

Inequalities in Learning Outcomes in East Africa and their implications for Policy: Evidence from Uwezo Learning Assessment Data

By James Ciera and Aidan Eyakuze, Twaweza East Africa

iciera@twaweza.org and ayakuze@twaweza.org

Abstract

Education sector in East Africa has expanded tremendously over the last years following the introduction of the free primary education. It has been documented that enrollment in primary schools went up tremendously. For instance, in Kenya after the introduction of free primary education, school enrollment increased from 6.1 million in 2002 to 8.2 million in 2007. Despite these commendable feat, concerns have been registered over the continued existence of inequality across the region over the years. Using gender, household socioeconomic status, parental education, school type and geographical location as analytical lenses, this paper unearths the different faces of inequality in East Africa education especially in regard to learning outcomes. The paper is based on data collected in 2015 Uwezo learning assessment large scale survey that was conducted in Kenya, Uganda and Tanzania. The survey was carried across 153 districts in Kenya, 159 districts in Tanzania and 112 districts in Uganda. A total of 112,480 Kenyan, 104,267 Tanzanian and 94,248 Ugandan children age 6-16 years were assessed on grade 2 literacy and numeracy work. With the district as the unit of analysis, and combining descriptive and multivariate methods, a multi-dimension analysis model established that districts with higher proportions of wealthy and educated parents, and private schooled children had better learning outcomes. We conclude that although gender inequality seems to be caving in many regions, other inequalities still persist and there is need to investigate, identify and formulate polices to address them. Therefore, for the region to achieve their goals in education, the reform process must ambitiously target elimination of the inequalities so prominent in our education system.

Key words: *inequality, districts, learning outcomes, socioeconomic status, Uwezo data*

Background

Expenditure in education has increased exponentially in East Africa as a result of the commitment made in the Dakar Framework for Action to improve all aspects of quality education and ensuring measurable learning outcomes are achieved by all (Riddell 2003; Oketch and Rolleston, 2007). Since 2000, Kenya, Uganda and Tanzania have enacted policies and laws to prioritise and promote the Free Primary Education. This has been viewed as the first step towards achieving Education for All (EFA) and some of the Millennium Development Goals (MDGs) (Bategeka, 2005;

Republic of Kenya, 2005; Galabawa, 2001). More teachers have been recruited, new classrooms built and school fees abolished leading to millions more children being enrolled in schools. The heavy investment in education has mostly achieved in increasing access to education. But to maximize the benefits reaped through education, equal access to schooling must be complemented with increases in the quality of education (Arcia and others 2011).

Despite this, inequality in learning outcomes has persisted over the years in East Africa (Oketch and Rolleston, 2007). Inequality in education is one of the core factors that was considered in formulating the Millennium development Goals (MDG). Moreover, addressing inequalities in education has also featured prominently in the formulation of goal 4 of the Sustainable Development Goal (SGD) which states “Ensure inclusive and quality education for all and promote lifelong learning”. Understanding and addressing inequality in education is key in unlocking county’s economic potential. The reduction of education inequality alone has the potential to produce quick gains in economic and social welfare (Pritchett 2004). Pritchett argues that although many international goals in education focuses on increasing enrollment and completion, it is important to recognize the long term goals of education. In many Sub-Sahara counties, being in school or completing primary school is not always a guarantee for literacy. Therefore, to improvement education system, there is need to monitor the quality of education provided which include inequality in school access and school completion, as well as information about learning outcomes (Pritchett 2004).

Education inequality can be analyzed by examining disparities in the incidence of key educational indicators e.g. between males and females, rural and urban residents, education background of the parents, household wealth level (highest and lowest income quintiles) and the type of school children attend (private/public). However, as we try to understand and address learning inequalities, it is also important to understand that there are wide disparities between countries’ education systems. For example, in both Kenya and Zambia, more than three-quarters of primary school age children make it beyond grade 4, but while in Kenya 70 percent of these children are able to read, just 44 percent can in Zambia. (EFA Global Monitoring Report: 2013/4).

Providing quality education to girls is an important intervention in promoting economical, health and social wellbeing in the society. Numerous literature suggest that providing girls with quality education helps break the cycle of poverty since educated women are more likely to marry late; more likely to have healthy babies; and are more likely to send their children to school (Confemen, 2011). Although gender differences on access and learning outcomes has dominated the education literature, it is still one of the most pervasive inequality worldwide (The EFA Global Monitoring Report: 2013/4). A lot has been done to bridge the gap although girls continue to suffer severe disadvantage and exclusion in education systems. Recent findings on learning outcomes indicate that girls have almost bridged the gap or outperformed the boys. For example, the 2012 UNESCO reports indicated that in two countries (Tanzania and Malawi), boys outperformed girls in reading; but in several sub-Sahara countries, there was no significant difference between boys and girls. In Math, girls outperformed boys in Seychelles while boys matched or outperformed girls in Kenya, Malawi, Mozambique, Swaziland, Tanzania Mainland, Uganda, and Zambia (Confemen, 2011; UNESCO, 2012).

Household wealth is another key important factor to understand while studying inequality in learning outcomes. Poor households are commonly characterized with low self-worth, poor access to education and health and inability to participation in social and political life. Most of the Sub-Sahara Countries have been affected in this aspect. Recent findings in Ethiopia, show that wealth effects are far more dominant than gender differences where children from poorer households are less likely to be able to read (Rolleston et al., 2014). In countries like Cameroon, Ghana and Sierra Leone, the difference in youth literacy rates between rich and poor is more than 50% while in Nigeria, about 92% of the rich youth can read compared to only 14% of the poor youth (EFA Global Monitoring Report: 2013/4). In South Africa too, children from the wealthiest provinces are six times more likely to have basic mathematics skills than are children from its poorest provinces (Moloi and Chetty, 2010). Previous findings from Uwezo survey shows the learning of children from poor households is at least one year behind that of children of the same age from more advantaged households (Jones and Schipper, 2012).

Though the choice of school the children attend is a decision made at the household due to different social economic reasons, it has been documented that children attending private schools have better learning outcomes. Using data from developing countries, Day-Ashley et al. (2013) and Desai et al. (2008) demonstrated that students achieve better learning outcomes in private schools even after adjusting for child's age, grade and gender. In sub-Saharan setting especially in East Africa, public or government schools are better equipped than private school in terms of school infrastructure, teachers experience and motivation. However, the trend is the same in favour of poorly equipped private school. For example, Ngware, et al., (2013) demonstrated that even in urban poor, low cost private schools performed slightly better than the government schools in literacy while in numeracy, the private formal schools performed better than the government schools, while the low cost private schools performed equally to the government schools (Ngware, et al., 2013).

The focus of this paper is to understanding inequalities in learning outcomes (English and Maths) among children aged 6-16 years in the Kenya, Uganda and Tanzania using household socioeconomic status, parental education, private/public schools and geographical location as analytical lenses.

Data and Methods

The data used in this paper is from the Uwezo surveys, collected in 2015 in Kenya, Uganda and Tanzania. Uwezo is a Citizen-led assessments conducted one-on-one at the household level and have been conducted annually since 2009. The survey has some distinct characteristics as opposed to many survey done to assess education outcomes. The survey collects learning outcome data at household level as opposed to school-based making it possible to obtain household information and information from multiple children within the same household. Uwezo tests are administered to each surveyed child age 6-16, regardless of their age or grade. In addition to collecting data at household level, the survey also collect infrastructure information from the sampled village and school where most of the children in the sampled EA attend. A detailed description of the Uwezo surveys is provided in Jones et al. (2014).

To collect data on learning outcomes in each of the three Countries, the survey is administered to a nationally representative random sample of children aged 6 to 16 years. As documented in Jones et al. (2014), the survey employ a two-stage random sampling design. This involves (i) selection of 30 primary sampling units (PSUs) with probability proportional to population size and (ii) selection of around 20 households in each enumeration area via systematic random sampling. Since the survey targets children of school age in households, all households without school age children are excluded from the analysis. The 2015 Uwezo survey covered all districts in the three countries but due to security and data quality reasons data for about four districts in Kenya and one or two districts in Tanzania were dropped. Following the population proportional to size sampling methodology, the survey was carried across 153 districts in Kenya, 159 districts in Tanzania and 112 districts in Uganda. A total of 112,480 Kenyan, 104,267 Tanzanian and 94,248 Ugandan children age 6-16 years in Kenya and Uganda and 7-16 years in Tanzania, were assessed on grade 2 literacy and numeracy work.

The assessment scores used to define child's competence in literacy and numeracy were based on results for basic numeracy and literacy tests administered individually to each child. The assessment tests are set according to the Standard 2 level curriculum in each of the three countries, which is the level to be attained after two years of primary education. In the literacy tests which in this case we only consider English, children were asked to read a letter (or letter sounds) from the alphabet, read a word, read a paragraph, and read a short story and answer two comprehension questions. For a child to be consider competent in literacy, he/she is supposed to read a story. In the numeracy tests, children were asked to recognize numbers, discriminate quantities, identify place value and perform basic operations of addition, subtraction, multiplication. In Kenya and Uganda, grade 2 curriculum includes division and hence all children in both countries were asked to solve a division problem. Therefore for a child to be consider competent in numeracy, he/she is supposed to solve a multiplication problem in Tanzania while in Kenya and Uganda a child is supposed to solve a division problem.

Methods

The learning outcomes are key factors in this assessment. However, when analyzing data collected in surveys that cutting across several countries, the content of each test item may differs between countries as does the test administration protocol. This raises the concern that raw test scores may not be strictly comparable. To address this problem Jones et al. (2014) deployed a polytomous Rasch (partial credit) model to generate estimates of a single latent measure of ability for each child (Zheng and Rabe-Hesketh, 2007; Bond and Fox, 2013). The results yields an 'equated' standardized measure of ability, that were very highly correlated with the raw test score, the unscaled vector of ability estimates as well as simple competence pass rates (Jones et al., 2014). These results implied that the raw Uwezo test results are extremely comparable between countries and can be used for comparison purposes.

Variables gender (boy/girl), school type (public/private) and mother's education are used as they are in the dataset. The mother's education is used instead of fathers' education because literature suggest that mothers education is an important factor in determine the wellbeing of a household (Wamani, et al., 2014). The household wealth is measured based on household assets (e.g. ownership of household items like TV, radio, car, table etc.) and relies on Principal Component Analysis as popularized by Filmer and Pritchett (2001) in estimating wealth levels instead of income or consumption data. After the computation of the principal component analysis, each household is assigned a standardized score for each asset, depending on whether or not the household owns that asset. The final household wealth index is obtained by summing all the indicator values and then standardized to have a mean zero and standard deviation one. The index is then used to distinguish between poor and non-poor households. All households with wealth an index above zero are tagged non-poor while those with indices below zero are tagged poor.

To assess inequalities in learning outcomes, the analysis involves pupil's scores in English and Maths as well as the combined score in both subjects. The paper uses a multi-dimension analysis approach that generates a composite inequality index based on household wealth (poor versus

non-poor) and mother's education level (at most primary versus above secondary), school type (public versus private) and geographical region.

At this level, the paper is purely descriptive. The unit of analysis is district and hence the first step involves computing the competence level in English and Math at national and at district level based on the four key determinant of inequality. For example, on gender, the learning outcomes in English and Math are computed for both boys and girls separately. The difference between boys and girls is then computed at both national and sub-national level. In each country, the national statistics is used as the cut-off to determine whether a district has high inequalities in learning outcomes. Therefore, in each learning outcome (English and Math) and factor (gender, school type, household wealth and mother's education), each district is assigned a value 1 if the inequality level is high and 0 if the inequality level is low.

Between and within district inequality comparisons are conducted on individual factors as well as on composite indices. Within district inequality assessment is then conducted to identify factors associated with promoting inequalities in learning outcomes.

Results

The results as revealed in the subsequent sections indicate that learning outcomes vary from country to country but generally, performance was better in Math than English in the three countries. Comparing learning outcomes based on the household social economic status, pupils from rich households had impressive results compared to pupils from the poor households. Similar trend are evident on mother's education, school type and geographical region. Poor scores were evident from pupils born to mother without education schooling in public schools in marginalized. Although learning outcomes in Kenya are fairly impressive compared to Uganda and Tanzania, the country has the highest levels of inequality, closely followed by Tanzania while Uganda has the lowest inequality levels. Table 1 shows the literacy and numeracy competence levels at national level based on grade 2 work.

Table 1: Competence level in literacy and numeracy in Kenya, Tanzania and Uganda

Country		English	Math	N
Kenya	National Average	54.4	56.2	112,480 pupils 153 districts
	Best district	72.1 (Gatanga)	75.2 (Gatanga)	
	Worst district	17.4 (Chalbi)	18.1 (Chalbi)	
Tanzania	National Average	20.7	39.5	104,267 pupils 159 districts
	Best district	55.7 (Moshi urban)	71.1 (Iringa Urban)	
	Worst district	5.0 (Uyui)	17.4 (Songea Urban)	
Uganda	National Average	27.2	34.1	94,248 pupils 112 districts
	Best district	50.8 (Wakiso)	49.3 (Nakasongola)	
	Worst district	6.3 (Kotido)	8.6 (Kotido)	

The results presented in table 1 are based on competence test administered to children aged 6-16 years in Kenya and Uganda and 7-16 years in Tanzania. The results show the percentage of children who can read a grade two English story and solve a multiplication problem in Kenya, Uganda and Tanzania. Results show high competence levels in Kenya for both Math and English compared to Tanzania and Uganda. For instance in Kenya, about five children out of ten can read an English story compared to three out of ten in Uganda and two out of ten children in Tanzania. In Math, about six out of ten children in Kenya are competent to solve a multiplication problem compared to three and four children in Uganda and Tanzania respectively. It is of interest to note that Tanzania has the lowest competence level in English which clearly indicates the stronger preference of Swahili relative to English because it is the official medium of instruction of all government primary schools in Tanzania.

Regional inequality in reading and arithmetic competence level are quite evident in the three countries. Table 1 also shows regional disparities by comparing the best and the worst performing district in each of the three countries. On average, the difference in literacy and numeracy competence level between the best and worst performing districts is about 50 percent points. For example, seven out of ten children in the best performing district Tanzania can read solve a multiplication problem compared to only two out of ten children in the worst performing district. Although the national averages for Kenya in both English and Math are quite impressive relative to Uganda and Tanzania, the regional inequality between the best and worst performing

districts is very high with about 55 and 57 percentage point difference in English and Math respectively. Tanzania has moderate regional inequality of about 50 percent points while Uganda which has moderately lower competence levels in both subjects, has the least regional inequalities of less than 45 percent points.

Learning Outcomes Levels by Different Social Demographic Factors

To uncover more inequalities in literacy and numeracy skills among children in the three countries, the national averages were disaggregated further by pupil's gender (boys versus girls), mothers' education, household wealth and school type. On mother education we compared the competence level of children born to mother with at most primary education against those born to mother with at least secondary education. School type is a key factor in understanding inequalities in education in Africa. Hence, we compared performance of children who attend private against those who attend private schools. Household wealth is also an important factor in studying inequality in education and therefore the national competence levels were further disaggregated to compare children from poor and non-poor households.

Table 2 presents competence levels in both English and Math based on the four social demographic characteristics. The results indicate identical trends when the disaggregated results are compared with the national competence levels. For example, there seem to exist a small disparities between boys and girls in the three countries. Being born to a poor mother with less than primary school level is linked to poor learning outcomes. Similarly, private school have better learning outcomes compared to public countries. The competence patterns in the three countries and for both literacy and numeracy are similar.

Table 2: Competence level in English and Math by different social-demographic factors

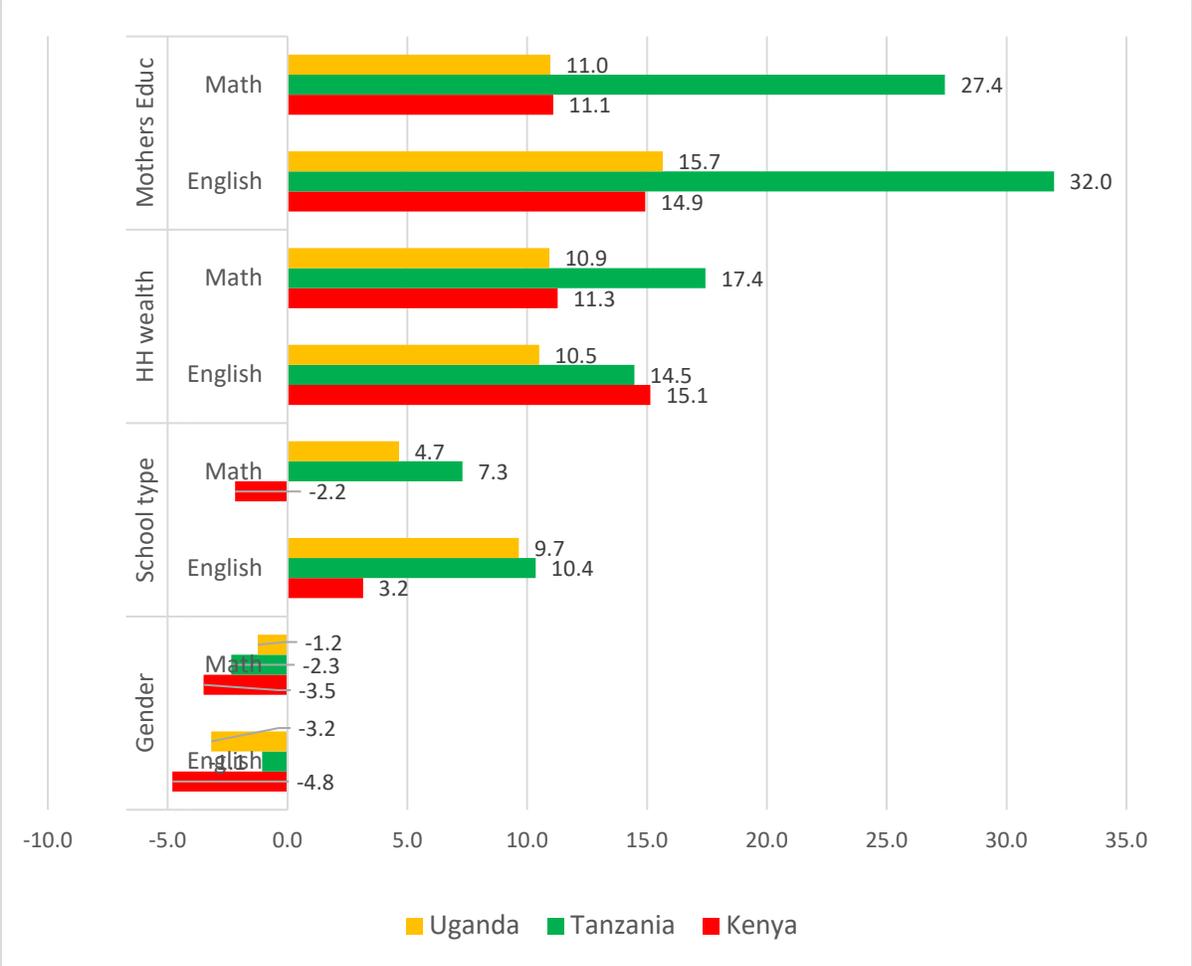
Kenya		English			Math		
		Mean (%)	95% CI		Mean (%)	95% CI	
Gender	Boys	52.0	51.6	52.3	54.4	54.0	54.8
	Girls	56.7	56.3	57.1	57.9	57.5	58.3
School type	Public	56.6	56.3	57.0	59.5	59.2	59.8
	Private	59.8	59.0	60.6	57.3	56.5	58.1
HH wealth	Poor	45.8	45.3	46.2	50.0	49.5	50.4
	Non-poor	60.9	60.5	61.3	61.2	60.8	61.7
Mothers education	< Primary	50.5	50.1	50.8	53.4	53.1	53.8
	> Secondary	65.4	64.7	66.1	64.5	63.8	65.2
Uganda							
Gender	Boys	25.6	25.2	26.0	33.4	33.0	33.9
	Girls	28.8	28.4	29.2	34.7	34.2	35.1
School type	Public	26.1	25.7	26.4	35.2	34.8	35.6
	Private	35.7	35.1	36.3	39.8	39.2	40.5
HH wealth	Poor	18.1	17.7	18.4	26.4	26.0	26.8
	Non-poor	28.6	28.2	29.0	37.3	36.9	37.7
Mothers education	< Primary	23.4	23.1	23.6	32.2	31.9	32.5
	> Secondary	49.6	46.5	52.7	49.1	46.0	52.2
Tanzania							
Gender	Boys	20.2	19.8	20.5	38.4	38.0	38.8
	Girls	21.3	20.9	21.6	40.7	40.3	41.1
School type	Public	22.6	22.3	22.9	45.1	44.7	45.4
	Private	32.9	32.2	33.7	52.4	51.5	53.2
HH wealth	Poor	12.8	12.5	13.1	30.1	29.7	30.5
	Non-poor	27.2	26.8	27.6	47.6	47.1	48.0
Mothers education	< Primary	19.0	18.7	19.3	38.2	37.9	38.6
	> Secondary	51.0	49.4	52.5	65.7	64.2	67.1

Inequalities in Learning Outcomes at National Level

Figure 1 shows the inequality levels computed by computing the difference in competence level between two groups (e.g. boys versus girls) in each of the four social-demographic characteristics at national level. The results strongly suggest that maternal education and household wealth are the strongest factor that promote inequalities in learning outcomes. In particular, maternal education in Tanzania contributes the lion share. Children born to mother with at most primary

school education have 30 percent chances to be more disadvantage compared to their counterparts born to mothers with at least secondary education. Comparing inequalities in numeracy and literacy outcomes, maternal education and household wealth contributes the highest inequality levels in learning outcomes.

Figure 1: Learning inequality levels based on different social-demographic factors



The results suggest that there are large gaps in learning outcomes by mother’s education. For instance, a child born to a mother with at most primary education are about 15 percentage points less likely to be competence in either numeracy or literacy compared to those born to mother with at least secondary school education. School type is also an important factor in understanding inequalities where public schools are particularly advantages in helping children get better literacy outcomes. However, In Kenya particularly in Math, public schools have better learning

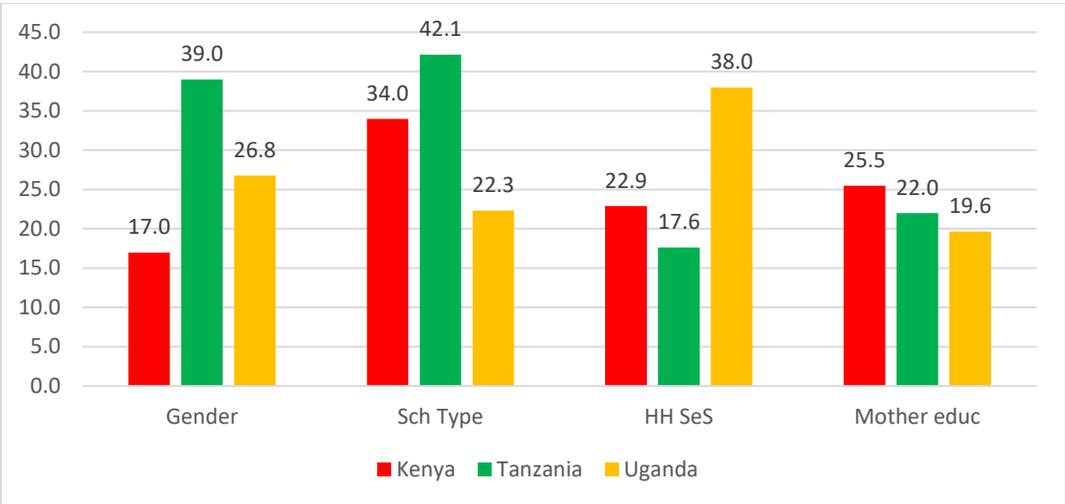
outcomes compared to private schools although the significance of the differences have not been tested. Results indicate that gender based related gaps in both learning outcomes have narrowed substantially over the past decades whereby on average girls are posing better outcomes in the region.

Inequalities in Learning Outcomes at Sub-National Level

The national level inequality levels on learning outcomes might be deceptive because as mentioned before, inequality is multidimensional and complex to understand and there is need to disaggregate the statistics at sub-national levels. Figures 1 and 2 show the percentage of districts (in a country) with high inequalities in learning outcomes – literacy (Figure 2a) and numeracy (Figure 2b). The disaggregated learning inequalities are still based on the four social-economic factors.

Kenya, Uganda and Tanzania have 153, 112 and 159 districts respectively. As described before, a district is considered to have high inequalities if the difference in competence level (e.g. between boys and girls) is above the national inequality level. For example, in district x where the difference in competence level between boys and girls is 6 percentage points while the national average is 3 percentage points, then district x is considered unequal. The results in both figures show identical patterns where gender and school type inequalities are experienced in most districts and closely followed by school type and household wealth.

Figure 2a: Proportion of districts with high inequality levels based on literacy outcomes



Results in figure 2a indicate that majority of the districts in the three countries are faced with gender, school type and household wealth inequalities in numeracy competence. At least 17% of the districts are faced with gender, school type (public/private) and poverty related inequalities. About 20% of the districts also face learning inequalities linked to mothers' education. In Kenya, the strongest driving factor of inequality in learning outcomes is school type. In Uganda gender and household social economic status are the key factors that promote inequality in learning outcomes. In Tanzania, school type and gender are the main factors to address in combating inequalities in learning outcomes.

Figure 2b: Proportion of districts with high inequality levels based on numeracy outcomes

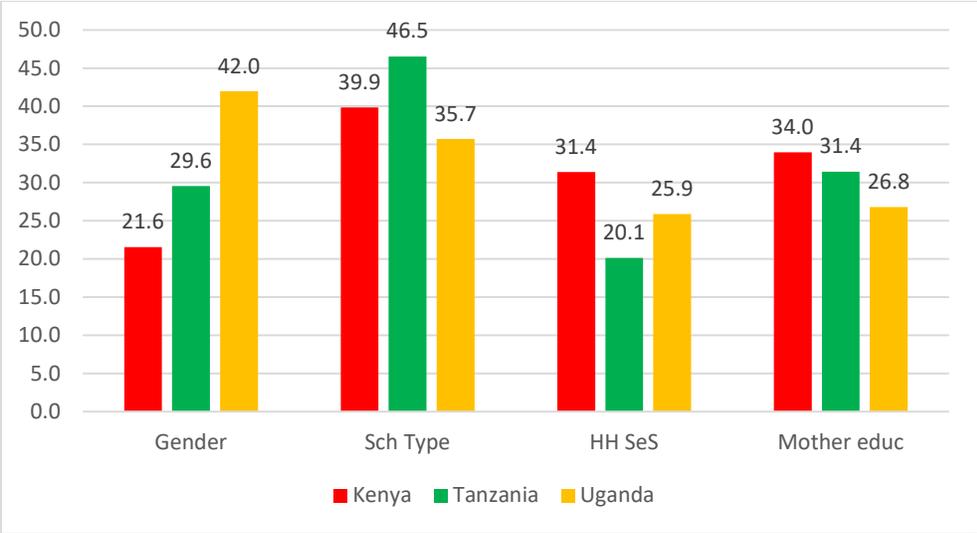


Figure 2b shows the percentage of districts that are experiencing high learning inequality levels in numeracy competence. As was observed in literacy competence, gender based inequalities are experienced in at least 20% of the districts while household wealth based inequalities are experienced in less than 30% of the districts in the region.

The results in both figures show that, although girls have been marginalized for long in many education related outcomes, the findings indicate that girls have superior competence levels compared to boys in many districts. It is also evident that boys are becoming more marginalized in many districts in each of the three countries. This indicates that majority of districts have high gender based inequalities but in favour of girls. Uganda has the highest (about 60%) while

Tanzania has the least (about 50%). These results imply that most of the districts in the three countries have not comprehensively addressed gender differences which is currently in favour of girls.

Discussion

This study examined different socio-economic factors namely mothers' education, gender, school type and household wealth in understanding inequality in learning outcomes in East Africa (Kenya, Uganda and Tanzania). Findings showed that inequality in learning outcomes is still high in the region and is well demonstrated using different social economic factors. By desegregating the learning inequalities using these factors, education stake holders can easily pin point the factors to address and in which district.

Drawing conclusion from the national inequality statistics can sometimes be erroneous because the results have demonstrated that many districts have wide inequality but at national level the levels seem not alarming. It is evident that majority of the districts in the three countries have high levels of inequality based on gender, school type as well as household social economic status. Although the national outlook indicate that girls outperform boys but in about 20-40% of the districts girl are still disadvantaged. With this understanding it is easy to map inequality levels in different regions and know the right intervention to apply.

Despite the surge in investment in education over the last decade, learning is far from being universally achieved and inequalities still persist. Therefore, if East Africa want to achieve equity in providing quality education, our reform process must ambitiously target elimination of the inequalities so prominent in our systems. To address education related crisis that are linked to inequality, the governments must implement policies that reduce poverty, such as improving infrastructure, buying more books etc.

The SDI World Bank report attributes the difference in leaning outcome between private and public schools to the amount of learning contact tome between teachers and pupils. Therefore, the government should employ more teachers and also provide incentives, such as additional

bonus for teachers who accept positions to teach large classes to enable them to have more contact time with the learners. The development partners are can also initiate programs that specifically target schools in order to help improve learning outcomes in those areas.

References

Filmer, D. and Pritchett, L. (2004). The effect of household wealth on educational attainment: Evidence from 35 countries. *Population and Development Review* 25(1): 85-120. doi:10.1111/j.1728-4457.1999.00085.x.

Jamison, E, and Woessmann, L (2008). Education and Economic Growth, *Education Next*, Spring 2008, 62–71. <http://taubcenter.org.il/tauborgilwp/wp-content/uploads/Hanushek-Taub-Presentation2.pdf>

Jones, S., Schipper, Y., Ruto, S. and Rajani, R. (2014). Can your child read and count? Measuring learning outcomes in East Africa. *Journal of African Economies*, 23(5):643–672.

UNESCO (2012), Education for All Global Monitoring Report 2012: Youth and skills: Putting education to work, <http://unesdoc.unesco.org/images/0021/002180/218003e.pdf> 8 Hanushek, E, Jamison, D,

Wamani, H., Tylleskär, T., Åstrøm AN., Tumwine, JK. and Peterson, S. (2014), Mothers' education but not fathers' education, household assets or land ownership is the best predictor of child health inequalities in rural Uganda; *International Journal for Equity in Health* 2004.