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Do Pakistani Kids Have An Equal Chance? A Study of Inequality of Human Opportunities for Kids in Pakistan.

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Abstract

This study aims to measure inequality of opportunities among kids in Pakistan at a provincial level for two sets of household data (2004-2005 and 2014-2015) from Pakistan Social and Living Standards Measurement Survey. The World Bank methodology of measuring the inequality of opportunities Human Opportunity Index (HOI) is used to measure the access to basic services in the country. In total seventeen opportunities are chosen to measure from education, health and infrastructure indicators and are adjusted for inequality caused due to exogenous factors (circumstances) of a child. The decomposition of the Dissimilarity index is obtained with the help of Shapely Decomposition. The findings of the study show that access to these basic services is inequitable and low on all Pakistan level. The HOI for all five-education indicators has deteriorated all over Pakistan and inequality in education is the worst in the province of Sindh, the reason behind this is low literacy rates of head of the household of a child. The province of Baluchistan has suffered the worst in infrastructure indicators and the state of education in the province is worrisome too. The location dummy (rural/urban), education of head of the household and income of the household were the most important circumstance variables influencing the inequitable access to the services. There is overall improvement noted in the health indicators but despite the improvement, Pakistan is long way from universal coverage of health facilities.

Keywords: Human Opportunity Index, Inequality of opportunity, basic services, children, Shapley decomposition

Do Pakistani Kids Have An Equal Chance?

For a long time now, economists and researchers have taken keen interest in the inequalities and its effect in the prevailing world. The earlier literature was primarily focused on income and consumption inequalities but later it was found that in the context of development, especially in the developing or under-developed countries, which are still struggling at the basic level of universal education, health, infrastructure and other basic services, it is inequalities of opportunities, which matters the most. It was found that there was a strong need, especially for developing countries and their policy makers to recognize the depth of multidimensional issues that are created due to inequality of opportunity. The "Equity and Development" report of World Bank (2006) states

“unequal opportunity caused by circumstances at birth, such as ethnicity, gender, caste, religion, and place of origin which are beyond the control of the individual is widely seen as intrinsically unfair, and unfairness bothers people and can lead to social conflict and further states that inequality in some particular circumstances (notably but not exclusively inherited wealth) can be economically inefficient

This report shifted the inequality debate from income to opportunities, emphasizing on the fact that for sustainable development to occur in the country, it is important to level the field at the basic stage of development. Therefore, it is an absolute necessity to understand the importance of equal opportunities to children. There are number of opportunities that can affect the future of a child varying from education to nutrition to skill development etc. However the developing societies like Pakistan, struggle at the basic level of education, quality health care and access to a decent living. Literature has proved that basic opportunities like primary education, access to safe drinking water, access to durable housing, access to sanitation etc. are crucial for deciding a good future for a child. The Development Report by the World Bank (2006) points out children

on the day of their birth are not responsible for the circumstances they are born with. Regardless of the fact that the child has no control over his/her race, caste, gender, religion, location, parents income and education, all these factors and more affect their future and make a major contribution later in their lives. This paper will focus on measuring equality of opportunity for children in Pakistan on national and provincial level using the World Bank recognized methodology Human Opportunity Index and aims to understand the changing opportunities for the children in Pakistan.

Human Opportunity Index

Soremekun (2016) defines Human Opportunity Index as the extent of existing opportunities of a society that are accessible and have been distributed fairly. HOI is a practical tool for the implementation of the equal opportunity principle. In its easiest terms, HOI is a coverage rate of an opportunity, which is sensitive to inequalities. Unlike the previous approaches, the opportunity in HOI is not only measured on the bases of coverage but also how its improper and biased allocation is causing the inequality. Based on a composite measure that joins two elements, first the HOI measures the degree of inclusion/coverage of fundamental opportunities, which are essential for human development for e.g. primary education, access to sanitation, access to electricity etc. The second component is the inequality index (D-index) which is measured as the difference between the distributions of opportunity based on circumstances (the exogenous factors in an individual's life, which he/she has no control on) for those who have the access and those who do not.

Mathematically the HOI represented as

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

Where

C denotes the coverage rate of an opportunity

D denotes the inequality index, which is mathematically given as

$$D = \frac{1}{2C} \sum_{i=1}^n c_i |C - \hat{p}_i|$$

Where \hat{p}_i is predicted probability of access to an opportunity given a circumstance of an individual 'i, obtained by logistic regressions (opportunity is the dependent variable and circumstances are treated as independent).

The construction of HOI needs conditional probabilities of access to an opportunity of individual given his/her circumstances. This can be estimated with the help of a logistic regression, which is linear in parameters. E is the representation of the event where the individual has access to opportunity, defined as E=1 if the individual has access to opportunity otherwise E=0 having no access. The coverage is universal when C =1, When C < 1, it represents how far the society needs to move forward to achieve the universal coverage i.e. C = 1. In order to access how equitably these opportunities distributed or covered by different sections of population, a set of independent variables X (circumstances) is selected and following logistic regression is fitted using survey data

$$\ln \left(\frac{P[(E = 1|X = (x_1, x_2, x_3, \dots, x_m)]}{1 - P[(E = 1|X = (x_1, x_2, x_3, \dots, x_m)]} \right) = \sum_{k=1}^m x_k \beta_k$$

The x_k here represents the row vector of circumstances of k-dimension hence $X=(x_1, x_2, x_3 \dots x_m)$ and $\beta'=(\beta_1, \beta_2, \beta_3, \dots, \beta_m)$ corresponding a column for parameters. By the logistic regression, one can estimate the parameters $\hat{\beta}_{k,n}$ where n is used for sample size.

One can obtain by odds-ratio the probability of having opportunity to an access for each individual after obtaining the estimates by logistic regression as,

$$\hat{p}_{i,1} = \frac{\exp(x_i \cdot \hat{\beta}_i)}{1 + \exp(x_i \cdot \hat{\beta}_i)}$$

After all, compute coverage rate C (unconditionally) and then D-index and HOI with the help of predicted probabilities \hat{p}_i and sample weights, c_i :

$$C = \sum_{i=1}^n c_i \hat{p}_{i,n} \quad D = \frac{1}{2C} \sum_{i=1}^n c_i |C - \hat{p}_i|$$

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

Shapley Decomposition

Once the Coverage and Dissimilarity index is obtained by the Barros et al. (2009) methodology, the next part of this paper is the decomposition. The decomposition methodology used in this paper is known as Shapley decomposition, used to understand the contribution of a circumstance in the unequal distribution of the opportunities. The coverage in the formula can simply be obtained by number of people who have the access to an opportunity divided by the total population whereas the D –index, is dependent on the set of circumstances selected for the model. With each addition in the circumstance, the value of D – index increases. When we have two set of non-overlapping circumstances F and G then coverage of (F,G) is $C(F, G) = C(F) + C(G)$, the D-index of the (F,G) is $D(F,G) \geq D(G)$ and the HOI (F,G) \leq HOI (G). The impact of an additional circumstance F can be seen as

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

Where N is the set of the circumstances, which 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 circumstances S with circumstance F

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

$$M_F = \frac{D_F}{D(N)}$$

Where $\sum_{i \in N} M_i = 1$

Data

The methodology of Human Opportunity index is applied to all four provinces of Pakistan for two waves of Pakistan Social and Living Standard Survey (PSLM) for year 2004-05 and 2014-2015. Pakistan Bureau of Statistics, a government agency dedicated to statistical research, publishes the PSLM data in alternative year as provincial and district data. PSLM is a nationally representative data started from the year 2004 and continued until 2015. With minor changes, PSLM questionnaire has primarily focused on questions about the economic activities of households including consumption, agriculture production, business operations, living standards and social networks. The survey has information on demographic characteristics as well as education, health, occupation and income. The information produced by these surveys assisted the government in preparing strategies to counter the poverty and development related issues in the country on both provincial and district level in context of Millennium Development Goals.

This survey was one of the fundamental instruments to monitor indicators of MDGs in the country. PSLM 2004-05 covers overall Pakistan and its four provinces and has 74,420 households with 575,040 individuals. The data represents 35 percent urban population and 65

percent rural population. PSLM 2014-2015, which is the tenth round of the survey, has total 78,635 households and 513,945 individuals in which 82 percent is rural population and 18 percent is urban population. The sample size from both the datasets includes children aged 0-18. The total number of children in PSLM 2004-05 is 266,732 and the total number of children in PSLM 2014-15 is 266,156.

Opportunities and Circumstances selected

Opportunities

There can infinite opportunities, which affect the future of a child varying from nutrition, education and the environment of a child. However, for this paper some basic opportunities have been selected which have been proved to be crucial to determine the future of a child. The opportunities here are treated as "access" to public facilities because unlike adults, children are not in control of making decisions that lead to these inequalities. Facilities like safe drinking water, basic education, safe sanitation etc. are not under the control of a child yet it affects his/her future. This paper has considered seventeen opportunities from basic education, basic health and infrastructure of the child. The opportunities taken from the each section presented in the table below

Education Opportunities	Primary Education: Enrollment of children in school aged 4 -10
	Secondary Education: Enrollment of children in school aged 11-15
	Higher Secondary Education: Enrollment of children in school aged 16-18
	Completing Primary on time: Children aged 11-13 who are enrolled in class 6 or greater then class 6
	Completing secondary on time: Children aged 15-18 who are enrolled in class 11 or greater then class 11
Infrastructure Opportunities	Having improved sanitation (defined improved if sanitation through flush to public sewage, flush to pit or pit latrine, unimproved sanitation if flush to open drain, raised latrine or no toilet) for children aged 0-18
	Having improved water (defined as improved if from pipe, hand pump, tube well or closed well, unimproved water if from open well, pond, river, spring or other) for children aged 0-18
	Having an electricity connection in the household for children aged 0-18
	Having a gas connection in the household for children aged 0-18

	Having a telephone (landline or mobile) connection in the household for children aged 0-18
	Having a durable house (defined durable as if roof of the house made of baked bricks or stones and walls of the house made up of baked bricks or stone. Otherwise zero)
Health Opportunities	Did not have diarrhea in the last 30 days for children less than 5
	Ever received immunization for children aged less than 5
	Prenatal care: Received prenatal care (defined as at least 3 prenatal care visits with first one occurring before fourth month of the pregnancy)
	Postnatal care: Received (any) postnatal care within 6 weeks after birth of the child
	Formally Assisted Birth: Attended by some traditional or formal birth attendant (defined as traditional birth attendant, nurse, trained dai, lady health visitor, doctor, lady health worker)
	Institutional birth: (defined as institutionalized if the birth occurred at a government or private hospital/clinic otherwise zero)

Circumstances

The "Circumstances" are defined as socially determined exogenous factors, which are not in the control of an individual like gender, ethnicity, race, socioeconomic background etc. The circumstances selected for study are gender of a child, child's location of residence (rural/urban), gender of head of household and education of head of the household of these children. The last circumstance is the wealth index, which measures the socioeconomic condition of the household. This composite measure was created to measure the socioeconomic standard of the household for both the data sets. The section F of the PSLM has the detail of wealth defined by assets of household and the facilities that household uses. A set of same variables from both the data sets are selected to form an identical wealth index. Each asset is then assigned a weight, which is generated by the help of principal component analysis. The standardized score is then utilized to generate five breaking points or the quintiles with first quintile being the poorest, second poorer, third middle, fourth richer and last one the richest.

Circumstances	Education of head of household: The number of years of education for the head of household.
	Gender of the head of household: (Dummy variable 1 – male, 0 – female)
	Gender of the child: (Dummy variable 1 – male, 0 – female)
	Area of residence: Urban/rural (1 – urban, 0 – rural)

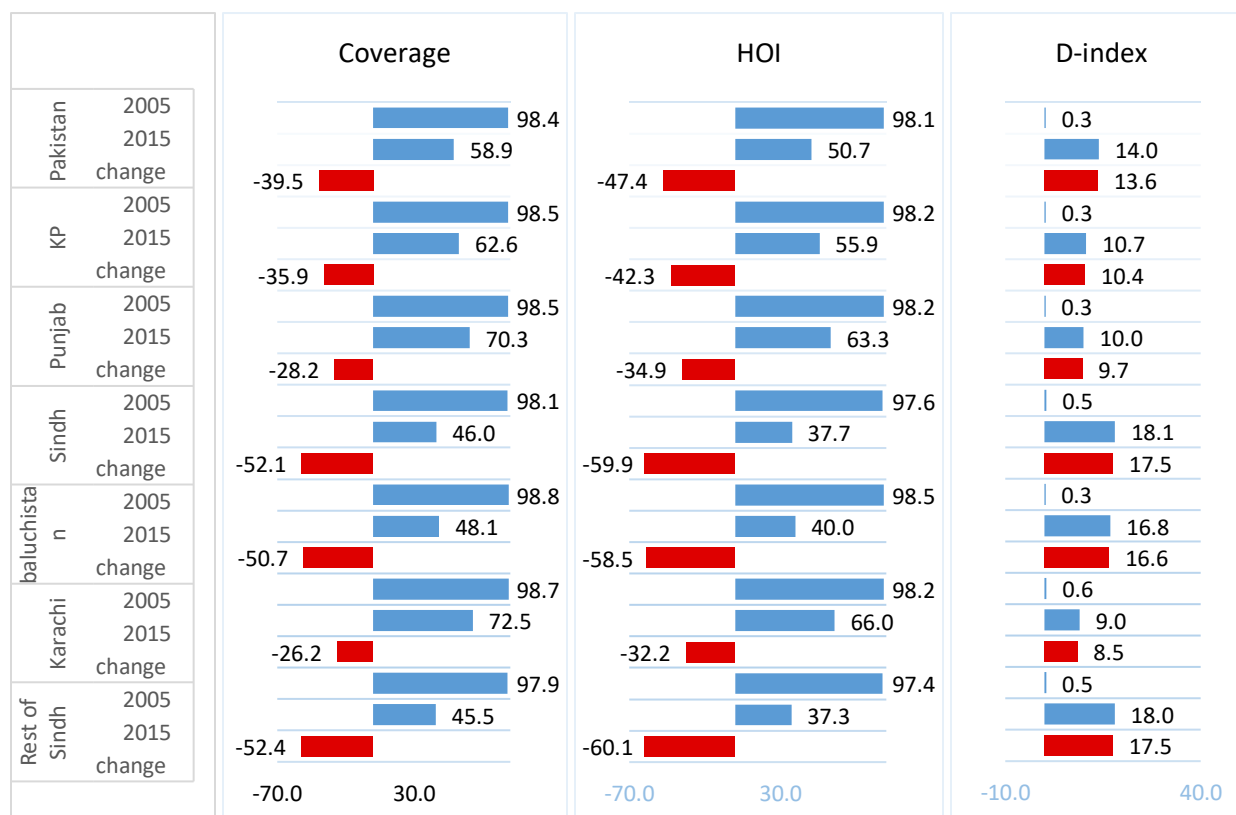
Wealth index : Quintiles – lowest, second, middle, fourth and highest

Results

Education situation in Pakistan

Figure 1 to 5 represent the Coverage rate, HOI and D-index and the changes occurred in them for education indicators in Pakistan. Figure 1-3 includes the data for enrollment in primary, secondary and higher secondary schools. Figure 4 and 5 represent the opportunity to finish the primary school and secondary school on time is used as a proxy to measure the quality of education in the country. A decomposition of inequality of each opportunity is given in the next section of the paper. However, the decomposition results are not obtained for both the datasets but only for the latest dataset, which was 2014-15

Figure 1 Primary School Enrollment in Pakistan (Aged 4 to 10) Coverage rate, HOI and D-index



It is discouraging to note decrease in both HOI and Coverage rate in primary education all over Pakistan in this period of ten years. The highest decline can be noticed in the province of Sindh with a decrease of almost 60 percent in the HOI and 52 percent in the coverage rate has occurred. Baluchistan, which was initially at a better position of 98.7 percent coverage rate and 98.5 percent HOI, has also suffered greatly with a decline of 50 percent in coverage and 58 percent in HOI. The rest of the provinces do not show a different picture either.

Figure 2 Secondary School Enrollment in Pakistan (Age 11 to 15) Coverage rate, HOI and D-index

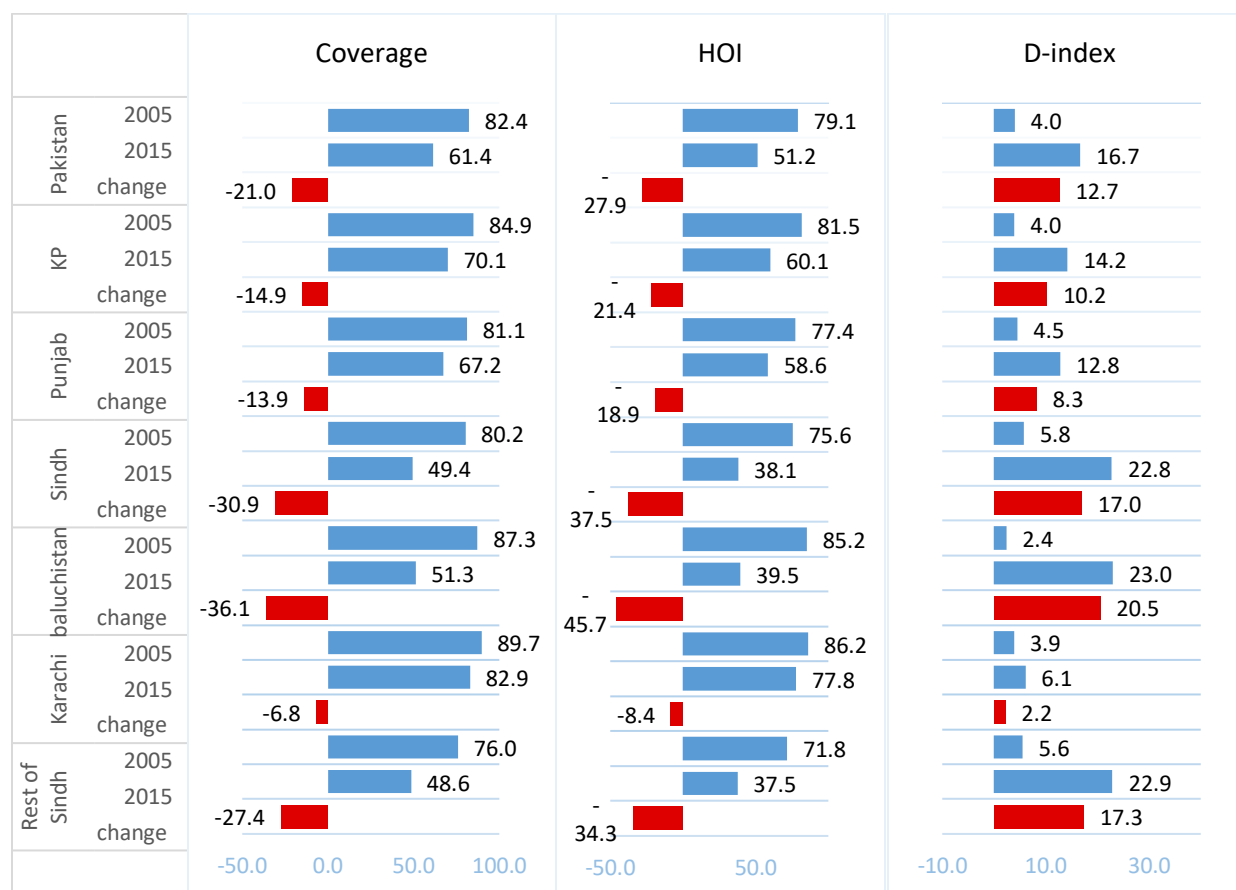
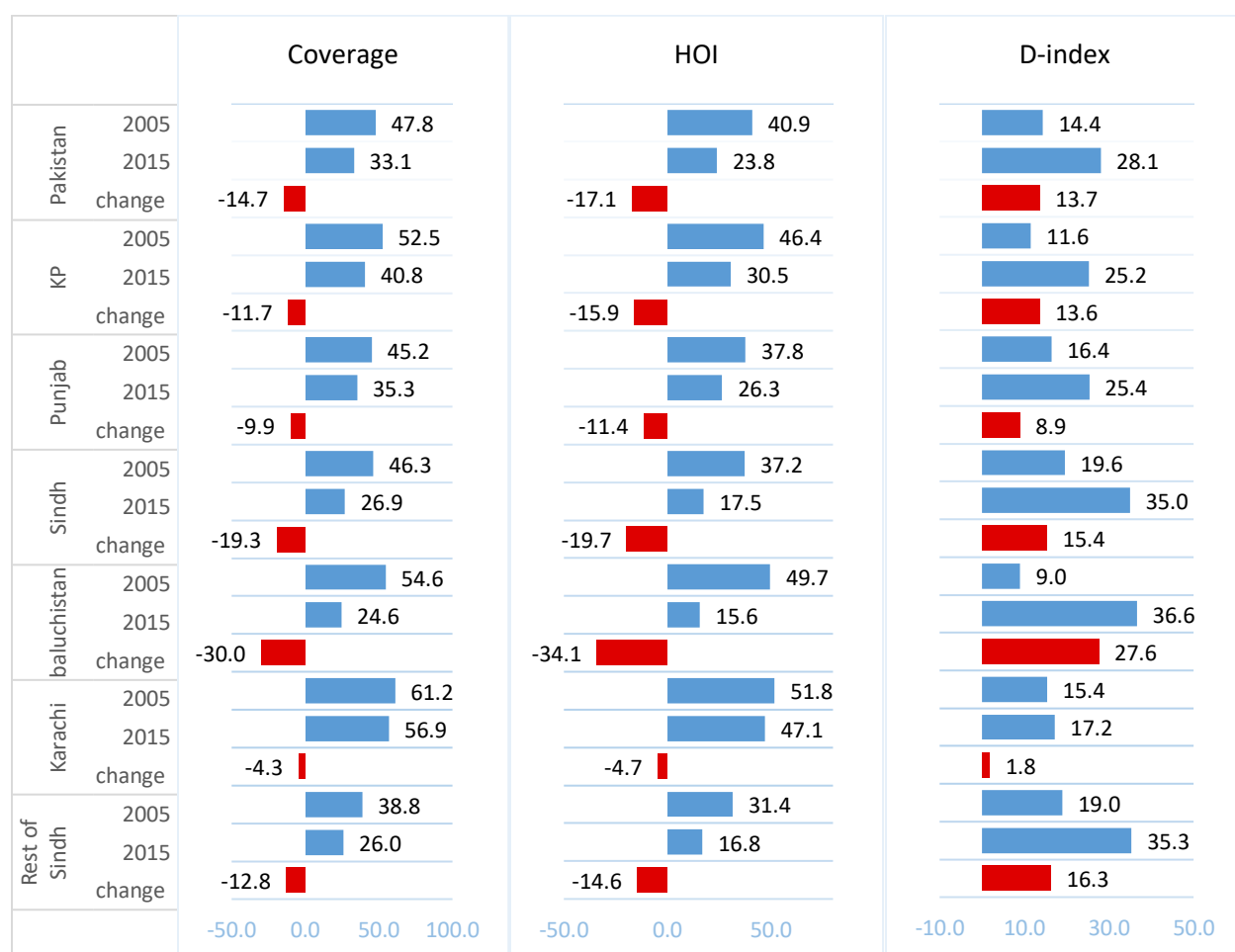


Figure 2 represents the structure of secondary education in the country. Like the primary education, this indicator has not improved in the country but instead has deteriorated on all

levels. There is a decrease of almost 28 percent in HOI and 21 percent in coverage on the national level. The worst inequality can be observed in the case of Baluchistan with an increase of 20 percent in the D-index. The worst HOI can be noticed in province of Sindh with the exception of the city Karachi. The results are evidence that Pakistan is struggling with its universal education and instead of increasing its education, supply has decreased.

Figure 3 Higher Secondary School Enrollment in Pakistan (Age 16 to 18) Coverage rate, HOI and D-index



Like secondary education, the higher secondary education indicator also paints a daunting picture of education emergency in the country. The overall decline is of 17 percent in the HOI, which dropped from 40 percent in 2005 to 23 percent in 2015. The worst case can be found in Balochistan where the coverage dropped from 54.6 percent in 2005 24.6 percent in 2015. The

highest increase in inequality can be seen in the same province. The urban center of the country, Karachi, is also suffering a loss of 4.3 percent in HOI. After Balochistan, Sindh with an exception of Karachi has the worst coverage rate with only 24.9 percent coverage. The HOI for the rest of Sindh is 16.8 percent which is the second worst situation in the county.

Figure 4 Completing Primary Education on time (Aged 11 to 13) Coverage rate, HOI and D-index

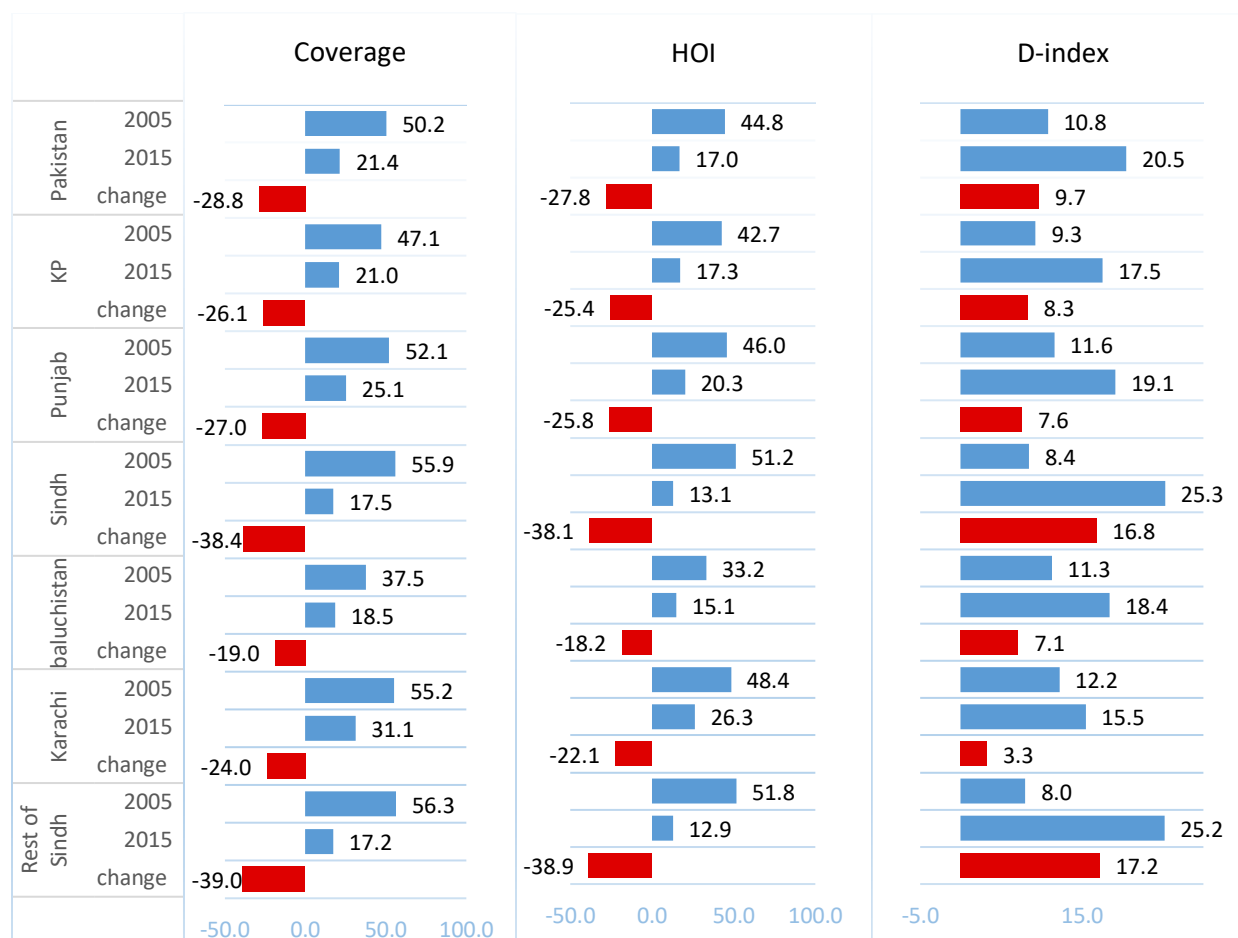


Figure 5 Completing Secondary Education on time (Aged 15 to 18) Coverage rate, HOI and D-index

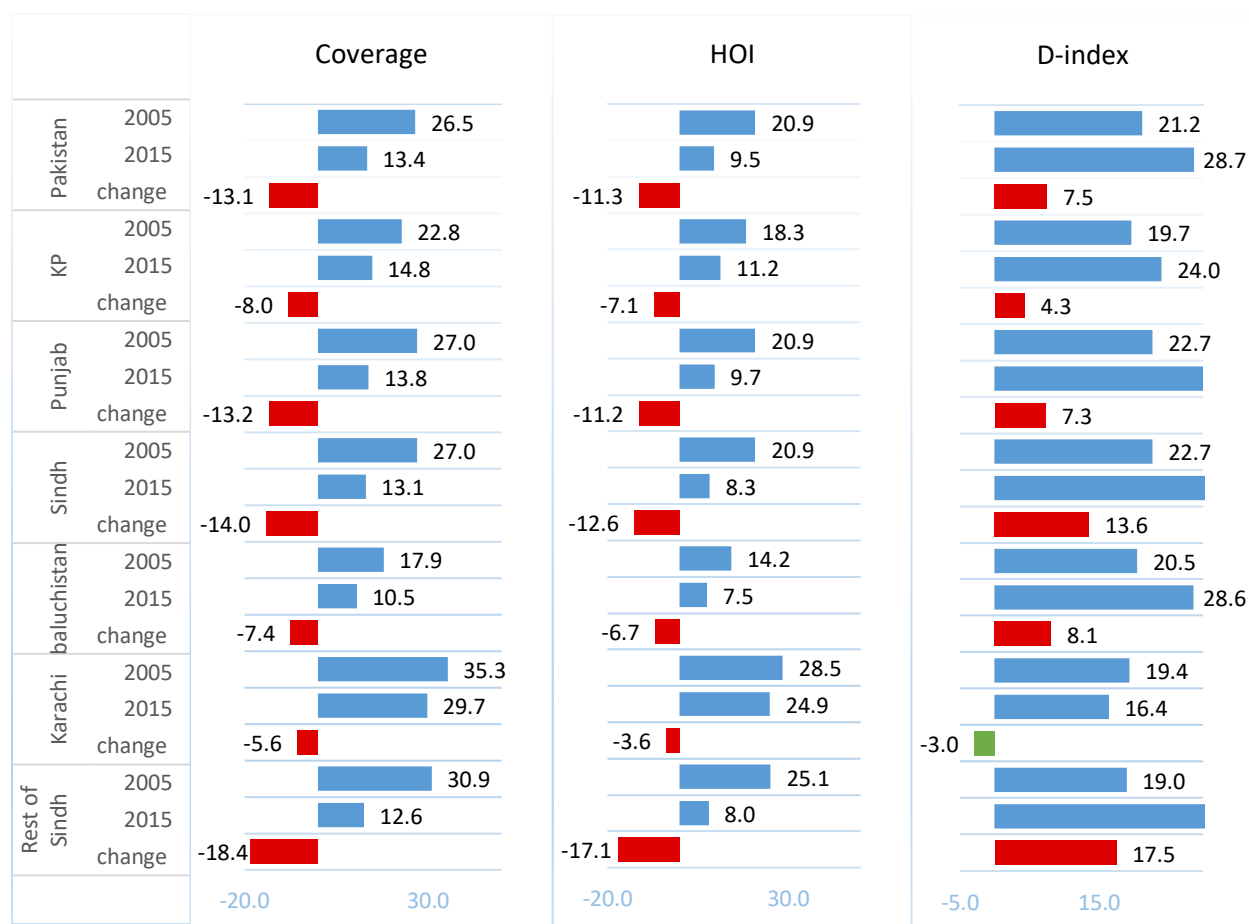


Figure 4 and Figure 5 represents the opportunity of completing primary education and completing secondary education on time. Like the rest of the education indicators, the results of completing primary on time show negative results all over Pakistan with highest negative change in Sindh, especially the worst decline in the case of Rural Sindh. A glance at the figure 5, which contains the data for the completion of secondary education on time shows similar discouraging picture of secondary education in the country with highest loss in HOI in Sindh and Rural Sindh with an HOI of only 8 percent. The result shows that education has declined all over the country with the biggest loss in the province of Sindh where Karachi, the opportunity hub of the country has also suffered but Rural Sindh has witnessed the worst loss in education.

Health HOI results in Pakistan

A similar comparison was conducted to measure the health services for kids aged 0-18 across Pakistan. The figure below shows the percentage of children who did not suffer from diarrhea in the last 30 days. The data shows that in comparison to 2005, around 7.4 percent children did not suffer diarrhea on a national level hence indicating an improvement in infant health services all over Pakistan from 2005 to 2015. The best improvement can be seen in the case of Sindh where there is an improvement of 13 percent in the HOI and 12 percent improvement in the coverage rate.

Figure 6 % of Children under five Who Did Not Suffer from Diarrhea from Last 30 Days: Coverage rate, HOI and D-index

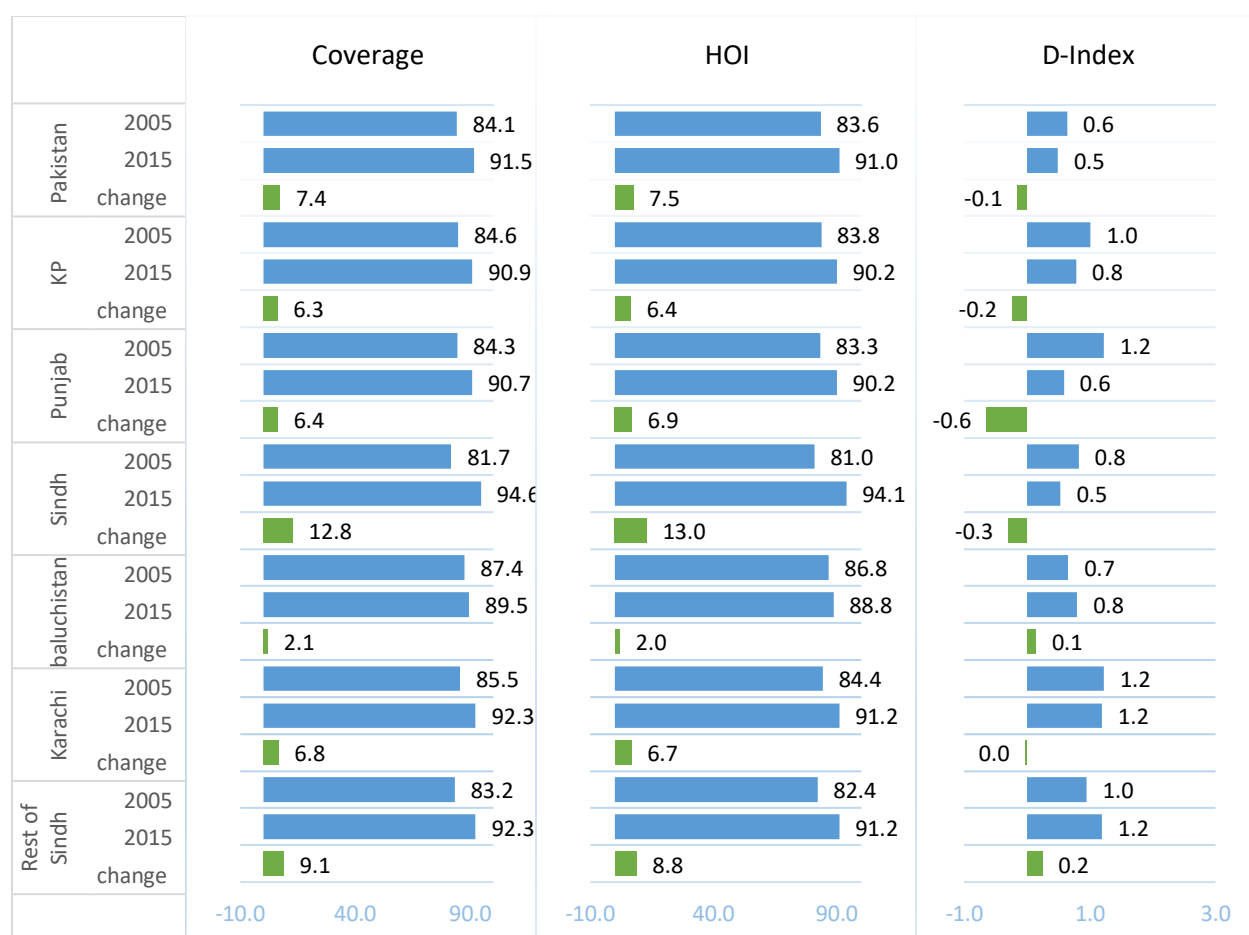
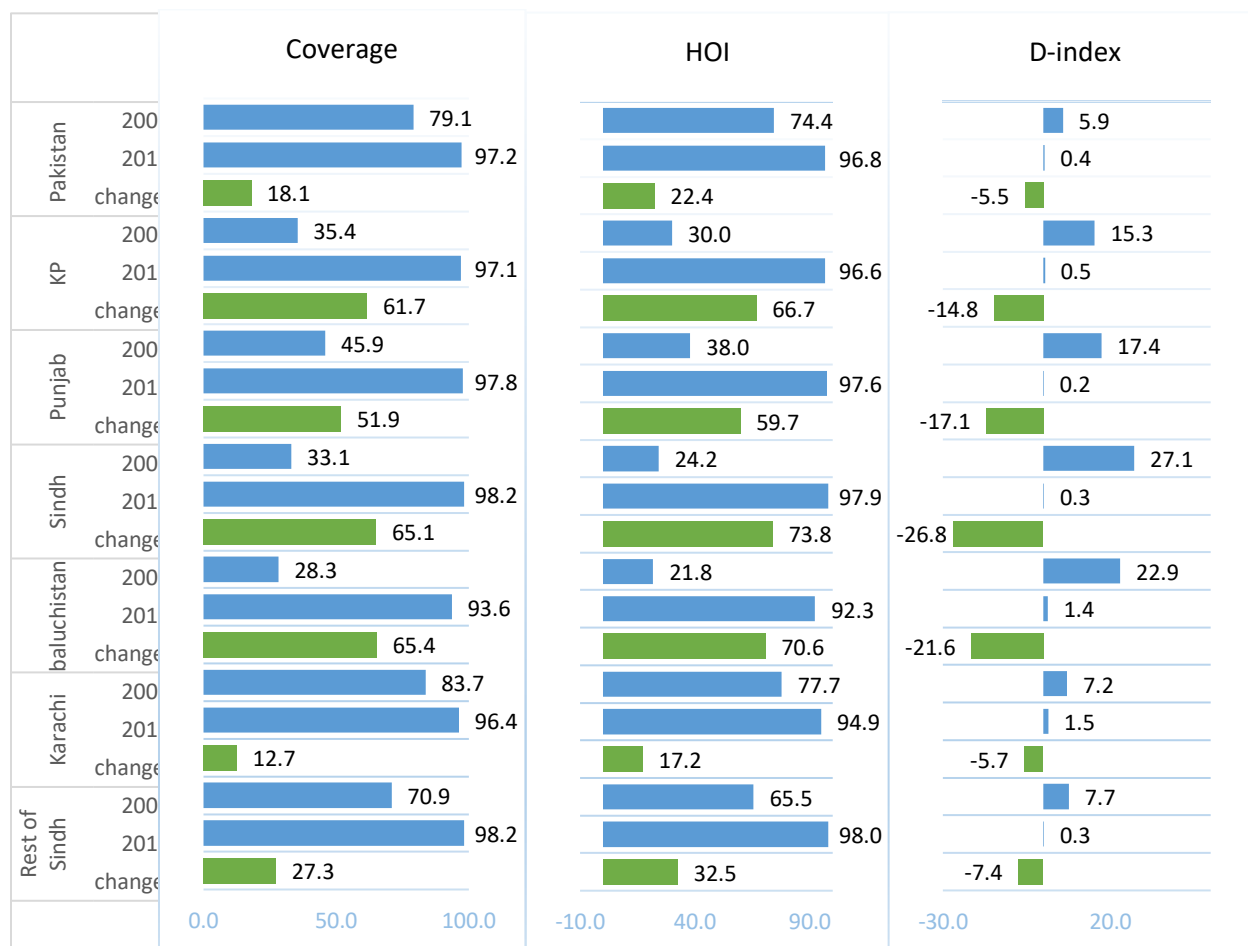


Figure 7 Immunization at all: For kids under the age of five: Coverage rate, HOI and D-index



Similarly the data for if the child has ever received any immunization has been presented in figure 7 where the best change can be noticed in the province of Sindh with a change of 73.7 percent increase in the HOI. However this indicator does not provide complete picture for the child immunization in Pakistan because this single indicator and is not true representative of the quality of child immunization services in country. In the order to understand the child immunization better, a researcher will have to look at all the available immunization data present in the data set. Since this paper is only accessing the basic opportunities of all the sectors in the

survey, the paper has not included the data for full immunization of the child. Perhaps an exclusive inquiry on health opportunities for kids in Pakistan can address the issue better.

Figure 8 Formal Birth Attendance in Pakistan: Coverage, HOI and D-index

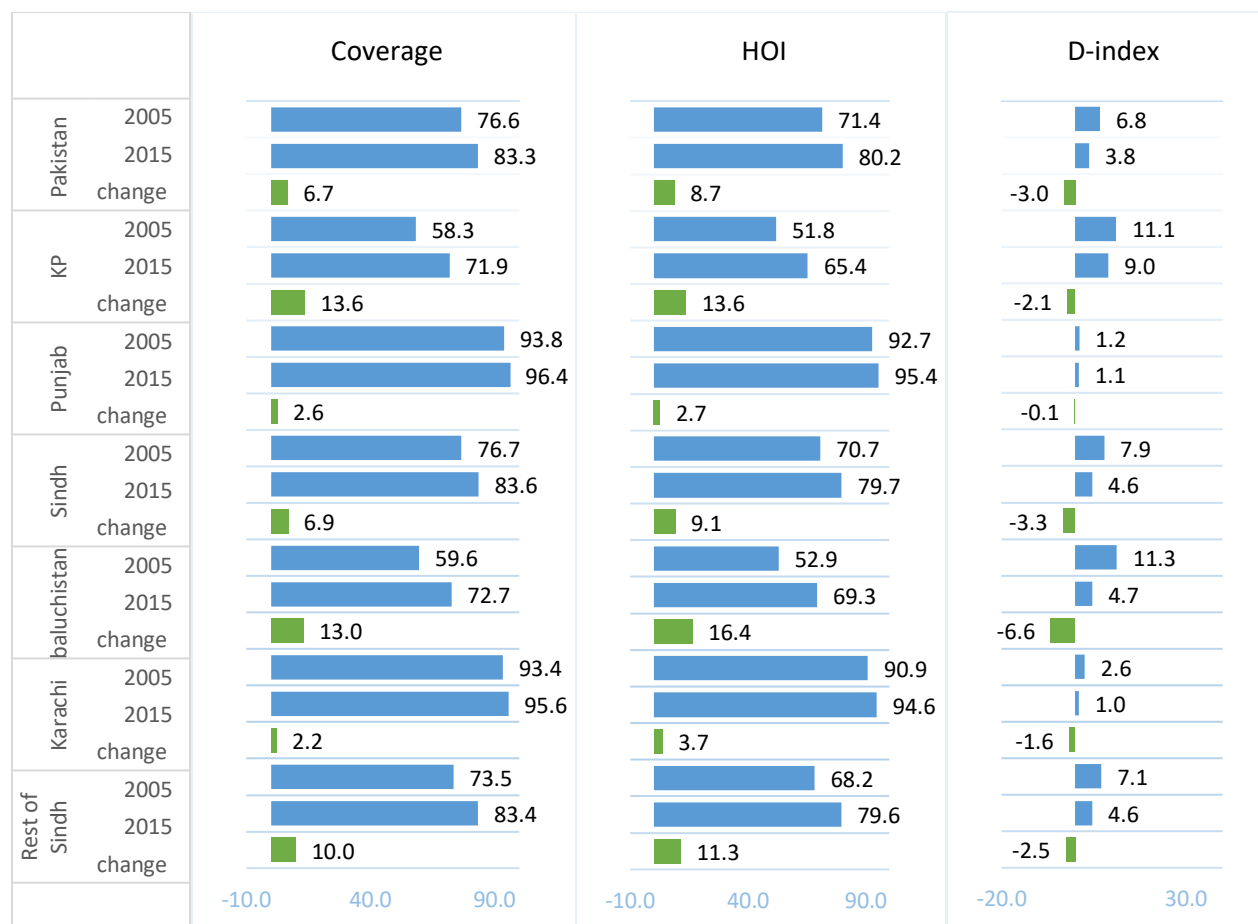


Figure 9 Institutionalized birth: Coverage, HOI and D-index

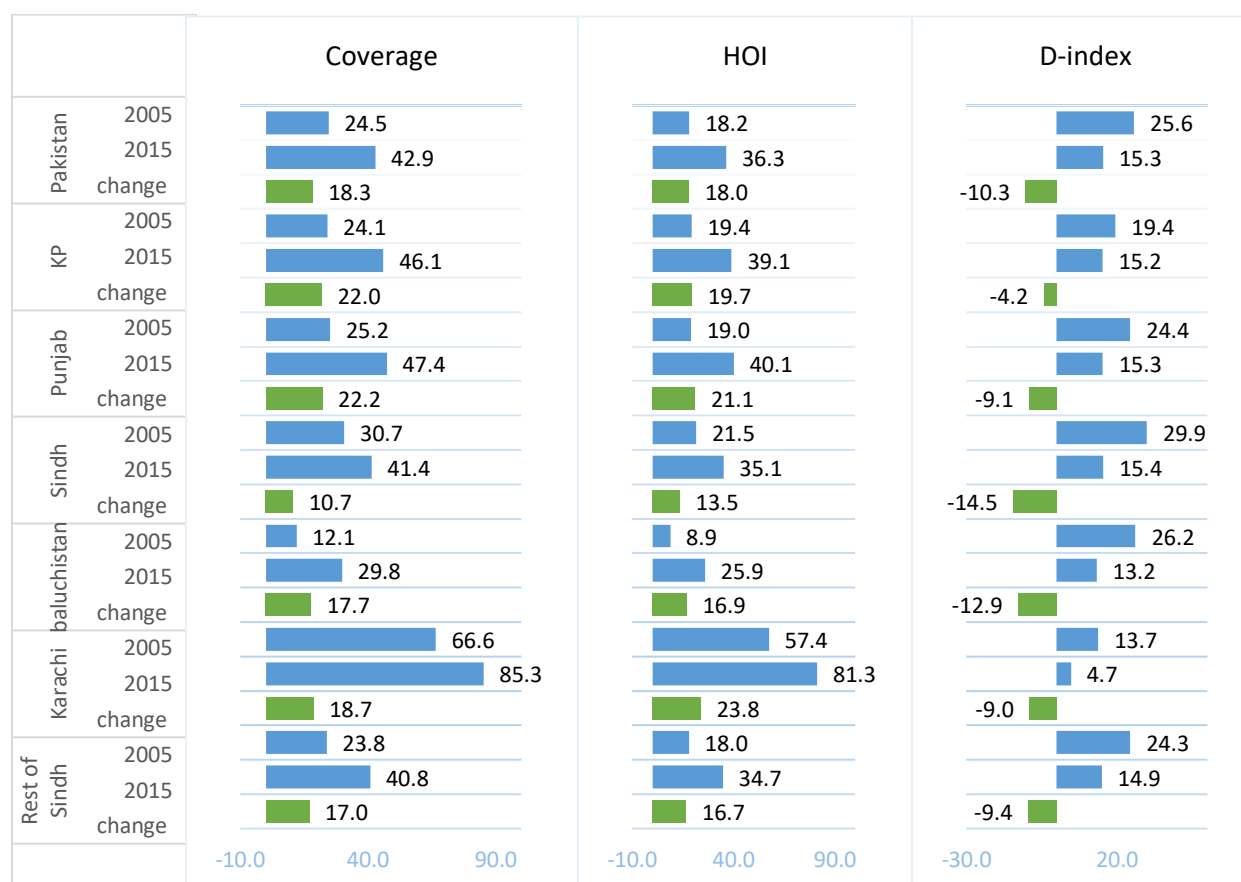


Figure 8 and 9 display data for formal birth and institutionalized birth in the country. Formal Birth is defined as formal if the birth of a child was attended by some traditional or formal birth attendant defined as traditional birth attendant, trained dai, doctor, lady health visitor, lady health worker, nurse and informal if the birth was attended by family member, neighbor or friend. It can be concluded from Figure 8 that the formal birth opportunity has improved in all Pakistan. The best improvement in the HOI can be seen in the province of Baluchistan, where the change of 16.3 percent has occurred and the HOI stands on 69.2 percent. Despite the improvement, both Baluchistan and Khyber Pakhtunkhwa have to struggle to achieve the universal coverage of this opportunity. Despite the improvement for the Institutionalized birth all over the country, the results presented in figure 9 are worrisome. Institutionalized birth, which is defined

institutionalized if the birth of the child has taken place in a medical facility (public or private) otherwise zero, has less than 50 percent coverage rate in the year 2015 on a national level. The national level HOI is only 36.3 percent, which shows how far it is from its goal of universal coverage. The worst HOI can be seen in the case of Baluchistan with 25.9 percent HOI.

Figure 10 Prenatal Care: Coverage Rate, HOI and D-index

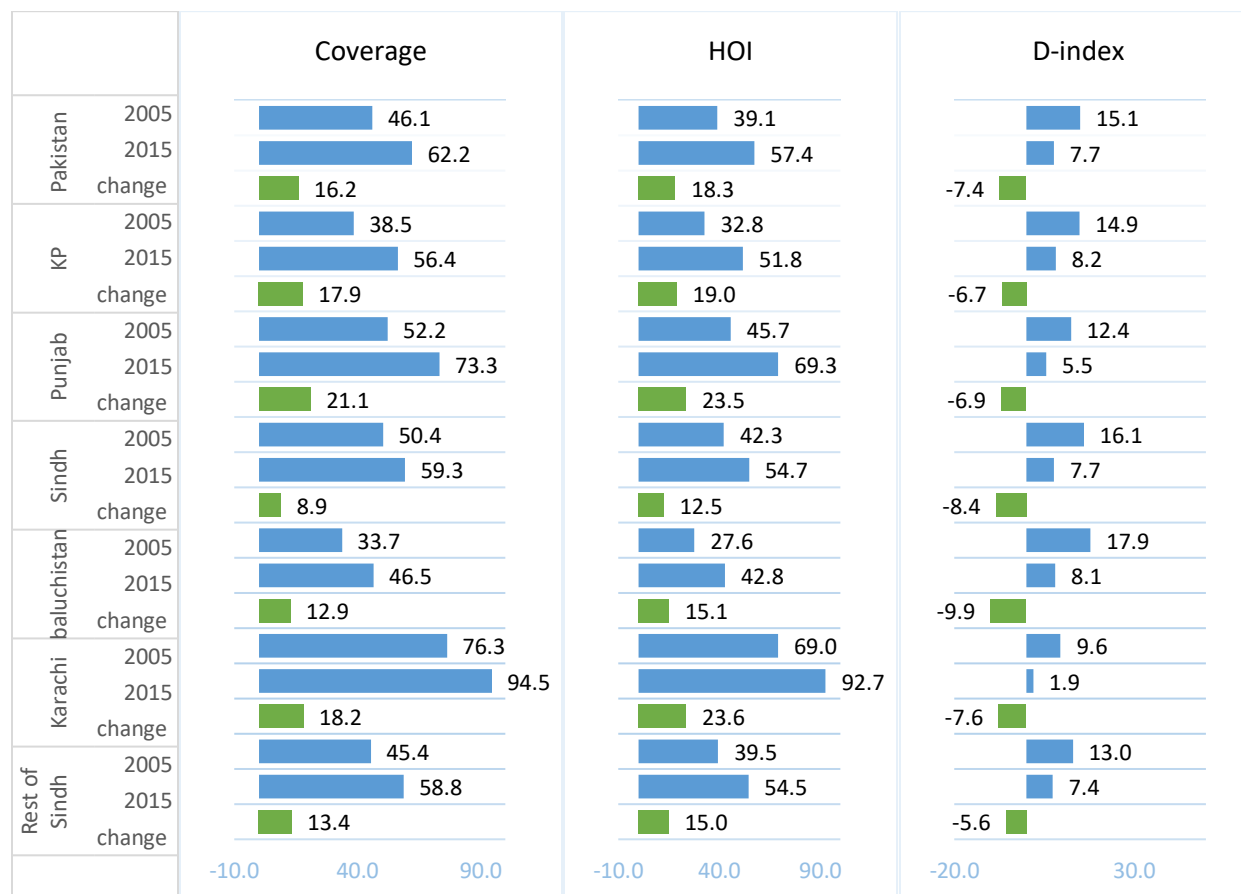
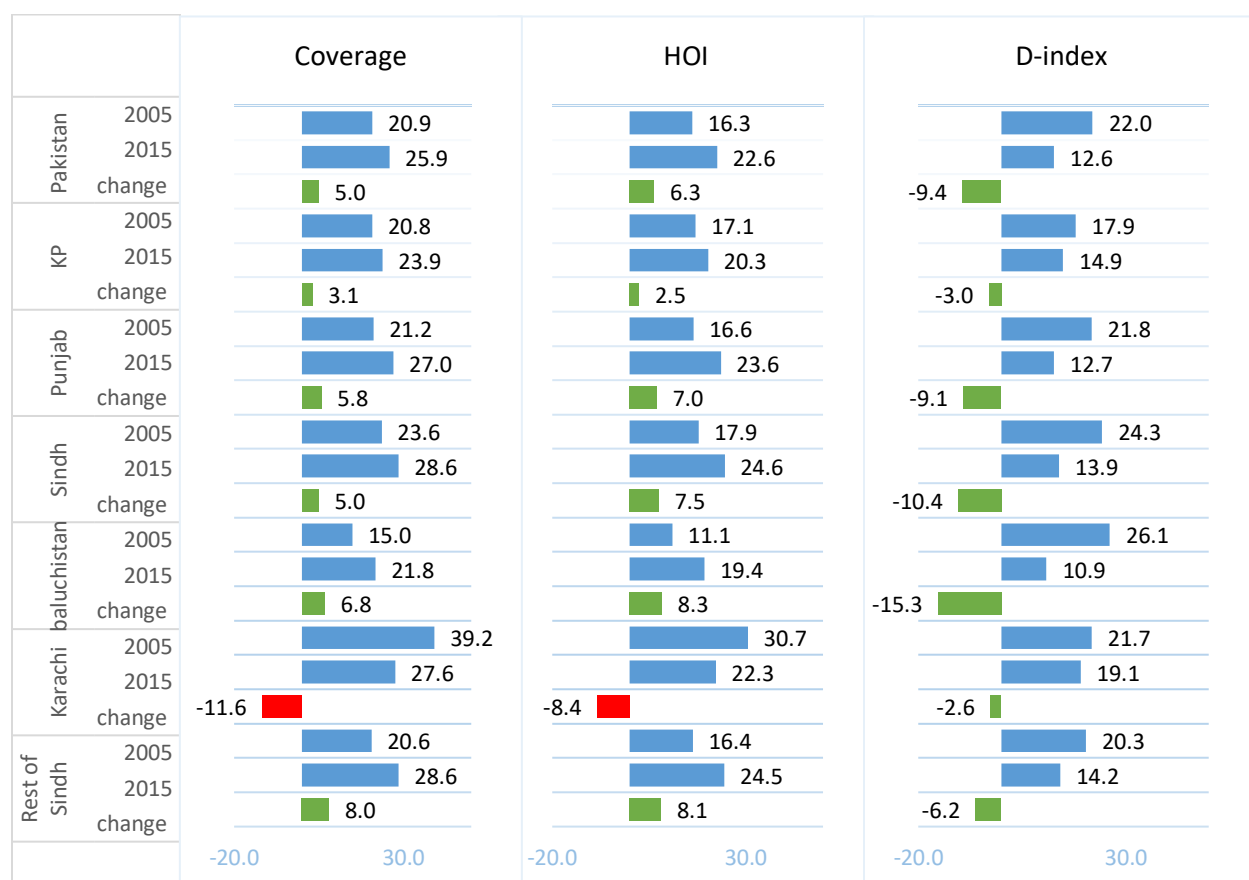


Figure 11 Postnatal care: Coverage rate, HOI and D-index



The data for prenatal and post-natal care is presented in figure 10 and figure 11. The result indicates that the service of prenatal and post-natal care is not distributed equitably. In case of prenatal care, the inequality can be worse in the province of Baluchistan and Khyber Pakhtunkhwa, while the lowest HOI is 42.7 percent in the province of Baluchistan. There is an overall improvement in prenatal care from the year 2005 and 2015, but the values are low and need further attention. The results of post-natal care are further alarming. The results reveal that only 25.8 percent women had access to post-natal services in the country while the national HOI, although positive, was only 22 percent. Despite small but positive changes in coverage and HOI nationally and on a provincial level, the figures of Karachi are the most surprising part of this table. Despite being urban center of the country, where maternal healthcare is expected to grow

in a decade, the HOI of Karachi post-natal services has decreased by 8.3 percent. Baluchistan has the worst HOI with only 11 percent HOI in 2005 and 19 percent in the 2015.

HOI results in Infrastructure

This section explores the condition of infrastructure facilities for the children in Pakistan including access to electricity, access to safe sanitation, access to safe drinking water, access to gas, access to good housing (access to decent housing with durable walls and roof) and access to telephone. In the case of electricity, the results are satisfactory in a way that no degradation is seen in any of the provinces or on the national level. However in case of Baluchistan, the coverage was 60 percent in 2005 which increased to 76.2 percent in 2015 which is the highest positive change as compared to other provinces but is still far from desired universal coverage of the opportunity. The HOI for electricity in Baluchistan is 67.8 percent, which is lowest in all the provinces. Despite the positive results, it is important to note that the country suffers from power shortages especially for households located in the rural areas in the country are common.

Figure 12 Electricity: Coverage rate, HOI and D-index

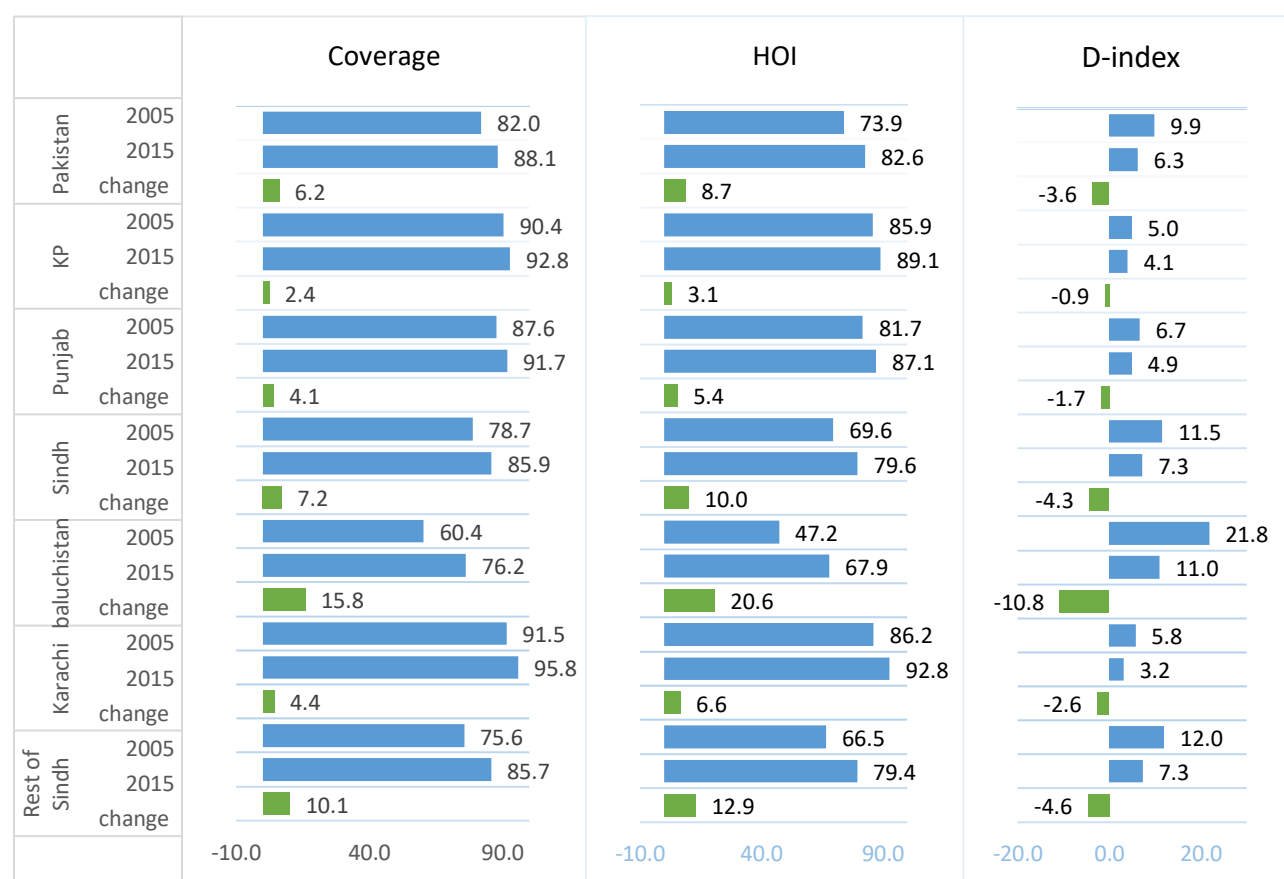


Figure 13 Gas: Coverage rate, HOI and D-index

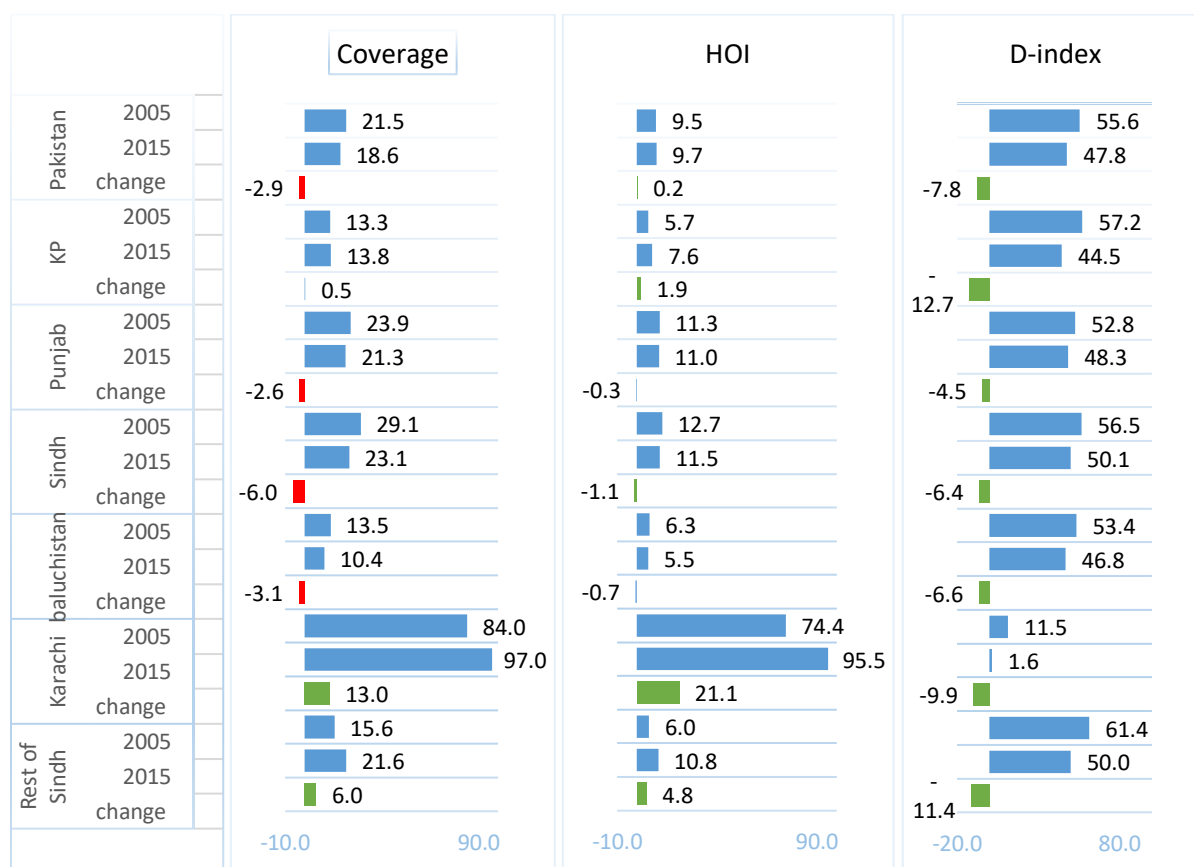


Figure 13 represents the situation of gas availability in the country. The national level shows a positive change however, the change is only of 0.16 percent, which is too low for a ten-year growth rate. The national coverage of gas 21.5 percent declined to 18.5 percent in the 2015. The least coverage can be noticed in the case of Baluchistan with a coverage rate of 13.4 percent in 2005 and 10.3 percent in 2015, which is astonishing because the biggest natural gas field of Pakistan is located in Baluchistan. The reason why Baluchistan does not have negative HOI is that its D-index has decreased from 53.4 percent to 46.8 percent. Punjab, Sindh and Baluchistan suffered a decrease in HOI. The best coverage can be seen in Karachi where the HOI increased 21 percent. However, in the recent times like the rest of the country, Karachi has also worsened in its gas supply shortages. The next dataset by PSLM can grab the unavailability of the facility in the city of Karachi and address the issue better.

Figure 14 Access To Safe Drinking Water: Coverage rate, HOI and D-index

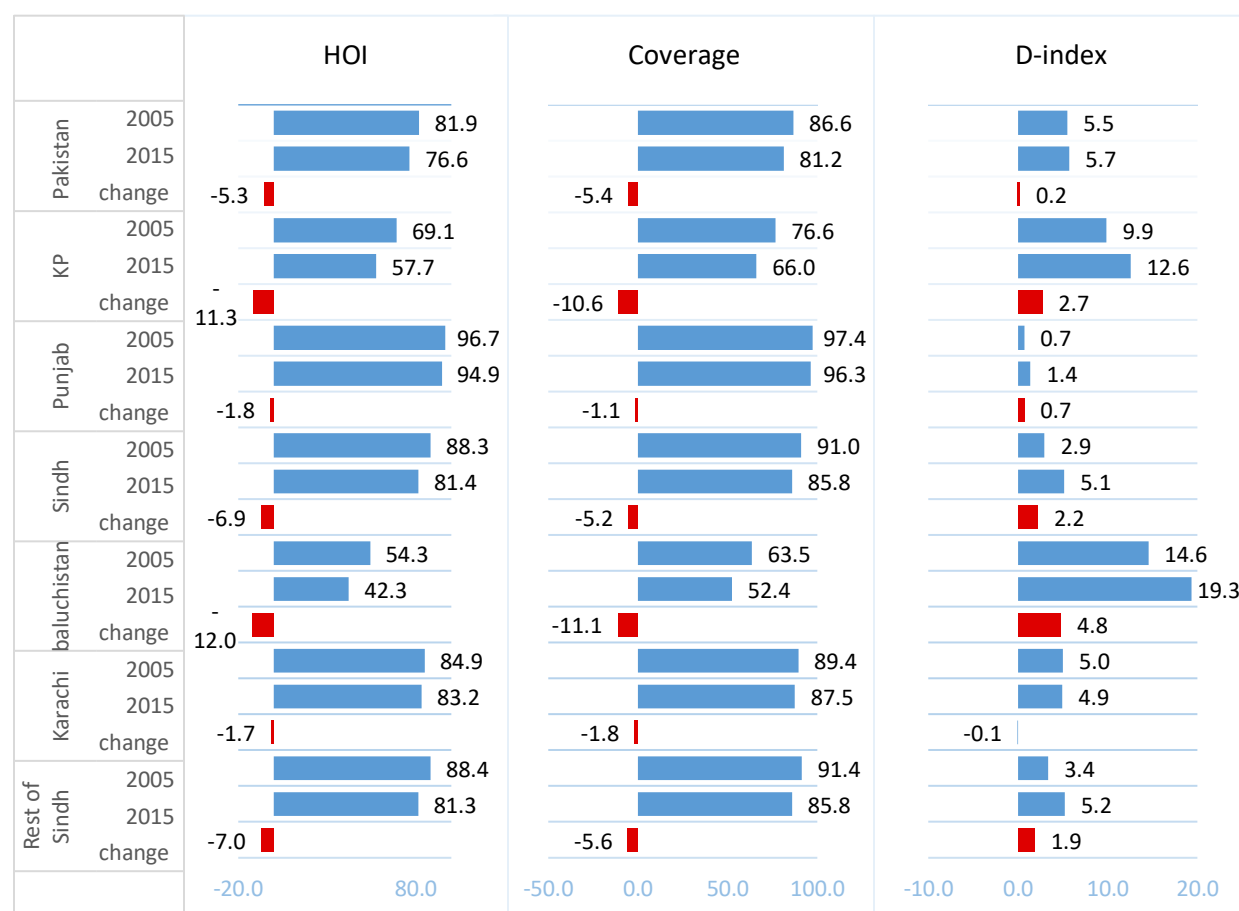


Figure 14 represents the results for the access to safe drinking. Unlike the results of provincial study done by World Bank in 2012, which showed significant improvement in coverage and HOI of safe drinking water (with an exception of Punjab which was already close to universal distribution), the results paint a different story. The coverage and HOI has decreased on both national and provincial level. Kids in Baluchistan, like rest of the above infrastructure indicators, have suffered the worst in safe drinking water opportunity with almost a decrease of 12 percent in HOI, dropping it from 54 to 42 percent. The second most vulnerable province is Khyber Pakhtunkhwa with a decrease of 10.6 percent in the coverage rate and 11.3 percent in HOI.

Figure 15 Access to Improved Sanitation: Coverage Rate, HOI and D-Index

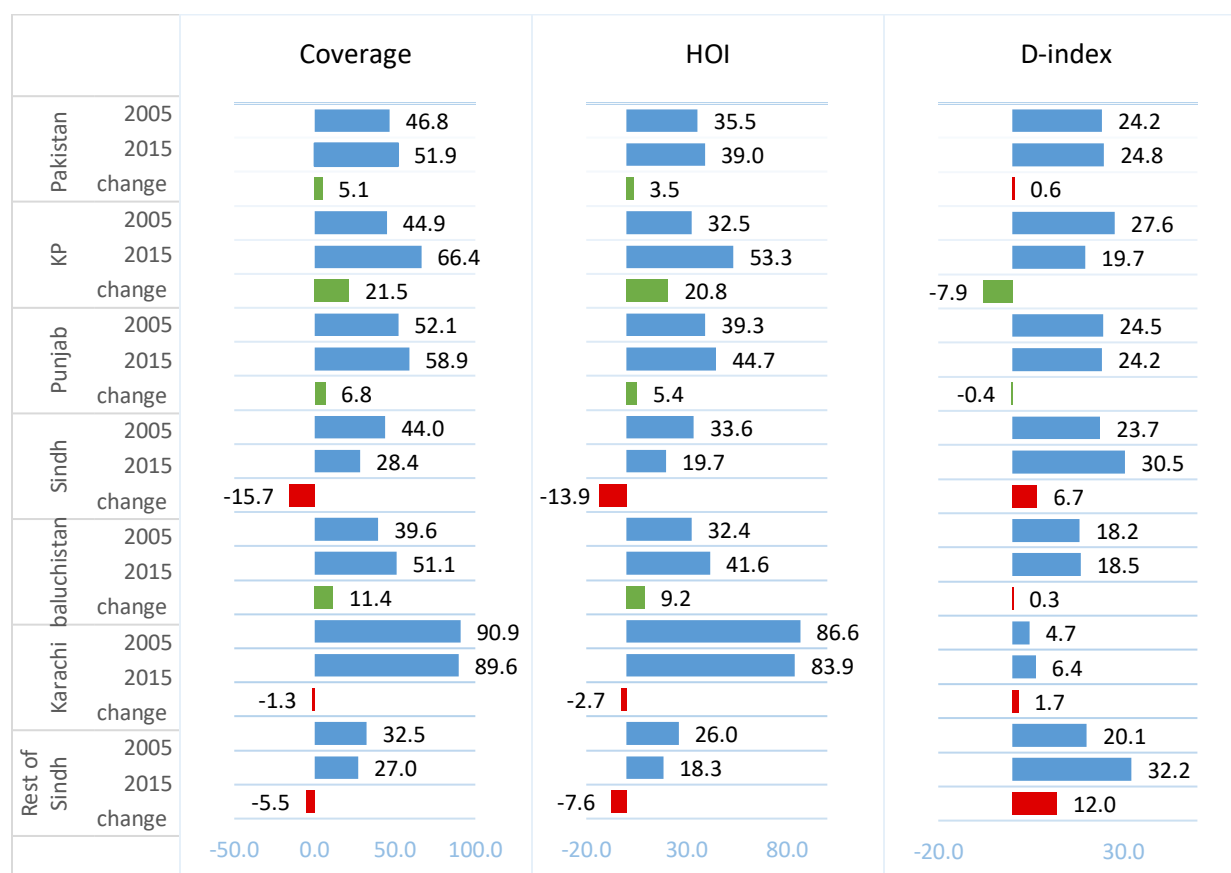
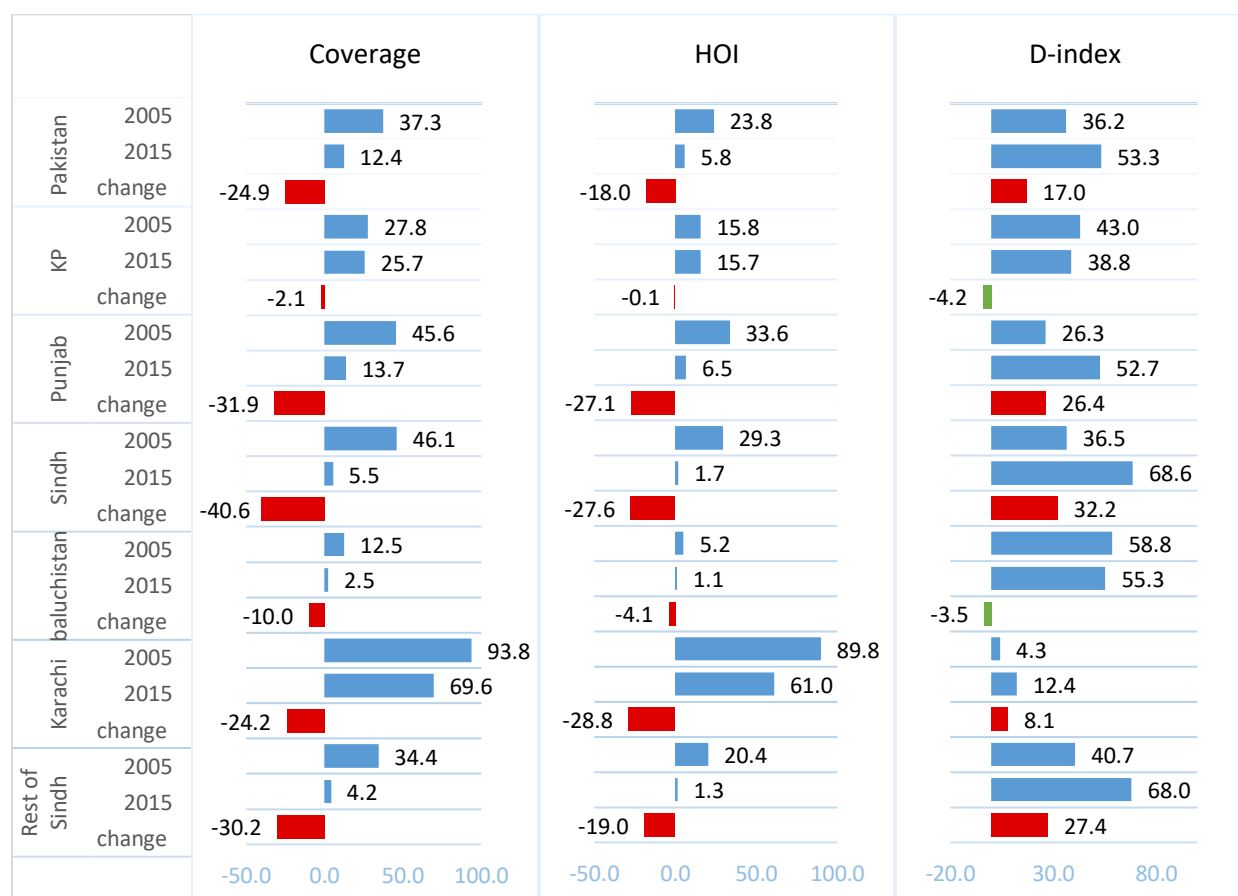


Figure 15 indicates the condition of sanitation throughout the country. The results are the proof that sanitation has improved in Pakistan with the exception of Sindh (both Karachi Rural Sindh has deteriorated in sanitation services). Despite the positive coverage rate and HOI in rest of the country, it is apparent that HOI and coverage has not improved majorly in sanitation in Pakistan except for Khyber Pakhtunkhwa where the change is relatively better. Results show that Sindh needs immediate attention to the sanitary conditions of the province as access to safe sanitation as it plays a major role in the overall health of the household.

Figure 16 Access to Good Housing (Durable Housing): Coverage Rate, HOI and D-Index



The figure 16 represents the data for the Good housing characterized with durable walls and durable roof for the homes in the country. The results are worrisome on all Pakistan level. Basic infrastructure makes a critical commitment to the prosperity of the kids. The results indicate that the country lacks a good housing system and the challenge to provide a decent housing is still great. The national level coverage rate in the year 2005 was 37.2 percent, which was very low to start with, but it further dropped to 12.3 percent in 2015. The worst coverage can be noticed in the Province of Baluchistan where coverage was dropped to 2 percent only and the HOI was only 1 percent for the year 2015. Karachi, the business hub of the country, also suffered a great loss of almost 29 percent in HOI.

Figure 17 Access to Telephone: Coverage Rate, HOI and D-Index

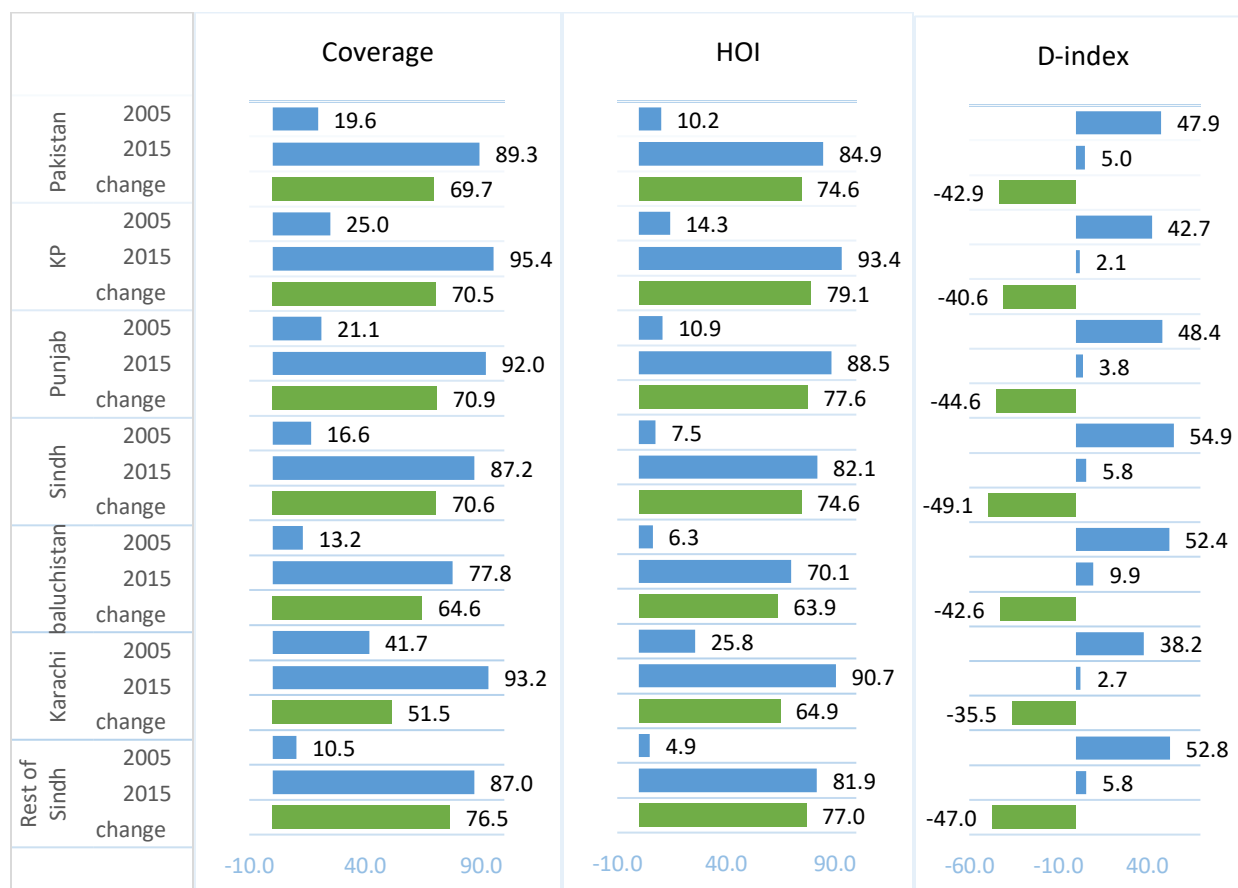


Figure 17 represents the data for the use of telephones (mobile or landline) in the household. The indicator shows great improvement all over the country for obvious reasons. In this decade, globalization and innovation made the wireless phone technology cheaper and easy to access for all. The data overall represents improvement in HOI and coverage by large scale and huge decrease in the inequality of the service. The highest coverage and HOI can be seen in the province of Khyber Pakhtunkhwa where there is almost universal coverage of 95.4 percent and HOI of 93.4 percent. This is satisfactory in a sense that this reassures that the methodology used for this study is able to grab the reality of situation and availability of the services.

Relative Contribution of Different Circumstances in determining the inequality in Education Opportunities

Figure 18 shows the results for Shapley decomposition for the primary education. The results reveal that in the year 2014-15, the most contributing factor in the inequality of opportunity of primary education was the education of head of household in entire Pakistan except for Khyber Pakhtunkhwa where the gender of the child was the biggest contributing factor and Punjab where the income of the household is affecting the primary education. However in case of Punjab, it can be noticed that the difference in education of the head of the household and wealth quintile is less than one percent representing the importance of education of household head in Punjab too. The same results can be seen in Newman (2012) where in case of primary education, education of the head of the household was the most significant in causing the inequality in primary education in both 1999 and 2008, except for Khyber Pakhtunkhwa, where gender was the biggest issue. Being the conservative society that Pathan tribe is, it is not difficult to believe that girls in Khyber Pakhtunkhwa have lower access to education.

Figure18: Decomposition of inequality in Primary Education Enrollment

	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	13.15	32.49	4.79	14.10	36.10	14.50	7.74
Location	6.07	5.20	7.19	9.89	6.07	9.24	6.98
Gender of Head	3.51	1.97	2.45	0.18	0.17	0.14	4.02
Head's education	23.01	17.29	23.69	32.26	28.08	32.49	29.32
Quintile 1	21.36	16.04	24.17	15.81	13.47	16.72	19.36
Quintile 2	5.30	3.45	7.03	5.49	1.15	4.17	7.21
Quintile 3	1.46	1.84	4.84	0.70	1.00	1.09	4.79
Quintile 4	9.76	6.25	11.16	5.29	7.62	5.66	9.36
Quintile 5	16.39	15.47	14.68	16.28	6.33	15.99	11.21

Figure19: Decomposition of inequality in Secondary Education Enrollment

	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	22.01	54.68	11.58	18.99	40.46	19.69	0.37
Location	5.93	2.91	6.30	9.53	9.50	8.77	21.07
Gender of Head	3.56	1.78	3.27	0.23	0.32	0.23	0.87
Head's education	23.89	16.24	29.34	30.88	23.80	31.20	32.09
Quintile 1	14.77	8.14	15.80	11.62	10.93	12.49	23.06
Quintile 2	5.88	2.63	8.09	6.52	2.04	4.64	3.24
Quintile 3	1.55	0.88	1.25	1.61	0.78	2.24	1.07
Quintile 4	6.93	3.78	8.66	3.50	6.26	3.41	8.65
Quintile 5	15.48	8.96	15.72	17.13	5.92	17.23	9.57

Figure20: Decomposition of inequality in Higher Secondary Education Enrollment

	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	16.08	47.80	5.63	14.53	36.47	16.06	0.38
Location	6.18	2.06	7.90	10.51	8.23	9.30	19.07
Gender of Head	2.68	2.31	2.71	0.08	0.35	0.12	1.49
Head's education	28.98	20.14	34.04	33.80	28.45	33.78	60.60
Quintile 1	10.89	8.54	11.89	9.66	10.91	10.16	2.21
Quintile 2	8.31	3.23	9.71	6.84	1.89	5.99	7.54
Quintile 3	3.19	2.01	2.61	3.27	1.31	3.38	3.76
Quintile 4	4.16	3.36	6.17	1.92	4.76	1.64	0.72
Quintile 5	19.52	10.54	19.34	19.39	7.63	19.57	4.23

Figure 19 and 20 present that data for the factors contributing to secondary and higher secondary education. The data in the tables show that the highest contributing factor in both secondary and higher secondary education was the education of the head of the household except for Khyber Pakhtunkhwa and Baluchistan. Both Khyber Pakhtunkhwa and Baluchistan more conservative societies in the country where the participation of women in the entire development sector is low, hence gender of the child plays a significant role at her chances at education. It is striking for the reason that unlike other countries where the income of the household plays the most vital role in explaining the educational inequality, the child education is dependent on head of the household.

The reason behind this are not explained in this paper but these results make it easier to explain the why Easterly (2003) described Pakistan a country of growth with no development. Same results can be seen in the case of higher secondary education where education of head of the household plays the most important role with the exception of Baluchistan and Khyber Pakhtunkhwa. This shows that in order for Pakistan to improve its enrollment rate in education, it is not income of the household it needs to increase but the educating the head of the household may play a significant role in increasing the enrollment rate.

Figure21: Decomposition of inequality for Completing Primary Education on time

	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	2.09	1.36	2.22	3.22	13.08	3.09	4.22
Location	8.08	7.71	6.24	15.74	5.36	14.86	15.96
Gender of Head	0.78	2.73	1.81	0.57	2.66	0.47	2.52
Head's education	32.11	27.34	34.15	24.00	39.50	22.94	16.11
Quintile 1	12.70	19.08	14.02	16.35	14.51	18.91	14.80
Quintile 2	10.33	9.82	11.59	5.88	5.31	5.07	7.58
Quintile 3	4.29	1.29	1.89	4.74	2.34	4.30	8.45
Quintile 4	5.43	8.23	9.07	4.65	11.94	5.21	19.44
Quintile 5	24.19	22.43	19.00	24.84	5.31	25.15	10.93

Figure22: Decomposition of inequality for Completing Primary Education on time

	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	0.51	13.95	6.02	6.19	2.61	6.91	1.13
Location	13.83	1.68	12.45	18.76	2.52	17.78	3.14
Gender of Head	1.39	1.05	2.39	0.11	0.84	0.09	0.41
Head's education	34.30	32.34	28.08	26.47	46.85	26.35	38.99
Quintile 1	7.03	12.76	8.37	8.47	17.17	10.36	8.71
Quintile 2	9.78	8.90	9.78	6.73	1.18	5.50	18.38
Quintile 3	6.93	3.44	6.27	4.28	6.50	3.30	2.14
Quintile 4	1.82	4.63	4.60	3.79	3.99	4.42	18.94
Quintile 5	24.41	21.25	22.04	25.20	18.35	25.29	8.15

Figure 21 and 22 represents the data for the completing primary and completing secondary education on time. In figure 21 (completing primary on time), the decomposition reveals that on a national level the most influencing factor on completing primary on time is education of the head of the household with the exception of Sindh (minus Karachi). In Sindh, the last wealth quintile is the most influential factor contributing to the inequality in the opportunity to complete primary education on time (with less than 1% difference from education of the head of the household which shows that Parental education is notable in Sindh too). It would be interesting to inquire why income quintile is significant for interior Sindh. One reason why income is the most contributing factor can be child labor in rural Sindh. The province of Sindh has around 4 million kids working as child labour with 1.8 million engaged in agriculture sector (Ram et al., 2020). This can be the reason of deteriorated primary education in the province. In the case of secondary education completion, the highest inequality causing factor is the education of the head of the household. According to results, the improvement in education cannot immediately come as it is not dependent on the income of the household but rather on the education of the parents which will take time to develop in the society.

Relative Contribution of Different Circumstances in determining the inequality in Infrastructure Opportunities

The results of the Shapley decomposition for the infrastructure variables indicate that on a national level the wealth of the households is the most significant circumstances affecting the quality of the life of the children. Figure 23 shows that location dummy is the main cause of inequality of gas on the national level and in Baluchistan. While in the rest of the provinces it is most affected by wealth quintiles. Figure 24 represents Shapley results for the opportunity of electricity which that the highest inequality can be found in the first quintile with the exception

of Karachi where the location (Urban/rural) dummy affects the opportunity for the child the most. This shows the poorest quintile is the most deprived of the electricity facility all over Pakistan. This can be true because of the power shortage in the country and the rise in price per unit of electricity in the country which is increasing regularly and is difficult for the family belonging to the poorest quintile to afford.

Figure 23: Decomposition of inequality in access to Gas

	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	0.26	0.04	0.14	0.29	0.28	0.32	5.96
Location	33.18	21.24	27.18	26.52	35.60	26.70	15.70
Gender of Head	0.17	0.15	0.25	0.26	0.04	0.24	1.95
Head's education	9.27	7.32	8.68	8.04	6.68	8.21	5.43
Quintile 1	10.87	13.75	10.74	12.88	12.69	14.46	32.43
Quintile 2	9.70	10.78	9.78	10.99	5.60	9.05	12.08
Quintile 3	4.85	5.50	6.95	6.66	4.90	6.76	4.72
Quintile 4	1.30	2.86	1.88	4.02	3.26	3.68	15.00
Quintile 5	30.40	38.37	34.41	30.34	30.95	30.57	6.72

Figure 24: Decomposition of inequality in access to Electricity

	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	0.20	0.50	0.34	0.19	0.07	0.21	2.51
Location	7.22	4.87	7.61	11.15	14.67	10.62	43.98
Gender of Head	1.36	2.20	2.67	0.16	0.06	0.17	2.24
Head's education	8.03	13.77	12.97	8.30	13.99	8.29	14.28
Quintile 1	38.12	35.02	38.99	41.52	32.54	41.72	15.03
Quintile 2	5.51	4.80	1.07	4.13	2.11	2.84	3.09
Quintile 3	7.73	4.58	10.74	6.67	1.64	8.41	9.04
Quintile 4	16.03	16.36	13.72	13.65	19.03	13.76	5.31
Quintile 5	15.79	17.90	11.88	14.23	15.90	13.97	4.52

Figure 25: Decomposition of inequality in access to safe Sanitation

	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	0.03	0.21	0.29	0.93	1.82	0.80	2.40
Location	1.90	5.18	6.66	22.57	0.70	26.88	73.29
Gender of Head	4.49	4.76	0.78	0.01	0.07	0.10	0.39

Head's education	8.35	16.48	11.11	2.62	13.35	0.86	0.40
Quintile 1	25.95	31.10	31.79	34.78	5.10	28.05	1.76
Quintile 2	12.07	2.89	9.03	6.79	8.03	12.98	4.84
Quintile 3	2.23	3.08	3.32	27.13	7.41	19.65	4.84
Quintile 4	16.87	12.87	16.48	3.21	28.68	2.83	5.37
Quintile 5	28.11	23.44	20.55	1.96	34.84	7.84	6.71

Figure 26: Decomposition of inequality in access to safe drinking water

	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	0.81	0.20	0.17	0.49	0.07	0.25	3.30
Location	16.61	11.50	27.68	11.39	12.43	6.58	14.15
Gender of Head	0.58	0.60	1.96	0.05	0.03	0.03	0.20
Head's education	12.42	15.93	3.36	3.13	6.02	2.07	23.92
Quintile 1	20.74	17.06	17.61	26.08	27.11	46.60	27.67
Quintile 2	4.46	10.07	9.45	12.09	3.58	4.88	1.95
Quintile 3	2.97	6.49	12.99	3.18	8.91	10.81	1.38
Quintile 4	17.30	12.83	8.03	25.72	20.99	13.42	19.12
Quintile 5	24.10	25.32	18.76	17.87	20.85	15.35	8.31

The data in figure 25 and figure 26 represent the effect of circumstances on the distribution of sanitation and water facilities across the country for the 2014-15 dataset. The results indicate that on a national and provincial level, these facilities are majorly affected by the income of the households. On the national level, the last quintile is the highest unequal group in the facility of sanitation indicating the inequality of coverage is highest in last quintile. The same can be seen in the case of Baluchistan. For Karachi, the location dummy is causing the highest inequality. The facility of clean drinking water is highly unequal in the lowest quintile group in Sindh, Balochistan, rural Sindh and Karachi. On the national level and in the province of Khyber Pakhtunkhwa the last quintile contributed the highest in the inequality where as in Punjab; the location dummy was the highest inequality causing circumstance.

Figure 27: Decomposition of inequality in access to Phone service

	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	0.13	0.15	0.09	0.30	0.45	0.33	1.61
Location	3.64	1.21	4.52	6.17	9.64	5.71	6.81
Gender of Head	0.18	4.82	0.95	0.52	0.23	0.52	1.81
Head's education	9.66	11.07	14.41	16.47	17.45	18.12	20.01
Quintile 1	44.78	42.20	41.48	39.74	30.89	38.17	30.37
Quintile 2	3.50	1.38	2.78	2.95	4.45	1.10	4.74
Quintile 3	10.67	8.06	9.45	8.28	1.86	10.39	7.24
Quintile 4	13.78	15.83	12.46	11.54	19.78	10.49	19.15
Quintile 5	13.65	15.27	13.85	14.03	15.25	15.16	8.27

Figure 28: Decomposition of inequality in access to Good Housing

	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	0.14	0.16	0.19	0.25	0.13	0.27	0.90
Location	11.87	6.83	14.42	23.05	61.64	19.82	1.48
Gender of Head	4.09	3.20	0.85	0.40	0.54	0.24	4.97
Head's education	8.73	7.45	11.93	9.79	16.78	9.30	19.41
Quintile 1	13.34	25.89	11.57	10.50	4.49	11.41	20.76
Quintile 2	12.36	6.89	10.23	8.96	1.75	7.21	16.16
Quintile 3	8.30	6.91	9.92	7.39	3.97	8.00	5.64
Quintile 4	1.68	8.28	2.25	4.24	0.89	5.77	20.11
Quintile 5	39.49	34.40	38.65	35.42	9.82	37.97	10.57

It is not important to talk about the D-index of telephone facility (defined as 1 if the household has a mobile or landline connection in the house otherwise 0), as the penalty for the telephone connection is low and its coverage and HOI are both high. The rate of technological advancement in telecommunication industry has been high in the world and in country of Pakistan; too where use of mobile phone is common now and lowest quintile is the most unequal group in the all quintile. The figure 28 represents data for good housing, which represents the facility of decent living made with durable walls and roof data. The richest quintile is the most

unequal quintile in the country contributing the highest to the decomposition for Khyber Pakhtunkhwa, Punjab, Sindh, interior Sindh as well as on the national level.

Relative Contribution of Different Circumstances in determining the inequality in Health Opportunities

As the HOI and coverage for diarrhea, not occurring in the kids under the age of five is positive and close to universal, it is not worthwhile to explore what accounts for the inequality of it. Mostly for all over Pakistan, location dummy is the most significant factor causing the diarrhea in the kids. Figure 29 explores the circumstance that explains the inequality for the immunization in the kids under the age of five. The results of the decomposition reveal that in case of immunization, the education of head of the education is the most accountable factor in the inequality of immunization of the kids. The same results for immunization are observed in the Newman (2012) report. This reveals that the phenomena of low immunization in low educated families in Pakistan has sustained over the time. This indicates that in order to achieve immunization in the country, policies must be directed at increasing the knowledge of the parents rather than increasing their income levels.

Figure: Decomposition of inequality in access to immunization at all

oimmunized,	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	1.99	2.60	4.51	3.71	0.72	3.68	1.50
Location	4.12	5.82	17.40	3.44	4.80	5.53	14.92
Gender of Head	0.06	7.84	2.56	1.50	0.45	1.24	1.95
Head's education	35.07	3.59	23.44	53.38	36.28	43.76	9.73
Quintile 1	18.62	23.59	15.71	6.54	19.42	15.03	10.42
Quintile 2	4.65	10.76	5.51	11.70	8.27	6.93	24.49
Quintile 3	2.37	5.47	5.80	3.03	3.78	4.71	3.49
Quintile 4	11.33	19.06	4.86	1.21	16.85	1.90	28.35
Quintile 5	21.79	21.27	20.22	15.49	9.42	17.23	5.14

Figure 30: Decomposition of inequality in access to Institutionalized Birth

	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	0.36	0.51	0.12	0.67	1.03	0.65	11.05
Location	13.28	7.00	11.26	25.69	23.49	24.24	31.34
Gender of Head	0.87	0.92	0.06	0.21	0.65	0.16	5.52
Head's education	15.29	11.12	20.46	20.69	24.82	20.94	23.59
Quintile 1	17.81	23.44	19.10	14.57	18.27	16.87	6.11
Quintile 2	11.65	10.06	12.79	8.89	4.83	4.77	1.23
Quintile 3	5.43	5.27	1.63	2.11	1.15	4.41	4.67
Quintile 4	7.52	10.05	9.74	4.77	4.09	5.35	1.36
Quintile 5	27.78	31.64	24.85	22.40	21.67	22.63	15.13

Figure 30 suggests explains the reasons behind the births taking places at formals institutions vs birth in the absence of medical supervision. The reason behind the non-institutional births in the country is the location dummy for the province of Sindh (both interior Sindh and Karachi) explaining the highest inequality is due to urban/rural disparity. For Baluchistan, the education of the head of household was the most significant factor which means the most births happening in at home in Baluchistan is due to lack of awareness in the area and not because of the cost . At the national level, Khyber Pakhtunkhwa and Punjab, the last income quintile is highest contributing factor suggesting that on a national level it is the cost of an institutionalized birth, which causes the inequality of it rather than the availability or knowledge of the facility.

Figure 30: Decomposition of inequality in access to prenatal care

	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	0.55	0.13	0.03	0.47	0.59	0.52	6.09
Location	13.16	9.30	7.47	16.51	30.95	16.07	51.40
Gender of Head	0.96	0.22	0.43	0.21	0.24	0.18	2.04
Head's education	14.62	11.39	17.32	20.67	28.96	22.28	2.38
Quintile 1	23.11	23.58	24.66	18.91	19.08	23.58	4.89
Quintile 2	7.09	10.54	12.56	11.53	1.01	6.42	6.80
Quintile 3	5.54	3.94	4.77	2.01	3.91	0.77	7.03
Quintile 4	10.01	11.72	11.63	6.59	6.57	6.88	6.63

Quintile 5	24.97	29.17	21.14	23.10	8.70	23.31	12.75
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Figure 31: Decomposition of inequality in access to postnatal care

	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	0.29	0.59	0.49	0.68	0.90	0.64	1.06
Location	15.54	4.14	13.30	22.51	20.77	22.59	8.29
Gender of Head	0.53	0.97	0.57	0.40	0.15	0.48	3.98
Head's education	23.83	21.46	26.17	24.18	10.58	22.27	58.13
Quintile 1	16.45	19.86	15.88	14.75	26.75	16.92	12.24
Quintile 2	8.93	11.81	10.12	9.18	7.39	5.52	7.58
Quintile 3	4.26	3.82	2.91	1.63	5.92	3.48	2.49
Quintile 4	4.77	10.33	8.72	4.62	13.53	3.25	2.30
Quintile 5	25.40	27.03	21.83	22.05	14.01	24.84	3.93

Figure 32: Decomposition of inequality in service of Formal Birth

	Pakistan	Kp	Punjab	Sindh	Baluchistan	Interior Sindh	Karachi
Child's gender	0.60	0.52	0.05	0.17	1.45	0.12	6.81
Location	22.25	11.16	8.11	17.38	31.24	15.17	12.39
Gender of Head	0.71	0.83	0.13	0.21	0.42	0.18	0.89
Head's education	20.70	19.82	6.31	8.13	56.29	7.48	3.94
Quintile 1	18.36	19.95	27.71	28.10	1.37	37.51	16.90
Quintile 2	5.04	7.06	14.58	8.27	5.41	2.13	2.43
Quintile 3	4.09	4.98	10.52	0.47	0.59	3.56	9.67
Quintile 4	4.87	5.53	12.99	18.07	0.68	15.62	36.93
Quintile 5	23.38	30.15	19.62	19.19	2.55	18.23	10.04

For the prenatal facility for the mothers (data in figure 30), the location dummy is the most significant for Baluchistan and Karachi. Why it is important for Karachi, would be an interesting factor to inquire. For the rest of the country, the wealth quintiles are the real inequality causing factors reflecting at cost of the prenatal care being the real reason rather than other factors in the circumstances. For postnatal care (Figure 31) and Formal Birth (Figure 32) it is the education of the head of the household and income of the families, which is affecting these facilities the most.

Summary of all results

This study has systematically gone through key education, infrastructure and health indicators at the provincial level of the country. The education results show a downfall of education all over the country but the province of Sindh has suffered the most. The reason behind this great loss is the Parental education of the child. For the infrastructure indicators, it is the province of Baluchistan which is least developed and needs a set of policies which are centered at the making the life of the Balochi kids prosper as poor infrastructure is affecting their future and is wasting the human potential of the province. The reason behind this is mainly education of the head of the household, the income of the household and the urban/rural dummy. There is overall improvement noted in the health indicators but despite the improvement, Pakistan is long way from universal coverage of health facilities for example immunization, prenatal and post-natal facilities. The education of the parents, income and location of residence of a child plays an important role in all the opportunities he/she receives in his childhood.

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