SES vs. SEX:
Where should education policymakers invest in sub-Saharan Africa?

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ABSTRACT

Recent evidence suggests that concerted efforts to reduce gender inequality in schooling globally have begun to payoff, especially in the case of sub-Saharan Africa. Given these improvements however, some researchers have questioned whether there should be a continued focus on gender at the expense of other aspects of educational disadvantage, such as that associated with family resources (SES). The question is one that will depend at least partially on the magnitude of disadvantage that stems from both sex and SES. Moreover, given the limited resources most sub-Saharan governments, such a decision will be guided by the payoff associated with funneling resources to particular groups. This paper uses DHS data from eight sub-Saharan countries to estimate the contribution of SES and sex to overall educational inequality countries. We then evaluate the impact of various policies that would raise enrollments of specific groups and the relative cost of these options.

Background

While the UN Millennium Development Goal of gender parity in education may not be reached by 2015, global convergence in schooling in the developing world has been widely acknowledged. The female-to-male ratio in secondary enrollment rose from 0.86 to 0.92 for the developing world, despite considerable variation across regions (UNICEF 2004; UNFPA 2005), and this trend towards gender parity raises new and important questions about the relative importance of gender as a focal point for addressing schooling inequality in developing countries. Is, as suggested by Knodel and Jones (1996:684) "*a strong policy emphasis on closing the [gender] gap is no longer needed*"? Or, given that some of the gains in women's schooling may be, in some cases, modest and reversible, (DeRose and Kravdal 2007; Hewett and Lloyd 2003; Kim et al. 1999; Subramanian 2002) would it be premature to shift attention away from gender to address other aspects of educational inequality, such as socioeconomic status?

Shifting away from a *à priori* emphasis on sex might seem most justified where the gender equity gap has closed. But while this may be the *global* trend, it clearly does not fit much of *sub-Saharan Africa's* situation where the female-to-male ratio in secondary enrollment remains below 0.80 in more than half the countries (UNESCO 2008; World Bank 2007). Although the gender gap in education has progressively narrowed through the 1990s, the pace of this narrowing has been too slow to expect a convergence by 2015 (World Bank 2001). Indeed, the convergence process seems to have stalled or slightly reversed, as secondary enrollments declined from 82 in 1999 to 79 in 2004 (UNESCO 2008). For most African countries therefore, the Millennium Development Goal of closing gender gaps within the projected time frame remains elusive. Even in such contexts however, is a continued focus on gender justified, especially in light of other forms of inequality?

To help guide policymakers with regards to this question, research needs to 1) document overall of levels educational inequality; 2) determine how much of this inequality can be attributed to differences in sex versus differences in family SES; 3) simulate the impact of policies that improve enrollments to varying degrees (5, 10, 15 percent) among different constituencies (poor boys, poor girls, all poor children, all girls, etc.) have on overall levels of educational inequality; and 4) evaluate the "cost[1]" of these policies. Given the disparity between sub-Saharan Africa's large school-age population and budgetary allocations for education that on average amount to no more than 4-5% of Africa's Gross Domestic Product (GDP), levels of expenditure per student are very small and thus resource allocation is a critical challenge for policy makers in these post-colonial states.

Data

This analysis uses data from nine of the most recent Demographic Health Surveys (DHS) in sub-Saharan Africa. Using nationally representative data from Burkina Faso (2003), Cameroon (2004), Ghana (2003), Madagascar (2003), Niger (2006), Tanzania (2004), Uganda (2005), Zimbabwe (2006) and Zambia (2001) allows us to examine educational inequality under a wide range of circumstances. Gender gaps in this subset of countries range from small (Madagascar, Zimbabwe) to very large (Burkina Faso), and the overall schooling levels vary similarly from a low of 41% in Niger in 2006 to a high of 78% in Uganda in 2005 (See Appendix Table 1).

Methods

Educational Inequality

In order to document the overall magnitude of educational inequality we use the Theil. Contrary to previous studies that focus on differentials, the Theil is a full-information measure of

[1] With regards to the last task, the "cost" here is not truly monetary but refers to the reductions in inequality that can be gained relative to the number of children that would have to be targeted.

inequality that integrates information about both effect size and group size. The theil is calculated as:

$$T = \sum_j p_j r_j \log r_j$$

where p is the proportion of children in group j, and r the ratio of enrollment in this group to average enrollment (all raw data used for these calculations is provided in Appendix Table 1). Given that there are 2 sexes and 8 different resource levels, there are 21 groups used in each calculation.

Index of Relative Importance

While the previous step provides an understanding of the overall level of educational inequality, it does not clarify the predominant driver of this inequality. To address this issue, we again use a full-information measure of inequality (the Theil). Key to our analysis is the distinction between inequality across SES (B_{SES}) or across the sexes (B_{sex}). These two components are computed as:

$$B_{SES} = (s_{male} T_{male}) + (s_{female} T_{female})$$

$$B_{Sex} = (s_{poor} T_{poor}) + ... + (s_{rich} T_{rich})$$

Where s_i is the share of the sum of the education of each sex (SES group, respectively) relative to the national sum, and T_i is the Theil inequality index across SES (sex) for the corresponding sex (SES group, respectively).

Ultimately, R is measured as the ratio of B_{sex} over $B_{SES.}$ It indicates whether inequality between the sexes supersedes inequality between the socioeconomic groups. Again, the comparison based on this fuller information measure is better than one derived from standard regression analysis because it combines information about both group differences and group size.

Policy Simulations:

The first task with regards to policy simulation is to determine how gains in enrollments among specific constituencies would change the overall level of educational inequality. To do this, we simply adjust group specific enrollment rates (r_j) for groups that may be of policy interest (i.e. poor boys, poor girls, all poor children, all girls, etc.) by set increments (5, 10, 15%) and plot the resultant changes in overall levels of educational inequality. The second task is to determine the cost effectiveness of these various options. To do this, we examine the change in educational inequality that results from increasing enrollments among a target group and divide this by the number of children that are in that group. For example, if we implemented a policy that targeted poor girls, and increased their enrollment by 15 percent, we then divide the change in inequality by the actual number of poor girls. Using this empirically-based simulation approach, African policy makers can have a better idea of both the impact and cost of different policies.

Findings

Appendix Table 1 provides the input data necessary for our analysis. Preliminary findings suggest large variation in educational inequality in sub-Saharan Africa. Moreover, we find, consistent with Knodel and Jones (1996), that schooling inequality between the sexes is consistently smaller than SES-related inequality. Future work on this paper will estimate various policy options and their cost effectiveness.

APPENDIX TABLE 1: School enrollment rates by country, sex, and SES, among 10-19 year-olds

	SOCIOECONOMIC GROUPS								
	1	2	3	4	5	6	7	8	ALL SES
CAMEROON 2004									
Male enrollment	0.62	0.79	0.73	0.76	0.78	0.85	0.91	0.92	0.80
N males	123	1322	826	1081	1046	753	683	467	6322
Female enrollment	0.53	0.64	0.56	0.59	0.76	0.79	0.86	0.78	0.69
N females	107	1341	802	1021	1013	825	685	478	6290
Both Sexes	0.58	0.71	0.65	0.68	0.77	0.82	0.88	0.85	0.75
Total N	230	2663	1628	2102	2059	1578	1368	945	12612
FMER	0.86	0.81	0.77	0.78	0.97	0.93	0.95	0.85	0.86
ZAMBIA 2001									
Male enrollment	0.56	0.63	0.69	0.71	0.80	0.83	0.84	0.84	0.70
N males	304	1382	1119	822	94	468	394	157	4762
Female enrollment	0.42	0.48	0.57	0.63	0.70	0.74	0.76	0.85	0.59
N females	303	1337	1116	754	123	445	449	161	4706
Both Sexes	0.49	0.55	0.63	0.67	0.74	0.78	0.80	0.85	0.65
Total N	607	2719	2235	1576	217	913	843	318	9468
FMER	0.75	0.76	0.83	0.88	0.88	0.89	0.91	1.01	0.85
BURKINA FASO 2003									
Male enrollment	0.12	0.19	0.31	0.33	0.51	0.61	0.76	0.62	0.29
N males	825	3240	625	1951	170	482	205	277	7779
Female enrollment	0.06	0.13	0.26	0.26	0.51	0.53	0.57	0.52	0.24
N females	674	2828	595	1715	165	561	313	347	7205
Both Sexes	0.09	0.16	0.28	0.30	0.51	0.57	0.65	0.57	0.27
Total N	1499	6068	1220	3666	335	1043	518	624	14984
FMER	0.53	0.67	0.82	0.78	0.99	0.87	0.75	0.84	0.83
TANZANIA 2004									
Male enrollment	0.56	0.66	0.66	0.73	0.72	0.78	0.74	0.71	0.69
N males	142	1680	1193	2209	195	167	176	96	5883
Female enrollment	0.44	0.58	0.63	0.66	0.69	0.71	0.65	0.61	0.63
N females	172	1618	1130	2126	220	213	261	147	5920
Both Sexes	0.49	0.62	0.64	0.69	0.70	0.74	0.68	0.65	0.66
Total N	314	3298	2323	4335	415	380	437	243	11803
FMER	0.77	0.88	0.95	0.91	0.95	0.92	0.88	0.86	0.91

	ZIMBABWE 2006								
Male	0.69	0.69	0.76	0.72	0.72	0.75	0.82	0.78	0.74
	54	1407	1489	705	229	636	603	365	5498
Female	0.60	0.66	0.76	0.73	0.60	0.73	0.71	0.73	0.71
	48	1391	1370	648	249	630	783	413	5544
Total %Enroll	0.65	0.68	0.76	0.72	0.65	0.74	0.76	0.75	0.72
Total Pop Enrolled	102	2798	2859	1353	478	1266	1386	778	11042
f/m	0.88	0.95	1.00	1.02	0.84	0.97	0.86	0.93	0.95

	UGANDA 2005								
Male enrollment	0.33	0.71	0.84	0.85	0.84	0.88	0.81	0.96	0.81
N males	168	917	1466	2539	130	195	120	132	5704
Female enrollment	0.35	0.67	0.76	0.81	0.75	0.84	0.70	0.79	0.76
N females	180	984	1417	2522	124	228	159	192	5843
Both Sexes	0.34	0.69	0.80	0.83	0.80	0.86	0.75	0.86	0.78
Total N	348	1901	2883	5061	254	423	279	324	11547
FMER	1.05	0.94	0.90	0.96	0.89	0.95	0.87	0.82	0.93

	MADAGASCAR 2003								
Male enrollment	0.38	0.47	0.48	0.65	0.79	0.83	0.84	0.83	0.64
N males	192	1057	560	1036	270	1053	189	207	4570
Female enrollment	0.37	0.46	0.50	0.64	0.69	0.78	0.70	0.74	0.62
N females	197	942	534	941	273	1091	195	217	4396
Both Sexes	0.37	0.47	0.49	0.65	0.74	0.81	0.77	0.78	0.63
Total N	389	1999	1094	1977	543	2144	384	424	8966
FMER	0.96	0.97	1.06	0.99	0.86	0.94	0.83	0.89	0.96

	GHANA 2003								
Male enrollment	0.43	0.50	0.68	0.67	0.77	0.81	0.82	0.77	0.69
N males	110	519	382	941	515	285	364	168	3294
Female enrollment	0.34	0.46	0.60	0.64	0.69	0.75	0.72	0.72	0.64
N females	61	427	375	752	458	257	469	229	3030
Both Sexes	0.40	0.48	0.64	0.66	0.73	0.78	0.76	0.74	0.66
Total N	171	946	757	1693	973	542	833	397	6324
FMER	0.81	0.92	0.88	0.95	0.91	0.93	0.87	0.93	0.93

	NIGER 2006								
Male enrollment	0.27	0.30	0.43	0.51	0.54	0.63	0.79	0.79	0.41
N males	70	3293	226	485	230	335	291	358	5300
Female enrollment	0.21	0.17	0.33	0.33	0.46	0.58	0.77	0.70	0.30
N females	72	3456	234	477	228	347	300	344	5474
Both Sexes	0.24	0.23	0.38	0.42	0.50	0.60	0.78	0.74	0.35
Total N	142	6749	460	962	458	682	591	702	10774
FMER	0.77	0.58	0.78	0.64	0.85	0.91	0.98	0.88	0.71

FMER: Female to Male Enrollment Ratio