequality (30.05%). In 2019-20, Sindh still had the highest impact of father's education (29.71%), followed by Punjab, KPK, Baluchistan, and Pakistan.

In 2008-09, Sindh had the highest impact of mother's education on inequality (13.81%). In 2019-20, Punjab had the highest impact of mother's education (28.19%), followed by Sindh, KPK, Baluchistan, and Pakistan.

In both years, Baluchistan consistently had the highest impact on inequality of opportunities in bachelor education attainment. This indicates that regional disparities play a significant role in shaping educational opportunities in this province. Sindh and Punjab also showed considerable impacts on inequality, with Sindh having a higher impact in 2008-09 and Punjab in 2019-20.

KPK and Pakistan as a whole had the lowest impacts, suggesting relatively lower regional disparities in these areas. KPK had the highest impact of household head gender on inequality in both years. This suggests that the gender of the household head had a more pronounced effect on inequality of education attainment opportunities in KPK compared to other provinces. Punjab, Sindh, and Pakistan had similar impacts of household head gender, while Baluchistan had the lowest impact in both years.

In both years, KPK consistently had the highest impact of child gender on inequality, indicating that child gender had a more pronounced effect on education attainment opportunities in this province compared to others. Baluchistan had the second-highest impact in both years, followed by Sindh and Punjab. Baluchistan consistently had the highest impact of father's occupation on inequality in both years, suggesting that the occupation of the father had a more pronounced effect on education attainment opportunities in this province. Sindh had the second-highest impact in both years, while KPK, Punjab, and

Pakistan had relatively lower impacts. In 2008-09, KPK had the highest impact of mother's occupation on inequality, but in 2019-20, Punjab had the highest impact. Baluchistan and Sindh had moderate impacts, while Pakistan had the lowest impact in both years.

In both years, Sindh consistently had the highest impact of father's education on inequality, indicating the importance of parental education in shaping educational opportunities in this province. KPK and Baluchistan had moderate impacts, while Punjab and overall Pakistan had lower impacts. In 2008-09, Sindh had the highest impact of mother's education on inequality, but in 2019-20, Punjab had the highest impact. Baluchistan and KPK had moderate impacts, while Pakistan had the lowest impact in both years.

Table 4.4.7
Decomposition of Inequality of Opportunities of Higher Education Attainment (Age:25 and Above) in Pakistan
(Percentages Explained by each Variable)

	Year	Pakistan	Punjab	Sindh	Baluchistan	KPK
Region of Residence	2008-09	31.88	33.63	21.30	39.46	36.09
	2019-20	23.71	20.42	16.25	29.02	28.67
Hh Head Gender	2008-09	4.28	7.97	3.83	1.62	0.83
	2019-20	0.21	0.34	0.99	1.15	0.42
Child Gender	2008-09	5.38	5.62	6.33	5.41	3.92
	2019-20	6.68	13.86	1.74	3.52	0.22
Father's Occupation	2008-09	8.74	5.91	12.84	8.33	10.82
	2019-20	5.26	3.99	3.96	8.46	9.04
Mother's Occupation	2008-09	1.29	0.67	2.46	1.26	1.55
	2019-20	4.81	5.75	1.68	0.98	7.79
Father's Education	2008-09	31.02	29.42	32.45	15.16	38.49
	2019-20	32.94	25.25	51.68	43.46	35.70
Mother's Education	2008-09	17.39	16.77	20.77	28.74	8.29
	2019-20	26.36	30.36	23.66	13.38	18.14

Source: Author's own calculation

Figure 4.4.7 shows that in both years, Baluchistan consistently had the highest impact on inequality of opportunities in higher education attainment. This indicates that regional disparities play a significant role in shaping educational opportunities in this province. KPK had the second-highest impact in both years, followed by Sindh and Punjab. Overall, there has been a reduction in regional disparities in higher education attainment between 2008-09 and 2019-20, as evident from the decreasing impacts in all provinces. In both years, Punjab consistently had the highest impact of household head gender on inequality, indicating that the gender of the household head had a more pronounced effect on education attainment opportunities in this province. Baluchistan had the second-highest impact in 2008-09, but in 2019-20, KPK had the second-highest impact.

In both years, KPK consistently had the highest impact of child gender on inequality, suggesting that child gender had a more pronounced effect on education attainment opportunities in this province compared to others. Punjab and Sindh had moderate impacts, while Baluchistan had lower impact. In both years, Punjab consistently had the highest impact of father's occupation on inequality, indicating that the occupation of the father had a more pronounced effect on education attainment opportunities in this province. Baluchistan and KPK had moderate impacts, while Sindh had lower impact.

In both years, KPK consistently had the highest impact of mother's occupation on inequality, suggesting the importance of mother's occupation in shaping educational opportunities in this province. Punjab and Baluchistan had moderate impacts, while Sindh and Pakistan had lower impacts. In both years, Punjab consistently had the highest impact of father's education on inequality, indicating the significance of parental education in shaping educational opportunities in this province. Sindh and Baluchistan had moderate impacts, while KPK and Pakistan had lower impacts. In both years, KPK consistently had the highest impact of mother's education on inequality, indicating the importance of maternal education in this province. Sindh had the second-highest impact in both years, while Punjab, Baluchistan, and Pakistan had lower impacts.

These findings evidently illustrate that the most significant factors like parental education, region of residence and parental occupation cannot be adjusted overnight. However, this development in society will take time, thus an immediate improvement in the education system is not possible.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

The study has investigated the role of inequality of opportunities of education in Pakistan. The study systematically gone through the key indicators of education in Pakistan. The study has empirically analyzed the average coverage rates and D-index of child education enrollment and education attainment, through Human Opportunity Index all over Pakistan. Furthermore, this study also investigated the marginal contribution of each circumstance. For this purpose, the Inequality of Opportunities of Education model has been further categorized into two categories. These models are termed as Inequality of Opportunities of Child Education Enrollment Model and Inequality of Opportunities of Education Attainment Model.

Inequality of Opportunities of Child Education Enrollment Model has been further categorized into five categories. Circumstances have been measured through gender of household head, child gender, parental education and occupation, region of residence and province. The findings of Inequality of Opportunities of Child Education Enrollment showed that coverage rates of primary, secondary, and higher secondary education enrollment have increased within the period of a decade. HOI also slightly increased about 11 percent in almost ten years period and dissimilarity index showed that equality of education decreased all over Pakistan. All child education enrollment indicators showed an increasing trend in coverage rate and in the value of HOI while Sindh and Baluchistan showed disappointing results. Punjab showed some better results, as inequality of opportunity of child education enrollment has slightly decreased in Punjab but Sindh and Baluchistan showed worrying results. The shapely decomposition analysis indicates that regional distribution plays a significant role in shaping educational enrollment, with certain provinces consistently exhibiting higher impacts than others. Punjab stands out as having the highest impact of regional residence, suggesting the need to focus on reducing educational disparities between provinces and promoting equal access to education for all regions.

Gender disparities emerge as another critical factor influencing education enrollment. KPK consistently witnesses the highest impact of household head gender, underscoring the importance of promoting gender equality and empowering women to enhance educational opportunities for all. Additionally,

Baluchistan consistently demonstrates the highest impact of child gender, calling for efforts to address gender biases and ensure equitable access to education for boys and girls. Model of Inequality of Opportunities of Education Attainment has been further categorized into seven categories. Circumstances of this model have also been measured through gender of household head, parental education and occupation, child gender, region of residence and province. The results of the HOI, Coverage rate, and D-index of inequality of opportunities of education attainment (age: 25 and above) for the two time periods 2008-09 and 2019-20 revealed that the opportunities for education attainment have declined by 0.3 percent while inequality of opportunities has risen over time. It means that there has been a decrease in the level of equality or fairness in accessing educational opportunities. A decline of 0.3 percent indicates a worsening of inequality, suggesting that the distribution of educational opportunities has become more uneven. Apart from Baluchistan, which shows a gradually growing percentage, all provinces exhibit a fall in HOI and coverage rates. where the gender of the child has become the key determinant. All evidence pointed to a gradual deterioration in education, placing Pakistan in an emergency scenario. The findings of Shapley decomposition of inequality of opportunities in education attainment among individuals aged 25 and above in Pakistan has provided valuable insights into the prevailing disparities across different provinces and variables. The findings reveal distinct patterns and underline the need for targeted policy interventions to address these disparities and foster greater equity in educational access.

The analysis demonstrates that regional distribution plays a significant role in shaping educational opportunities, with Punjab consistently exhibiting the highest impact. This highlights the importance of directing attention and resources towards less-developed provinces like Baluchistan and KPK to narrow the regional gaps in educational attainment.

Gender disparities also emerge as a critical factor influencing educational opportunities. KPK consistently witnesses the highest impact of household head gender, indicating the need to implement gender-sensitive policies that empower women and promote gender equity in education. Furthermore, Baluchistan consistently demonstrates the highest impact of child gender, calling for focused efforts to address gender biases and ensure equal educational opportunities for all children.

The influence of parental factors, such as occupation and education, on educational attainment is evident in the results. Sindh consistently exhibits the highest impact of father's and mother's education, emphasizing the crucial role of parental education in shaping opportunities for higher education.

Encouraging parents to pursue higher education and providing incentives for their children can be instrumental in breaking the cycle of educational inequality.

5.2 RECOMMENDATION

- Efforts should be made to reduce the disparities in educational opportunities between different regions and provinces. Special attention should be given to regions with less access to education, such as Baluchistan and KPK, by establishing more educational institutions and providing additional support.
- Gender disparities in education should be addressed through targeted interventions. This includes ensuring equal access to education for both boys and girls, implementing initiatives to increase girls' enrollment and retention rates, and eliminating discriminatory practices that hinder girls' education.
- It may also improve policy outcomes to imitate successful projects and policies from other developing nations. For the Millennium Development Goals to be substantially attained by 2030 and for inequality to be reduced, there must be a significant and sustained increase in investment in education.
- It is essential to make government officials aware of the disparate set of circumstances that exist in Pakistan's provinces as a starting point for changing targeting strategy. It will assist in removing obstacles to equality of educational opportunities.
- By establishing a carefully planned nationwide awareness-raising and advocacy campaign, you may change parents' perceptions of girls' education in KPK, where the child's gender has remained the core problem for equitable chances of getting an education.
- Launch awareness campaigns in underprivileged areas to inform parents about the importance of education and its long-term benefits for their children.
- Promote research and innovation in the education sector to identify and implement effective strategies to improve educational outcomes and reduce disparities.

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