

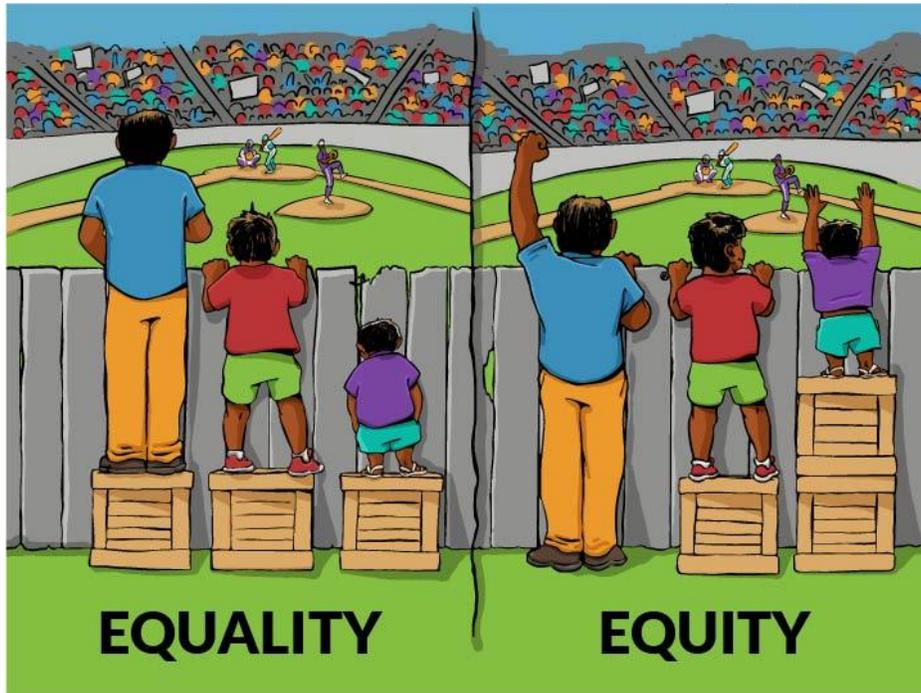


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# DEVELOPING A PLANNING AND MONITORING FRAMEWORK FOR EDUCATIONAL EQUITY IN ZAMBIA

## EXECUTIVE SUMMARY



June 15, 2016

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**Image credit: Interaction Institute for Social Change | Artist: Angus Maguire.**

# PLANNING AND MONITORING FOR EQUITY AT THE DISTRICT LEVEL

## OBJECTIVE OF THE EQUITY STUDY

The objectives for the analysis are to:

- Using existing data, assess equity in the current delivery of education in terms of investments and outcomes (that is, students staying in school longer and their learning achievement).
- Analyze the distribution of education investments and education outcomes, identifying key relationships between investment and outcomes.
- Develop recommendations for priority actions for improving equity in the system and using existing data to support better decision-making to promote equity.
- Elaborate draft benchmarks/indicators for monitoring progress on equity at the national, provincial, and district levels (with focus on district level).
- Create a proposed “equity index” for use in planning and monitoring for equity.

## EQUITY IN EDUCATION

Equity is about outcomes, not inputs (or investment). Equity exists in an education system when the years of education a child completes and the skills he/she learns are determined by his/her capacity rather than the barriers he/she faces. Equity often requires “unequal” support (see cartoon).

Two children have equal access to free education, but have very different outcomes because:

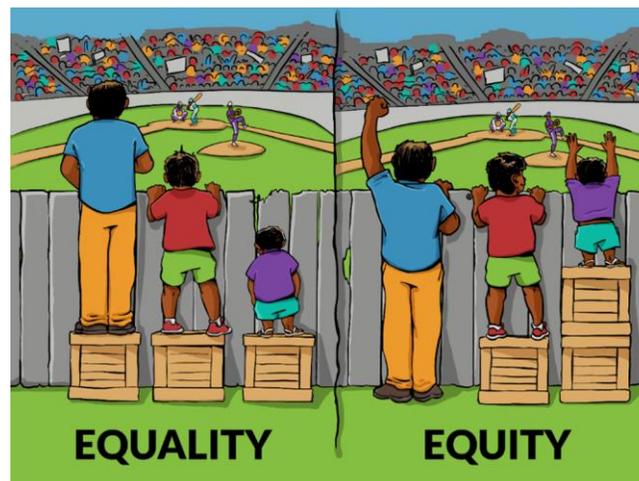


Image credit: Interaction Institute for Social Change | Artist: Angus Maguire.

- One child lives 200 meters from school, the other must walk 90 minutes to reach school;
- One child has a mother and father at home, the other has a single mother without income;
- One girl attends a school with secure toilets, the other girl must find a safe place in the bush.

## **EQUITY IN GRZ COMMITMENTS AND POLICY DOCUMENTS**

Planning and monitoring to improve equity in the districts is:

### **Right in principle**

The commitments to equity (rights, justice, and fairness) is reflected in the Government of the Republic of Zambia’s commitments to:

- Convention on the Rights of the Child
- Education for All
- Millennium Development Goals.

It is also reflected in GRZ education policies, including *Educating Our Future* and the *National Implementation Framework, 2011-2015*:

“The overall objective of the Ministry of Education equity strategy is to promote fairness and inclusion by creating conditions that equalize learning opportunities for all. The NIF’s approach ensures coherence in the implementation of equity policies and strategies. It also aims to increase equity in the allocation and utilization of educational resources.” (NIF, p. 48)

### **Right in practice**

Many gains in education indicators (in Zambia and other countries) over the last three decades have resulted from expanding access to education: more schools in more places, more teachers, etc. Now, most children have access to a school. Improving overall results in the system depends on improving outcomes for ALL students. The most cost-effective way to improve results for the entire system may be ensuring that results are more equitable.

## **STUDY METHODOLOGY AND DATA LIMITATIONS**

To identify possible indicators and benchmarks for planning and monitoring for equity, the study author:

1. Examined the relationship between characteristics of schools, students, and outcomes;
2. Used these relationships to develop the indicators and benchmarks; and
3. Presented a baseline for each district.

In carrying out Step 1 (estimating the relationship between school characteristics and outcomes), it is necessary to keep several considerations in mind (as described below).

- In this study, many of the relationships presented between outcomes and schools are estimated using statistical methods. These methods yield the “net” or unique impact of a variable (such as the student-teacher ratio, etc.) on survival rates or exam results. For example, the difference between public and private school outcomes in the model is the differences that can be attributed to being a public or private school controlling for other differences between public and private schools (like student-teacher ratios, student-classroom ratios, the percent of students overage for grade, etc.). This same “net” or unique impact is used for most of the variables analyzed.
- The study and this document refer to “spending per student.” Spending was used as convenient shorthand for estimates yielded by an investment model of a monetary per student equivalent of all of the infrastructure, furniture, materials, teachers, and supplemental support for students (bursaries and boarding places) available to a student in the school she/he attends. This estimation of the annual monetary equivalent of all of the resources available to students in a school is more relevant than an analysis of a single year’s budget. When reference is made in the presentation to “spending per student,” the more correct interpretation would be the total resources available at the school for that year per student.

Using existing data does present limitations, as described below:

- We have information about schools and the students that attend the school, but we do not have information about an individual student. For example, we can calculate the percentage of girls in a school, the percentage of orphans, the percentage of children overage for grade, the student-teacher ratio of the school, etc., and then examine how outcomes differ across different profiles of schools. However, we cannot say that a school having a low student-teacher ratio or having a high percentage of overage children *causes* poor results, only that there is an association that officials may choose to track and investigate.
- Equity is about the distribution of inputs and outcomes. When data is aggregated to present overall results (for example, promotion rates), any underlying errors in reporting and managing data at the provincial or district level are not visible. When this same data is examined school by school, these errors become more obvious. While these errors produce “impossible” results for a particular school — like promotion rates greater than 100 percent — the number of “outliers” is relatively

few compared to the number of schools in the data set and should not result in bias in the analysis.

## **BARRIERS TO EDUCATIONAL ATTAINMENT (CHILDREN COMPLETING MORE YEARS OF SCHOOL)**

### **How was it measured?**

Educational attainment was measured in terms of a student’s “survival rate” to Grade 4, Grade 7, Grade 9, and Grade 12 (i.e., did he/she remain in school long enough to enroll in this grade). The survival rate is calculated using EMIS data for two consecutive years. The transition rate, repetition rate, and dropout rate are used to calculate the probability that a child entering Grade 1 today will reach Grade 4, Grade 7, Grade 9, or Grade 12. These rates can be calculated for a school or the district, provincial, and national level and separately for girls and boys.

### **Interpreting survival rates**

A 50 percent Grade 7 survival rate for a *school* means that — with this school’s current repetition, transition, and dropout rates — about 50 percent of the children who enter Grade 1 this year will reach Grade 7 within 10 years

A 50 percent Grade 7 survival rate for a *district* means that — with the current repetition, transition, and dropout rates in the district — we expect 50 percent of all the children who enter Grade 1 in the district to reach Grade 7 within 10 years. Schools and districts with lower repetition and dropout have higher survival rates.

### **What are the current survival rates?**

Table 1 shows national rates estimated using the entire enrollment by grades in 2012-2013 and 2013-14. These rates tell us the percentage of children entering Grade 1 in a school in Zambia today who will reach a given grade with current national levels of repetition and dropout.

**Table 1: National aggregate survival rates**

<b>Survival Rates 2014</b>			
	Boys	Girls	Total
To Grade 4	89%	88%	89%
To Grade 7	69%	64%	67%
To Grade 9	48%	45%	47%
To Grade 12	30%	27%	29%

These rates also tell us that the percentage of girls entering a school in Zambia today that will reach the next grade is a little less than the percentage of boys. However, these rates do not tell us much about equity because they do not describe how survival rates vary across schools and children.

**The most striking feature of the results is that 30 percent of pupils who enter Grade 1 are missing by Grade 7 and 70 percent are missing by Grade 12.**

Table 2 shows rates calculated by school for Grades 4 and 7 and by zone for Grades 9 and 12. The table presents the middle 50 percent of schools (or zones). For example, 50 percent of the schools offering Grade 7 or higher in Zambia have a Grade 7 survival rate for girls between 26 and 110 percent.<sup>1</sup> Fifty percent of the zones in Zambia have Grade 9 survival rates for boys between 23 percent and 82 percent. (In each of these instances, 25 percent of Zambian schools have survival rates lower than those listed in Table 2 and 25 percent of Zambian schools have rates higher than those listed in Table 2.)

**Table 2: Interquartile range for survival rates**

<b>Survival Rates 2014</b>		
Interquartile (by school); Middle 50%		
	Boys	Girls
To Grade 4	51-124%	50-124%
To Grade 7	32-116%	26-110%
To Grade 9*	23-82%	20-70%
To Grade 12*	9-92%	8-70%

\*estimated for zones

These estimations by school and zone demonstrate that outcomes for children vary significantly from school to school. This variation in outcomes is what we need to understand in order to plan and monitor for improving equity.

### **What are the student, community and school characteristics that are associated with lower (or higher) survival rates?**

#### **Physical accessibility of schools**

- Survival rates to Grade 4 are much higher in schools that offer at least seven grades than in schools with similar resources that offer fewer than seven grades.
  - Twenty-five percent or more of Grade 1-4 students in Zambia attend schools that do not offer Grade 7.
- Small schools (measured by student-teacher ratios under 30 to 1)<sup>2</sup> lose about 10 percent more of their students before reaching Grade 4 than equally resourced “typical” schools (with student-teacher ratios between 30 to 1 and 60 to 1) or even overcrowded schools (with student-teacher ratios of 85 or more to 1).
  - This finding holds true regardless of whether a school is a government school, community school, or private school.
  - Survival rates to Grade 4 in community schools were about 25 percent lower when compared to public and private schools with similar levels of resources.

<sup>1</sup> Survival rates greater than 100 percent are due to movements in the school population (closing a nearby school, opening a nearby school, new roads/villages/job opportunities for parents, etc.) and errors in reporting school data. As described previously, these errors are also present in aggregated measures of system performance and are not new errors.

<sup>2</sup> In international education literature, schools are categorized as “small” when they have low pupil-teacher ratios because such schools can face particular challenges with respect to funding (and equity) as they have the same fixed costs as other schools (for school buildings, head teachers, teachers, etc.) but — in a circumstance in which funding is allocated based on the number of students — they can receive little funding based on their small student populations. Such schools are often (though not always) located in isolated rural areas with sparse populations.

- The distribution of opportunities for post-primary schooling (Grade 8 and above) is associated with differences in transition rates to post-primary schooling. Regardless of the total number of Grade 8 school places in a district, the higher the percentage of schools that offer Grade 8, the higher the district transition rate from Grade 7 to 8.

### Teachers

- Schools with higher average years of experience for teachers had higher Grade 4 and Grade 7 survival rates.
- Students that attend a school where 25 percent or more of the teachers report that they are unqualified had lower Grade 4 and Grade 7 survival rates (20 percent lower for Grade 4 and 10 percent lower for Grade 7).
- Schools with student-teacher ratios less than 30 to 1 had lower Grade 4 and Grade 7 transition rates than schools with more “typical” ratios (30-60 to 1) or overcrowded schools (above 60): see earlier finding on “small” schools (previous page).

### School programs and facilities

- Schools that provided a preschool program whose enrollment was at least 50 percent of the enrollment of the Grade 1 class in the school had higher Grade 4 and Grade 7 transition rates than schools that had no preschool or a much smaller number of preschool places (less than 50 percent the size of Grade 1).
- Schools that provided toilets at a ratio of one toilet (or less) per 50 students (fewer students per toilet) had higher Grade 7 survival rates than schools that provided no toilets or fewer toilets (more students per toilet).

### Support for students

- The number of bursaries (from all sources) provided in a school relative to the number of students or the number of orphans had little or no associated impact on survival rates at any level.
  - This should not be interpreted to mean that bursaries are not important for promoting equity. We would need individual student-level data to accurately evaluate the impact of bursaries.
  - What the analysis suggests is that bursaries may not be allocated efficiently. Across all schools offering basic education in Zambia, the correlation between the number of orphans in the school and the number of bursaries provided is 0.25. A perfect relationship between the bursaries provided and orphans would be a correlation of 1.0. Interviews at provincial and district levels also indicated

that the mechanisms for allocating the scarce funds for bursaries should be strengthened.

- The number of bursaries provided in Grade 8 in a district did not have an impact on district transition rates from Grade 7 to Grade 8.
- Schools that allocated more resources per student had higher survival rates to Grade 4 and Grade 7. This was particularly true when those resources were spent on teachers.
  - This finding was based on a model that estimated the resources available per student in a school, covering infrastructure/materials, teachers, and supplemental support for students.

**More school resources per student (particularly spent on teachers) had a statistically significant correlation with Grade 4 and Grade 7 survival rates.**

## **BARRIERS TO LEARNING ACHIEVEMENT (HIGHER NATIONAL EXAM RESULTS)**

### **How was it measured?**

Learning achievement was measured as the percent of ECZ examinees scoring credit, merit, or distinction on Grade 7 and Grade 9 exams in English and mathematics.

### **Interpreting exam results**

Exam results were provided by testing center. They included individual student results, but students were linked to provinces and districts and not directly to schools. Students can be linked to a probable school match for Grade 7 results, but is not 100 percent perfect. It was possible to get a good match between testing centers and schools for about 2,200 schools that offer Grade 7 (most — if not all — students in that testing center would come from the school).

### **How are exam results distributed?**

The percentage of examinees in who scored credit, merit, or distinction was lower for Grade 9 results than for Grade 7 results. The range for the middle 50 percent of results (percentage of a districts examinees scoring credit, merit, or distinction) for girls and boys are very similar for both English and mathematics at Grade 7 and Grade 9.

**Table 3. Distribution of Grade 7 and Grade 9 Exam Results**

Percent Sitting for Exam						
	Grade 7 Exams			Grade 9 Exams		
	Lowest	Middle 50%	Highest	Lowest	Middle 50%	Highest
Total	51%	85% to 98%	179%	68%	101% to 131%	647%
Male	60%	86% to 98%	187%	72%	101% to 135%	760%
Female	38%	84% to 99%	172%	62%	99% to 137%	523%
English (% credit, merit, or distinction)						
	Grade 7 Exams			Grade 9 Exams		
	Lowest	Middle 50%	Highest	Lowest	Middle 50%	Highest
Total	31%	40% to 57%	74%	10%	26% to 43%	62%
Male	29%	41% to 57%	75%	9%	25% to 40%	64%
Female	24%	39% to 57%	78%	10%	26% to 43%	60%
Maths (% credit, merit, or distinction)						
	Grade 7 Exams			Grade 9 Exams		
	Lowest	Middle 50%	Highest	Lowest	Middle 50%	Highest
Total	33%	43% to 57%	71%	10%	21% to 38%	63%
Male	30%	47% to 60%	76%	10%	22% to 38%	63%
Female	23%	40% to 54%	68%	7%	17% to 37%	65%

**What is the relationship between resources and achievement (district mean per student spending and district exam results)?**

Higher mean spending per student in schools in a district on teachers and infrastructure were correlated with a higher percentages of Grade 7 and Grade 9 examinees scoring credit, merit, or distinction on the English examination.

For districts in the bottom 20 percent of mean total spending per student in schools, the percentage of examinees scoring credit, merit, or distinction on Grade 7 English examinations was 43 percent while the average for districts not in the bottom 20 percent of spending per student was 50 percent.

**CONVERTING FINDINGS TO INDICATORS FOR PLANNING AND MONITORING FOR EQUITY (EQUITY INDEX)**

Red indicates that the district value for the indicator is in the bottom 25 percent of all districts. Indicator values that fall within the middle 50 percent of indicator values are coded yellow and values in the top 25 percent are coded green.

## Physical access

**Table 4. Equity Indicators for Physical Access in Eastern Province<sup>3</sup>**

Physical Access	Chipata	Ketete	Lundazi	Mambwe	Nyimba	Petauke	Sinda	Vubwi
Percent of basic enrollment that attends a complete primary school (to Grade 7 or higher)	72%	75%	85%	87%	78%	87%	79%	95%
Percent of a district's zones offering Grade 8	100%	100%	89%	55%	69%	78%	45%	100%

### Observations:

- Three districts rank poorly with respect to percent of students attending a complete primary school.
- Three districts rank low with respect to percent of zones offering Grade 8; three districts have 100 percent of zones offering Grade 8.

## Age and gender of students

**Table 5. Equity Indicators for Student Age and Gender in Eastern Province**

Age and Gender of Students	Chipata	Ketete	Lundazi	Mambwe	Nyimba	Petauke	Sinda	Vubwi
Percent of Grade 1 to 4 enrollment two years or more overage for grade	28%	40%	31%	32%	48%	47%	53%	45%
Gender parity in Grade 7 survival rates	96%	82%	79%	75%	87%	79%	95%	80%
Gender parity in Grade 7 to 8 transition rate	103%	113%	100%	102%	98%	94%	73%	99%
Gender parity in Grade 7 English exam results	102%	88%	84%	98%	90%	91%	N/A	83%
Gender parity in Grade 9 English exam results	120%	106%	94%	97%	91%	77%	N/A	100%

### Observations:

- Across districts there is an overall high percentage of students' overage for grade in Grades 1 to 4.
- Districts have good gender parity in Grade 7 to 8 transition.
- Several districts have low gender parity in exam results.

<sup>3</sup> Complete equity index baseline for all districts available in Annex 5 of full report ("Developing a planning and monitoring framework for equity in the Zambia education system").

## Teachers

**Table 6. Equity Indicators for Teachers in Eastern Province**

Teachers	Chipata	Ketete	Lundazi	Mambwe	Nyimba	Petauke	Sinda	Vubwi
Percent of basic enrollment attending school with 25 percent or more teachers without qualification	4%	15%	20%	13%	6%	25%	14%	0%
Mean school-level spending per student on teachers	747	769	562	833	943	814	760	829

### Observations:

- Three districts have a high percent of students attending schools where 25 percent or more of teachers have no qualification.
- Two districts rank low on per student “spending” on teachers, which indicates both higher student-teacher ratios and less qualified teachers.

## School programs and facilities

**Table 7. Equity Indicators for School Programs/Facilities in Eastern Province**

School Programs and Facilities	Chipata	Ketete	Lundazi	Mambwe	Nyimba	Petauke	Sinda	Vubwi
Ratio of five- and six-year old preschool students to new Grade I entrants	4%	9%	1%	2%	1%	6%	0%	7%
Percent of basic education enrollment that attends a school where preschool enrollment is at least 50 percent of Grade I enrollment	1%	9%	0%	2%	0%	2%	0%	4%
Percent of basic education enrollment attending school with student-toilet ratio of 50 to 1 or less	8%	12%	16%	19%	10%	18%	8%	40%

### Observations:

- The percent of children attending preschool relative to Grade I enrollment ranks low in most districts.
- No districts rank as low (red) in access to toilets at ratio of 50 students per toilet.

## Supplemental support for students

**Table 8. Equity Indicators for Student Supplemental Support in Eastern Province**

Supplemental Support for Students	Chipata	Ketete	Lundazi	Mambwe	Nyimba	Petauke	Sinda	Vubwi
Ratio of number of bursaries to number of orphans	0.23	0.24	0.03	0.21	0.07	0.11	0.20	0.38
Correlation of bursaries in schools and number of orphans in a school	0.32	0.05	0.09	0.17	0.14	0.12	0.39	0.44

### Observations:

- Only one district ranks in the lowest (red) category in the average school-level ratio of bursaries to students at the basic education level.
- One district ranks in the lowest (red) group with respect to the correlation of bursaries in a school and orphans in a school at the basic education level.

## Financial equity

**Table 9. Equity Indicators for Financial Equity in Eastern Province**

Financial Equity	Chipata	Ketete	Lundazi	Mambwe	Nyimba	Petauke	Sinda	Vubwi
Mean school-level 'spending' per student	907	968	726	1,038	1,163	996	959	1,041
Inequality of per student school-level spending within the district (Gini coefficient)	0.33	0.32	0.36	0.29	0.25	0.28	0.32	0.18

### Observations:

- Two districts rank in the bottom group of average per student “spending” at the school level.
- None of the districts are ranked in the group of most inequitable districts (none classified as red) in terms of differences across spending per student in schools within the district.

**Table 10. Full Set of Equity Indicators in Eastern Province**

	Chipata	Ketete	Lundazi	Mambwe	Nyimba	Petauke	Sinda	Vubwi
<b>Physical Access</b>								
Percent of basic enrollment that attends a complete primary school (to Grade 7 or higher)	72%	75%	85%	87%	78%	87%	79%	95%
Percent of a district's zones offering Grade 8	100%	100%	89%	55%	69%	78%	45%	100%
<b>Age and Gender of Students</b>								
Percent of Grade 1 to 4 enrollment two years or more overage for grade	28%	40%	31%	32%	48%	47%	53%	45%
Gender parity in Grade 7 survival rates	96%	82%	79%	75%	87%	79%	95%	80%
Gender parity in Grade 7 to 8 transition rate	103%	113%	100%	102%	98%	94%	73%	99%
Gender parity in Grade 7 English exam results	102%	88%	84%	98%	90%	91%	N/A	83%
Gender parity in Grade 9 English exam results	120%	106%	94%	97%	91%	77%	N/A	100%
<b>Teachers</b>								
Percent of basic enrollment attending school with 25 percent or more teachers without qualification	4%	15%	20%	13%	6%	25%	14%	0%
Mean school-level spending per student on teachers	747	769	562	833	943	814	760	829
<b>School Programs and Facilities</b>								
Ratio of five- and six-year old preschool students to new Grade 1 entrants	4%	9%	1%	2%	1%	6%	0%	7%
Percent of basic education enrollment that attends a school where preschool enrollment is at least 50 percent of Grade 1 enrollment	1%	9%	0%	2%	0%	2%	0%	4%
Percent of basic education enrollment attending school with student-toilet ratio of 50 to 1 or less	8%	12%	16%	19%	10%	18%	8%	40%
<b>Supplemental Support for Students</b>								
Ratio of number of bursaries to number of orphans	0.23	0.24	0.03	0.21	0.07	0.11	0.20	0.38
Correlation of bursaries in schools and number of orphans in a school	0.32	0.05	0.09	0.17	0.14	0.12	0.39	0.44
<b>Financial Equity</b>								
Mean school-level 'spending' per student	907	968	726	1,038	1,163	996	959	1,041
Inequality of per student school-level spending within the district (Gini coefficient)	0.33	0.32	0.36	0.29	0.25	0.28	0.32	0.18



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