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A NOTE ON EDUCATION ATTAINMENT GAPS IN SUB-SAHARAN AFRICA AND SOUTH ASIA

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A NOTE ON EDUCATION ATTAINMENT GAPS IN SUB-SAHARAN AFRICA AND SOUTH ASIA

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This paper uses a simple decomposition is provided to analyze gaps in educational attainment by gender, location, and socio-economic (wealth) status for a large number of countries in sub-Saharan Africa and South Asia. The decomposition considers six conditional steps required for completing high school, namely starting and completing primary school, starting and completing junior high school, and starting and completing senior high school. Using Demographic and Health Surveys the parameters are estimated conditionally on having completed the previous step as well as cumulatively. By estimating the decomposition for various groups, we are able to assess when dropping out takes place in the education system for various groups.

1. Introduction

Progress has been achieved for the MDGs related to education. In the last two decades, large gains have been made in attainment, including with respect to ensuring universal primary education and eliminating persistent gender inequalities. The number of out-of-school girls in primary school has been cut in half since 1999 and two-thirds of developing countries have reached gender parity in primary education. In over one-third of these countries, girls outnumber boys in secondary education. At the same time, according to the most recent data from the UNESCO Institute of Statistics, 58 million children of primary school age remain out of school today, to which one can add 63 million or so out of school children of junior secondary school age (UNESCO and UNICEF, forthcoming), for a total of about 120 million children out of school.

Most of these children live in sub-Saharan Africa or South Asia and many may be missing out on their chance for an education simply because of where, to whom, and what gender they were born. Armed conflict compounds these multiple sources of disadvantage, and states suffering (or emerging) from pervasive armed conflict have been found to have some of the world's worst indicators for education (UNESCO, 2010, 2011). In South Sudan alone, until recently one million children remained out of school – even as enrollment in primary school increased by 700,000 between 2005 and 2009 (World Bank, 2012). Moreover, while students may be entering primary school, they are not always completing the cycle. African countries in particular suffer from some of the lowest primary completion rates in the world: two thirds of sub-Saharan African countries have primary completion rates of less than 80%. Other countries with higher primary completion rates but large out-of-school youth populations in absolute numbers also warrant attention. Finally, gender, location, and wealth disparities persist beyond primary education.

While the MDG target relates to the completion of primary education, primary education is often not enough in many countries today to escape poverty or at least vulnerability. It is therefore useful to look at disparities between household groups in the completion of secondary education and to analyze what drives these disparities in terms of previous drop-outs. One way to look at such disparities is to compare the ratios for completion rates between girls and boys, rural and urban locations, and the bottom versus the top quintiles of wealth, and to assess where gaps

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occur in the progression of children through the education system. On the basis of a decomposition framework suggested by Nguyen and Wodon (2014), this is done in this paper using Demographic and Health Survey (DHS) data for a sample of 31 low income and lower middle income countries African and South Asian in order to compare education attainment for different groups of children.

The paper is structured as follows. Section 2 introduces the methodological framework. Section 3 provides the results. A brief conclusion follows.

2. Methodology

We use data from the most recent nationally representative DHS household survey data available for a sample of 31 countries. The decomposition framework is illustrated here with respect to gender gaps in attainment following Nguyen and Wodon (2014), but the same framework is also used for gaps by location and socio-economic status.

Denote the gender ratio of the share of girls completing senior high school to the share of boys attaining the same level as GR_{CSH} (C in the subscript denotes completion, and SH stands for senior high). This ratio can be expressed as the product of six ratios as follows:

$$GR_{CSH} = \frac{SP_G}{SP_B} \frac{CP_{G|SP}}{CP_{B|SP}} \frac{TJH_{G|CP}}{TJH_{B|CP}} \frac{CJH_{G|TJH}}{CJH_{B|TJH}} \frac{TSH_{G|CJH}}{TSH_{B|CJH}} \frac{CSH_{G|TSH}}{CSH_{B|TSH}} \quad (1)$$

In this decomposition, SP_G represents the share of girls who start primary school, while $CP_{G|SP}$ refers to the share of girls who complete primary school among those who started primary schooling (hence the use of the conditional symbol '|') in the mathematical notation). Next, we consider the transition to junior high school among girls who completed primary school (denoted by $TJH_{G|CP}$), and again the completion of junior high school among girls who started that cycle (denoted by $CJH_{G|TJH}$). The same is repeated for senior high school, with the last two terms of the decomposition for girls, $TSH_{G|TSH}$ and $CSH_{G|TSH}$. The overall gender ratio for the completion of senior high school is obtained by considering these parameters for both girls and boys.

Another way to write the same relationship is to express the overall gender ratio as a product of six conditional gender ratios. Since we will use this alternative presentation in the discussion of the results, it is useful to specify the notations that are being used as follows:

$$GR_{CSH} = GR_{SP} \times GR_{CP|SP} \times GR_{TJH|CP} \times GR_{CJH|TJH} \times GR_{TSH|CJH} \times GR_{CSH|TSH} \quad (2)$$

One can also define similarly the gender ratio for primary school completion as the product of the first two gender ratios on the right hand side of equation (2), and a gender ratio for the completion of junior high (product of the first four gender ratios), and the same can be applied to other stages in the process. We will refer to conditional parameters when considering any of the six stages conditionally on having completed the previous stage. By contrast, we will refer to cumulative parameters when taking all steps up to a certain stage into account. For example, the conditional completion ratio for senior high school is defined as $GR_{CSH|TSH}$, while the cumulative gender ratio is defined as GR_{CSH} . This applies also to lower levels of attainment.

The above decomposition helps to identify where exactly ‘losses’ out of the education system take place in terms of girls not proceeding through the cycles in an equal manner with boys. One can also look at drivers of changes in the gender ratio over time, or at what drives differences in gender ratios between various groups at one point in time (this is not done here, but see Nguyen and Wodon, 2014, for an illustration in the case of Ghana). One way to do this additively for relatively small changes over time (or for small differences between groups at one point in time) is to compute the percentage change in the gender ratio as follows:

$$\begin{aligned}
\Delta GR_{CSH} / GR_{CSH} &= (GR_{CSH}^{t+1} - GR_{CSH}^t) / GR_{CSH}^t \\
&\approx (\ln GR_{SP}^{t+1} - \ln GR_{SP}^t) + (\ln GR_{CP|SP}^{t+1} - \ln GR_{CP|SP}^t) \\
&+ (\ln GR_{TJH|CP}^{t+1} - \ln GR_{TJH|CP}^t) + (\ln GR_{CJH|TJH}^{t+1} - \ln GR_{CJH|TJH}^t) \quad (3) \\
&+ (\ln GR_{TSH|CJH}^{t+1} - \ln GR_{TSH|CJH}^t) + (\ln GR_{CSH|TSH}^{t+1} - \ln GR_{CSH|TSH}^t)
\end{aligned}$$

In terms of data, when implementing the decomposition with a household survey, one needs to be careful in selecting properly the age group on which the decomposition is applied. On the one hand, it is best to choose an age group that is as young as possible, in order to approximate better the current state of an education system. On the other hand, one needs to allow for the fact that many students take longer to complete a cycle than the normal completion time, and that some of the children will enter in the first grade of primary school at a late age. In this note, for simplicity, we simply focus on youth between 21 and 24 years of age (see Nguyen and Wodon, 2014, on how to consider younger age groups). The analysis is carried for gaps in education attainment by gender, location, and socio-economic status (based on wealth quintiles themselves defined on the basis of a factorial analysis of indicators of household wealth in the surveys).

3. Results

Summary values for the gaps in attainment are provided in **Table 1** with equal weights for all countries and in **Table 2** with population-based weights. A few findings stand out. First, and as expected, the ratios are by far lower when comparing wealth quintiles than locations, with the smallest ratios observed by gender. This suggests that disparities related to wealth are much more severe than those related to location and gender. Second, the average ratios tend to be very low. Consider the case of average values without population weights, thereby giving the same weight to all countries. The average ratio of 0.041 by quintiles implies that a child in the top quintile is 25 times more likely than a child in the bottom quintile to complete secondary school. The average ratio of 0.214 by location implies that an urban child is almost five times more likely to complete secondary education than a rural child. Finally, the average ratio of 0.645 by gender implies that a boy is 1.55 times more likely than a girl to complete secondary school. In other words, despite progress, major inequalities persist between groups within countries. The values of the various education attainment ratios are higher with population weights, but overall they remain low.

The data in Tables 1 and 2 also suggests that disparities are smaller in the lower middle income group than in the low income group. As countries grow, disparities are reduced. Yet at the same time, there is also a lot of variation within the two groups of countries as suggested by the standard deviations and the minimum and maximum values. This can be illustrated graphically.

Table 1. Ratio of secondary school completion rates, equal weight for all countries

	Number of countries	Mean value	Standard deviation	Minimum value	Maximum value
Female/Male					
All countries	31	0.645	0.251	0.226	1.280
Low income	19	0.547	0.218	0.226	0.901
Lower middle income	10	0.759	0.218	0.521	1.280
Rural/Urban					
All countries	31	0.214	0.151	0.000	0.521
Low income	19	0.156	0.129	0.000	0.468
Lower middle income	10	0.319	0.151	0.103	0.521
Quintile 1 (Poorest) /Quintile 5 (Richest)					
All countries	31	0.041	0.044	0.000	0.176
Low income	19	0.017	0.022	0.000	0.072
Lower middle income	10	0.078	0.050	0.019	0.176

Source: Authors

Table 2. Ratio of secondary school completion rates, population weights

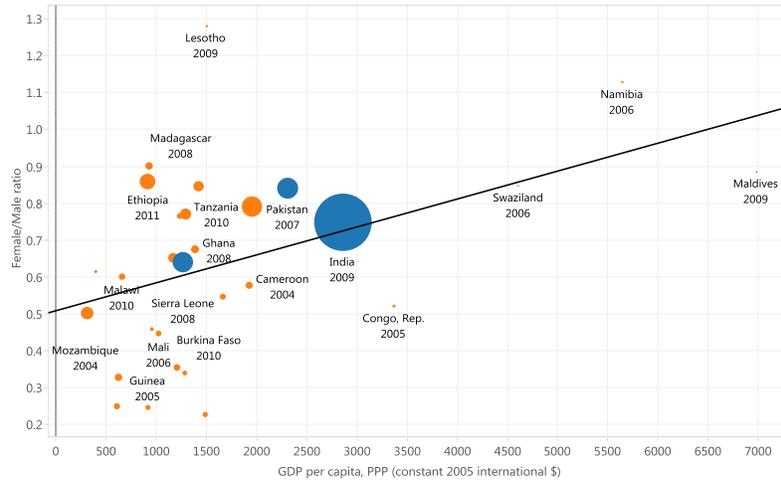
	Number of countries	Mean value	Standard deviation	Minimum value	Maximum value
Female/Male					
All countries	31	0.720	0.130	0.226	1.280
Low income	19	0.643	0.185	0.226	0.901
Lower middle income	10	0.760	0.058	0.521	1.280
Rural/Urban					
All countries	31	0.720	0.130	0.226	1.280
Low income	19	0.643	0.185	0.226	0.901
Lower middle income	10	0.760	0.058	0.521	1.280
Quintile 1 (Poorest) /Quintile 5 (Richest)					
All countries	31	0.082	0.052	0.000	0.176
Low income	19	0.024	0.022	0.000	0.072
Lower middle income	10	0.112	0.035	0.019	0.176

Source: Authors

Figures 1 to 3 display this variation between countries in a more visual way. Countries are ranked on the horizontal axis according to their level of GDP per capita in purchasing power parity terms. Gaps in secondary school completion by gender (ratio of the completion rates for girls and boys), location (ratio of the completion rates for rural versus urban areas), and wealth (ratio of the completion rates for children in the bottom versus the top quintiles of wealth) are displayed on the vertical axis. The sizes of the dots on the Figures represent the size of the country's population. Data are provided for sub-Saharan countries in orange and South Asian countries in blue.

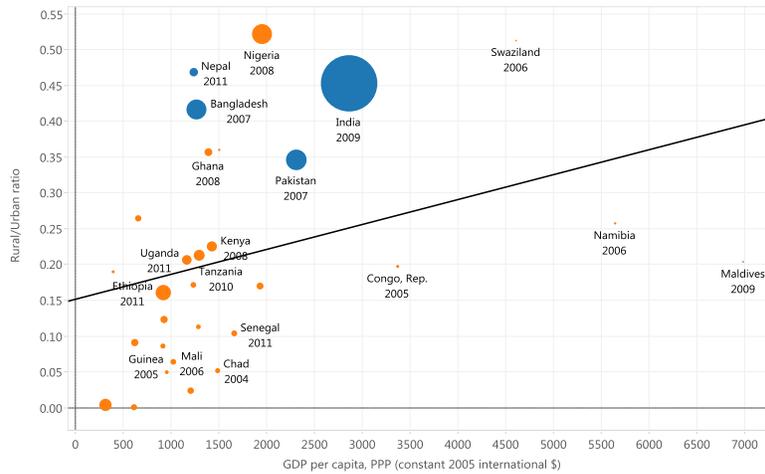
A few points are worth highlighting. First, the three graphs have very different intercepts – with the lowest value for disparities by quintiles followed by disparities by location and finally disparities by gender. This echoes the fact that disparities are larger according to wealth, then location, and then gender. Second, the slopes of the lines of best fit are all positive, suggesting that disparities are reduced with economic development as measured through GDP per capita. Yet at the same time, there is a lot of variation between countries, suggesting that broader contexts (including circumstances such as conflicts) as well as education policies and programs can make a major difference in reducing such disparities.

Figure 1. Ratio of secondary school completion rates by gender



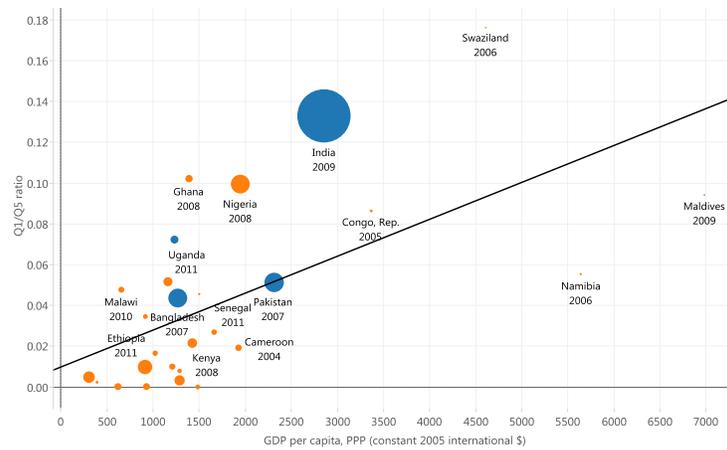
Source: Authors

Figure 2. Ratio of secondary school completion rates by location



Source: Authors

Figure 3. Ratio of secondary school completion rates by wealth



Source: Authors

As mentioned in the methodological section, a simple decomposition can be used to analyze what contributes to such large disparities in education attainment. The ratios of secondary school completion between girls and boys, as well as between urban and rural location and between the bottom and top quintiles, can be expressed as the product of six ratios for (1) the proportion of students starting primary school (SP), (2) completing primary school conditionally on starting primary school (CP), (3) transitioning to junior high school conditionally on completing primary school (TJH), (4) completing junior high school conditionally on starting that cycle (CJH), (5) transitioning to senior high school conditionally on completing junior high school (TSH), and finally (6) completing senior high school conditionally on starting that cycle (CSH).

The decomposition helps in assessing exactly where disparities in attainment occur. Because the decomposition is multiplicative, the largest contributors to disparities are simply the smallest of the six ratios. For example, if the value of SP is smaller than those of CP, TJH, CJH, TSH, and CSH, this indicates that for that ratio (whether related to gender, location, or wealth) and that country, the gap that contributes the most to the overall final gap in the completion of secondary school is precisely the gap in starting primary school. What **Figure 4** displays is the share of countries for which the various gaps (from SP to CSH) contribute the most to the overall gaps in secondary school completion.

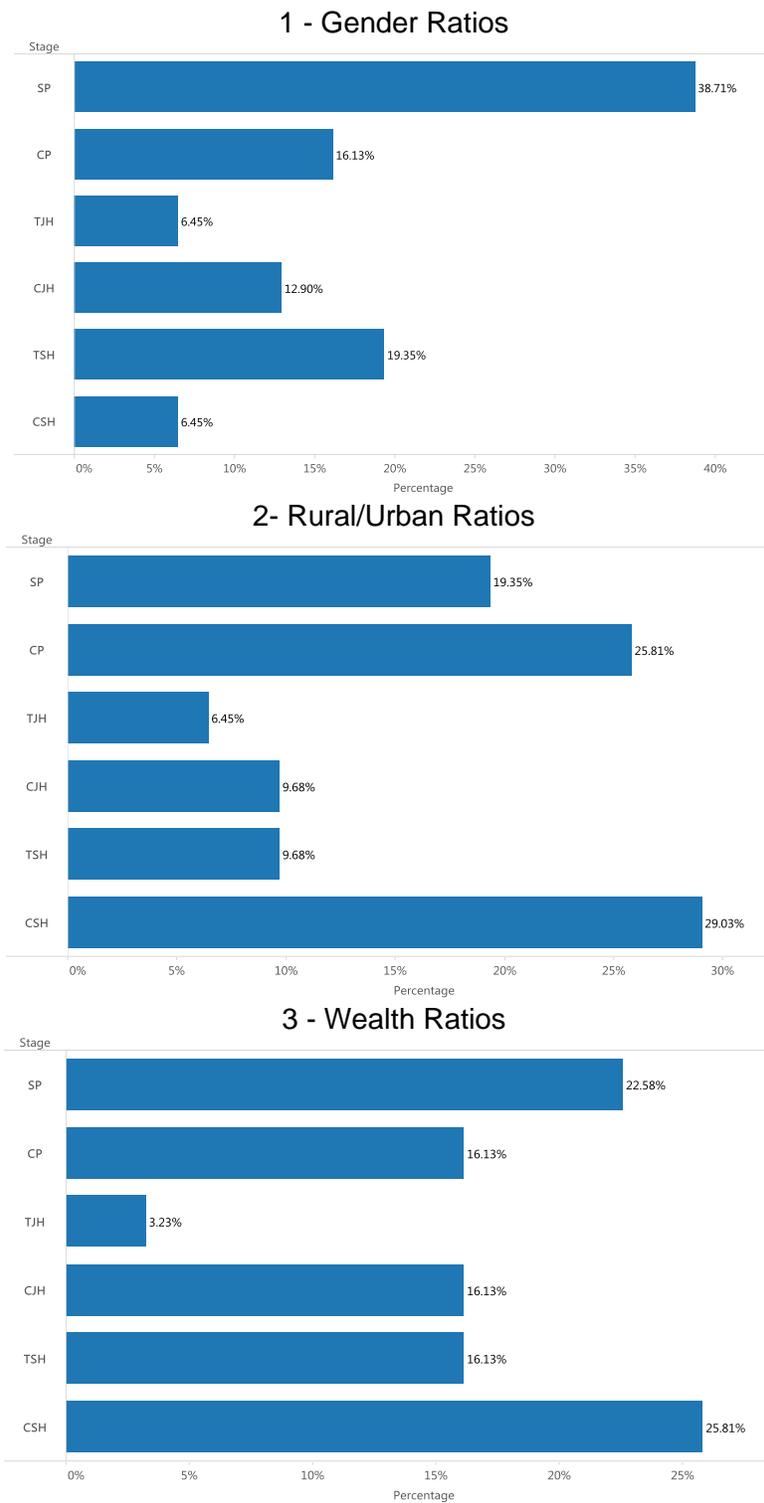
In the case of gender, differentials in the share of girls and boys who start primary school matter the most when considering completion of secondary school. In the case of location and wealth, gaps in the completion of secondary schools tend to matter more, but differences in the proportion of students who start and complete primary school also matter. Note that if the analysis were conducted in terms of completion of basic education – which often corresponds to nine years of schooling, the role of gaps in starting and completing primary schools would matter even more.

4. Conclusion

Despite progress towards universal primary education as well as junior secondary education, large gaps remain in education attainment by gender, location and especially socio-economic status. This paper has relied on a simple decomposition is provided to analyze gaps in educational attainment by gender, location, and socio-economic (wealth) status for a large number of countries in sub-Saharan Africa and South Asia. The results suggest that disparities start at an early age – not starting or completing primary school contribute in a major way to disparities later in terms of education attainment at higher levels of schooling. If one were to consider disparities in learning as well, apart from disparities in attainment, disadvantage at an early age is likely to contribute even more to disparities later in life. But of course disparities alter in life matter as well.

While the purpose of this paper was to provide broad stylized facts on the magnitude of disparities in secondary school completion by gender, location, and especially socio-economic status, as well as indications of when disparities occur, the analysis can also be applied in a more detailed way to country data in order to conduct case studies of who drops out when and thereby inform policy dialogue on the type of interventions that could help reduce drop-outs.

Figure 4. Share of countries where different stages contribute the most to gaps



Source: Authors

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