



Working Paper No. 2

Do Children Play on a Level Playing Field? Measuring Inequality of  
Opportunity in Bangladesh

Rituparna Sanyal

October 2020

**Citation:**

Sanyal, R. (2020) “Do Children Play on a Level Playing Field? Measuring Inequality of Opportunity in Bangladesh.” *Development Research Foundation*, Working Paper 2, October 2020.

# Do Children Play on a Level Playing Field? Measuring Inequality of Opportunity in Bangladesh

Rituparna Sanyal<sup>1</sup>

## Abstract

This paper attempts to measure the inequality of opportunity in basic education, health, infrastructure and documentation services among children in Bangladesh at the division level based on two waves (2011 and 2015) of data from the Bangladesh Integrated Household Survey (BIHS). The analysis applies a methodology called the Human Opportunity Index (HOI), which measures the total contribution of individual socioeconomic and demographic circumstances to inequality of opportunity in accessing basic services. The novelty of this paper is the use of household surveys and decomposition techniques to understand the scale and distribution effects over time. The change in the HOI between the two periods has been decomposed into a scale effect (coverage) and distribution effect (equity). Much of the increase is due to the scale effect and not so much due to the distribution effect. Results of the empirical analysis indicate that opportunities to access basic services in the seven divisions vary widely in terms of availability and distribution, ranging from 67 percent in Dhaka to 55 percent in Sylhet. Of the four dimensions studied in this paper (*viz* education, health, housing, identification document), the HOI is highest for health at 80 percent and lowest for education at 43 percent. Over the four years, there has been a 10 percent increase in the overall opportunity index of the country, which stood at 64 percent in 2015. The index will therefore allow policy makers to track the country's progress over time in improving the distribution of certain basic opportunities to children.

**Keywords:** Inequality, opportunity, human opportunity index, dissimilarity index, circumstance, allocation, Bangladesh

**JEL classification:** D61, D63, I31, I38, O15

---

<sup>1</sup> Yale University, New Haven, CT 06511, USA. Email: [rituparna.sanyal@aya.yale.edu](mailto:rituparna.sanyal@aya.yale.edu)

I would like to thank Dr Michael Boozer, Dr Murray Leibbrandt, Martin Mattsson and an anonymous reviewer for their technical advice and insightful comments on the paper.

## 1. Introduction

*“Even though poverty and inequality are related concepts, the goals of reducing them have received different levels of support. Reducing poverty is a universally accepted aim and a priority for development work, and is included as the first Millennium Development Goal [Now, Sustainable Development Goal 1]. By contrast, while inequality has received a lot of attention, consensus on promoting policies to reduce inequality has been much harder to achieve.”*

Inequality continues to be a significant concern despite progress in and efforts at narrowing disparities of opportunity, income and power — the richest 10 percent have 57 percent of global income whereas the bottom 50 percent together earn only 12 percent. 27 percent of the global income is received by the top 1 percent (World Inequality Report, 2018). In 2017, the richest 1 percent of the world’s population held 50.1 percent of the world’s wealth, while the poorest 70 percent of the world’s working age population together hold only 2.7 percent of global wealth. The world’s 10 richest billionaires, according to Forbes, own \$505 billion in combined wealth, a sum greater than the total goods and services most nations produce on an annual basis (UN, 2016).

Since 2000, the picture is more nuanced for inequality between countries, but within-country inequality is on the rise. However, it is not enough to focus on income and wealth inequality alone. The World Development Report 2006, titled “Equity and Development,” states that 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 intrinsically unfair. Unfairness can lead to social conflict, and inequality in some particular circumstances (notably but not exclusively inherited wealth) can be economically inefficient (World Bank, 2006). One of the distasteful manifestations of inequality is when it interferes with equality of opportunity. The Human Development Report 2019, “Beyond income, beyond averages, beyond today: Inequalities in human development in the 21st century,” argues that focusing exclusively on income and wealth inequalities is too reductive by failing to acknowledge the full scope of inequality in human development (UNDP, 2019).

Inequality can be a roadblock to progress when it deprives people of opportunity, and subjects them to conditions of poverty. According to the inequality-adjusted Human Development Index (HDI), Sub-Saharan Africa loses 33 percent of its HDI to inequality and South Asia 25 percent (UN, 2016). Further, inequality can be a serious threat to social and political stability.

Recognizing the urgency and consequences of inequality, the United Nations adopted “Reducing Inequality within and among countries” by 2030 as an explicit goal of the Sustainable Development Goals (SDG) in 2015. The SDGs, especially SDG 10, represents a significant shift in the global conversation on development. There are 7 targets under this goal, and this paper specifically addresses Target 3: “Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard” (UNDP, 2016).

Figure 1. SDG Goal 10



For decades, inequality was measured in terms of income (Kakwani, 1980; Benabou, 1996; Bourguignon & Morrisson, 2002; Atkinson et al, 2011; Milanovic, 2013), wealth (Wolff, 1992, 1996; Davies, 2011; Piketty & Saez, 2014) or consumption (Blundell & Preston, 1998; Krueger & Perri, 2005; Attanasio & Pistaferri, 2016), but the concept is now being extended to cover many other dimensions of standard of living. Although society endeavours to reduce inequality of *outcomes*, the World Development Report (2006) has argued that inequality of *opportunity*, not of outcome, should inform the design of public policy. According to this view, public policies need not necessarily eliminate or reduce all outcome inequalities (especially those arising out of inequalities in *choice* or *effort*<sup>2</sup>), but should instead focus on reducing inequalities that arise from unequal opportunity. Inequality of opportunity due to differences in *circumstances*<sup>3</sup> is unjust and of concern to all societies. While economic inequality in terms of income and wealth has gained renewed political prominence in recent years, inequality of opportunity has received insufficient focus by policymakers and the wider public. One possible explanation could be that it is hard to rigorously measure inequality of opportunity and separate circumstance from effort.

The South Asian country of Bangladesh has greatly reduced poverty over the last decades and has the potential to end extreme poverty by 2030. More than 16 million people in Bangladesh graduated from extreme poverty between 2000 and 2010 (World Bank, 2016). Bangladesh's Human Development Index value for 2017 was 0.608— which put the country in the medium human development category—positioning it at 136 out of 189 countries and territories. Between 1990 and 2017, Bangladesh's HDI value increased from 0.387 to 0.608, an increase of 57.1 percent. Life expectancy, education and GNI per capita are all on the rise (UNDP, 2018). Since 2013, official statistics show that the country has experienced accelerated GDP growth from 6.01 percent per year to 8.15 percent annually in 2019.

However, inequality in the country is at an all-time high. As per the latest Household Income and Expenditure Survey (HIES) by the Bangladesh Bureau of Statistics (BBS), the country's Gini coefficient stood at 0.482 in 2016, up from 0.458 in 2010, suggesting that economic growth has been far from inclusive. The income share held by the highest 10 percent of the population increased to 27 percent in 2010 while that held by the lowest 10 percent declined to 4 percent. There is also an

<sup>2</sup> For which the individual alone must be held responsible.

<sup>3</sup> Exogenous factors which are beyond one's control. Includes personal, family, or community characteristics that a society believes should not play a role in determining access to basic opportunities.

increasing inequality of opportunities particularly in access to health care, education, financial services and social protection (Byron & Parvez, 2019). This paper, therefore, attempts to analyse the extent of inequality of opportunity with respect to basic opportunities and services, and further assess whether it could be a key reason for slow economic development in Bangladesh.

To measure the inequality of opportunity contributed by individual socio-economic and demographic circumstances, the World Bank (Barros et al. 2009) developed the Human Opportunity Index (HOI), which is used in this paper. Universal access to basic opportunities<sup>4</sup> is a key concern in public policy and development economics. The access to opportunities depends on two key factors:

- (i) Overall coverage rate of the opportunity
- (ii) Allocation of the opportunity

Box 1: Illustration of factors that define access to opportunity

Example

To clearly distinguish between coverage rate and allocation of an opportunity, consider the following example provided in Barros et al. (2008):

Allocation of opportunity	Ethnic Group A	Ethnic Group B	Average Coverage Rate
Society I	100%	0%	50%
Society II	50%	50%	50%

*Consider two societies (I and II) made of two ethnic groups (A and B) with equal population size. Assume that there are enough opportunities to cover only one half of the total population in each society. Hence, the overall coverage rate is 50% in both cases. But assume that the allocation of these scarce opportunities is distinct in the two societies. In Society I, all opportunities are allocated to ethnic group A and none to group B, whereas in Society II both ethnic groups receive an equal share. Hence, while in Society I the coverage rates for groups A and B are 100% and 0% respectively, in Society II the coverage rate is 50% for both groups. Thus, although both societies have the same overall coverage rate, they differ markedly in terms of the disparities in coverage by ethnicity. Going by their overall coverage rates, the two societies would be considered alike. Nevertheless, any measure sensitive to group differences in access would consider Society II closer to the ideal of opportunity for all than Society I.*

The HOI synthesizes both these factors into a single indicator in a simple and intuitive way using the formula detailed in the Methodology section. The analysis in this paper applies the HOI method to Bangladesh using a household survey dataset, which will seek to measure inequality of opportunity

<sup>4</sup> Goods and services that are critical for economic development and advancement in life. Either affordable by society already, or could be, given the available technology.

in accessing four basic services *viz* education, health, housing and identification document. Each dimension is comprised of certain indicators which are later combined to arrive at the index. The novelty of this paper is the use of household surveys and decomposition techniques to understand the scale and distribution effects between 2011 and 2015 in Bangladesh.

In summary, the analysis shows a 10 percent increase in the HOI for Bangladesh – from 58 percent in 2011 to 64 percent in 2015. While the change is positive, it is still lower than the average for Latin American countries and some South Asian countries. Also, much of this change is due to increased coverage (scale effect) and not much due to an equitable distribution (distribution effect) of these opportunities. Dhaka is the best performing division with the highest opportunity index as well as the largest change over the two periods under study, and the health dimension has the highest opportunity index in the country, although the education dimension shows the greatest improvement since 2011. This information is crucial in terms of developing better-targeted interventions.

To implement policies that reduce inequality of opportunities, a clear understanding of which key exogenous circumstances are unfairly influencing children's access to basic services is needed. The index sheds light on which specific basic opportunities require more attention, either because of inequitable distribution or low absolute levels. It also helps to identify the more disadvantaged segments of the population and to determine where policies should place more emphasis, given financial, managerial, and technological constraints. Only by combining expansion of coverage with equal allocation of opportunities will the growth of the Human Opportunity Index of the country be maximized.

The rest of the paper is organized as follows. Section 2 reviews existing literature on this topic, Section 3 describes the data source used, Section 4 gives an overview of the country of analysis, Section 5 explains the methodology, Section 6 presents the key findings, Section 7 lays out policy implications and Section 8 concludes.

## **2. Review of Literature**

Much of the recent interest in inequality of opportunity among economists and advocates of public policy is due to the formulation of this idea by John E. Roemer and his collaborators in a series of contributions (Roemer & Trannoy, 2016; Roemer, 2008, 2002, 1998, 1993), although theories on equality and distributive justice can be traced back to John Rawls (1971, 1958) and Ronald Dworkin (1981). According to Roemer, what an individual has been able to achieve (“outcome,” e.g., earnings or health status) is a result of two sets of factors: “effort” and “circumstances.” The first set is within the control of individuals, and therefore they should be held accountable for it. On the contrary, individuals have no control over their circumstances (e.g., they could be born into or inherit them), and they should therefore not be held accountable for them. The extent to which circumstances influence the outcome can be viewed as a measure of the inequality (or its inverse, equality) of opportunity prevailing in a particular society.

This paper draws on the works of Barros et al. (2012), Barros et al. (2009) and Barros et al. (2008), wherein the authors build on the concepts to describe methods behind measurement of inequality of

human opportunities for children in general, and outline the construction of the Dissimilarity Index (D-Index) and HOI in particular. They apply it to 19 Latin American and Caribbean countries and decompose the change in the index by scale as well as distribution effects over the decade 1995-2005, with an inter-country comparison.

Applying the World Bank method for the first time to South Asia, Son (2013) analyzed the equity of opportunity in basic education and infrastructure services in seven developing countries: Bangladesh, Bhutan, Indonesia, Pakistan, the Philippines, Sri Lanka, and Vietnam. The author found that opportunities to access basic education and infrastructure services in the seven countries varied widely in terms of availability and distribution. The study also found that inequality of opportunity is driven mainly by per capita household expenditure. This suggests that household poverty plays a crucial role in determining equitable access to basic services. For Bangladesh, the Household Income and Expenditure Survey 2000 was used.

Marrero and Rodríguez (2013, 2012) decompose total inequality into an inequality of opportunity component (inequality that is due to circumstances outside the person's control) and a residual inequality component that is assumed to be due to effort and luck. In two separate applications, one to the European Union member countries and one to the American states, they found that inequality of opportunity is negatively correlated with growth while the residual ("good inequality") tends to help growth. The rationale is that inequality of opportunity may harm economic growth because it favours human capital accumulation by individuals with better social origins, rather than by those with more talent. Perceptions of unequal opportunities, by affecting individual aspirations, may also reduce investments in human capital.

Islam and Mitra (2015) focus on the complementarities among access to multiple services. They apply a Multidimensional HOI (MHOI) to the two Himalayan states of South Asia, Nepal and Bhutan and show that although each basic service is available to a large proportion of the population, only two-thirds in Bhutan and one half in Nepal have access to the bundle of basic services in 2011-12. The MHOI differs from the original index in that it measures joint access to multiple services or access to a bundle of services. To develop this aspect, they relied on the multidimensional poverty framework by Alkire and Foster (2011).

In a recent paper, Vani and Madheswaran (2018) have carried out an extensive state-level analysis for India using the two waves of India Human Development Survey (2004-05 and 2011-12). Their findings show that the opportunities to access services are low and inequitable at the all-India level, except in access to safe drinking water. Over the period of seven years, there was an increase in HOI and much of it was due to the scale effect and not much due to the distribution effect. Among the circumstance variables, location of residence and per capita expenditure were found to be crucial in influencing equitable access to basic services.

### **3. Data Source**

This paper uses the Bangladesh Integrated Household Survey (BIHS), conducted by Policy Research and Strategy Support Program (PRSSP) and International Food Policy Research Institute (IFPRI).



The IFPRI-PRSSP–designed BIHS is a comprehensive, nationally representative household survey conducted in Bangladesh. The first round took place in 2011, and the second round in 2015. BIHS samples are statistically representative for rural areas in all seven administrative divisions of the country—Barisal, Chittagong, Dhaka, Khulna, Rajshahi, Rangpur, and Sylhet (IFPRI, 2016). Hence, the analysis is restricted to rural Bangladesh. However, since almost 80 percent of Bangladesh’s population continues to live in rural areas, it is an important sample to study.

BIHS deployed two survey instruments: a) gender-disaggregated household questionnaires, designed to collect individual- and household-level information from both the primary male and female respondents, who were interviewed separately; and b) a community questionnaire to provide information on area-specific contextual factors. Apart from collecting information on agricultural production and practices, anthropometric measurements, and dietary intake, the survey also asked questions related to schooling information for children (ages 6-17), immunisation and health status of young children (ages 0-5), dwelling characteristics, access to electricity, telephones and other facilities, water and sanitation. These are the primary variables looked at in this paper.

The sample size is 6,500 households (in each wave) across 325 primary sampling units (PSUs), stratified by Division (see Appendix A1). Population weights were constructed with reference to the census and have been taken into consideration in the empirical strategy.

#### 4. Bangladesh: Some Descriptive Statistics

Table 1 and figures 2 and 3 below present the social, economic, demographic and health characteristics of children for two waves of BIHS data. It can be seen from the data that the structure has not changed much between the two periods. The contribution of religion, gender and number of members under 16 years has remained the same across two rounds. There is a small increase in the proportion of literate household heads between the rounds.

Figure 2: Distribution of the sample by Division

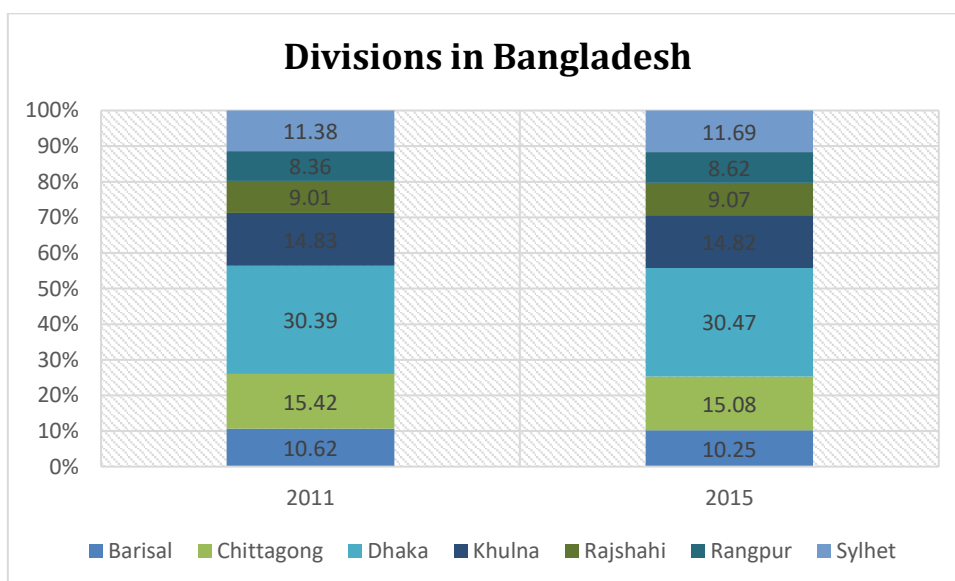
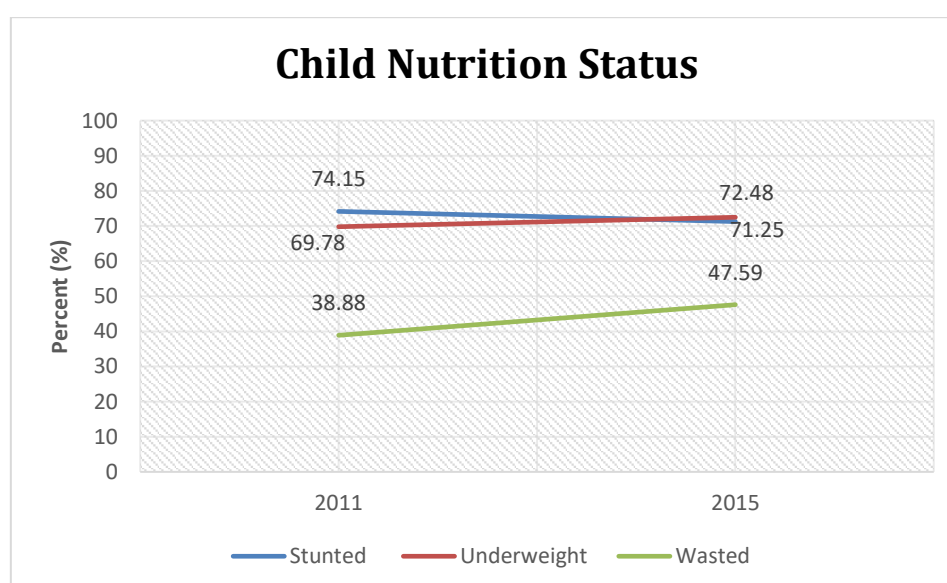


Table 1: Sample demographics at Division level

Division	Year	Household head's religion		Household head's gender		Household head's literacy		No. of children under age 16 in the house	
		Other (%)	Muslim (%)	Female (%)	Male (%)	Illiterate (%)	Literate (%)	At most 3 (%)	4 and more (%)
Barisal	2011	12.68	87.32	18.93	81.07	47.85	52.14	93.58	6.42
	2015	11.7	88.3	16.13	83.87	47.44	52.56	93.36	6.64
Chittagong	2011	7.26	92.74	35.92	64.08	45.63	54.37	88.19	11.81
	2015	7.32	92.68	33.81	66.19	41.16	58.84	89.94	10.06
Dhaka	2011	6.86	93.14	16.53	83.47	57.51	42.48	93.39	6.61
	2015	7.51	92.49	19.92	80.08	53.25	46.75	93.55	6.45
Khulna	2011	15.98	84.02	9.85	90.15	46.54	53.45	97.19	2.81
	2015	15.41	84.59	10.37	89.63	44.62	55.38	97.77	2.23
Rajshahi	2011	10.32	89.68	4.00	96.00	56.63	43.37	96.21	3.79
	2015	10.83	89.17	7.30	92.7	54.5	45.49	96.57	3.43
Rangpur	2011	10.88	89.12	8.84	91.16	57.59	42.4	96.37	3.63
	2015	10.58	89.42	9.03	90.97	52.82	47.18	97.51	2.49
Sylhet	2011	19.17	80.83	16.50	83.5	52.84	47.17	80.00	20.00
	2015	18.44	81.56	15.31	84.69	50.75	49.25	80.37	19.63
Overall	2011	10.94	89.06	17.01	82.99	52.42	47.58	92.15	7.85
	2015	10.92	89.08	17.59	82.41	49.34	50.66	92.68	7.32

The indicators on children's anthropometric measures are not too favourable as per WHO standards (WHO, 2010). While fewer children below the age of five were stunted (height for age less than -2 standard deviations (SD)) in 2015, the proportion of underweight (weight for age less than -2 SD) and wasted (weight for height less than -2 SD) children increased. This is a concern as these indicators have serious implications on the child's further growth and development – both physical and mental, which can exacerbate inequality with respect to their peers with better nutritional outcomes (*ceteris paribus*).

Figure 3: Distribution of stunted, wasted and underweight children



## 5. Methodology

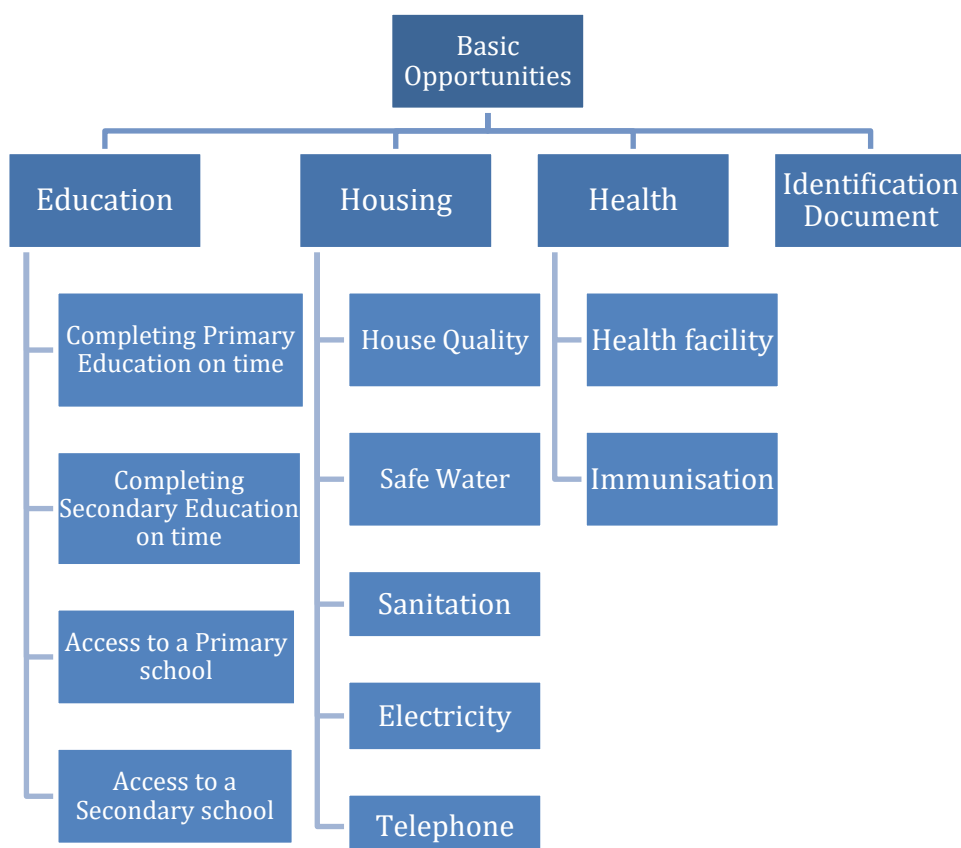
### *Basic Opportunities and Circumstances*

For adults, endogeneity makes classifying opportunities as the result of either effort or circumstance more difficult. But for a child, access to safe drinking water or to a primary school is plausibly an exogenous opportunity. Access is controlled not by the child, but by the family or society. Hence, because opportunities are easier to directly observe among children, and because opportunities early in life are a precondition for equality of opportunity throughout the lifetime, this study focuses on basic opportunities among children.

The HOI is a synthetic measure of inequality of opportunity in basic services for children. The index is inspired by the work of Amartya Sen and posits that a development process in which society attempts to equitably supply basic opportunities requires ensuring that as many children as possible have access to those basic opportunities, with a target of universalism; it requires distributing available basic opportunities increasingly toward the more disadvantaged groups.

Basic Opportunities in this paper are defined by twelve indicator variables under four broad dimensions shown in the flowchart below. The variables are further explained in Table 2.

Chart 1: List of Basic Opportunities



Source: Author's framework

Table 2: Explanation of the opportunity variables considered

<b>Outcome Variable</b>	<b>Explanation</b>
Completing primary education on time	“1” if the child has completed sixth grade, given s/he is 10-12 years old. “0” otherwise.
Completing secondary education on time	“1” if the child has completed tenth grade, given s/he is 14-16 years old. “0” otherwise.
Access to primary school	“1” if there is a primary school at most 30 minutes away from home. “0” otherwise.
Access to secondary school	“1” if there is a secondary school at most 30 minutes away from home. “0” otherwise.
House quality	“1” if roof material is concrete/brick/tin sheet/wood and walls material is concrete/brick/tin sheet/wood/mud and floor material is concrete/brick/wood/mud. “0” otherwise.
Safe water	“1” if the water source is piped inside the house, piped outside, own tubewell, community tubewell, rainwater. “0” otherwise.
Sanitation	“1” if the latrine type is pucca (unsealed), sanitary with, or without flush (sealed). “0” otherwise.
Electricity	“1” if the house has electricity. “0” otherwise.
Telephone	“1” if the house has a cell phone or a land line. “0” otherwise.
Health facility	“1” if there is a health centre, hospital or community clinic within 30 minutes from the house. “0” otherwise.
Immunisation	“1” if the child has received BCG, Hepatitis B or OPV vaccination. “0” otherwise.
Identification document	“1” if the child has a birth certificate. “0” otherwise.

For education, the completion of sixth grade on time is used as a proxy for a child’s opportunity for basic education. Primary schools must be of sufficient quality to provide the differentiated instruction required to get all children promoted through the first six years of schooling on time, avoiding grade repetition or very low marks. If schooling quality is good, the child will learn the content needed to be promoted from grade to grade, regardless of his or her circumstances.<sup>5</sup> In a world of equality of opportunity, all children, regardless of their circumstances, should have access to basic quality education. In practice, this variable is measured by computing the probability of having ended sixth grade on time for all children aged 10 to 12. Similarly, completion of tenth grade on time is looked at as a proxy for a child’s opportunity for higher education. It is measured by computing the probability of having ended tenth grade on time for all children aged 14 to 16, as that is the standard age in Bangladesh to complete secondary school. To avail education services however, it is crucial that there are schools at proximity. There are still villages in Bangladesh where children have to travel large distances to reach school, which is one of the reasons why many of them gradually drop out.

<sup>5</sup> Bangladesh does not have a “no retention” policy, wherein children would be promoted across classes regardless. This is important to note as, if there was such a policy in play, this could confound the results.

A child's access to adequate housing conditions is a critical element of the opportunity for a healthy life. Five conditions have been selected for this study: access to water, sanitation, electricity, a quality house, and a telephone. Numerous studies exist that establish the importance of these factors for a child's development. Improved water, sanitation, and hygiene are the only ways to reduce the incidence of diarrhea and related serious long-term consequences, which include making children more vulnerable to malnutrition and opportunistic infections (such as pneumonia), and physical or mental stunting for the rest of their lives. Water and sanitation are primary drivers of public health and should be considered basic opportunities for all children. Quality of the house, especially its resilience to harsh weathers (such as heavy rain) and natural calamities is an important factor too.

Access to electricity is also a basic opportunity for children. Electricity improves quality of life with respect to alternative sources of energy for lighting, cooking, and heating, such as kerosene and wood fuel. The provision of electricity to households allows for improved conditions for studying in the evenings; for avoiding deaths produced by indoor air pollution due to biomass burning (particularly among young children and mothers); for accessing information and entertainment via radio, television, and the Internet; for freeing parents' time from domestic chores so they could spend quality time raising their children; and for home and community safety. In a rapidly growing, socially connected world, owning a telephone (whether a mobile phone or a land line) in the house is also an asset. All children ages 0 to 16 are considered for the housing conditions.

There should be at least one health facility – hospital or community clinic – in close proximity to the house. These facilities should inform new mothers of best practices as well as administer vaccinations to the children at appropriate ages. Immunization is a way of protecting from serious yet preventable diseases. It also protects the broader community by minimizing the spread of the disease. Immunizations against polio, hepatitis B and tuberculosis are considered as they are given at birth, and every infant should have received it.

The issuance of a birth certificate is consistent with Article 7 of the Convention on the Rights of the Child (UNOCHR, 1989) that states that every child should be registered immediately after birth. Birth certificate is a basic legal document that automatically bestows a number of rights such as right to an official identity, nationality, schooling, voting, and passport. Without birth registration, it becomes difficult to protect a child against early marriage and child labour. In most developing countries, however, the onus to register a birth is entirely on the family. Even if it is assumed that they are aware of this obligation, it often requires substantial effort and expense, and can take several weeks. This explains in part why so many births go unrecorded. South Asia has the largest number of unregistered children, with approximately 22.5 million, or over 40 percent of the world's unregistered births in 2000 (UNICEF, 2003). The homepage of UNICEF Bangladesh states that only 37 percent of children below five years are registered (UNICEF, 2018). As far as the author is aware, this is the first paper that takes birth registration into consideration.

A child's circumstances are defined by: (i) gender (ii) religion (iii) household head's education (iv) total number of children aged 0-16 in the house (v) per capita expenditure (as a proxy for income). Age of the child is also considered for the probability of completing primary and secondary education on time, and for immunizations. The specification of these variables can be found in the Appendix A2. Ethnicity would be an important consideration in many countries. However, given that over 98

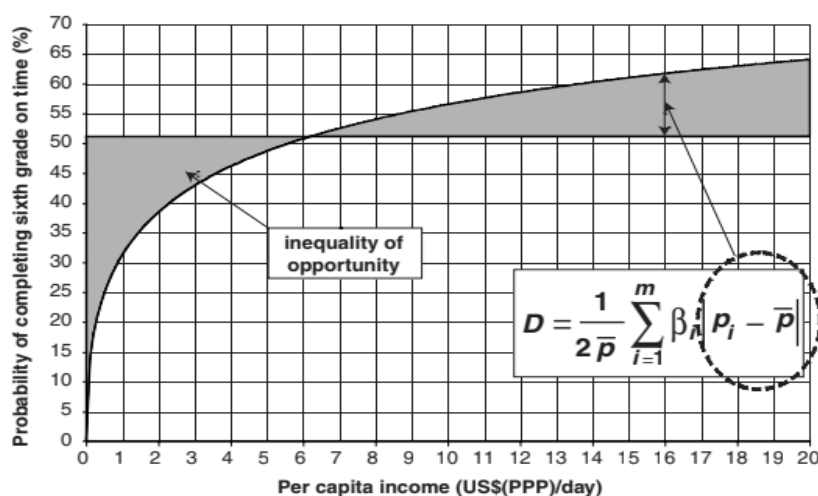
percent of the population is *Bengali* (remaining are *Bihari* or belong to other tribes), ethnicity was not taken into consideration in this context. Location of residence (urban/rural) is another crucial circumstance. But as the dataset is representative of rural Bangladesh, this aspect cannot be included in the study. Lastly, while the household head's occupation and mother's education play an important role in accessing many of the basic opportunities, the dataset covers only households with farming as the primary occupation of the household head, and does not have information on the mother's education (unless she is the household head). Hence, these variables could not be included in the analysis.

### *Inequality of Basic Opportunities*

The use of the overall coverage rate to monitor progress towards universal access of a service has a fundamental shortcoming: insensitivity to the allocation of opportunities. This is not an issue when access is universal; in this case, the number of available opportunities is equal to or greater than the population size and everyone has access to an opportunity. However, when coverage is only partial, opportunities are scarce and a variety of alternative allocations are possible. Among these alternatives, fairness may vary considerably. The overall coverage rate treats all of them as equals.

The appropriate measure of inequality of opportunity is a version of the dissimilarity index, widely used in sociology. The D-index measures the dissimilarity of access rates for a given service for groups defined by circumstance characteristics compared with the average access rate for the same service for the population as a whole. Access probability gaps are the core of this index. It can also be intuitively interpreted as showing the fraction of all available opportunities that needs to be reassigned from better-off groups to worse-off groups to achieve equal opportunity for all. If there is perfect equality of opportunity, an exact correspondence between population and opportunity distributions should be observed and the D-index will be 0.

Figure 4: Graphical Representation of the Dissimilarity Index



Source: Authors' estimation.

Note: PPP = purchasing power parity.

Source: Barros et al., 2009

The index is Pareto-consistent, in that it will improve if the overall average access to a given opportunity increases, no matter how access is distributed — as long as someone is better off, and no one is worse off. However, the D-index gives greater weight to those opportunities allocated to a disadvantaged sector of the population than to those allocated to an advantaged group, and is therefore a distribution-sensitive measure.

### *Human Opportunity Index*

The HOI is an equity-sensitive measure. It summarizes in a composite indicator the two elements: (i) how many opportunities are available, i.e., the coverage rate of a basic service and (ii) how equitably those opportunities are distributed, i.e., whether distribution of that coverage is related to exogenous circumstances (D-Index). It is given by:

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

where C = overall coverage rate

and (1-D) = percentage of available opportunities that were equitably allocated

An important feature of the index is that changes can be decomposed over time. Two forces drive the index: for a given level of D, an increase in the prevalence of opportunities (that is, a higher C) increases the index, while an improvement in the way existing opportunities are allocated (a reduction in D) will also improve the index. The former is called the *scale effect* while the latter is the *distribution effect*. Hence, an increase in coverage of a basic service at the national level will always improve the index. However, if that increase in coverage is biased toward a disadvantaged group (for example, children in a poor region), it will further reduce inequality of opportunity, increasing the index more than proportionally.

$$\text{Change} = O^f - O^i$$

$$= \text{Scale Effect} + \text{Distribution Effect}$$

$$= [C^f(1 - D^i) - C^i(1 - D^i)] + [C^f(1 - D^f) - C^f(1 - D^i)]$$

Here, the initial time period  $i$  is the year 2011 and final time period  $f$  is 2015. Only by combining expansion of coverage (C) with equal allocation of opportunity (1-D) will the growth of the Human Opportunity Index be maximized. The index ranges between 0 and 1 (or 0 and 100 in percentage – the higher the better), and is Pareto-consistent.

### *Empirical Computation of the Index*

Suppose a person  $i$  has access to a given opportunity ( $I_i = 1$  if person  $i$  has access and  $I_i = 0$  otherwise) and a vector of  $m$  variables indicating his/her circumstances,  $x_i = (x_{1i}, \dots, x_{mi})$ .

Step 1: Estimate a logistic model, linear in the parameters:

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

where  $x_k$  denotes the row vector of variables representing the  $k$ -dimension of circumstances, hence,  $x = (x_1, \dots, x_m)$  and  $\beta' = (\beta_0, \dots, \beta_m)$  will be a corresponding column vector of parameters.<sup>6</sup> From the estimation of this logistic regression, estimates of the parameters  $\beta_k$  denoted by  $\hat{\beta}_{k,n}$  are obtained, where  $n$  denotes the sample size. The results of the logistic regressions are shown in the Appendix A3.

Step 2: Given the estimated coefficients, obtain the predicted probability of access to the opportunity in consideration for each individual in the sample, i.e., for each individual  $i$  compute

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

Step 3: Then, compute the average coverage rate, weighted by the sampling weights,  $w_i$ .

$$\bar{p} = \sum_{i=1}^n w_i \hat{p}_i$$

Step 4: The D-Index is given by the formula

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

where  $p_i$  = group-specific access rate

$|p_i - \bar{p}|$  = access probability gap

and  $\hat{D}$  is a consistent estimator of D.

Step 5: Finally, the opportunity index combines the result in steps 3 and 4

$$\hat{o} = \bar{p} (1 - \hat{D})$$

$\hat{o}$  is a consistent estimator of O.

Several mathematical properties as well as limitations of the dissimilarity index and opportunity index are detailed in Barros et al. (2010, 2008).

## 6. Results

### *Coverage of Basic Opportunities*

---

<sup>6</sup> A logistic model is used as the dependent outcome variables are binary (refer to Table 2). The model estimates the 'log odds', or the natural log of the odds of an event (here, I) occurring. The coefficients in the output of the logistic regression (here,  $\hat{\beta}$ ) indicate the amount of change expected in the log odds when there is a one unit change in the predictor variable with all of the other variables in the model held constant.



The coverage rate gives detailed information about the availability of the services, without reference to the equity of their distribution, which is addressed in the next sub-section.

For education, Bangladesh has registered an increase in children completing sixth grade on time. By 2015, a simple average across divisions of the probability of an 11-year-old child completing sixth grade was 38 percent, up from 20 percent in 2011. The average probability of a 15-year-old child completing tenth grade was 37 percent in 2015, only slightly more than the probability of 36.5 percent in 2011. These numbers are low, once we consider that 74 percent of the children had access to primary schools and 45 percent had access to secondary schools in 2015.

The average probability of completing primary school increased greatly for all divisions by at least 15 percentage points. However, the divisions have very low levels of this indicator, with only Barisal faring above 40 percent. The probability is the least in Rangpur, at 34 percent. For completing secondary education, Sylhet has the highest probability, while Rangpur is again at the bottom. However, in terms of access to primary schools, Rangpur is among the top three with highest probabilities. Dhaka, Rajshahi and Rangpur have access rates above 78 percent. Access rates for secondary school are highest in Dhaka and Khulna, at 50 percent.

Table 3: Coverage of Basic Opportunities in Education

Division	Completing sixth grade on time		Completing tenth grade on time		Access to Primary School		Access to Secondary School	
	2011	2015	2011	2015	2011	2015	2011	2015
Barisal	18.45%	41.59%	34.26%	40.14%	-	75.99%	-	42.46%
Chittagong	21.58%	36.15%	36.40%	39.25%	-	67.37%	-	43.26%
Dhaka	20.81%	36.03%	36.03%	34.24%	-	78.13%	-	50.06%
Khulna	18.69%	38.59%	35.08%	40.76%	-	69.70%	-	50.23%
Rajshahi	22.44%	38.05%	34.61%	35.29%	-	78.56%	-	44.19%
Rangpur	18.63%	33.85%	29.68%	26.08%	-	78.01%	-	43.96%
Sylhet	20.70%	39.80%	49.42%	46.59%	-	67.08%	-	38.41%
Overall	20.19%	37.72%	36.50%	37.48%		73.55%		44.65%

Note: - = Data not available

Access to quality housing is mostly uniform across divisions, above 80 percent for all except Khulna (78 percent). Important differences persist with regard to access to electricity - in Rangpur and Barisal, less than 45 percent have access while in Chittagong, almost 68 percent have access. The average across divisions for access to clean water is 73 percent. This average hides important differences. 85 percent of children in Khulna live in dwellings which have access to safe water, whereas 66 percent of children in Sylhet dwell similarly. The percentage of children living in houses with a latrine is high, with the country average at 87 percent. Bangladesh seems to have made massive strides in this domain. Access to telephones is high too, with an average of 89 percent of houses owning a phone. It is the most uniform across divisions.

Table 4: Coverage of Basic Opportunities in Housing Conditions

House Quality	Electricity	Water	Sanitation	Telephone
---------------	-------------	-------	------------	-----------

Division	2011	2015	2011	2015	2011	2015	2011	2015	2011	2015
Barisal	87.85%	93.35%	40.17%	43.45%	88.03%	68.69%	77.85%	92.03%	70.17%	90.32%
Chittagong	76.13%	84.25%	56.33%	67.61%	88.06%	66.19%	84.25%	92.12%	82.28%	93.54%
Dhaka	83.28%	92.84%	48.22%	61.30%	79.35%	70.68%	70.05%	91.69%	74.04%	88.05%
Khulna	69.82%	78.87%	49.74%	61.02%	92.45%	82.67%	85.16%	85.17%	76.72%	89.37%
Rajshahi	85.68%	90.77%	48.42%	62.87%	98.77%	74.67%	62.52%	90.98%	76.21%	90.55%
Rangpur	69.38%	83.74%	26.30%	41.98%	98.25%	85.32%	70.06%	77.20%	65.53%	85.10%
Sylhet	67.33%	87.68%	42.66%	55.40%	77.16%	66.05%	75.50%	80.03%	71.66%	88.68%
Overall	77.07%	87.36%	44.55%	56.23%	88.87%	73.47%	75.06%	87.03%	73.80%	89.37%

Access to immunisations is roughly 80 percent for all divisions (71 percent in Barisal). In Rajshahi and Khulna, over 90 percent of children live close to a health facility, whereas the same statistic in Rangpur is 79 percent. Bangladesh fared the best in the Health category in 2015.

There is a large disparity in children with birth certificates. 78 percent of children in Rangpur have a birth certificate, while only 30 percent of children in Sylhet have one.

Table 5: Coverage of Basic Opportunities in Health and Identification Document

Division	Immunization		Health Facility		Birth Certificate	
	2011	2015	2011	2015	2011	2015
Barisal	89.85%	71.21%	-	88.98%	74.39%	81.69%
Chittagong	77.18%	78.14%	-	85.12%	60.86%	72.99%
Dhaka	78.42%	81.36%	-	87.31%	72.21%	79.76%
Khulna	91.95%	85.00%	-	90.81%	80.95%	85.88%
Rajshahi	88.60%	81.81%	-	90.56%	67.68%	79.12%
Rangpur	90.00%	85.52%	-	79.64%	70.25%	74.95%
Sylhet	61.33%	80.22%	-	80.37%	62.85%	71.61%
Overall	82.48%	80.47%		86.11%	69.88%	78.00%

Note: - = Data not available

### *Inequalities in Opportunity*

The average in 2015 of the D-Index for completing sixth grade was 15 percent, indicating that 15 percent of the opportunities of children to complete sixth grade on time need to be reallocated in these divisions to eliminate the differences across the defined circumstance groups. Inequalities have increased in Chittagong, Rajshahi and Dhaka. The index is higher for completing tenth on time (16 percent), but it has reduced for all divisions since 2011. Inequality in access to schools is lower, at 7 percent for primary schools and 9 percent for secondary school (Table 6).

Table 6: Inequality of Opportunities in Education

Completing sixth grade on time	Completing tenth grade on time	Access to Primary School	Access to Secondary School
--------------------------------	--------------------------------	--------------------------	----------------------------

Division	2011	2015	2011	2015	2011	2015	2011	2015
Barisal	18.37%	11.00%	34.17%	17.48%	-	6.68%	-	9.75%
Chittagong	8.20%	15.17%	25.28%	12.96%	-	4.96%	-	5.65%
Dhaka	9.61%	14.37%	25.98%	13.69%	-	4.90%	-	7.34%
Khulna	36.87%	17.30%	29.24%	20.93%	-	7.14%	-	7.28%
Rajshahi	13.29%	16.32%	33.11%	11.84%	-	6.39%	-	7.87%
Rangpur	20.85%	17.09%	31.17%	21.01%	-	6.66%	-	12.58%
Sylhet	16.34%	13.97%	24.31%	15.64%	-	10.13%	-	10.16%
Overall	17.65%	15.03%	29.04%	16.22%		6.69%		8.66%

Note: - = Data not available

Inequality of opportunity averages 3 percent for quality housing, 5 percent for water, 3 percent for sanitation, 3 percent for telephones and 11 percent for electricity (Table 7). Again, these averages hide important cross-division differences. These wide differences – up to 10 percentage points in electricity – are smaller for phones (3 percentage points). Inequalities in access to safe water seem to have increased for divisions since 2011. Rajshahi has taken significant steps to reduce inequalities in sanitation and Sylhet has improved a lot in providing quality housing and telephones. The slow improvement in distribution of electricity, despite high initial levels of inequality, indicates that advances in promoting equality of opportunity in this area have been slow.

Table 7: Inequality of Opportunities in Housing Conditions

Division	House Quality		Electricity		Water		Sanitation		Telephone	
	2011	2015	2011	2015	2011	2015	2011	2015	2011	2015
Barisal	4.36%	2.27%	15.61%	14.98%	0.61%	3.50%	6.36%	2.92%	9.27%	3.59%
Chittagong	3.95%	2.66%	11.16%	9.23%	1.64%	9.08%	3.20%	1.97%	6.82%	2.24%
Dhaka	4.60%	2.14%	13.15%	10.43%	3.91%	5.81%	4.50%	1.48%	8.22%	3.00%
Khulna	6.73%	3.86%	11.81%	7.66%	1.41%	4.06%	3.05%	3.57%	6.36%	2.10%
Rajshahi	5.38%	3.02%	12.71%	9.17%	0.24%	4.07%	12.04%	3.36%	8.51%	3.17%
Rangpur	7.94%	6.14%	26.59%	17.27%	0.46%	3.13%	7.63%	4.37%	10.31%	5.06%
Sylhet	7.28%	1.76%	16.13%	8.49%	3.55%	4.26%	7.37%	5.75%	12.17%	4.61%
Overall	5.75%	3.12%	15.31%	11.03%	1.69%	4.84%	6.31%	3.35%	8.81%	3.40%

There is very low inequality in access to health facilities, with a national average of 2 percent. Inequalities seem to have increased for providing immunizations, except in Dhaka and Sylhet. The D-Index is 6 percent for the whole country (Table 8).

Table 8: Inequality of Opportunities in Health and Identification Document

Division	Immunization		Health Facility		Birth Certificate	
	2011	2015	2011	2015	2011	2015
Barisal	4.91%	7.20%	-	1.60%	4.64%	13.51%
Chittagong	5.43%	6.52%	-	1.84%	7.77%	4.54%

Dhaka	6.82%	3.07%	-	1.30%	5.86%	4.23%
Khulna	3.64%	6.79%	-	1.44%	6.03%	12.63%
Rajshahi	5.45%	6.07%	-	2.09%	9.72%	9.02%
Rangpur	3.85%	5.18%	-	3.07%	9.18%	2.67%
Sylhet	8.91%	5.20%	-	3.33%	1.97%	7.54%
Overall	5.57%	5.72%		2.10%	6.45%	7.73%

Note: - = Data not available

The average inequality in access to birth certificates is 8 percent (Table 8). The degree varies considerably by division. In Rangpur, better-off groups and worse-off groups are on average only 3 percent above or below the national average of having a birth certificate, whereas in Barisal this average distance is 14 percent.

### Opportunity Index and Decompositions

With respect to finishing sixth grade on time, only 28 percent of all opportunities needed to ensure universal access to primary education are both available and allocated equitably in Rangpur, compared with 37 percent in Barisal (Table 9). This is the combination of both average coverage and distribution of access. The opportunity index for completing secondary education has increased for all divisions, largely due to a distributional effect (Figure 5). Average opportunity to primary and secondary school is 69 and 41 percent, respectively.

Figure 5: Decomposition of Change in HOI for Education

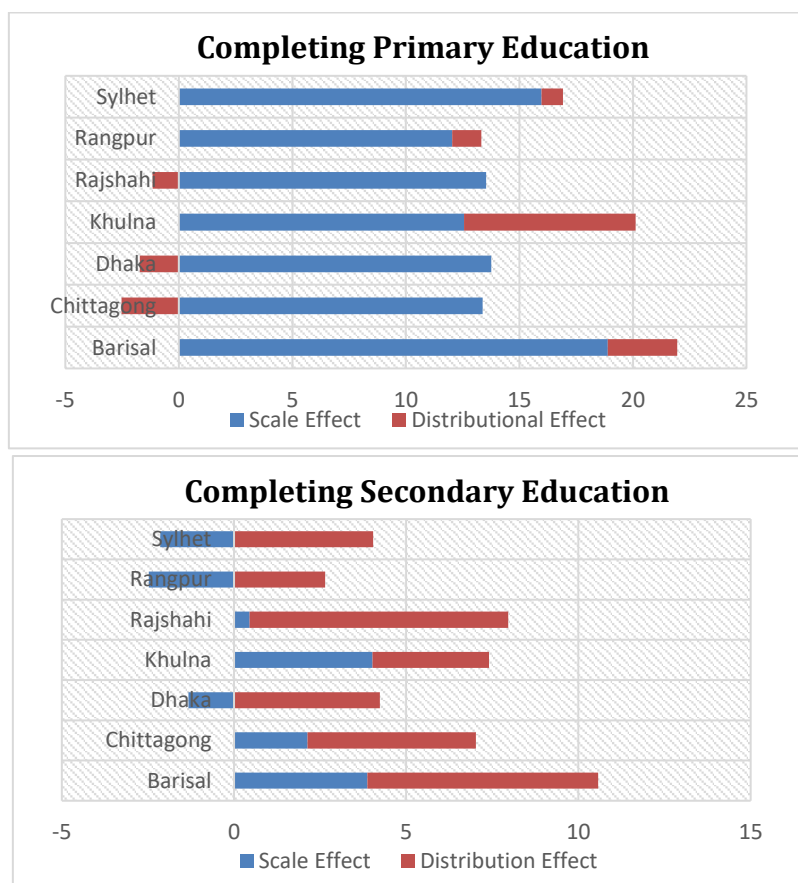


Table 9: Human Opportunity Indexes in Education

Division	Completing primary education					Completing secondary education					Primary school		Secondary school	
	2015	2011	Change (pp)	Scale Effect	Distribution Effect	2015	2011	Change (pp)	Scale Effect	Distribution Effect	2015	2011	2015	2011
Barisal	37.01%	15.06%	21.95	18.89	3.07	33.12%	22.55%	10.57	3.87	6.70	70.91%	-	38.31%	-
Chittagong	30.66%	19.81%	10.85	13.38	-2.52	34.22%	27.20%	7.02	2.13	4.89	64.02%	-	40.82%	-
Dhaka	30.85%	18.81%	12.04	13.76	-1.72	29.57%	26.66%	2.91	-1.32	4.23	74.29%	-	46.38%	-
Khulna	31.91%	11.79%	20.12	12.56	7.55	32.22%	24.82%	7.4	4.02	3.38	64.72%	-	46.57%	-
Rajshahi	31.84%	19.46%	12.38	13.54	-1.15	31.11%	23.15%	7.96	0.45	7.51	73.53%	-	40.71%	-
Rangpur	28.06%	14.75%	13.31	12.05	1.27	20.60%	20.43%	0.17	-2.48	2.65	72.81%	-	38.43%	-
Sylhet	34.24%	17.32%	16.92	15.98	0.94	39.30%	37.40%	1.9	-2.14	4.04	60.28%	-	34.50%	-

Note: pp refers to percentage points.

Table 10: Human Opportunity Indexes in Housing Conditions

Division	House Quality					Electricity					Water				
	2015	2011	Change (pp)	Scale effect	Distribution effect	2015	2011	Change (pp)	Scale effect	Distribution effect	2015	2011	Change (pp)	Scale effect	Distribution effect
Barisal	91.23%	84.02%	7.21	5.26	1.95	36.94%	33.90%	3.04	2.77	0.27	66.28%	87.49%	-21.21	-19.22	-1.99
Chittagong	82.01%	73.13%	8.88	7.80	1.08	61.37%	50.04%	11.33	10.02	1.31	60.17%	86.61%	-26.44	-21.51	-4.93
Dhaka	90.85%	79.44%	11.41	9.12	2.29	54.90%	41.87%	13.03	11.36	1.67	66.57%	76.24%	-9.67	-8.33	-1.34
Khulna	75.82%	65.11%	10.71	8.44	2.27	56.34%	43.86%	12.48	9.95	2.53	79.31%	91.14%	-11.83	-9.64	-2.19
Rajshahi	88.02%	81.06%	6.96	4.82	2.14	57.10%	42.26%	14.84	12.61	2.23	71.63%	98.52%	-26.89	-24.04	-2.85
Rangpur	78.59%	63.87%	14.72	13.22	1.50	34.73%	19.30%	15.43	11.51	3.92	82.65%	97.80%	-15.15	-12.87	-2.28
Sylhet	86.13%	62.42%	23.71	18.87	4.84	50.69%	35.78%	14.91	10.69	4.22	63.23%	74.42%	-11.19	-10.72	-0.47

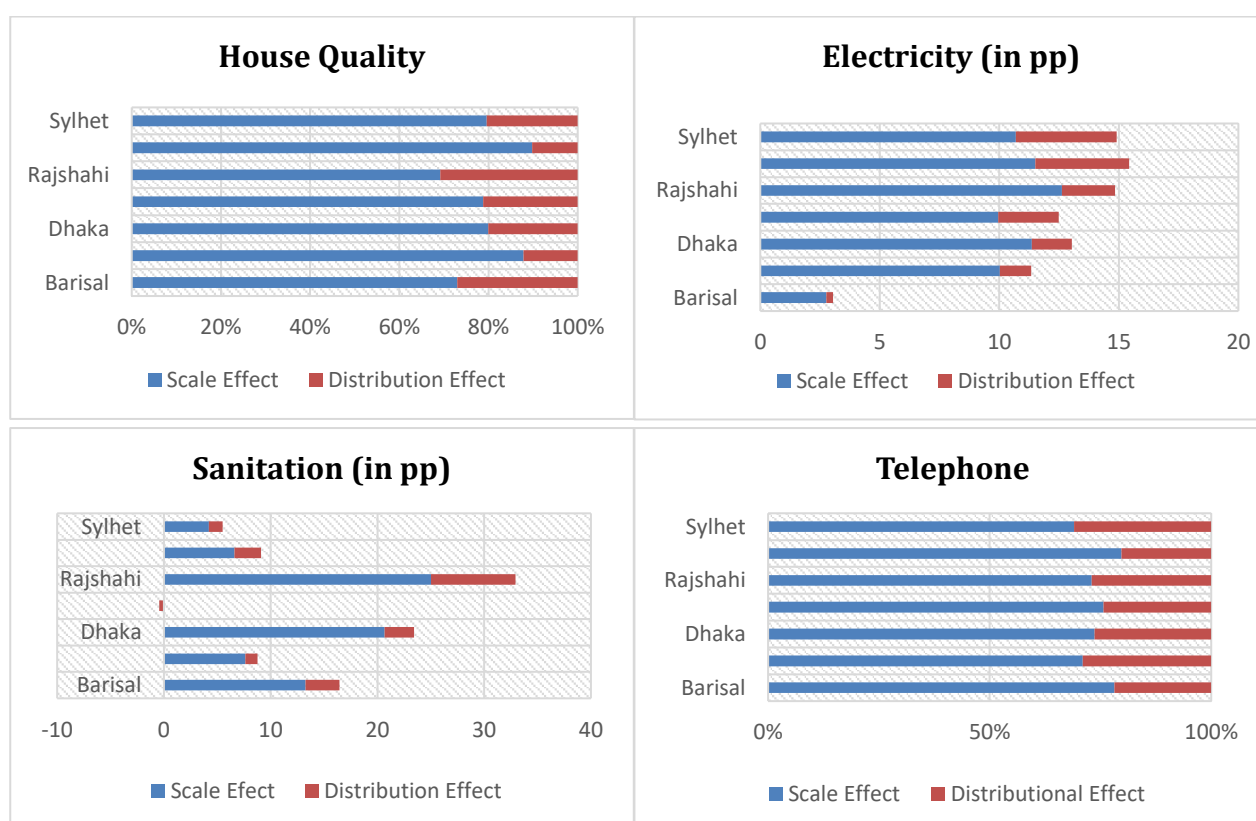
Note: pp refers to percentage points.

Table 11: Human Opportunity Indexes in Housing Conditions (continued)

Division	Sanitation					Telephone				
	2015	2011	Change (pp)	Scale effect	Distribution effect	2015	2011	Change (pp)	Scale effect	Distribution effect
Barisal	89.34%	72.89%	16.45	13.28	3.17	87.07%	63.67%	23.4	18.28	5.12
Chittagong	90.31%	81.55%	8.76	7.62	1.14	91.44%	76.66%	14.78	10.49	4.29
Dhaka	90.33%	66.89%	23.44	20.67	2.77	85.41%	67.96%	17.45	12.86	4.59
Khulna	82.12%	82.56%	-0.44	0.01	-0.45	87.49%	71.84%	15.65	11.85	3.80
Rajshahi	87.92%	54.99%	32.93	25.03	7.90	87.68%	69.71%	17.97	13.12	4.85
Rangpur	73.82%	64.71%	9.11	6.60	2.51	80.78%	58.77%	22.01	17.55	4.46
Sylhet	75.42%	69.93%	5.49	4.20	1.29	84.59%	62.94%	21.65	14.95	6.70

The Human Opportunity Index for housing conditions (Table 10 and Table 11) improved in the region for all indicators except water. These changes are largely driven by a scale effect (Figure 6). Equal opportunity in access to quality housing increased from 73 percent to 84 percent, on average. In sanitation, the average grew from 70.5 percent to 84 percent, while in electricity it went from 38 percent to 50 percent.

Figure 6: Decomposition of Change in HOI for Housing Conditions



The average of the index over all the divisions for being immunised (Table 12) went down from 77 percent in 2011 to 76 percent in 2015. For the same period, birth certificates for children decreased from 65 percent to 56 percent. The opportunity index for health facilities is high, at 84 percent.

Table 12: Human Opportunity Indexes in Health and Identification Document

Division	Immunization					Health Facility		Birth Certificate				
	2015	2011	Change (pp)	Scale effect	Distribution Effect	2015	2011	2015	2011	Change (pp)	Scale effect	Distribution Effect
Barisal	66.07%	85.43%	-19.36	-17.72	-1.64	87.55%	-	51.35%	70.93%	-19.58	-14.32	-5.26
Chittagong	73.04%	72.99%	0.05	0.91	-0.86	83.55%	-	67.15%	56.13%	11.02	8.75	2.27
Dhaka	78.86%	73.06%	5.80	2.74	3.06	86.17%	-	64.30%	67.98%	-3.68	-4.77	1.09
Khulna	79.22%	88.60%	-9.38	-6.70	-2.68	89.49%	-	50.44%	76.06%	-25.62	-21.82	-3.80
Rajshahi	76.84%	81.88%	-5.04	-6.42	1.38	88.67%	-	53.06%	61.10%	-8.04	-8.44	0.40
Rangpur	81.09%	86.52%	-5.43	-4.31	-1.12	77.19%	-	75.85%	63.80%	12.05	6.98	5.07
Sylhet	76.04%	55.86%	20.18	17.21	2.97	77.69%	-	27.60%	61.61%	-34.01	-32.35	-1.66

Table 13: Summary Opportunity Indexes

Division	Education		Housing		Health		Identification Document	
	2011	2015	2011	2015	2011	2015	2011	2015
Barisal	18.81%	44.84%	68.39%	74.17%	84.98%	76.81%	70.93%	51.35%
Chittagong	23.51%	42.43%	73.60%	77.06%	72.47%	78.30%	56.13%	67.15%
Dhaka	22.74%	45.27%	66.48%	77.61%	71.17%	82.52%	67.98%	64.30%
Khulna	18.31%	43.86%	70.90%	76.22%	89.75%	84.36%	76.06%	50.44%
Rajshahi	21.31%	44.30%	69.31%	78.47%	80.58%	82.76%	61.10%	53.06%
Rangpur	17.59%	39.98%	60.89%	70.11%	83.01%	79.14%	63.80%	75.85%
Sylhet	27.36%	42.08%	61.10%	72.01%	55.11%	76.87%	61.61%	27.60%
Overall	21.37%	43.25%	67.24%	75.09%	76.72%	80.11%	65.37%	55.68%

One important observation stands out from these tables. Divisions can rank differently when measuring different opportunities. For instance, Sylhet performs highly for health but poorly on birth certificate. Some, however, rank consistently across all dimensions. For instance, Rangpur has low results for most.

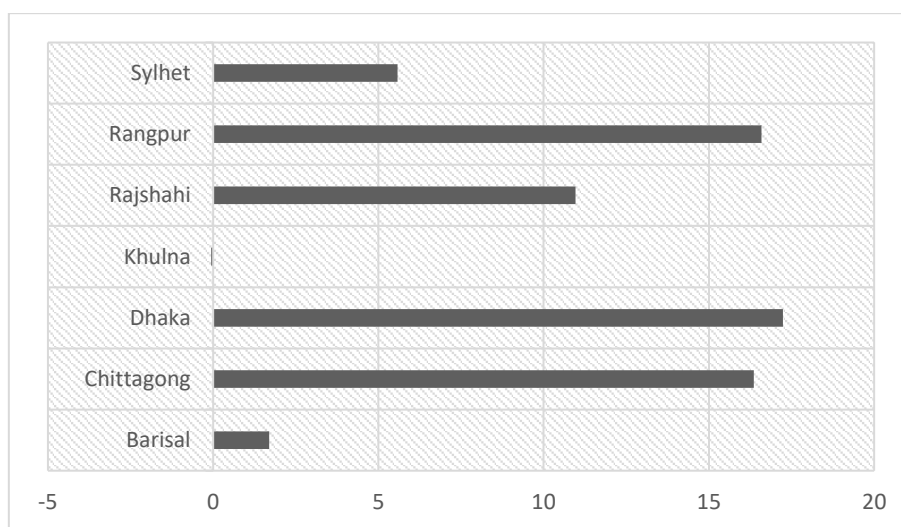
### *The Bigger Picture*

A summary index incorporates all twelve indicators into four dimensions of children’s opportunities — education, housing conditions, health and identification document. These dimensions are then summarized in a single Human Opportunity Index (Table 13). The overall Human Opportunity Index is a simple average of the division indexes along all dimensions. Each dimension has a summary index itself. For education, it is the simple average of the four indicators, and for housing conditions it is the simple average of the five indicators. The summary index for each dimension equals the proportion of available opportunities that are distributed according to the principle of equality of opportunity. Note that because the Human Opportunity Index is a simple average, the opportunities are *assumed* to be perfect substitutes within each dimension, and each dimension is a perfect substitute for the other.

Dhaka ranks at the top with an overall Human Opportunity Index of 67 percent while Sylhet is at the bottom with 54 percent. In the summary index for Education, Dhaka is again on the top. Rajshahi does best for Housing conditions, Khulna for Health, and Rangpur for Identification document.

All divisions in the country have recorded increases in the index for the period 2011-15, barring Khulna which has remained at the same level. Some have improved significantly, such as Dhaka, Chittagong and Rangpur (Figure 7). This indicates that there is room for policy options with regard to improvement of the index for the other divisions.

Figure 7: Change in HOI by Division (%)



Comparing by opportunity for Bangladesh, education has recorded the greatest percentage increase in HOI, crossing 100 percent (Table 14 and Figure 8). There is a small improvement in the health and housing dimensions, while there is a percentage decrease in the index for identification document. A



reason behind this may be because the high level in health and housing opportunity in 2011 to some extent restricted their potential for growth. Since the initial level for education was low, there was more scope for growth and improvement.

Table 14: Summary Indexes by Basic Opportunity

Opportunity	2015			2011		
	Coverage	D-Index	HOI	Coverage	D-Index	HOI
Education	48.35%	11.65%	43.25%	28.34%	23.34%	21.37%
Housing	78.69%	5.15%	75.09%	71.87%	7.57%	67.24%
Health	83.29%	3.91%	80.11%	82.48%	5.57%	76.72%
Documentation	60.10%	7.73%	55.68%	69.88%	6.45%	65.37%

Figure 8: Change in HOI by opportunity (%)

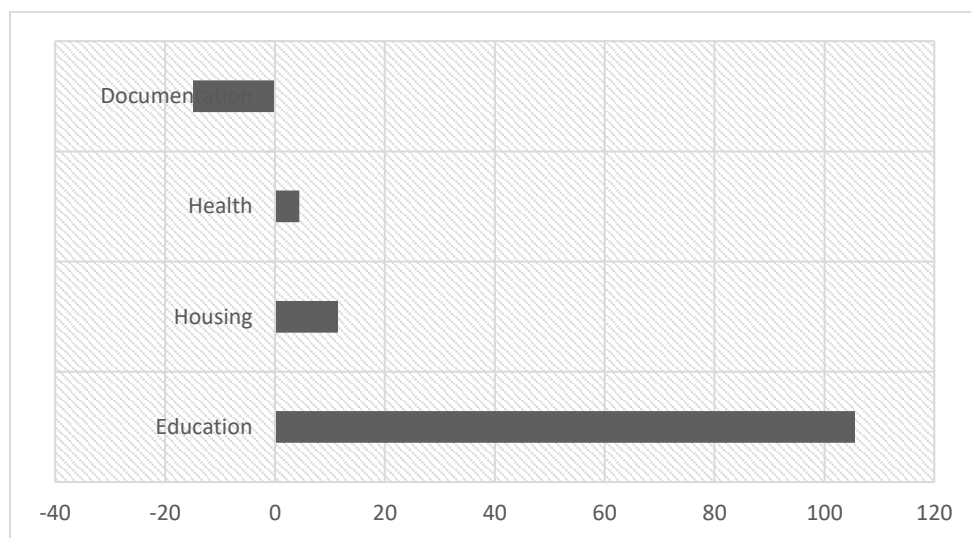
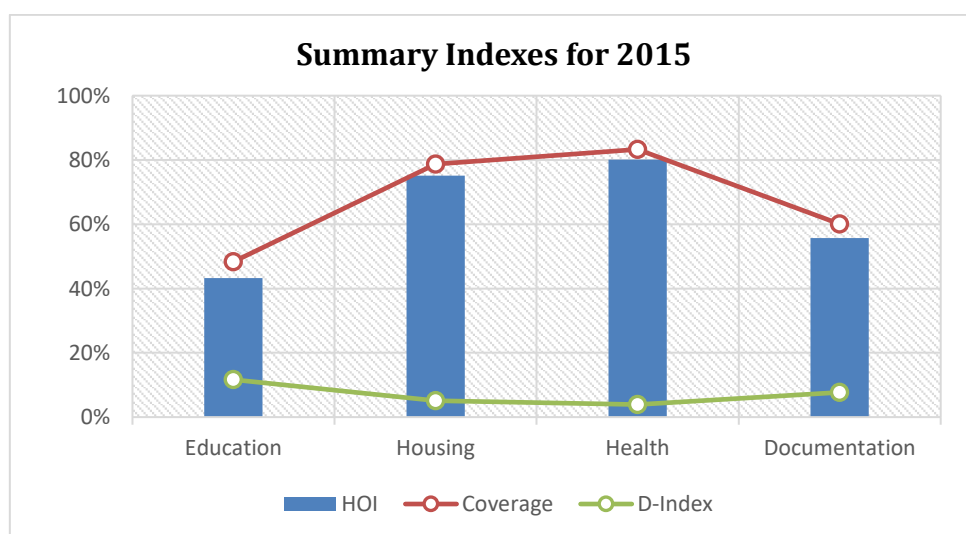


Figure 9: Summary Index by Basic Opportunity in 2015



Overall, there has been a 10 percent increase in the HOI for Bangladesh – from 58 percent in 2011 to 64 percent in 2015 (Table 15). The country has huge potential to improve its performance in each dimension and thereby increase the opportunity index.

Table 15: Human Opportunity Index for Bangladesh

Division	Overall HOI		Change	
	2015	2011	percentage points	percentage
Barisal	61.79%	60.78%	1.02	1.6936
Chittagong	66.23%	56.43%	9.81	16.3630
Dhaka	67.42%	57.09%	10.33	17.2399
Khulna	63.72%	63.75%	-0.04	-0.0630
Rajshahi	64.65%	58.07%	6.57	10.9649
Rangpur	66.27%	56.32%	9.95	16.5953
Sylhet	54.64%	51.29%	3.34	5.5802
National Average	63.53%	57.68%	5.85	9.7677

### Comparison with Other Countries<sup>7</sup>

Most of the empirical work on inequality of opportunity has been for the period 2010-12, or before. Thus, it seems more appropriate to use the 2011 Bangladesh indicators to make inter-country comparisons.

Vani and Madheswaran (2018) considered schooling (completing primary education on time), health (access to a medical facility), housing (water, sanitation, electricity, good housing) as opportunities for children in India. Their results are as follows:

Table 16: HOI for India between 2004-05 and 2011-12

Access to	2004–2005			2011–2012		
	Coverage ( $\mu$ )	Dissimilarity Index (D)	HOI	Coverage ( $\mu$ )	Dissimilarity Index (D)	HOI
Education	52.2	5.1	49.5	57.6	5.0	54.7
Health	46.9	8.9	42.7	74.2	3.3	71.8
Water	82.9	2.6	80.8	83.5	1.5	82.2
Electricity	54.9	17.1	45.6	62.6	12.8	54.6
Latrine	34.8	31.5	23.8	44.7	28.3	32.1
Housing	36.1	30.6	25.1	39.7	27.2	28.9
Multidimensional	38.3	30.1	26.8	52.0	21.0	41.1

Source: Vani and Madheswaran, 2018

Bangladesh in 2011 as well as 2015 performs better in the areas of Health, Latrine and Housing, compared to India.

Son (2013) looked at education (attendance in primary and secondary school) and housing (access to water, sanitation, electricity) for seven South Asian countries. Sri Lanka performed the best in education; Bangladesh and Pakistan were at the bottom. Average HOI for Bangladesh in education was 63.23 percent. This is much higher than the average HOI of 21 percent in this paper. This may either be due to the difference in measuring education opportunity, or due to the fact that Son's study used the Household Income and Expenditure Survey, which is nationally representative of the entire country. It surveyed both urban and rural areas. Accounting for children in urban areas may result in

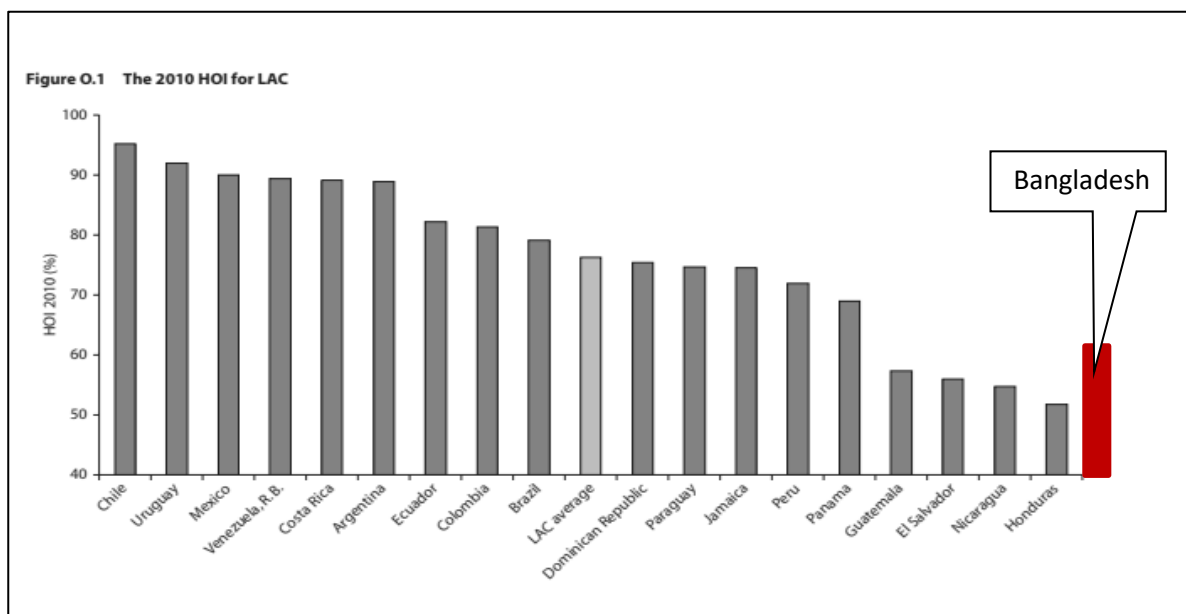
<sup>7</sup> The caveat for this sub-section is that the definition of the indicators used to create the HOI is different in each study, but it still presents a useful overview of how similar countries perform on similar indicators.

lower inequality as they are more likely to have access to the basic services. In all infrastructure related opportunities, Bangladesh performed the worst. Its HOI for access to safe water was only 1.58, far lower than 74 in this paper. This could suggest that the country improved by leaps and bounds in 11 years. HOI for electricity is 20.08 (compared to 36 in this paper), and sanitation is 13.38 (70 in this paper).

Islam and Mitra (2015) calculated HOI for Nepal and Bhutan using 5 opportunities: access to schools, hospitals, roads, electricity and clean water. Bhutan has an HOI above 70 for all opportunities. Access to electricity and water was 92 percent in 2012. Thus, it fares better than Bangladesh in these aspects. For access to a health facility, Bangladesh in 2015 fared better with an HOI of 78 percent, while Bhutan was at 76.68 percent. Nepal in 2011 had an HOI of 92 percent for access to schools. HOI for electricity (62.7), water (72.3) are lower than the results in this paper; for electricity (57.3), Bangladesh is lower.

Comparing Bangladesh with 19 Latin American and Caribbean (LAC) countries, its HOI value lies somewhere towards the lower end, between Guatemala and Panama. It is lower than the LAC average of 76 percent. The red bar on the histogram below shows the HOI for Bangladesh.

Figure 10: Bangladesh’s performance with respect to LAC



Source: Barros et al., 2012

## 7. Implications for Policy

*“An equitable development process should pursue the equalization of opportunities at all stages of an individual’s life, seeking to level the playing field for all citizens.”*

Measuring the inequality of opportunity allows policy instruments to focus more exactly on the component of unequal outcomes caused by factors outside individual control, while not affecting

differences resulting from individual choice and the application of effort. It helps inform policies between sub-national units as well as across dimensions.

Knowledge on coverage and distribution of opportunities, as well as the interaction between the two, at sub-national levels can help the government plan better and focus on divisions and dimensions that lag behind. For instance, Rangpur has the lowest coverage of electricity and further, distribution of this opportunity is the most unequal among divisions. Hence, it scores the lowest while ranking the HOI for this dimension, indicating that the government should combine expansion of coverage of electricity in Rangpur with an equal allocation to maximise its HOI. Focusing on coverage alone is not sufficient. For instance, continuing with the example of electricity, Chittagong has the highest coverage rate. However, since its distribution is very unequal, the division does not have the highest HOI and does not rank first compared to other divisions. Thus, the government should work towards making access to electricity more egalitarian in Chittagong. Within a division, one can look at the performance across different indicators. For instance, Barisal has the highest HOI for good housing and completing primary education on time, but it fares the lowest in terms of immunization opportunity for children, which deserves greater attention.

To both widen the coverage and promote the equality of basic opportunities for children, public policy should be oriented toward directing marginal investments so as to increase basic opportunities for the most disadvantaged groups, helping equalize access to education, electricity, water, birth certificates, and so on. This, in turn, implies shifting the pattern of resources spent by society such that disadvantaged groups receive proportionately more.

Further, focusing on children helps put inequality of opportunity at the centre of the policy debate. Evidence suggests that interventions to equalize opportunity early in the lifecycle of an individual are significantly more cost effective and successful in reducing inequality than interventions later in life.

The index will therefore allow policy makers in the country to track the country's progress over time in providing equity of certain opportunities to children such as education, immunization and access to electricity, unrelated to circumstances.

## **8. Conclusion**

As long as some children in a country do not have access to education, health, housing, and basic services, and as long as access is determined by circumstances for which the child is not accountable, such as gender, ethnicity, or family background, inequality of opportunity will prevail in that country. Equality of opportunity ensures that basic goods and services are distributed among children without correlation to circumstances. The Human Opportunity Index provides an instrument to gauge advances in equality of opportunity over time for a country and compare performance across countries. It can be interpreted as a social welfare function that reacts to both changes in overall access to basic opportunities for children, as well as to their equitable distribution.

Twelve basic opportunities are considered in this paper, which are aggregated into a summary index for education, housing, health and identification document. The average of these indexes constitutes

an overall Human Opportunity Index that condenses into a single number the level of equality of opportunity in a country. The predetermined circumstances comprised gender, religion, years of schooling of the family head, family composition (number of children at home), and per capita expenditure. Data from a nationally representative rural household survey for the seven divisions in Bangladesh was used for the period 2011-15. The survey represents over 5,000 children in rural Bangladesh in each wave. Most divisions in the country show advances in the index for the period, although some registered setbacks in certain indicators. Thus, the overall message that emerges from the country is one of cautious hope.

The statistical evidence for the country shows that the Human Opportunity Index has two salient regularities. First, divisions with low coverage of a given basic opportunity also show large inequality in its distribution (e.g., access to primary schools in Sylhet), which indicates that there is room for rapid expansion of the Human Opportunity Index through increasing the prevalence of basic opportunities while taking special care in the distribution of these increments. Second, heterogeneity is evident in the changes in the Human Opportunity Index (e.g., high positive increase for Dhaka whereas almost no change for Khulna; large positive increase in education, but smaller increase in health and housing services). This implies that there is margin for policy makers in the country to identify areas of potential progress and lead advances in the Human Opportunity Index.

In conclusion, only by combining expansion of coverage with equal allocation of opportunities will the growth of the Human Opportunity Index of a country be maximized.

## Postscript: Human Opportunity in the times of COVID-19 and Climate Change

The current context of COVID-19 has and will throw up many challenges, particularly by amplifying already existing inequalities. The pandemic is expected to significantly set back efforts to achieve the 2030 Agenda, including SDGs 1 and 10 on poverty and inequality. The World Bank estimates that COVID-19 could push *71 million* people into extreme poverty by the end of 2020—a majority of them in the climate-sensitive and vulnerable regions of South Asia and Sub-Saharan Africa.<sup>8</sup> Unequal access to health care in any country makes being ill especially expensive for the poor, thus widening health disparities. Basics such as soap and clean water are luxuries for many.

Apart from the impact on health, UNDP estimates indicate that 86 percent of primary school-age children in low human development countries are currently not getting an education. 166 countries have implemented country-wide school and university closures. With schools closed, UNDP estimates that effective out of school rates could regress to levels not seen since the 1980s.<sup>9</sup> As a result of the unequal nature of the impact of the coronavirus (as well as the impact of governments' policies to combat the virus including lockdowns), its effects will reverberate across generations; sustained disruption of education could lead to a rise in child labour and child marriage.

Added to that are the challenges imposed by climate change, which will also exacerbate these inequalities. In May 2020, super-cyclone Amphan, the most powerful cyclone to hit Bangladesh and eastern India in more than 20 years, caused massive destruction in both countries. Natural disasters worldwide are becoming more frequent rather than a one-off occurrence. The poor will likely be the first to bear the disproportional brunt of climate change. Given these circumstances, inclusion and equity must be the guiding principles to avoid a further deepening of inequalities, with special measures taken to jointly meet the health, nutrition and learning needs of the most vulnerable and marginalized children and youth.

Studying human opportunity is particularly relevant in these times to identify the extent to which exogenous circumstances govern access to the basic services essential for combating the inequalities posed by the dual forces of pandemics and climate change, and to identify areas of targeted policy intervention.

---

<sup>8</sup> Projected estimates as on 8 June 2020, <https://www.worldbank.org/en/topic/poverty/brief/projected-poverty-impacts-of-COVID-19>

<sup>9</sup> Estimates as on 20 May 2020, [https://www.undp.org/content/undp/en/home/news-centre/news/2020/COVID19\\_Human\\_development\\_on\\_course\\_to\\_decline\\_for\\_the\\_first\\_time\\_since\\_1990.html#:~:text=In%20education%2C%20with%20schools%20closed,with%20very%20high%20human%20development.](https://www.undp.org/content/undp/en/home/news-centre/news/2020/COVID19_Human_development_on_course_to_decline_for_the_first_time_since_1990.html#:~:text=In%20education%2C%20with%20schools%20closed,with%20very%20high%20human%20development.)

## References

- Alkire, S., & Foster, J. E. (2011). Counting and multidimensional poverty measurement. *Journal of Public Economics*, 95(7–8), 476–487
- Atkinson, A., Piketty, T. & Saez, E. (2011). Top Incomes in the Long Run of History. *Journal of Economic Literature*, 49(1), 3–71
- Attanasio, O. & Pistaferri, L. (2016). Consumption Inequality. *Journal of Economic Perspectives*, 30(2), 3–28
- Benabou, R. (1996). Inequality and Growth. *NBER Macroeconomics Annual*, 11, 11–74
- Blundell, R. & Preston, I. (1998). Consumption Inequality and Income Uncertainty. *The Quarterly Journal of Economics*, 113(2), 603-640
- Bourguignon, F. & Morrisson, C. (2002). Inequality Among World Citizens: 1820–1992. *American Economic Review*, 92(4), 727-744
- Byron, R. K. & Parvez, S. (2019). Inequality at an all-time high. The Daily Star, May 19, 2019. Available [here](#).
- Davies, J. (2011). Wealth and Economic Inequality. The Oxford Handbook of Economic Inequality. Oxford, UK: Oxford University Press. DOI: 10.1093/oxfordhb/9780199606061.001.0001
- de Barros, R. P., Vega, J. R. M., & Chanduvi, J. S. (2008). Measuring inequality of opportunities for children (Unpublished). Washington, DC: World Bank.
- de Barros, R., Ferreira, F. H. G., Vega, J. R. M., & Chanduvi, J. S. (2009). Measuring inequality of opportunities in Latin America and the Caribbean. Washington, DC: The World Bank.
- de Barros, R. P., Vega, J. R. M., & Saavedra, J. (2010). Measuring progress toward basic opportunities for all. *Brazilian Review of Econometrics*, 30(2), 335–367.
- de Barros, R., Ferreira, F. H. G., Vega, J. R. M., & Chanduvi, J. S. (2012). Do Our Children Have A Chance? A Human Opportunity Report for Latin America and the Caribbean. Washington, DC: The World Bank.
- Dworkin, R. (1981a). What is equality? Part 1: Equality of welfare. *Philosophy and Public Affairs*, 10(3), 185–246.
- . (1981b). What is equality? Part 2: Equality of resources. *Philosophy and Public Affairs*, 10(4), 283–345.
- Ferreira, F.G.H., & Gignoux, J. (2008). The measurement of inequality of opportunity: Theory and application to Latin America. Policy Research Paper No. 4659. Washington, DC: The World Bank.
- International Food Policy Research Institute. (2013). Bangladesh Integrated Household Survey (BIHS) 2011-2012. *Harvard Dataverse*, 2013. Available [here](#).

- . (2016). Bangladesh Integrated Household Survey (BIHS) 2015. *Harvard Dataverse*, 2016. Available [here](#).
- . (2016). BIHS Round 2 dataset now available. *International Food Policy Research Institute Bangladesh*, December 15, 2016. Available [here](#).
- . (2017). BIHS Harmonized Dataset. *Harvard Dataverse*, 2017. Available [here](#).
- Kakwani, N. (1980). *Income Inequality and Poverty*. Washington, DC: The World Bank. Oxford University Press.
- Krueger, D. & Perri, F. (2005). Does Income Inequality Lead to Consumption Inequality? Evidence and Theory. Federal Reserve Bank of Minneapolis Research Department Staff Report 363
- Marrero, G., & J. Rodríguez. (2012). Inequality of opportunity in Europe. *Review of Income and Wealth*, 58, 597-621.
- . (2013). Inequality of Opportunity and Growth. *Journal of Development Economics*, 104, 107–122.
- Milanovic, B. (2013). Global Income Inequality in Numbers: in History and Now. *Global Policy*, 4(2), 198-208
- Mitra, Shabana, & Islam, T.M. Tonmoy (2015). Multidimensional Human Opportunity Index. *Social Indicators Research*, 130, 523–535
- Piketty, T. & Saez, E. (2014). Inequality in the long run. *Science*, 344(6186), 838-843
- Rawls, J. (1958). Justice as fairness. *Philosophical Review*, 67(2), 164–194.
- . (1971). *A theory of justice*. Cambridge, MA: Harvard University Press.
- Roemer, J. (1993). A pragmatic approach to responsibility for the egalitarian planner. *Philosophy & Public Affairs*, 20, 146-166.
- . (1998). *Equality of opportunity*. Cambridge, MA: Harvard University Press.
- . (2002). Equality of opportunity: A progress report. *Social Choice and Welfare*, 19(2), 455–471.
- . (2008). Equality of opportunity. In S. Durlauf & L. Blume (Eds), *The new Palgrave dictionary of economics* (pp. 5–10). London: Palgrave Macmillan.
- Roemer, J., & Trannoy, A. (2016). Equality of opportunity: Theory and measurement. *Journal of Economic Literature*, 54(4), 1288–1332.
- Son, H. H. (2013). Inequality of human opportunities in developing Asia. *Asian Development Review*, 30(2), 110–130.



The World Bank. (2006). World development report 2006: Equity and development. Washington, DC: Ferreira, F.G.H. & Walton, M.

The World Bank. (2016). Bangladesh Can Overcome Extreme Poverty through More Inclusive Growth. *The World Bank*, Press Release dated October 3, 2016. Available [here](#).

UNICEF. (2003). Factsheet: Birth Registration. *UNICEF*, 2003. Available [here](#).

———. (2018). Timely and accessible birth registration. *UNICEF Bangladesh*, 2018. Available [here](#).

United Nations. (2016). SDG 10: Reduced Inequalities. *United Nations India*, n.a. Available [here](#).

United Nations Development Programme. (2016). Goal 10: Reduced Inequalities. *United Nations Development Programme*, n.a. Available [here](#).

———. (2018). Human Development Indices and Indicators: 2018 Statistical Update Bangladesh. *United Nations Development Programme*, 2018. Available [here](#).

———. (2019). Human Development Report 2019: Beyond income, beyond averages, beyond today. New York: Conceição, P.

United Nations Office of the High Commissioner for Human Rights. (1989). Convention on the Rights of the Child. *United Nations*, n.a.. Available [here](#).

Vani, B.P., Madheswaran, S. (2018). Inequalities of Human Opportunities in India: A State-level Analysis. *Indian Journal of Human Development*, 12(2), 248-264

Wolff, E. (1992). Changing Inequality of Wealth. *The American Economic Review*, 82(2), 552-558.

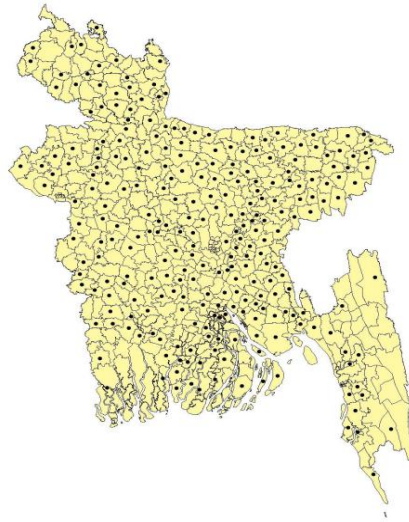
———. (1996). International Comparisons of Wealth Inequality. *Review of Income and Wealth*, 42(4), 433-451.

World Health Organization. (2010). Nutrition Landscape Information System (NLIS) country profile indicators: interpretation guide. Geneva.

World Inequality Lab. (2017). World inequality report 2018. Paris: Alvaredo, F., Chancel, L., Piketty, T., Saez, E. & Zucman, G.

## Appendix

### A1. Map of Bangladesh showing the sampling upazilas



### A2. Table of circumstances considered

<b>Circumstance</b>	<b>Specification</b>
Age	Linear
Gender (1=Male)	Dummy
HH head's years of education	Quadratic
HH head's religion (1=Muslim)	Dummy
Per capita expenditure	Logarithmic
No. of members under 16yrs	Linear

### A3. Logistic Regression Results

#### 3.1 Completing Primary and Secondary Education

	(2011) completed_6	(2015) completed_6	(2011) completed_10	(2015) completed_10
Child's age	0.118*** (3.13)	0.407*** (12.25)	0.991*** (15.34)	0.236*** (5.22)
Child's gender	0.142* (1.74)	-0.0639 (-0.87)	0.450*** (3.81)	0.0683 (0.69)
Religion	-0.0395 (-0.28)	-0.0129 (-0.10)	-0.296 (-1.61)	0.226 (1.37)
HH Head's education	-0.0872*** (-3.00)	-0.0228 (-0.90)	-0.117*** (-2.80)	-0.0653* (-1.75)

HH Head's education squared	0.00774*** (3.04)	0.00373* (1.73)	0.00851** (2.34)	0.00368 (1.09)
log (per capita monthly expenditure)	-0.218** (-2.04)	-0.112 (-1.27)	-0.121 (-0.79)	0.0334 (0.28)
No. of Members under 16	0.0375 (1.15)	-0.0482 (-1.24)	0.0756 (1.54)	-0.226*** (-4.63)
Constant	0.143 (0.17)	0.193 (0.27)	-1.224 (-1.02)	-0.699 (-0.74)
<i>N</i>	4309	3955	1875	2218

*t* statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### 3.2 Access to Schools and Health Facilities

	(2015) prim_school	(2015) secon_school	(2015) health_fac
HH Head's gender	0.259*** (3.79)	0.134** (2.17)	0.274*** (3.21)
Religion	0.0986 (1.13)	-0.109 (-1.34)	-0.335** (-2.53)
HH Head's education	-0.0150 (-0.81)	-0.0113 (-0.67)	0.0359 (1.49)
HH Head's education squared	0.000197 (0.12)	0.00559*** (3.66)	-0.00267 (-1.27)
log (per capita monthly expenditure)	-0.247*** (-3.92)	0.262*** (4.63)	0.0919 (1.14)
No. of Members under 16	0.384*** (12.96)	0.122*** (5.87)	-0.235*** (-7.15)
Constant	1.858*** (3.60)	-2.555*** (-5.59)	1.779*** (2.67)
<i>N</i>	8725	8725	8725

*t* statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### 3.3 Housing conditions - part 1

	(2011)	(2015)	(2011)	(2015)	(2011)	(2015)
	quality_house	quality_house	house_electricity	house_electricity	asset_telephone	asset_telephone
HH Head's	0.0000350	0.0229	-0.0449	-0.0368	0.326***	0.577***
gender	(0.00)	(0.16)	(-0.50)	(-0.39)	(3.23)	(4.31)
Religion	0.212	0.512***	0.492***	0.654***	0.285**	0.296*
	(1.59)	(3.47)	(4.12)	(5.62)	(2.19)	(1.71)
HH Head's	0.0556	0.0296	0.0951***	0.0846***	0.169***	0.125***
education	(1.61)	(0.75)	(3.89)	(3.42)	(4.93)	(2.90)
HH Head's	0.00236	0.00469	-0.000512	-0.00165	-0.00196	-0.00176
education squared	(0.65)	(1.24)	(-0.23)	(-0.74)	(-0.53)	(-0.41)
log (per capita	1.028***	0.661***	1.182***	1.239***	1.508***	1.214***
monthly	(8.93)	(4.80)	(12.72)	(13.49)	(13.45)	(8.03)
expenditure)						
No. of Members	-0.0309	0.0531	-0.0206	-0.0827**	-0.00814	-0.0211
under 16	(-0.81)	(1.04)	(-0.60)	(-2.18)	(-0.22)	(-0.41)
Constant	-6.828***	-3.840***	-9.782***	-9.914***	-11.16***	-8.168***
	(-7.63)	(-3.46)	(-13.21)	(-13.34)	(-12.76)	(-6.92)
<i>N</i>	4474	4363	4474	4363	4474	4363

*t* statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### 3.4 Housing conditions - part 2

	(2011)	(2015)	(2011)	(2015)
	water	water	toilet	toilet
HH Head's	0.369***	0.450***	-0.103	-0.0761
gender	(3.16)	(4.83)	(-1.00)	(-0.53)
Religion	0.214	-0.132	-0.0333	0.582***
	(1.45)	(-1.03)	(-0.25)	(3.82)
HH Head's	-0.0114	0.0226	0.154***	0.101**
education	(-0.33)	(0.84)	(5.17)	(2.43)
HH Head's	0.00475	0.00266	-0.00575**	0.00239
education	(1.43)	(1.06)	(-1.98)	(0.55)
squared				

log (per capita monthly expenditure)	0.0321 (0.28)	0.591*** (6.46)	0.700*** (6.93)	0.720*** (5.44)
No. of Members under 16	-0.0573 (-1.41)	-0.0377 (-0.99)	-0.0536 (-1.48)	-0.0449 (-0.93)
Constant	1.306 (1.45)	-3.871*** (-5.26)	-4.290*** (-5.41)	-4.196*** (-4.01)
<i>N</i>	4474	4363	4474	4363

*t* statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### 3.5 Immunization and Identity Documentation

	(2011) immunisation	(2015) immunisation	(2011) birth_certi	(2015) birth_certi
Child's age	0.552*** (3.30)	0.124 (0.63)	-0.241*** (-6.85)	-0.112*** (-3.34)
Child's gender	-0.0206 (-0.13)	0.0295 (0.16)	0.0424 (0.43)	0.00229 (0.02)
Religion	-0.0903 (-0.30)	-0.295 (-0.93)	-0.346* (-1.92)	0.254* (1.70)
HH Head's education	0.0349 (0.60)	0.0503 (0.80)	0.0568* (1.70)	0.0256 (0.79)
HH Head's education squared	-0.00116 (-0.20)	-0.00659 (-1.21)	-0.00650** (-2.29)	-0.000366 (-0.13)
log (per capita monthly expenditure)	0.519** (2.57)	0.178 (0.87)	0.265** (2.11)	-0.129 (-1.15)
No. of Members under 16	-0.181*** (-3.32)	-0.219*** (-2.69)	-0.156*** (-3.85)	-0.0554 (-1.17)
Constant	-2.512 (-1.63)	0.727 (0.45)	0.0420 (0.04)	1.667* (1.85)
<i>N</i>	1238	896	2401	2279

*t* statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$