

Inequality of Human Opportunities in Developing Asia

Hyun Hwa Son

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CONTENTS

ABSTRACT	v
I. INTRODUCTION	1
II. HUMAN OPPORTUNITY INDEX	2
III. CONTRIBUTION OF INDIVIDUAL CIRCUMSTANCE VARIABLES	3
IV. EMPIRICAL ANALYSIS	4
A. Inequality of Opportunity in Basic Education	4
B. Inequality of Opportunity in Basic Infrastructure	6
C. Do Circumstance Variables Matter for Inequality of Opportunity?	8
V. CONCLUSIONS	13
REFERENCES	16

ABSTRACT

This paper analyzes the equity of opportunity in basic education and infrastructure services in seven developing countries, namely, Bangladesh, Bhutan, Indonesia, Pakistan, the Philippines, Sri Lanka, and Viet Nam. The analysis applies a method developed by the World Bank called the Human Opportunity Index (HOI). The HOI measures the total contribution of individuals' socioeconomic and demographic circumstances to inequality of opportunity in accessing basic services. A new methodology presented in this study, however, provides a way to quantify the relative contribution of each circumstance variable to the inequality of opportunity. Results of the empirical analysis indicate that more needs to be done to improve the distribution of economic benefits. Opportunities to access basic education and infrastructure services in the seven countries vary widely in terms of availability and distribution. The study also finds 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.

I. INTRODUCTION

Inequality remains a persistent challenge in many economies today. In Asia and the Pacific, inequality has risen over the last decade despite growth rates that have lowered poverty incidence (ADB 2007). In developing Asia's 16 countries, the Gini coefficient increased from 46.8 in 1993 to 52.4 in 2003 (ADB 2007).

Inequality is usually measured in terms of income or consumption. But the concept of inequality is now being extended to cover many other standard of living dimensions, such as inequality of outcomes in health, education, basic infrastructure, and so on. In recent studies, Zhang and Kanbur (2005) and Tandon and Zhuang (2007) have demonstrated that disparities in health outcomes in the People's Republic of China have worsened.

Although any society's ultimate objective is to eliminate or reduce inequality of outcomes, the 2006 *World Development Report* has argued that it is not appropriate to focus on this alone when assessing the fairness of a social system. 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 but may instead focus on reducing inequalities that arise from unequal opportunity. Thus, a just society is one that provides equal opportunity to all.

Governments usually provide people opportunities in education, health, nutrition, security, and basic infrastructure. However, not all citizens can avail of these opportunities equally. Many school-age children in developing countries, for instance, are unable to attend school due to family circumstances. Similarly, many of those children have no access to clean water, electricity, and sanitary toilets. Measurement of the inequality of opportunity in such basic services is therefore essential prior to designing policies aimed at universal provision of these basic opportunities.

The World Bank has developed the Human Opportunity Index (HOI), which measures inequality of opportunity contributed by individuals' socioeconomic and demographic circumstances. Inequality of opportunity caused by differences in circumstances is considered unjust and should be of concern to society. When a child is unable to get proper education because his family belongs to a low social group, for instance, it is a gross injustice. In its study on Latin America, the World Bank considered six circumstance variables: (i) urban or rural area, (ii) gender, (iii) number of siblings, (iv) parent's education, (v) per capita income, and (vi) presence of parents. The number of circumstance variables included was determined by the availability of data in 19 Latin American countries.

This paper seeks to measure inequality of opportunity in seven developing countries: Bangladesh, Bhutan, Indonesia, Pakistan, the Philippines, Sri Lanka, and Viet Nam. The HOI is measured for a set of opportunities related to education and basic infrastructure: school attendance among children aged 6–11 years for primary school and 12–17 years for secondary, as well as access to safe water, electricity, and sanitation.

This paper is outlined as follows. Section II briefly outlines the HOI methodology. Section III is devoted to the method of quantifying the relative contribution of each of circumstance variables to inequality of opportunity. Section IV provides a cross-country comparison of inequities in opportunity in the seven developing member countries considered for this study. Section V summarizes the major findings emerging from the study and presents the policy implications.

II. HUMAN OPPORTUNITY INDEX

Let us define a variable z_i which takes a value of 1 if the i th individual has access to an opportunity (such as education) and takes a value of 0 if the i th individual lacks access to the opportunity. It can be easily seen that $E(z_i) = \pi_i = P(z_i)$, where π_i is the probability that the i th individual has access to a given opportunity. A distinction is made between circumstance and effort variables (Roemer 1998). Circumstance variables are exogenous variables in the sense that an individual has no control over them. Effort variables, meanwhile, reflect an individual's efforts and capacity to innovate and take risk. Inequality caused by differences in effort is deemed acceptable, while inequality caused by circumstances is considered unjust and unacceptable, and should thus be reduced. The HOI measures the contribution of inequality of opportunities by the circumstance variables. Therefore, we estimate π_i by means of a logit model using a set of k circumstance variables $x_{i1}, x_{i2}, \dots, x_{ik}$. Accordingly, we have a logit model:

$$\pi_i = \frac{e^{\sum_{j=1}^k \beta_j x_{ij}}}{1 + e^{\sum_{j=1}^k \beta_j x_{ij}}} \quad (1)$$

This model can be estimated using the maximum likely method. $\hat{\pi}_i$, the maximum likely estimate of π_i , is the probability of access to a given opportunity that is explained by the circumstance variables. Any measure of inequality of $\hat{\pi}_i$ will be the inequality of opportunity that is explained by the circumstance variables. The World Bank uses the relative mean deviation defined as¹

$$D = \frac{1}{2\bar{\pi}} \sum_{i=1}^n w_i |\hat{\pi}_i - \bar{\pi}| \quad (2)$$

where n is the number of sample households, w_i is the population weight attached to the i th sample household, and $\bar{\pi}$ is the proportion of the population with access to a given opportunity.² Note also that $\bar{\pi}$ may be called level or coverage. D measures the degree of inequality of opportunity that is explained by the individual's circumstances. As such, $(1-D)$ may be interpreted as equity of opportunity.

The Human Opportunity Index (HOI) is then defined as

$$HOI = \bar{\pi}(1 - D) \quad (3)$$

which is a composite index of two factors: (i) the level or coverage and (ii) equity of opportunity. The policymakers' objective will be to maximize HOI, which can be achieved either by enhancing total opportunity (coverage) or by increasing equity of opportunity (more equitably distributing opportunity) or by increasing both coverage and equity.

¹ D is also referred to in the literature as the dissimilarity index, which is widely used in sociology.

² Note that $\bar{\pi}$ is the mean of $\hat{\pi}_i$ across all individuals.

III. CONTRIBUTION OF INDIVIDUAL CIRCUMSTANCE VARIABLES

The relative mean deviation defined in equation (2) measures the total contribution of all circumstance variables to inequality of opportunity. Although it is useful to determine the total impact of all circumstance variables on inequality of opportunity, determining the impact of individual circumstance variable would be more useful to policymakers. These individual contributions will identify the circumstance variables having the most impact on inequality of opportunity. In this section, we present a method of calculating the relative contributions of individual circumstance variables to the inequality of opportunity.

A variable $y_i = \frac{\pi_i}{(1-\pi_i)}$ is the ratio of the odds of $z_i = 1$ against $z_i = 0$; thus, the larger y_i , the greater will be the odds for the i th person to have access to an opportunity. A special feature of the odd ratio is that on utilizing equation (1) it can be written as

$$\ln(y_i) = \sum_{j=1}^k \beta_j x_{ij} \quad (4)$$

The maximum likelihood estimate of y_i is then given by

$$\ln(\hat{y}_i) = \sum_{j=1}^k \hat{\beta}_j x_{ij} \quad (5)$$

where $\hat{\beta}_j$ is the maximum likelihood estimate of β_j derived from the logit model in (1). \hat{y}_i is the i th person's odd ratio that is explained by the circumstance variables.

Since y_i is a monotonically increasing function of π_i , there is one-to-one relationship between them. This implies that inequality of π_i will be equivalent to inequality of y_i . This in turn suggests that inequality of \hat{y}_i will be equivalent to inequality of $\hat{\pi}_i$ which, as shown earlier, is also equal to the inequality of opportunity explained by the circumstance variables. We can thus measure inequality of opportunity explained by the circumstance variables through measuring inequality of \hat{y}_i .

We may measure inequality of opportunity by any of the inequality measures that have been proposed in the literature. As discussed above, the World Bank used the relative mean deviation to measure inequality of opportunity. In this study, we have used log variance measure of inequality, which has an attractive feature of decomposability.

Following Field (2003), we took the variance of both sides in equation (5) to obtain

$$\sigma^2(\ln(\hat{y}_i)) = \sum_{j=1}^k \hat{\beta}_j \text{cov}(x_{ij}, \ln(\hat{y}_i)) \quad (6)$$

which decomposes the inequality in opportunity (measured by the log variance) in terms of the contributions made by each of the individual circumstance variables. Dividing both sides of equation (6) by $\sigma^2(\ln(\hat{y}_i))$ gives the percentage contribution of individual circumstance variables as

$$100\% = \sum_{j=1}^k S_j \quad (7)$$

where

$$S_j = \frac{100 \times \hat{\beta}_j \text{cov}(x_{ij}, \text{Ln}(\hat{y}_i))}{\sigma^2(\text{Ln}(\hat{y}_i))} \quad (8)$$

is the percentage contribution of the j th circumstance variable to the total inequality of opportunity.

The decomposition presented in equation (7) is based on log variance as a measure of inequality. This may appear to be a restricted result but is in fact not. Using a famous Shorrocks (1982) theorem, we can easily show that this result holds for a wide variety of inequality measures including Gini index, the Atkinson index, generalized entropy family, and coefficient of variation.

IV. EMPIRICAL ANALYSIS

In this section, the methodologies outlined in the previous sections are applied to seven developing countries in Asia: Bangladesh, Bhutan, Indonesia, Pakistan, the Philippines, Sri Lanka, and Viet Nam. The section provides analysis of the inequality of opportunity related to basic education and infrastructure. There are five outcome variables used in our analysis, including (i) primary school attendance among children aged 6–11 years, (ii) secondary school attendance among children aged 12–17 years, (iii) access to safe water, (iv) access to electricity, and (v) access to sanitation. Similarly, we used a set of circumstance variables required to estimate the D-Index and the HOI. These circumstance variables are (i) gender, (ii) location of household (urban or rural area), (iii) education of household head, (iv) per capita household expenditure as an indicator of household living standard, (v) age of household head, (vi) gender of household head, and (vii) household size. Circumstances, as used here, consist of personal or family socioeconomic and demographic characteristics over which an individual has no direct control. These seven circumstance variables are available to household data sets for the seven countries selected for the study.

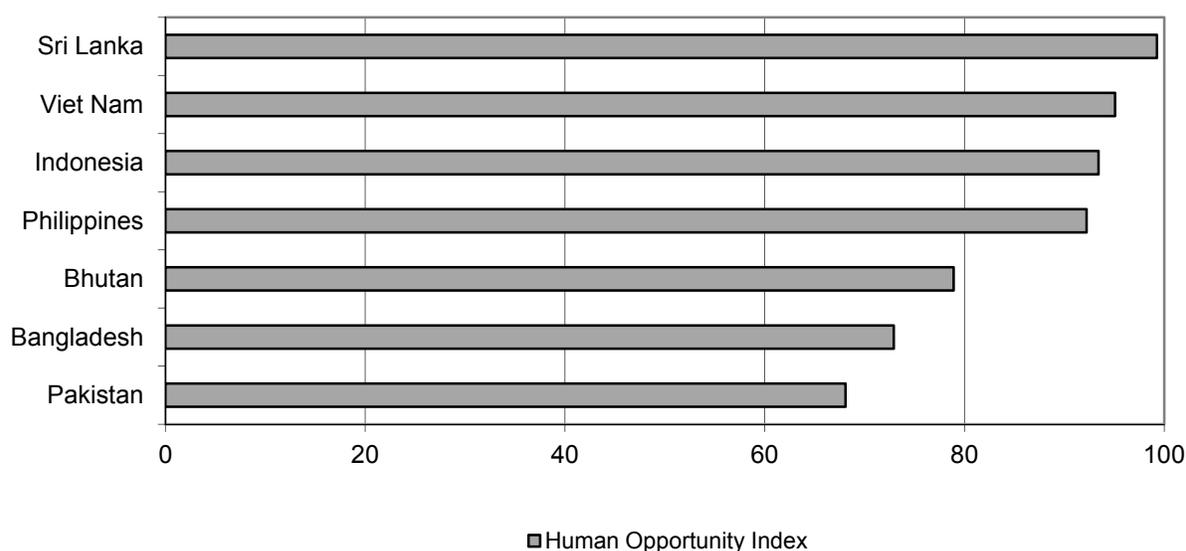
A. Inequality of Opportunity in Basic Education

The distribution of opportunity for children to access basic primary education is highly variable across countries in Asia. As indicated by the high value of HOI in Table 1, the playing field is level for primary-school-age children in Sri Lanka, where 99.27% of primary education services are available and equitably allocated. In contrast, only 68.09% of the basic services in Pakistan are available and are distributed inequitably among children. Countries in Southeast Asia, such as Indonesia, the Philippines, and Viet Nam are moving toward universal access of basic primary education. For each of these countries, the estimated HOI is higher than 90%, suggesting that more than 90% of primary education services required for universal coverage are available and distributed equitably. Three countries are at the bottom of the ranking, with HOIs lower than 80: Bangladesh, Bhutan, and Pakistan (Figure 1).

Table 1: Inequality of Opportunity in Primary Education, 6–11 years

Country	Survey Year	Average Opportunity	D-Index	Human Opportunity Index
Indonesia	2009	94.29	0.92	93.42
Philippines	2002	93.92	1.80	92.22
Viet Nam	2008	96.31	1.29	95.07
Bangladesh	2000	75.59	3.53	72.92
Bhutan	2007	83.05	4.98	78.91
Sri Lanka	2009–2010	99.39	0.12	99.27
Pakistan	2007–2008	74.59	8.71	68.09

Source: Author's calculations based on household surveys.

Figure 1: Human Opportunity Index for Primary Education for Selected DMCs

DMC = developing member country.

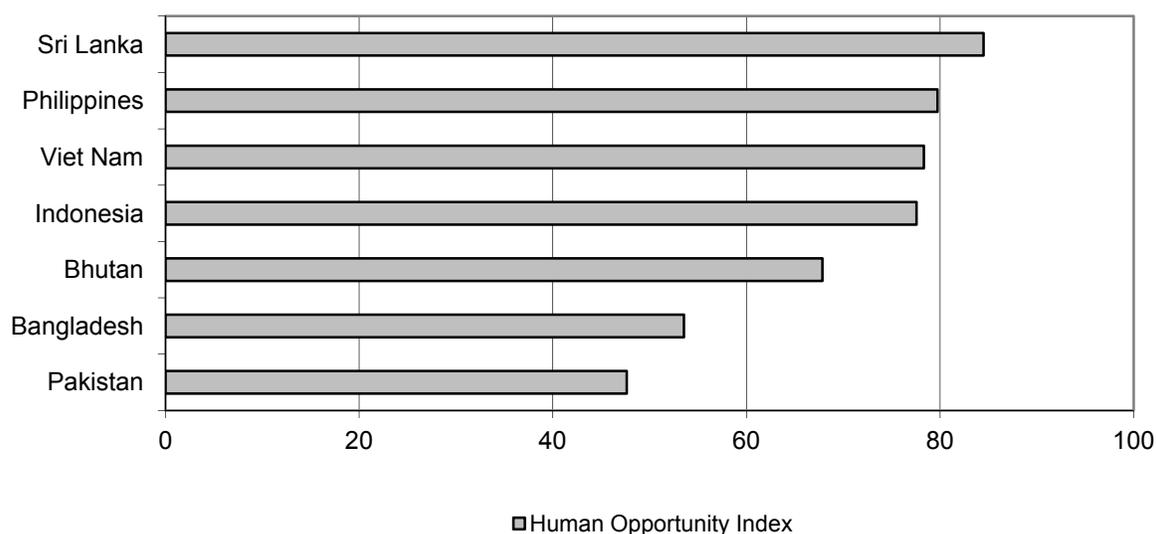
Source: Author's calculations based on household surveys.

Children at the secondary-school-age group (12–17 years old) in developing Asia are more likely to have lower levels of equitably allocated education services than their younger cohorts: the HOI for primary school attendance is far lower than the corresponding figure for secondary school across the seven countries. As shown in Table 2 and Figure 1, the HOI for secondary education services ranges from a high of 84.49 for Sri Lanka to a low of 47.64 for Pakistan. These findings suggest that countries in the region face greater challenges in equitably ensuring that all children aged 12–17 attend school than ensuring that all children at primary school age attend school. This result would be expected because the opportunity costs of sending children to school are higher at the secondary than the primary level. This also implies that financial incentives, such as conditional cash transfer programs, could be more effective in targeting older children if the main objective is to improve school enrollment.

Table 2: Inequality of Opportunity in Secondary Education, 12–17 years

Country	Survey Year	Average Opportunity	D-Index	Human Opportunity Index
Indonesia	2009	80.58	3.74	77.57
Philippines	2002	83.09	4.03	79.74
Viet Nam	2008	81.97	4.43	78.33
Bangladesh	2000	58.25	8.08	53.54
Bhutan	2007	72.04	5.81	67.86
Sri Lanka	2009–2010	86.39	2.19	84.49
Pakistan	2007–2008	56.15	15.15	47.64

Source: Author's calculations based on household surveys.

Figure 2: Human Opportunity Index for Secondary Education for Selected DMCs

DMC = developing member country.

Source: Author's calculations based on household surveys.

B. Inequality of Opportunity in Basic Infrastructure

Basic infrastructure services make significant contributions to well-being. Basic services, such as safe water and sanitation (e.g., flushing toilets), have a direct impact on health status and overall well-being. Having access to services, such as electricity, helps households increase their productivity for income generation. A number of studies reveal that a household's access to basic infrastructure services is highly and significantly correlated with a lower probability of being poor.

Compared to basic education services, our results for the HOIs suggest that Asia faces a greater challenge in providing basic infrastructure services. As presented in Tables 3–5, the HOIs for access to basic infrastructure services, such as safe water, electricity, and sanitation,

show lower values for all countries and higher dispersion across countries than those for access to basic education services, highlighting the uneven rates of progress in expanding opportunities for basic infrastructure services in the region.

As seen in Table 3, Bhutan takes the lead in the provision of access to safe water with its HOI equal to 86.91. In contrast, Bangladesh and Viet Nam have HOIs lower than 20 for this service. In the area of electricity provision, Sri Lanka and Viet Nam lead, with HOIs higher than 90. Compare that to the HOI of about 20 for Bangladesh (Table 4). In sanitation, three of the seven countries examined in this study display an HOI higher than 50, while Bangladesh and Bhutan have HOIs lower than 20 (Table 5). These findings suggest that in Bangladesh, less than one out of five people has equal opportunity to live in households with access to safe water, electricity, and sanitation.

Table 3: Inequality of Opportunity in Access to Safe Water

Country	Survey Year	Average Opportunity	D-Index	Human Opportunity Index
Indonesia	2009	26.80	21.34	21.08
Philippines	2002	61.54	12.05	54.12
Viet Nam	2008	26.38	42.66	15.12
Bangladesh	2000	6.66	76.34	1.58
Bhutan	2007	89.94	3.38	86.91
Sri Lanka	2009–2010	40.54	16.34	33.92
Pakistan	2007–2008	34.15	24.07	25.93

Source: Author's calculations based on household surveys.

Table 4: Inequality of Opportunity in Access to Electricity

Country	Survey Year	Average Opportunity	D-Index	Human Opportunity Index
Indonesia	2009	89.51	3.21	86.63
Philippines	2002	78.45	12.53	68.62
Viet Nam	2008	97.19	1.45	95.78
Bangladesh	2000	32.55	38.30	20.08
Bhutan	2007	70.05	13.28	60.75
Sri Lanka	2009–2010	93.83	2.05	91.90
Pakistan	2007–2008	90.24	4.66	86.03

Source: Author's calculations based on household surveys.

Table 5: Inequality of Opportunity in Access to Sanitation

Country	Survey Year	Average Opportunity	D-Index	Human Opportunity Index
Indonesia	2009	55.18	10.61	49.33
Philippines	2002	85.64	6.38	80.17
Viet Nam	2008	40.24	30.96	27.78
Bangladesh	2000	20.33	34.20	13.38
Bhutan	2007	26.47	43.51	14.95
Sri Lanka	2009–2010	94.19	2.22	92.10
Pakistan	2007–2008	66.01	17.72	54.31

Source: Author's calculations based on household surveys.

C. Do Circumstance Variables Matter for Inequality of Opportunity?

This section quantifies the relative contribution of each of the seven circumstance variables to inequality of educational opportunity for both primary and secondary, as well as inequality of opportunity to access basic infrastructure such as safe water, electricity, and sanitation.

For primary education, the most important circumstance variable is per capita household expenditure that influences whether or not a child has fair access to education opportunities. Its contribution to inequality of opportunity for primary education ranges from 60.6% in Pakistan to more than 95% in countries such as Bangladesh and the Philippines (Table 6). This suggests that overall standards of living for households play a major role in affecting the ability of a child to improve his or her situation over time and achieve intergenerational mobility through education.

For equal opportunity for primary education, variables such as education of household head, urban or rural location (where a child lives), and household size are also important circumstance in Asia. In Pakistan, whether or not the head of household received any level of formal education accounts for more than 20% of the inequality of educational opportunity for the primary-school-age children, 6–11 years. This suggests the direct association between the household head's education and his perception on education. A recent study by Lodhi, Tsegai and Gerber (2011) found that parents with less education in Pakistan are more likely to view education as a trivial factor to future income. In turn, parents with these perceptions are significantly more likely to send their children to *madrassahs* or let them find paid work.

Similarly, location circumstance (urban–rural residence) substantially contributes to inequality of opportunity for primary education in countries like Bhutan (16.1%) and Indonesia (12.4%). In addition, a significant proportion of children aged 6–11 years old in Sri Lanka and Viet Nam are often deprived of their basic opportunities to help them gain access to education due to large household size, which accounts for 12.1% and 10.7%, respectively. Controlling for factors such as household expenditure, parents' education, or others, households with more members tend to invest less in education of school-age children (Dang and Rogers 2009).

Our results in Table 6 suggest that circumstance variables such as age and gender of household head have little influence on whether or not a primary-school-age child has fair access to education opportunities.

Table 6: Contribution of Circumstance Variables to Inequality of Opportunity for Primary Education, 6–11 years (%)

Country	Survey Year	Gender	Area of Residence (Urban/Rural)	Per Capita Household Expenditure	Age of Household Head	Gender of Household Head	Education Level of Household Head	Household Size
Indonesia	2009	0.9*	12.4*	74.6*	4.5*	-0.0	3.4*	4.0*
Philippines	2002	0.8*	1.3	95.2*	0.6*	0.2	0.3*	1.7*
Viet Nam	2008	0.1	10.5	72.8*	0.0	-0.4	6.3*	10.7*
Bangladesh	2000	2.8*	-2.7*	97.1*	-0.0	0.7	2.1*	-0.0
Bhutan	2007	0.2	16.1*	77.6*	-1.1	0.9*	6.8*	-0.5
Sri Lanka	2009–2010	0.4	5.1*	76.4	3.8	2.1	0.0	12.1*
Pakistan	2007–2008	5.8*	10.5*	60.6*	-0.0*	2.4*	20.5*	0.2

Note: * indicates that the estimated coefficient was found to be statistically significant at the 5% level in the logit regression model of the probability of school attendance among the primary-school-age children, 6–11 years.

Source: Author's calculations based on household surveys.

In terms of school attendance for children aged 12–17, the inequality of educational opportunity is also driven mainly by their per capita household expenditure. Table 7 shows that per capita household expenditure yields a higher level of contribution to inequality of opportunity for secondary education compared with the other six circumstance variables in the seven selected countries. The contribution of household expenditure to inequality of opportunity for secondary education ranges from 61% in Pakistan at the minimum to 96% in Sri Lanka at the maximum. Apart from per capita household expenditure, the gender of the child, urban–rural residence, and education of household head make a sizable contribution to the inequality of educational opportunity for the secondary-school-age children.

In Bangladesh, a child's gender accounts for 20.8% of the inequality of opportunity for secondary education and about 10% in Pakistan. These findings call for strategic government policies that could redistribute the available education services toward female children to help achieve equality of opportunity in secondary education. In Bangladesh, a major hindrance to girls' attendance in secondary school is early marriage and fertility, prompting the government to introduce the highly successful Girls' Stipend Program aimed at encouraging girls to continue their schooling (Raynor and Wesson 2006). However, despite recent increases in enrollment, girls still face inequity in achieving education outcomes especially in secondary school (Hossain and Zeitlyn 2010). A similar story of gender bias can also be found in Pakistan. For children in secondary-school age, households exhibit a pro-male bias both in the decision to enroll children as well as in the amount to spend on education conditional on enrollment, while in primary-school age, the bias is only in the decision whether or not to enroll (Aslam and Kingdon 2008).

The results in Table 7 also show that the rural–urban divide in terms of residence affects whether or not the child has access to opportunities for secondary education. The contribution of this location circumstance is particularly prominent for the Bhutan case where the urban–rural residence accounts for 42.4% of the total inequality of opportunity. The urban–rural residence is the most important circumstance in Bhutan's case followed by per capita household expenditure (54.7%). Children living in rural areas in Bhutan have limited access to schools due to their remote and mountainous location. According to the Ministry of Education of Bhutan (2004), a continuing problem is that children tend to drop out of schools if these are distant, and many

teachers do not wish to be assigned in remote areas. A study conducted by the World Bank (2009) found that teachers are a critical constraint to improving quality of education in Bhutan. In particular, it is more difficult to recruit and motivate teachers to rural and remote areas.

Table 7: Contribution of Circumstance Variables to Inequality of Opportunity for Secondary Education, 12–17 years (%)

Country	Survey Year	Gender	Area of Residence (Urban/Rural)	Per Capita Household Expenditure	Age of Household Head	Gender of Household Head	Education Level of Household Head	Household Size
Indonesia	2009	0.2*	11.6*	69.1*	0.4*	1.5*	17.2*	0.1
Philippines	2002	6.4*	2.4*	90.7*	0.3*	-0.5*	0.0	0.6
Viet Nam	2008	4.0*	6.6*	65.7*	1.2	-0.4	11.0*	12.0*
Bangladesh	2000	20.8*	-2.6*	76.9*	-0.4	2.5*	0.5	2.5*
Bhutan	2007	3.4*	42.4*	54.7*	4.1*	1.4*	-4.5*	-1.6
Sri Lanka	2009–2010	1.3*	0.8*	96.0*	0.6	0.7	0.0	0.6
Pakistan	2007–2008	9.5*	5.2*	61.0*	0.2	1.2*	24.0*	-1.1*

Note: * indicates that the estimated coefficient was found to be statistically significant at 5% level in the logit regression model of the probability of school attendance among the secondary-school-age children, 12–17 years.

Source: Author's calculations based on household surveys.

Furthermore, the results also reveal that the education level of household head has a significant influence on whether or not a child at the secondary-school age has fair access to education opportunities. More importantly, the relative contribution of parental education to inequality of opportunity among children is far higher for secondary education than for its primary counterpart: its contribution jumps to 17.2% for secondary from 3.4% for primary in Indonesia, and to 11% for secondary from 6.3% for primary in Viet Nam.

As indicated by Table 7, other circumstances, such as age and gender of household head and household size, seem to have relatively negligible or statistically insignificant effect on the inequality of opportunity for secondary education.

For access to safe water, electricity, and sanitation, the inequality of opportunity is driven mainly by per capita household expenditure, and to the same extent by where an individual lives (urban or rural residence). As can be seen from Tables 8–10, location circumstance dominates in six countries (out of seven) in the case of safe water, while per capita household expenditure is the most important circumstance in five countries in electricity and sanitation.

In the case of water and sanitation, their access is generally higher in urban areas than rural areas (WHO and UNICEF 2010). This can also be seen from Tables 8–9. In rural areas, the main challenge is the relatively higher cost of building water and sanitation infrastructure as well as the presence of rural poverty. Given this, rural areas often lack an enabling environment that encourages public or private investment in water services, leading to low provision of those services (UNESCAP 2011; WHO and UNICEF 2006). This is a particular problem in South Asia, where there is low overall public or private investment in these types of infrastructure, particularly in Bangladesh, India, and Pakistan (WaterAid 2011). Moreover, even if investments are made in these countries, poor maintenance in rural areas still persists due to poor planning and lack of support (UN 2005). Even in Sri Lanka, which is on track to meet its Millennium

Development Goal commitments on water and sanitation, rural areas are relatively underserved because the National Water Supply and Drainage Board has concentrated its efforts in providing services to densely populated areas (ADB 2007).

On top of financial constraints in providing water and sanitation services in rural areas, the perceptions and behavior of people in rural areas relating to water use and sanitation also pose challenges. Many rural households do not see the need to invest in tap water or sanitary toilets in their households since there are free options available. This leads to low demand and further decreases the financial viability of such projects. Such behavior has been observed in Indonesia, where low consumer demand and community acceptance for water and sanitation services in rural areas are deemed important constraints to investment (AusAID 2009; Yuerlita 2008). Similarly, lack of community participation in water and sanitation projects and poor hygienic behaviors in rural areas contribute to low demand are seen as constraints to improving health and sanitation outcomes in Bhutan (Collett 2010). In Viet Nam, this problem is exacerbated by the decentralized structure of delivering water and sanitation services. Households and communes in Viet Nam are expected to pay for the construction, use, and maintenance of these infrastructure. However, in rural areas, there is less appetite among households to invest in these costly infrastructure (Sijbesima et al. 2010).

Table 8: Contribution of Circumstance Variables to Inequality of Opportunity for Access to Safe Water (%)

Country	Survey Year	Area of Residence (Urban/Rural)	Per Capita Household Expenditure	Age of Household Head	Gender of Household Head	Education Level of Household Head	Household Size
Indonesia	2009	67.7*	29.5*	0.7*	0.3*	0.5*	1.3*
Philippines	2002	8.5*	89.0*	2.6*	0.6*	0.5*	-1.2*
Viet Nam	2008	82.8*	11.9*	2.5*	2.6*	0.1	0.1
Bangladesh	2000	82.0*	17.5*	0.4*	-0.0*	0.1*	0.1
Bhutan	2007	55.6*	32.4*	0.5	-0.2*	13.8*	-2.1*
Sri Lanka	2009–2010	89.0*	9.1*	0.2*	0.2*	0.0*	1.5*
Pakistan	2007–2008	70.8*	19.0*	-0.0*	0.0*	10.2*	-0.1

Note: * indicates that the estimated coefficient was found to be statistically significant at the 5% level in the logit regression model of the probability of having access to safe water.

Source: Author's calculations based on household surveys.

In the Philippines, household poverty is a more important constraint to accessing water and sanitation services than residing in a rural area. This has been reflected by our results in Tables 8–9 that per capita household expenditure is the main contributor to inequality of opportunity to access water and sanitation services in the Philippines. Although in general the rural population still has less access to safe water or sanitation services than urban dwellers, poor people in rural and urban areas suffer the most deprivation, and thus tend to bear higher burdens of diseases or economic costs (USAID 2008). Thus, investments in water and sanitation in the country should be focused on rural areas and urban slum dwellers.

Table 9: Contribution of Circumstance Variables to Inequality of Opportunity for Access to Sanitation (%)

Country	Survey Year	Area of Residence (Urban/Rural)	Per Capita Household Expenditure	Age of Household Head	Gender of Household Head	Education Level of Household Head	Household Size
Indonesia	2009	79.6*	17.0*	0.6*	0.1*	2.7*	0.1*
Philippines	2002	2.5*	97.2*	1.1*	0.1*	0.7*	-1.5*
Viet Nam	2008	29.0*	67.0*	0.8*	1.5*	2.3*	-0.6*
Bangladesh	2000	20.4*	71.0*	1.8*	0.2*	0.0	6.6*
Bhutan	2007	43.7*	33.7*	1.7*	1.4*	21.0*	-1.6*
Sri Lanka	2009–2010	-0.3*	98.9*	2.4*	-0.0	0.0*	-0.9*
Pakistan	2007–2008	38.7*	50.6*	0.6*	0.8*	10.1*	-0.8*

Note: * indicates that the estimated coefficient was found to be statistically significant at the 5% level in the logit regression model of the probability of having access to sanitation.

Source: Author's calculations based on household surveys.

As shown in Table 10, the inequality of opportunity for access to electricity is largely dependent on two circumstance variables: location (i.e., whether living in urban or rural areas) and economic status (as measured by per capita household expenditure). The first circumstance is straightforward to explain—there are high costs associated with building an electricity grid in rural areas (UNDP 2009; World Bank 2010). As such, people living in rural areas are expected to be less likely to have access to electricity than their urban counterparts. However, this is not the entire story as there are other constraints to achieving universal electrification in rural areas. In the case of Viet Nam, early attempts at rural electrification were hampered by inefficient coordination and lack of a regulatory framework (World Bank 2010). The high cost of building a rural grid and lack of central coordination also hampered electrification in Sri Lanka, but in response the government took a decentralized approach by encouraging off-grid electrification such as the use of solar panels (Independent Evaluation Group 2008).

A particular problem for rural electrification in Bhutan and Indonesia is their terrain, remoteness, and scattered settlements. In Indonesia, many islands are so sparsely populated that electrifying them is not financially viable (World Bank 2005). In fact, it is unlikely that the Indonesian State Electricity Company will achieve its electrification targets outside the islands of Java and Bali. In Bhutan, a major challenge is the ruggedness and remoteness of the mountainous terrain, compounded by the fact that the rural population is scattered in small settlements (Kumar 2011). Similarly, community remoteness is an important factor explaining lack of access to electricity in Pakistan (Mirza and Kemp 2011). Thus, even rich households in rural areas can be considered living in energy poverty.

On the other hand, in Bangladesh and the Philippines, it is household-level constraints—i.e., poverty—that is a major constraint to electrifying rural areas (World Bank 2010). Poor rural households are unlikely to be able to pay for connection fees or electricity consumption, which in turn makes it less financially viable to invest in rural electrification. However, the recent success of Bangladesh shows the importance of central planning to map out subsidies and investments in rural electrification, as well as the need to provide rural households with financial assistance through cooperatives (Barnes 2007). However, in the Philippines, household poverty is a particularly binding constraint to having access to electricity because of high costs as

confirmed by studies, which show that the country has among the highest electricity rates in Asia due to inefficiencies in energy production and transmission (Department of Energy 2008; Woodhouse 2005).

Table 10: Contribution of Circumstance Variables to Inequality of Opportunity for Access to Electricity (%)

Country	Survey Year	Area of Residence (Urban/Rural)	Per Capita Household Expenditure	Age of Household Head	Gender of Household Head	Education Level of Household Head	Household Size
Indonesia	2009	86.5*	2.0*	6.0*	-0.3*	1.4*	4.5*
Philippines	2002	7.0*	93.6*	0.2*	0.2*	0.5*	-1.4*
Viet Nam	2008	15.3*	72.2*	2.8*	3.0*	2.7*	4.1*
Bangladesh	2000	35.1*	63.1*	0.2*	0.1*	0.0	1.7*
Bhutan	2007	53.3*	39.4*	-0.4*	-0.1*	9.1*	-1.3*
Sri Lanka	2009–2010	23.8*	72.6*	1.6*	0.2*	0.0*	1.9*
Pakistan	2007–2008	29.8*	58.6*	0.1*	1.3*	9.9*	0.3*

Note: * indicates that the estimated coefficient was found to be statistically significant at the 5% level in the logit regression model of the probability of having access to electricity.

Source: Author's calculations based on household surveys.

V. CONCLUSIONS

Inequality has become a major item on the development agenda in recent years. After decades of rapid economic growth around the world, economic gains were threatened by the global financial crisis of 2008 and the ongoing eurozone crisis. While economic theory has always maintained that economic growth is a necessary but not sufficient condition for improving standards of living, the recent economic crises have reinforced this view even in developed countries. Concepts such as equity, fairness, and justice in the distribution of economic benefits are no longer in the realm of philosophers and theorists. Rather, they are now in the forefront of policy design and economic reform in both developed and developing countries.

This study is concerned with analyzing the equity of distribution of opportunity in basic services in education and infrastructure. The analysis was carried out using a methodology called the HOI introduced by the World Bank, the product of average opportunity and the equity of opportunity. The HOI shows both coverage and distribution of opportunity in an outcome variable such as school attendance, access to safe water, access to electricity, or access to sanitation. The methodology is applied empirically using available household data from Bangladesh, Bhutan, Indonesia, Pakistan, the Philippines, Sri Lanka, and Viet Nam.

The HOI measures the total contribution of all circumstance variables to inequality of opportunity. From the perspective of policymakers, determining the impact of individual circumstance variables would be more useful since these individual contributions will help to identify circumstance variables that have the most impact on inequality of opportunity. This study presents a method of quantifying the relative contributions of individual circumstance variables to the inequality of opportunity. The new methodology introduced in this study would be helpful in analyzing binding constraints to providing equitable opportunities across countries.

Opportunities to access basic education services in the seven countries vary widely. At the primary and secondary levels, Sri Lanka is a stellar example in equitably providing opportunities to access education, with school attendance among children aged 6–11 years reaching nearly 100% and an HOI of more than 99. The country also has the highest attendance rate among secondary-school-age children (86.38%) and an HOI of about 85. Sri Lanka's educational achievements are remarkable considering that it does not have the highest per capita gross domestic product among the seven countries, with the Philippines higher in 2007.

In contrast, Sri Lanka's neighbors—Bangladesh, Bhutan, and Pakistan—have yet to reach 90% attendance rates among primary-school-age children, while attendance rates for secondary-school-age children are still below 60% in Bangladesh and Pakistan. HOIs in these South Asian countries are also among the lowest, indicating that they need to both improve overall access to basic education services and ensure that education opportunities among children are equally distributed, even to the poorest segments of the population.

In Southeast Asia, access to and distribution of opportunities for basic education services have been impressive in Indonesia and Viet Nam in recent years, pointing to the effectiveness of their governments' efforts to provide basic education for all.

Likewise, there is wide variation in the availability and distribution of opportunities to access basic infrastructure services, such as safe water, electricity, and sanitation. Bhutan has the highest level of access to safe water (89.94%); Viet Nam has the highest level of electrification (97.19%); and Sri Lanka has the highest percentage of population living in homes with sanitation (94.19%). Our findings highlight the uneven rates of progress in expanding opportunities to access quality infrastructure services in the region as compared with education opportunities.

Unfortunately, for all basic infrastructure, Bangladesh shows the lowest levels of overall opportunities available and the distribution across population. Less than one-third of the population has household access to electricity, about one-fifth have sanitation, and only a little more than one-twentieth have safe water. For all these facilities, only the richest 20% of the population has access rates of 50% or higher. These findings suggest that these basic infrastructure services are nearly luxuries to most people in Bangladesh.

Clearly, a lot needs to be done to improve the distribution of economic benefits in developing countries in Asia. While Bangladesh may be a particularly urgent case, all countries considered in this analysis need to bolster their efforts to improve access to basic education and infrastructure services, especially among the poor and marginalized groups. Sri Lanka's achievements in equitably providing basic education opportunities demonstrate the importance and possible effectiveness of public policy in achieving equity of opportunity, particularly in education.

An important factor to consider in improving the delivery of basic services could be decentralization. Many countries have decentralized the delivery of services in education, water, electricity, and sanitation mainly to improve transparency, accountability, and responsiveness in providing these services. However, decentralization could also exacerbate existing inequities across various local government units. Moreover, these local government units will have their own solvency and liquidity issues, which could affect their access to financial services. This could cause highly inequitable distribution of services across districts, with affluent areas having much better services than poorer areas. As such, national governments will have to balance the

costs and benefits of decentralizing the responsibility of delivering these services. More rigorous research would be required to determine the best method to deliver public services more effectively and efficiently.

It may also be noted that household poverty—as manifested in the contribution of per capita household expenditure in the inequality of opportunity in accessing education and infrastructure services—plays an extremely significant role in determining equitable access to education and infrastructure. Household poverty defines the ability of households to pay for and access these services. This study showed a significant correlation between household resources and the demand for education and infrastructure services. Thus, policymakers may opt to explore policies that address the demand side of the provision of education and infrastructure. Targeted subsidies or loans may be used to provide incentives to households to increase their demand for education and infrastructure. For education, cash transfers have been widely used to encourage school attendance such as the Philippine government's conditional cash transfer program that provides stipend to poor households whose children meet the required school attendance rate, among others.

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Inequality of Human Opportunities in Developing Asia

The paper analyzes equity of opportunity in basic education and infrastructure services in seven developing countries, namely, Bangladesh, Bhutan, Indonesia, Pakistan, the Philippines, Sri Lanka, and Viet Nam. It uses a method developed by the World Bank called the Human Opportunity Index. The study finds 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.

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