Integrating Indicators of Education Quantity and Quality in Six Francophone African Countries

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Stellenbosch Economic Working Papers: WP09/2018

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A WORKING PAPER OF THE DEPARTMENT OF ECONOMICS AND THE
BUREAU FOR ECONOMIC RESEARCH AT THE UNIVERSITY OF STELLENBOSCH

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Integrating Indicators of Education Quantity and Quality in Six Francophone African Countries

Adaiah Lilenstein[a]

Abstract:

Research and policy-making in education have historically focused on quantitative measures of education when assessing the state of education across countries. Recently, large-scale cross-national tests of cognitive skills have emerged as one way of moving beyond mere quantitative indicators of education (enrolment and attainment), and instead allow researchers to incorporate qualitative elements of education (learning outcomes). Notwithstanding the above, research and development initiatives too often assess these complementary aspects separately, which can lead to biased conclusions. To resolve this issue, the research presented here follows the method developed by Spaull and Taylor (2015) and provides composite measures of educational quantity (grade completion using Demographic Household Survey data) and quality (learning outcomes using PASEC data) for six Francophone African countries. These composite measures are termed 'access to literacy' and 'access to numeracy' for literacy and numeracy rates respectively. Furthermore, this work also contributes to understanding the extent and nature of inequalities, by looking at gender and socioeconomic status groups separately when considering the composite measure of access and learning. All unadjusted access and learning scores are also provided, as well as a brief overview of any gender and socioeconomic differences that exists in these. Results of this work point to an education crisis within the six African countries included, where both non-enrolment and a lack of learning within schools are contributing to dismal educational outcomes, even at the Grade 2 level but especially at the Grade 5 level. For example, only 17% - 24% of the Grade 5 cohort investigated have access to literacy or numeracy in Togo. Furthermore, inequality within socioeconomic groups is extremely large resulting in near zero estimates of competency levels for the most economically disadvantaged (poorest 40% of females) in some countries. Gender differentials are dwarfed by economic differentials but mean estimates suggest that while educational opportunities are similar for males and females at a Grade 2 level, gender differentials may already be visible at the Grade 5 level.

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1. Introduction and Rationale

Access to education which is of a reasonable quality can have broadly positive effects on multiple systems, both for individuals as well as for nations. For individuals, education is associated with better living standards such as higher wages (Hanushek & Zhang, 2009; Heckman, Stixrud, & Urzua, 2006; McIntosh & Vignoles, 2000), better mental and physical health (Murrell & Meeks, 2002), and higher levels of subjective life satisfaction (Melin, Fugl-Meyer, & Fugl-Meyer, 2003; Murrell & Meeks, 2001), among a myriad of other benefits. As a nation, more education translates into higher labour productivity and, relatedly, higher growth (Altinok, 2007; Appleton, Atherton, & Bleaney, 2013; Barro & Lee, 2013). For these reasons, education has long been considered a human right as well as a crucial aid to and goal of development. Unfortunately, however, many countries struggle with providing access to education for their citizens, and when this is provided it is often of an extremely poor quality (Beatty & Pritchett, 2012; Spaull & Taylor, 2015). Unsurprisingly, girls and the socioeconomically disadvantaged often face the greatest challenges when access to education and quality education are scarce commodities (Spaull & Taylor, 2015).

This landscape of multiple beneficial consequences of education, together with the scarcity of this commodity and the lack of equality in these systems in many countries, provides the rationale for including educational goals in national agendas. Similarly, it also provides the rationale for including an educational goal as one of the 17 Sustainable Development Goals (SDGs) which form part of the UN's 2030 Agenda for Sustainable Development[1]. The educational goal of the SDGs has an explicit focus on both quality and equity and the reaching of this goal by 2030 will require reliable data on both access and quality of education.

This research investigates the state of education in six Francophone African countries – namely, Benin, Burkina Faso, the Democratic Republic of the Congo (DRC), the Ivory Coast, Senegal, and Togo. While data on education quantity (e.g. grade access or completion rates) has been widely available for a long time, data on the quality of education (e.g. literacy and numeracy rates) is relatively new in developing countries. However, both data sources are, by themselves, insufficient and result in biased indicators of the educational landscape when used in isolation, and most research using these data to look at education systems have used them in this way. By combining these two indicators into one composite measure, this analysis provides new insights and a greater understanding of the problems that face policymakers in these regions, around which there is currently a dearth of research. The analysis pays special attention to gender and socioeconomic disparities in educational outcomes in these countries. In doing so, this work provides the first adjusted indicators of educational success in the six countries investigated here as well as the first in-depth analysis of gender and socioeconomic inequalities in access to quality education in these countries and the francophone West African region more generally. The

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[1] For an overview of these goals see https://sustainabledevelopment.un.org/?menu=1300

results point to a deep education crisis in these countries and report the patterns of inequality within and between countries.

The remainder of this section elaborates on the rationale and research questions addressed in the paper. Section 2 discusses the data used, while Section 3 addresses the methodology, before presenting the results in Section 4. Section 5 gives a final discussion and conclusion.

1.1 The Importance of Combining Quantity and Quality Indicators of Education

Theoretically, measures of education quantity such as years of schooling, enrolment rates, and completion rates are different to measures of education quality such as results on tests of cognitive skills. Enrolment in a school does not guarantee the acquisition of cognitive skills (Filmer, Hasan, & Pritchett, 2006; Pritchett, 2013; Spaull & Taylor, 2015) and neither does the acquisition of cognitive skills by the in-school population serve as a good indication of overall schooling outcomes in the country since it excludes the out-of-school population. Both are important indicators of the success of an education system but when seen in isolation they lead to biased assessments. This has not been widely discussed in the extant literature.

Access measures of education overestimate the success of the education system because they ignore the learning outcomes (quality) in the schools within which students are enrolled. Looking only at access to schooling is especially problematic when many of those who have access to school do not learn even basic skills. On the other hand, learning outcomes as measures of the success of the education system also generally overestimate educational success. In the presence of below-universal enrolment and/or completion rates any attempt to use these results to say something about the education level of the population as a whole is problematic. This is because cognitive tests administered through the schooling system only test students who are in school and therefore ignore the out-of-school population[2]. Those who are not in school are likely to have a lower level of learning than their in-school peers, especially in developing countries, thus resulting in an overestimate of the level of education overall. Selection effects which result in those who are most able to attend school, or those that do the best in school, being the ones who are actually in school or remain in school, contribute to this effect.

Interestingly, studies that only look at learning outcomes but make comparisons over time actually underestimate, rather than overestimate, the progress that countries are making toward universal quality education. This is because they often see test scores stagnate or decrease but do not recognize that this is partly due to the influx of more disadvantaged individuals into the schooling system over time (Taylor & Spaull, 2015). The fact that most developing countries have vastly increased their primary school enrolment and completion rates in the last few decades (Barro & Lee, 2013) means that analyses conducted over time which look at learning outcomes

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[2] Some cognitive tests do overcome this problem however, notably Uwezo in East Africa and ASER in India which sample from households and not from schools. ASER stands for the Annual Status of Education Report Survey and Uwezo means 'capability' in Kiswahili. Both run regional assessments on cognitive achievement in their respective areas.

of primary school children will almost always underestimate progress in the educational quality of the schooling system because they are not accounting for large increases in access and the subsequent increased socioeconomic diversity of the school population.

While the above issues are certainly relevant in a national context, they are also relevant when making cross-national comparisons. It is clear that access levels cannot be compared across countries when the quality of schooling is not taken into account if the goal is to make a meaningful comparison of the different schooling systems. Similarly for learning outcomes. In fact, it has been demonstrated that the average level of cognitive ability observed on international school assessments varies inversely with the enrolment rate of the population in developing countries (Postlethwaite, 2004), thus leading to the erroneous conclusion that these countries (with lower enrolment rates) have better schooling systems. These issues when looked at in an international context are especially relevant when countries have widely varying enrolment or completion rates, and when countries have widely varying levels of educational quality. Both are likely to be the case in developing countries, especially those in Africa.

1.2 Literature and Research Aims

As already discussed by Spaull and Taylor (2015), and implied above, the literature on education is mostly bifurcated into studies looking at education quantity (enrolment and attainment) and studies looking at education quality (learning outcomes). To date it appears that only six exceptions to this bifurcated literature exist. In 2001 Michaelowa conducted a study which used PASEC[3] data from 1996 to create a single indicator of educational quality and quantity. The current paper also uses PASEC data (the more recent versions) with the same aim. However, Michaelowa used UNESCO's[4] Net Enrolment Rates (NERs)[5] to estimate education quantity which, according to Spaull and Taylor (2015) as well as UNESCO itself (UNESCO Institute for Statistics, 2010), can potentially lead to large biases in estimates. It is likely that Michaelowa's results, despite showing very low levels of access and access to learning (for example, only a 34% enrolment rate and a 20% access to learning rate for Burkina Faso), are actually overestimates of the proportions of students enrolled as well as overestimates of the proportion of individuals who acquire basic literacy and numeracy skills.

The remaining five papers on this topic all combine Demographic and Health Survey (DHS) data with at least one cross-national student assessment. Filmer et al. (2006) estimate the proportion of 15 year-olds who achieve basic learning standards in a number of developed and developing countries. Unfortunately, they do not include any Francophone African countries in their

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[3] Programme for the Analysis of Education Systems of CONFEMEN countries (or in French, Programme d'Analyse des Systèmes Educatifs de la CONFEMEN) which was established by CONFEMEN to support cross-national student assessments in Francophone African countries. CONFEMEN is the Conference of Ministers of Education of African Countries and Madagascar in French (or in French, Conférence des ministres de l'Education des Etats et gouvernements de la Francophonie).
[4] The United Nations Educational, Scientific and Cultural Organization.
[5] Published in UNESCO's Global Monitoring Report and available for most countries.

analysis, nor do they aim to combine access and learning rates into a single statistic. Similarly, Pritchett (2013) estimates learning achievement in a number of developing countries but also does not create a single metric of educational quantity and quality. Hanushek and Woessmann (2008), however, do combine measures of quantity and quality into a single measure of educational success, or access to learning. Unfortunately, the sample used only included a small number of developing countries, three of which are in Africa and none of which are investigated in this paper.

Finally, Spaull and Taylor (2015) formalise a method for combining access and learning indicators and apply their method to 11 Sub-Saharan African countries. In their follow-up paper (Taylor and Spaull, 2015) they take ten of these countries and compare changes in their learning profiles over time. Spaull and Taylor's (2015) method of creating indicators take both measures of education quantity (completion rates) and measures of education quality (test scores) into account and they use DHS grade completion data to estimate levels of education quantity, which they argue is the most rigorous method of doing so. They combine measures of quantity and quality in a single indicator and term this access to learning, or access to literacy and access to numeracy for language and mathematic skills respectively.

The purpose of the current paper is to extend Spaull and Taylor's (2015) method to six Francophone African countries (five in West Africa and one in Central Africa) by using the data from PASEC studies, something that has not been done before.

Based on the above discussion the following research questions will be under consideration in this paper, the categorisation of which is the same as that of Spaull and Taylor (2015):

(1) In each country what proportion of children
   a. never enrol,
   b. enrol initially but drop out before completing the relevant grade,
   c. enrol and complete the relevant grade but do so without having acquired grade-appropriate basic literacy and basic numeracy skills by this time, and
   d. enrol and complete the relevant grade having acquired grade-appropriate basic literacy and numeracy skills?
(2) In each country, how does the above differ by the subnational categories of
   a. Gender (males and females)
   b. Wealth (poorest 40%, middle 40%, and richest 20%), and
   c. A gender-wealth interaction (poorest 40% of females compared to poorest 40% of males, middle 40% of females compared to middle 40% of males, and richest 20% of females compared to richest 20% of males)?

These questions form the basis of this work and the remainder of this paper is structured around answering them. The 40/40/20 split for wealth categories was chosen following the work of Spaull and Taylor (2015) and Filmer (2010)[6].
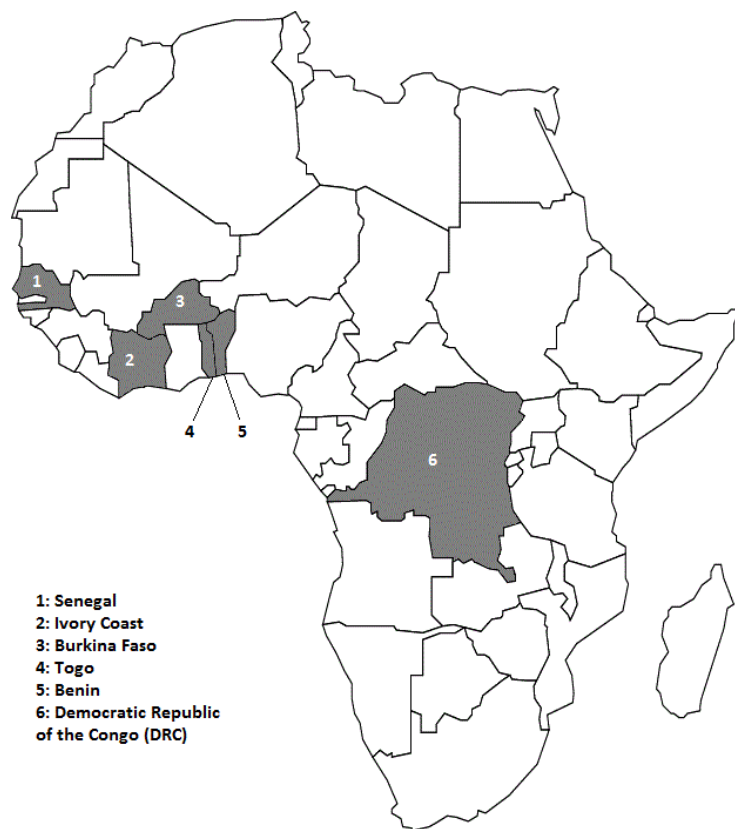
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[6] Where asset-based wealth indices were not already available in the data, they were created using Multiple Correspondence Analysis.

Throughout the discussion to follow, cognitive assessments are likened to education quality almost synonymously. Regional assessments of cognitive skills such as PASEC usually focus on the testing of math, language, and sometimes, science skills. An important question to deal with in light of this is whether measures of such skills are really the most appropriate measures of education quality. On the one hand, the fact that scores in these skills are found to be related to growth across countries (Altinok, 2007; Appleton, Atherton, & Bleaney, 2013; Gundlach, Rudman, & Woessmann, 2002) and individual wages within countries (Bedard & Ferrall, 2003; Hanushek & Zhang, 2009) suggest that they are a good measure of learning and have worth. However, even if the cultivation of these three skills are the main aim of education practitioners it is not clear that this should be what education institutions strive most to impart. Simply because these skills are related to growth and wages does not mean that other skills are not, or that other skills are not more related to some other worthwhile criteria of a country's or individual's success. Relatedly, such skills are often imparted through internalization of information and it is not clear that this information gathering and enhancing of the capacity for memorization are more important than the fostering of critical thinking and imaginative capacities, which are often neglected in the school system (Nussbaum, 2006). Despite these shortfalls, education assessment using outcomes on cognitive tests remains the only available source of data for research of this nature.

Figure 1 below displays a map of Africa with the relevant countries highlighted. Five countries are located in West Africa – Benin, Burkina Faso, the Ivory Coast, Senegal, and Togo – while only the DRC is located in Central Africa. All of the West African countries are relatively small countries by African standards. Benin, Burkina Faso, the Ivory Coast, and Senegal were all colonised by France while Togo was colonised by Germany and the DRC was colonised by Belgium. Although initially being colonised by Germany, Togo was captured by the French and English during the First World War. All countries achieved independence from their colonisers in 1960. The 2014 Human Development Report (United Nations Development Programme, 2014) ranked countries according to their Human Development Index – a composite statistic of the state of education, life expectancy, and per capita income in a country – and all six of the countries under review ranked in the lowest 15% of the 187 countries included.

Figure 1. Map of Africa with Relevant Countries Highlighted

1: Senegal
2: Ivory Coast
3: Burkina Faso
4: Togo
5: Benin
6: Democratic Republic
of the Congo (DRC)

2. Data

Creating access to learning indicators involves combining information from two sources of data: literacy and numeracy rates are derived from PASEC data and combined with completion rates, which are derived from the most relevant DHS data set for each country. The international comparative surveys supported by PASEC test students in mathematics and French but also contain a wealth of background information on the home and schooling environments of students. These surveys provide the most comprehensive data on education quality in Francophone Africa. PASEC samples follow a randomised stratification design and are conducted in classrooms of different grade levels – Grade 2 and Grade 5 – in primary schools. Although a more recent round of PASEC than what is used here is now available, this methodology cannot be replicated with the same rigorous standard until some years have passed as the method requires using an older cohort to estimate completion rates, and hence uses DHS data from later years.

One data caveat is that the PASEC data for Benin contains no sample structure (weight and strata) variables. This is due to an error during data collection that meant that these could not be calculated[7]. In the interest of including as many countries as possible, the results that will be

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[7] The PASEC report itself does not use weighting and strata variables for Benin (Rahelimanantsoa & Grillet, 2005).

presented in Section 4 were re-calculated for each of the other five countries to see how much they changed in the absence of weighting variables. Most results changed only marginally with the exclusion of the sample weight[8]. Given the paucity of research in this area, it was decided that the analysis should be inclusive of Benin data, despite the issues that a lack of sampling information can cause. Note that the lack of strata variables means that no standard errors can be computed for Benin.

A second difficulty with using the PASEC data is that unfortunately there are no meta-data, manuals, or technical reports. However, each participating country does publish a PASEC report, which documents results of the study as well as varying amounts of technical information[9]. To ensure that the data would provide reliable results, the estimates of French and math scores derived from the micro data were compared to the same estimates presented in the country reports. It is unclear to what extent the available data were cleaned before or after the reports were written, but it does appear that some cleaning took place for at least some countries after the reports were published. Of the countries used here, only Burkina Faso definitely has missing data, although the Senegal report does not state the number of students so it is not possible to tell in this case. Furthermore, even when there are no cases missing from the data, the estimates derived are not always exactly the same as those reported. However, whether there are missing data or not, the estimates are often the same and almost always within the relevant confidence interval[10].

For the completion rates, DHS data are used. DHS data provide an important source of information for researchers in public health and social science fields and the data have been widely used in both areas (Spaull & Taylor, 2015). DHS data have also been used in hundreds of peer-reviewed papers for a variety of analyses, including both educational attainment (Filmer & Pritchett, 1999) and enrolment (Hanushek & Woessman, 2008). See Spaull and Taylor (2015), who also use DHS data for their analyses, for an overview of why they consider DHS data to be the best source of access rates in education.

Matching PASEC and DHS data requires an age cohort to be settled on first. To ensure that the grade completion rate estimated includes all those who will ever complete the grade we must use an age cohort older than the actual age at which most children complete Grade 2 or Grade 5, due to the common practice of late enrolments in developing countries. For this study age cohorts were chosen independently for each country depending on the Grade 2 or Grade 5 completion rates within that country, derived from DHS data. Cohorts were chosen by looking at

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[8] There were some differences that fell outside of the confidence intervals for the original results. There did not seem to be any pattern as to whether the lack of weights under- or over- estimated results.

[9] All reports can be found at http://www.confemen.org/le-pasec/rapports-et-documents-pasec/les-rapports-du-pasec/

[10] Our estimates fall outside of the relevant confidence intervals in the PASEC report for Burkina Faso in Grade 5, but when we rerun our results without weights and strata variables, they match. Hence, it appears that in this case the report simply did not consider sample structure. Secondly, the standard errors of our estimates differ for Senegal in Grade 5. This is likely due to missing data and hence the confidence intervals associated with these results should be interpreted with caution.

the youngest age at which less than 5% of the population were still enrolled in grades 1-2 (for the gr.2 cohort) or grades 1-5 (for the gr.5 cohort). Hence, the DHS datasets used are necessarily from later years than the PASEC datasets. Table 1 below displays the years that each PASEC and DHS dataset was collected.

Table 1. Years of Data Collection - PASEC and DHS

	PASEC	DHS
Benin	2005	2011/12
Burkina Faso	2006	2010
DRC	2010	2013/14
Ivory Coast	2009	2011/12
Senegal	2006	2012/13
Togo	2010	2013/14

3. Methodology

An initial point to note is that the research questions ask about the proportions of students acquiring basic competencies, yet the data on education quality being used is in the format of a continuous variable; students answer a number of multiple choice questions and they get a grade according to the proportion of questions answered correctly. For SACMEQ[11], which is the student achievement data used by Spaull and Taylor (2015), there are clearly defined levels of achievement according to how many questions were correctly answered. These correspond to the achievement of general basic skills, rather than grade-specific skills and are psychometric in their formulation[12]. Unfortunately, the same categorisation does not exist for PASEC, but PASEC does make use of a levels system which is also based on the number of correct answers given by students. Theirs is a more arbitrary way of defining achievement but it still represents the best data on cognitive achievement available for these countries.

Learning benchmarks for PASEC consist of three levels: Level 1 is a score of between 0% and 24% correct answers (inclusive). At this level, students are said to be failing scholastically. Level 2 is a score of between 25% and 40% (inclusive). At this level, students are not failing but they also cannot be said to possess basic knowledge in reading, writing, and counting. Level 3 is a score of above 40% and at this level, students are said to possess basic knowledge (Education Policy and Data Center, 2012). The 40% threshold for level 3 was chosen by PASEC and CONFEMEN

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[11] The Southern and Eastern Africa Consortium for Monitoring Educational Quality which is run by UNESCO and conducts cross-national student achievement tests in Anglophone African countries.
[12] This means that they were developed by professionals who ensured that the benchmarks developed actually correspond to learned skills. Conversely, PASEC levels were chosen in a more arbitrary manner.

because, due to the multiple choice format of the PASEC tests, a student could score 30% on the test just by guessing. This is a weak reason to use this benchmark; however, it has been used before with earlier rounds of PASEC surveys (Michaelowa, 2001). One can imagine that this could be considered as giving an upper bound estimate of the proportions of children who meet basic competency standards, as it is a low threshold to pass.

Calculating the proportion of the age cohort who achieve a learning benchmark (access to learning) is given by multiplying the proportion of the cohort who complete the grade with the proportion of the in-school cohort who reach the basic competency standard outlined above. For example, if 60% of the age cohort have completed Grade 5 and 40% of these acquired basic literacy skills at the Grade 5 level, then 24% of the age cohort completed Grade 5 with basic literacy skills (0.6x0.4=0.24). The inverse of this proportion – 76% in this case – represents the proportion of the age cohort who did not acquire basic literacy skills.

Since we are assuming to know the proportions of the population meeting and not meeting basic learning standards, while we only have data on the learning achievement of those in school, we are making an assumption about the learning achievement of those who are out of school. The assumption made is that those who do not complete the relevant grade also do not achieve the grade-specific level of basic learning. This assumption follows that used by Spaull and Taylor (2015) who motivated it by pointing out that (1) it is unlikely that individuals who never enrol in school will learn to read, write, and do math, and (2) it is also unlikely that individuals who enrol but drop out would have acquired these skills before dropping out. This second motivation may seem weak at first but if we consider the fact that most individuals who drop out do so because they have failed previous grades or repeated multiple grades then the motivation becomes more clear. Consider as well that those who drop out because of income constraints or distance from school are also statistically less likely to be in the better performing part of the performance distribution before dropout. Finally, the fact that a large proportion of students who do complete the grade do not acquire basic skills makes it unlikely that those who drop out before completing the grade would acquire these skills (Spaull & Taylor, 2015).

Finally, given that poorer learners are less likely to make it into the school-attending sample (PASEC), one cannot simply multiply DHS wealth groups (which are representative of the entire population) and PASEC wealth groups (which are only representative of the school-going population). As a result we conduct an adjustment exercise to make the wealth groups comparable between DHS and PASEC. This is documented in detail in Spaull and Taylor (2015: 153) and we use the identical approach here. It is only excluded for the sake of space.

4. Results

The statistics presented below are describing different time periods for different countries, due to PASEC being administered in different years. Tests in Benin were administered in 2005, in Burkina Faso and Senegal tests were administered in 2006, the Ivory Coast dataset is from 2009, and the DRC and Togo datasets are from 2010. While the education landscape may change

relatively slowly, differences of three to four years may not be negligible in developing countries. Besides causing issues for comparability, the fact that the PASEC data are somewhat dated also means that the results here may no longer accurately reflect the state of education in these countries. It is impossible to say in exactly what ways the access to learning rates may have changed between when the data was collected and now, nor can we know in what ways they may have changed (whether enrolment rates, quality of schooling, or both have improved or worsened). Unfortunately, until late grade completion becomes trivial, this will always be the case with analyses of this sort.

Appendix A provides completion rates from DHS data, while Appendix B provides achievement rates on PASEC tests. Appendix C provides the combined access to literacy and access to numeracy rates. All results are separated by gender, wealth and a gender-wealth interaction. These tables were used to create the figures and graphs provided in this paper. This paper also provides a short description of the issues which are evident when analysing access and quality independently, rather than as a combined estimate. These results can be viewed in Appendix D.

4.1 Aggregate Levels of Access, Learning, and Access to Learning

Figure 2 and

Figure *3* below display the proportion of children in each country who (a.) never enrolled in school, (b.) enrolled initially but dropped out before completing the relevant grade, (c.) completed the grade but did not acquire basic literacy (Figure 2) and numeracy (

Figure *3*) skills, and (d.) completed the grade and did acquire basic literacy and numeracy skills. These figures refer to Grade 2 literacy and numeracy rates. Figure 4 and Figure 5 below display the same information for Grade 5 literacy and numeracy rates.

Improved enrolment for most countries: As expected, the proportion of students who never enrolled is higher for Grade 5 than for Grade 2. This difference does not represent learners dropping out between Grade 2 and Grade 5 since "never enrolled" refers to those who had never enrolled in school, even in grade 1. Hence the higher enrolment rates for the Grade 2 cohort refers to higher initial school enrolments for that age group, which is younger than the Grade 5 age cohort. Therefore, this represents an improvement in school enrolments between the years when the Grade 5 cohort would have been expected to enrol and the years when the Grade 2 cohort would have been expected to enrol. For Benin, Burkina Faso, the DRC, and the Ivory Coast there is a five year age difference between the two cohorts. For Senegal there is a four year age difference and for Togo there is a six year age difference. This means that in five years enrolment rates increased by 7% in Benin, 12% in Burkina Faso, 4% in the DRC, and 11% in the Ivory Coast. In Senegal enrolment rates increased by 7% in four years and in Togo enrolment rates increased by 4% in six years. The improvements of the DRC and Togo should be seen in the light of their high initial enrolment levels, meaning that small improvements are good improvements.

Figure 2. National Levels of Access and Quality of Education - Grade 2 Literacy

Benin[a] — Never enrolled 21%, Enrolled initially but dropped out before completing Gr.2 2%, Completed Gr.2 without basic literacy 52%, Completed Gr.2 with basic literacy 25%

Burkina Faso — 42%, 3%, 32%, 23%

DRC — 4%, 2%, 28%, 66%

Ivory Coast — 25%, 2%, 44%, 29%

Senegal — 30%, 2%, 34%, 34%

Togo — 7%, 3%, 60%, 30%

Legend:
- Never enrolled
- Enrolled initially but dropped out before completing Gr.2
- Completed Gr.2 without basic literacy
- Completed Gr.2 with basic literacy

Note: [a]Estimates for literacy rates are run on the unweighted sample.

Figure 3. National Levels of Access and Quality of Education - Grade 2 Numeracy

Benin[a] — 21%, 2%, 47%, 30%

Burkina Faso — 43%, 3%, 34%, 20%

DRC — 4%, 2%, 27%, 67%

Ivory Coast — 25%, 2%, 54%, 19%

Senegal — 30%, 2%, 29%, 39%

Togo — 7%, 3%, 48%, 42%

Legend:
- Never enrolled
- Enrolled initially but dropped out before completing Gr.2
- Completed Gr.2 without basic numeracy
- Completed Gr.2 with basic numeracy
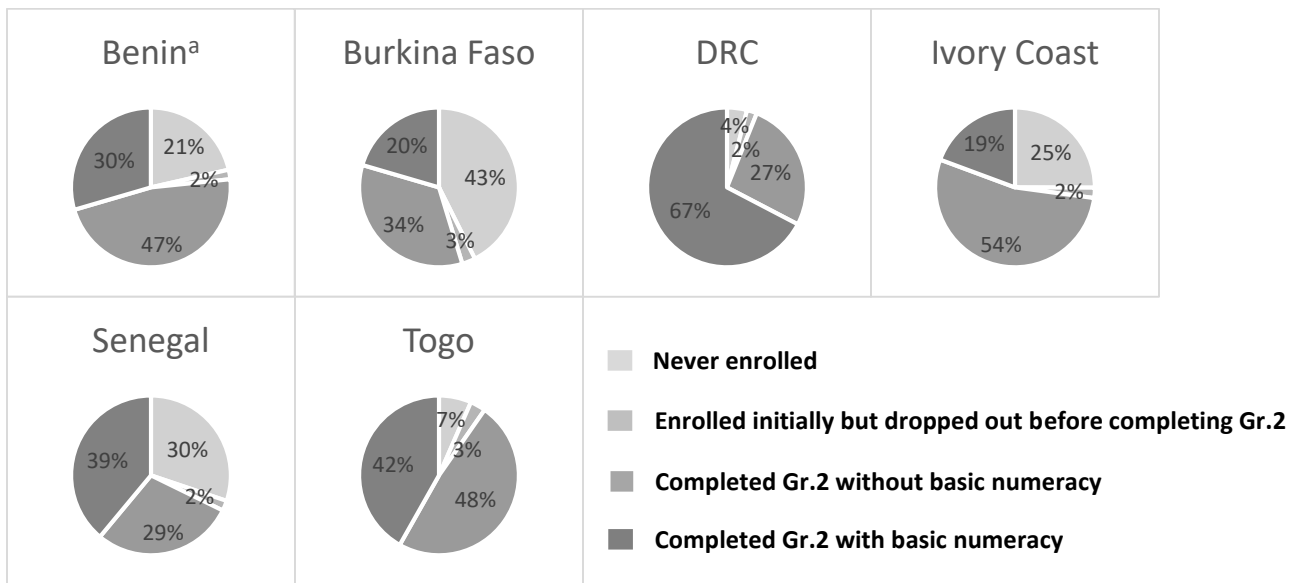
Note: [a]Estimates for numeracy rates are run on the unweighted sample.

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Figure 4. National Levels of Access and Quality of Education - Grade 5 Literacy
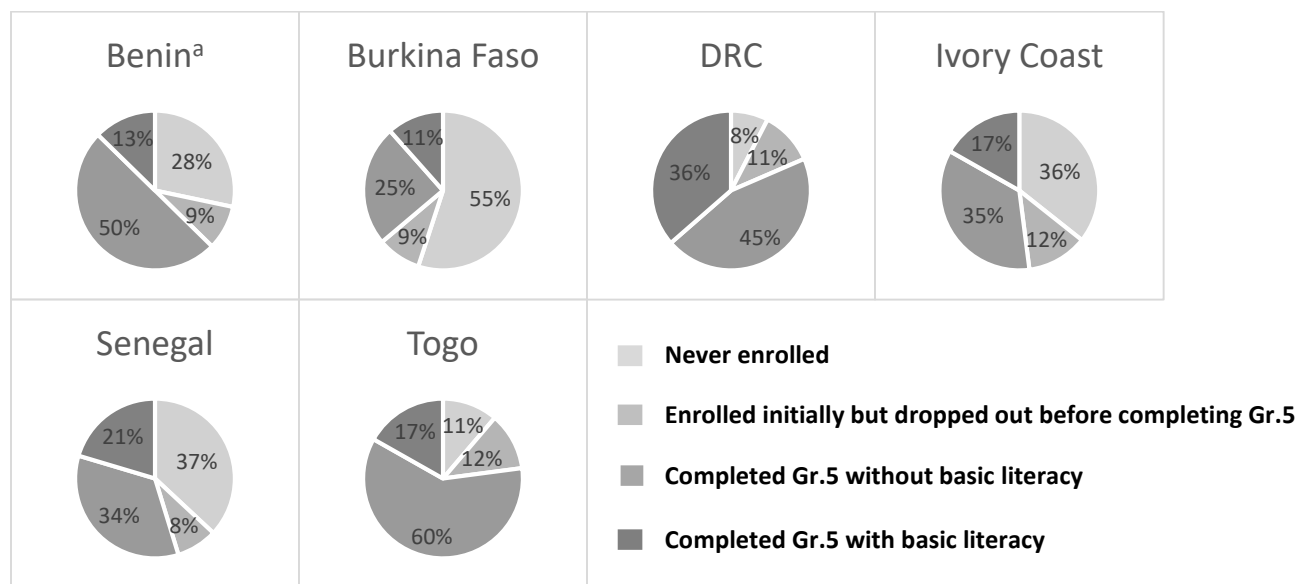
Note: ᵃEstimates for literacy rates were run on the unweighted sample.

Figure 5. National Levels of Access and Quality of Education - Grade 5 Numeracy

Note: ᵃEstimates of numeracy rates were run on the unweighted sample.

Poor performance is common throughout: Even the DRC and Togo, which have near universal completion rates, have a large proportion of students who do not acquire basic literacy (28% and 60% respectively) and basic numeracy (27% and 48% respectively) at a Grade 2 level. The DRC has the highest proportions of students who leave Grade 2 with basic literacy (66%) and basic numeracy (67%), while the Burkina Faso has the lowest for literacy (23%) and the Ivory Coast has

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the lowest for numeracy (19%). One-in-three students in the DRC are completing Grade 2 without possession of basic Grade 2-level skills. Two of every five students in Senegal and three of every five students in Benin, Burkina Faso, and the Ivory Coast are doing the same. In Togo, two-thirds of students are completing Grade 2 without basic literacy skills and half of students are completing Grade 2 without basic numeracy skills. This is highly worrying, especially given that these are only the Grade 2 results and that the benchmark used here for achievement is so low. Many of these children will be pushed through to higher grades and will continue to struggle there. In Grade 5, the DRC has the highest literacy (36%) and numeracy (46%) but even these are similar to the lowest scores seen for Sub-Saharan Africa's grade 6's (Spaull & Taylor, 2015; Taylor & Spaull, 2015), although the SACMEQ data for Sub-Saharan Africa is not directly comparable to the PASEC data used here. Benin and Burkina Faso have the lowest literacy rates (13% and 11% respectively) and the Ivory Coast has the lowest numeracy rate with only 7% of the student population completing Grade 5 having acquired basic grade-appropriate numeracy skills. Additionally, unlike the results of Spaull and Taylor's (2015) study on Sub-Saharan Africa, literacy rates are not usually higher than numeracy rates for these countries. This calls into question the adequacy of only testing students in French and not in any indigenous languages.

In summary, while the DRC and Togo have achieved near universal enrolment and completion for Grade 2, the remaining countries have low completion rates, which are driven by low initial enrolment rates. Yet even when a country has achieved universal enrolment and completion, as in the case of the DRC and Togo, far too many still do not acquire basic numeracy and literacy skills. For Grade 5, the DRC and Togo again display high initial enrolment, but dropout rates before reaching Grade 5 mean that universal completion of Grade 5 is not being achieved. The remaining countries all have a far larger problem with non-enrolment than with dropout – although both rates are disturbingly high. Burkina Faso in particular is very far from achieving universal enrolment, with 42% of the Grade 2 age cohort having never enrolled in school. On the other hand, there have been improvements in educational access in all countries but particularly in Burkina Faso and the Ivory Coast. Once in school, learning achievement is worryingly low for all countries and for both grades.

Thus, neither educational access nor educational quality is being achieved for these countries. These figures, although not unexpected given what has already been discussed about these countries, point to an education crisis in West Africa and the DRC. Although improvements have been made in initial enrolment rates, initial enrolment remains worryingly low for all countries except for the DRC and Togo. Improvements in quality between Grade 2 and Grade 5 cannot be inferred from this data, but future research on the next round of PASEC could do so.

All of the statistics presented so far have been the national averages (i.e., the national average enrolment and completion rates, and the national average literacy and numeracy rates taking completion into account). Given what was discussed in the introduction to this paper we can expect that males and the richer portions of the age cohorts will display higher access to learning rates than those seen so far, and that females and the poorer portions of the age cohorts will display even lower rates than those seen so far. Hence, the next section presents the same statistics disaggregated by gender and wealth levels.

## 4.2 Disaggregated Levels of Access to Learning

This section deals with how access to literacy and access to numeracy (i.e. the access-adjusted literacy and numeracy rates) differ by gender, wealth, and a gender-wealth interaction. The results in this subsection are also derived from Tables 1C to 4C in Appendix C. For the sake of parsimony only the results for differentials in access to literacy are displayed here. Where the results for access to numeracy differ widely these differences are discussed.

Socioeconomic differentials are evident despite large confidence intervals: We find very large confidence intervals (at 95%) for each estimate. The large confidence intervals come from the fact that (1) the standard errors from the PASEC data are generally large, and (2) combining standard errors requires taking the square root of the sum of the squared standard errors from each distribution, which results in larger standard errors for the combined estimate. Since the confidence intervals are so large we can't actually be sure that most gender differentials and gender-wealth differentials are not actually zero or negative. However, even with the large standard errors, we can be sure that all wealth differentials besides those for the DRC are in fact positive and generally very large. The wealth differential is far larger than the gender differential in all countries and in both grades. Needless to say, the wealth differential always favours the rich. The wealth differential is usually the largest in Senegal and the smallest in the DRC. As an example, the richest portion of the Senegalese population is 5 times more likely to achieve basic literacy at a Grade 5 level than the poorest portion. In the DRC the richest individuals are 1.5 times more likely to achieve the same as the poorest individuals.

Gender differentials favour males with one exception: There is only one case in which the gender differential favours females – in Senegal for Grade 2 – otherwise the differential always favours males. Senegal clearly has a much larger problem addressing schooling for the economically disadvantaged than in addressing gender equality, although mean estimates do suggest gender differentials in Senegal for the Grade 5 cohort. Gender differentials for the DRC are some of the largest despite their relatively more equal society socioeconomically. Females in the DRC in Grade 5 are 12 percentage points less likely to achieve basic literacy than males are.

Figure 6. Grade 2 Literacy Differentials
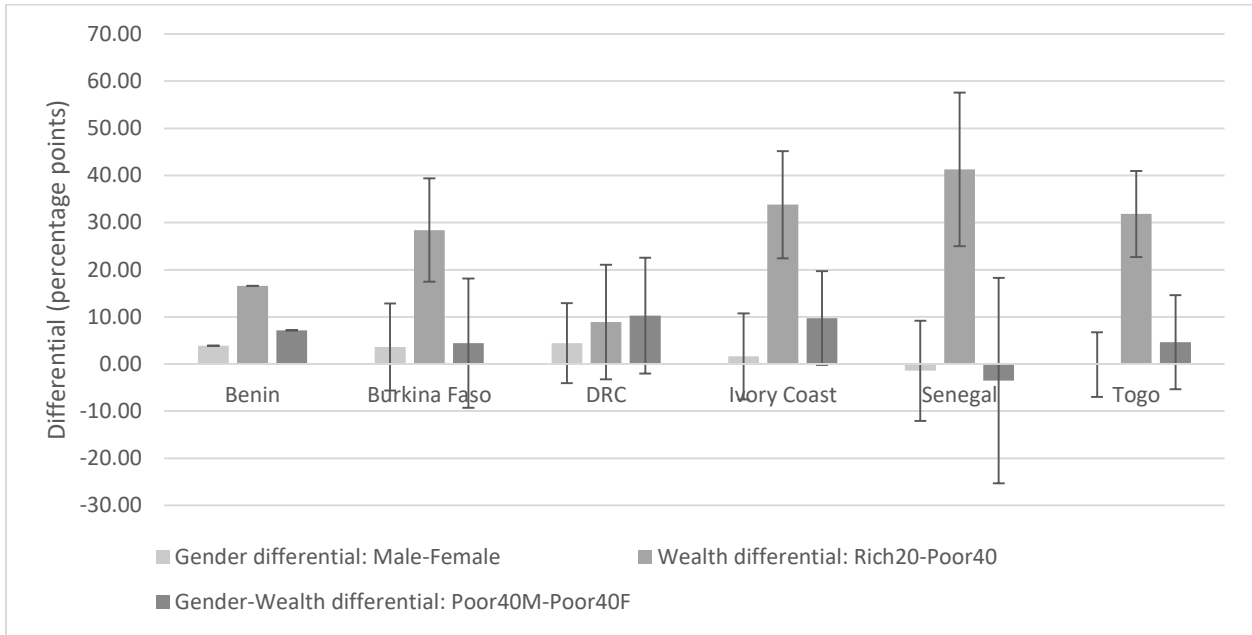
Note: For Benin estimates of literacy rates were run on the unweighted sample. Confidence intervals are unavailable for Benin.
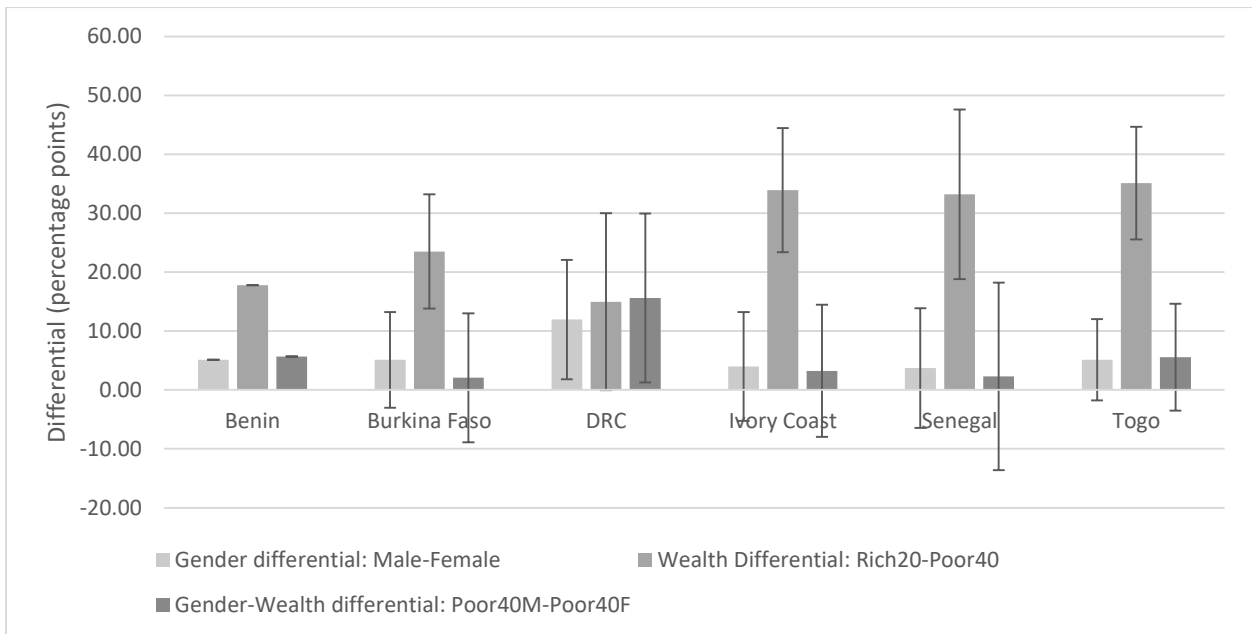
Figure 7. Grade 5 Literacy Differentials

Note: For Benin estimates of literacy rates were run on the unweighted sample. Confidence intervals are unavailable for Benin.

Poor females have the lowest access to learning rates generally, although the differences are not statistically significant: The last differential displayed is the gender-wealth interaction; this gives the difference in scores between the poorest males and the poorest females and is the effect of the double disadvantage of being both poor and female. For Grade 2, the added disadvantage of being female actually an advantage in Senegal. However, all other cases display this double-disadvantage effect but not to a statistically significant degree. In Grade 5, all countries, even Senegal, display a double-disadvantage effect but again the estimates are not statistically significant, except for the DRC in Grade 5. The DRC displays the largest gender-wealth differentials in all cases. For the DRC in Grade 2, the added disadvantage of being female when one is already poor is around 10 percentage points (i.e. a poor female is 10 percentage points less likely to achieve basic literacy and numeracy at a Grade 2 level than a poor male). In Grade 5, this jumps to around 16 percentage points.

It is clear that wealth differentials pose the biggest threat to educational equality in these countries – even for the DRC and Benin which have relatively low inequalities in quality of education between wealth quintiles – since they still showed large access inequalities in this regard. We saw, too, how national access to literacy and access to numeracy rates were extremely low in most cases, and how they were likely to be lower in the case of inequalities. However, since this section has only discussed differentials and not actual access to literacy and access to numeracy rates, what we have not yet seen is how low the access to literacy and access to numeracy rates are for the most excluded groups. Table 2 and Table 3 display access to literacy and access to numeracy rates by gender for the poorest 40% of the age cohorts for Grade 2 and Grade 5 respectively. In all cases in the DRC, the access to literacy and numeracy rates are larger or similar for the poorest males than they are nationally, while the rates for females are substantially below. For the other five countries, the access to literacy and access to numeracy rates are smaller for both males and females in the poorest 40% of the wealth distribution than they are nationally.

Poor females face near-zero estimates of access to learning rates in 5 of 6 countries: For all countries except the DRC, the poorest females always display extremely low access to literacy and access to numeracy rates, for both Grade 2 and Grade 5. Although access to learning in the DRC is substantially higher, it is still very low for females. In the Ivory Coast in Grade 5, only 1.2% of females have access to numeracy and the standard error here is 2.8, meaning that we can't be sure that the rate here is not actually zero. Access to numeracy in the Ivory Coast is not an exception: This estimate could be zero for females in Burkina Faso as well, and the access to literacy rate in Grade 5 could be zero for females in Benin, Burkina Faso, the Ivory Coast, and Togo and very close to zero for Senegal. Poor males have better access to literacy and access to numeracy than poor females in all cases except Senegal in Grade 2, but in absolute terms the rates here are still often extremely low: Less than 10% of males have access to literacy at a Grade 5 level in all countries except the DRC (and even here, the access to literacy rate is only 39%). Less than 20% of males have access to numeracy at a Grade 5 level in all countries except the DRC (and here it is only 48% - less than half).

These results highlight the fact that there is barely any real formal education (i.e., formal education which results in learning) happening in West Africa – which excludes the DRC – at a Grade 5 level for the poorest 40% of the population. Some basic education is taking place at a Grade 2 level but most of the poorest 40% of the population will not even acquire basic Grade 2 level skills.

Table 2. Access to Literacy and Access to Numeracy for the Poorest 40% of Individuals – Grade 2

| Countries | Literacy | | | | | |
	National	SE	Poor Males	SE	Poor Females	SE
Benin	24.9	-	21	-	13.8	-
Burkina Faso	22.9	3	15.3	4.6	10.9	5.3
DRC	66.3	2.8	67.5	4.5	57.2	4.4
Ivory Coast	28.9	2.7	21.8	3.4	12	3.7
Senegal	33.8	3.4	17.5	7.6	21.1	8.1
Togo	30.5	2	22.6	3.4	18	3.8
	Numeracy					
	National	SE	Poor Males	SE	Poor Females	SE
Benin	29.5	-	24.2	-	15.7	-
Burkina Faso	20.5	3	14.4	3.9	10.8	4.2
DRC	67.3	2.8	66	4.2	54.7	4.3
Ivory Coast	19.3	2.7	16.4	3	7.9	3.1
Senegal	39	3.4	22.7	7.8	24.8	7.1
Togo	41.8	2	36.3	3.6	25.5	3.9

Note: 'SE' is the standard error. Values shown are percentages. Estimates were run on the unweighted sample, standard errors are not available.

Table 3. Access to Literacy and Access to Numeracy for the
Poorest 40% of Individuals - Grade 5

	Literacy					
	National	SE	Poor Males	SE	Poor Females	SE
Countries						
Benin	12.7	-	7.6	-	1.9	-
Burkina Faso	11.6	2.6	5	4.2	2.9	3.7
DRC	36.4	3.3	38.7	5.1	23.1	5.2
Ivory Coast	16.8	2.8	6.8	4.2	3.6	3.9
Senegal	20.4	3.2	8.9	5.4	6.6	6
Togo	16.8	2.1	8.1	3	2.6	3.5
	Numeracy					
	National	SE	Poor Males	SE	Poor Females	SE
Benin	17.3	-	12.8	-	5.2	-
Burkina Faso	13.6	2.6	7.5	4.5	3.8	4.6
DRC	45.7	3.3	48.1	5.1	31.6	5.6
Ivory Coast	7.3	2.8	4.4	3.4	1.2	2.8
Senegal	31.4	3.2	17.5	5.3	15.5	6.1
Togo	24.3	2.1	16.4	3.5	10	4.3

Note: 'SE' is the standard error. Values shown are percentages.
Estimates were run on the unweighted sample, standard errors are not
available.

5. Discussion and Conclusion

The results presented above clearly indicate that there is an education crisis in Francophone Africa, at least for the six countries included in this study. Although access to learning in the DRC was comparatively high, even here the learning levels are actually worryingly low. Togo has high enrolment and moderate completion rates but still displays extremely low access to learning due to the poor quality of education in its schools. The other four countries all had shockingly low levels of access to education, quality education, and access to quality education. All countries had moderate dropout rates at a Grade 5 level, an extremely low level of quality education in both grades, and very high socioeconomic disparities in access to education. This reality needs to be faced and taken into account by policymakers and those tracking indicators for the 2030 SDGs if progress is to be made.

Dropout in all countries may be related to the low level of quality schooling as those who see the benefits of schooling are more likely to remain in the schooling system. In the same vein, higher quality schooling may lead to higher enrolment by increasing the demand for education.

Therefore, increasing school quality could also decrease school dropout and increase school enrolment. Finally, the absence of discrimination against girls in Grade 2 in Senegal may be due to the effectiveness of policies supported by donor funding in light of the MDGs for 2015. Other countries may benefit from modelling their own gender-oriented policies on those of Senegal's.

It is notable that governments need to continue their focus on enrolment and completion rates, even as the international community begin to look to results on tests of cognitive skills to guide development strategies. Although improving the quality of education can lead to higher enrolment and completion rates, this cannot be the only pathway through which access is achieved. However, a focus on access also cannot be the sole guiding factor in policy. The fact that 62% and 43% of students in Senegal can spend 5 years in formal full-time schooling and still not emerge with the most elementary literacy and numeracy skills (respectively) is testament to this fact.

Overall the suggestion here is that countries need to see access to education (grade completion) and quality of education (learning) as two sides of the same coin. Prior to the SDGs the international community prioritized the universalization of access while neglecting learning. As the SDGs begin to be implemented countries must not switch to prioritising learning while ignoring access, especially those with low access rates as seen here. Both are important and crucial elements of the schooling system.

This paper has provided a first look at the education landscape in Francophone Africa. Future research can build on this to determine improvements or regressions of these schooling systems over time. A lack of baseline indicators is not unique to Francophone Africa – future research could apply Spaull and Taylor's (2015) methodology to data from other areas such as Latin America and the Caribbean using SERCE[13] data. Newer rounds of PASEC (which are now being conducted in the same year for all countries involved) or use of other data techniques[14] could also allow comparison between countries and regions. In general, research of this kind will always be dated unless late grade completion becomes trivial. International cognitive assessments such as PISA[15] get past this issue by testing a sample of students of 15 years of age, rather than a sample of students in a specific grade. PASEC administrators should consider using this methodology instead to help research of this kind to be as relevant as possible.

When less than 1 in 4 children who should be completing Grade 5 reach minimum benchmarks in either literacy or numeracy it is clear that there is an ongoing education crisis in Francophone West Africa. Furthermore, while access is a necessary condition for universal quality education, when seen in isolation it is misleading. Understanding the patterns of underperformance and

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[13] The Second Regional Comparative and Explanatory Study conducted by UNESCO and the LLECE (Latin American Laboratory for Assessment of the Quality of Education).

[14] For example, matching SACMEQ learning levels to PASEC achievement scores. This procedure has been done before for other cognitive achievement tests (Gustafsson, 2012).

[15] The Programme for International Student Assessment, run by the OECD (Organisation for Economic Co-operation and Development) in member and non-member countries.

exclusion are important not only for researchers but for policy-makers in the region and those funding interventions aimed at reaching SDG-4.

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Appendix A Completion Rates from DHS Data

Table 1A. Demographic and Health Survey Grade 2 Completion Rate, with Standard Errors (%)

Country	National	SE	Males	SE	Females	SE	Poor40	SE	Mid40	SE	Rich20	SE
Benin	76.6	0.8	80.2	0.8	72.7	0.9	64.2	1.3	83.5	0.8	89.5	0.8
Burkina Faso	54.7	1	57.4	1.2	51.9	1.1	37.9	1.2	58.4	1.3	82.4	1.2
DRC	93.9	0.4	95.6	0.4	92.1	0.6	89.4	0.8	95	0.6	99	0.3
Ivory Coast	72.9	1.1	79.7	1.1	65.9	1.6	68.5	1.7	71.6	1.6	82.5	1.6
Senegal	67.8	1.8	67.4	1.9	68	2.2	54.1	3.3	77.6	2.2	84.1	3.2
Togo	90.3	0.8	92.2	0.9	88.3	1	84.7	1.4	94.7	0.6	95.7	0.8
	Poor40M	SE	Poor40F	SE	Mid40M	SE	Mid40F	SE	Rich20M	SE	Rich20F	SE
Benin	69.4	1.4	57.9	1.5	86.1	1	80.6	1	95.1	0.9	85	1.2
Burkina Faso	41	1.5	34.6	1.5	61	1.6	55.6	1.6	87.9	1.5	77.7	1.6
DRC	92.3	0.8	86.4	1.4	96.4	0.6	93.3	0.8	99.5	0.3	98.5	0.4
Ivory Coast	74.7	1.8	61.1	2.5	79.8	1.6	63.2	2.1	90.5	1.6	76.7	2.5
Senegal	53.9	2.9	54.4	4.5	77.3	2.6	77.8	2.6	87.2	4.2	81.5	3.9
Togo	87.7	1.7	81.1	1.7	96	0.7	93.2	0.9	97.3	1	94.5	1.2

Note: Poor40 refers to the poorest 40% of individuals in the country, Mid40 the middle 40%, and Rich20 the richest 20%. 'SE' is the standard error. An 'M' or 'F' after the wealth bracket refers to 'Males' or 'Females', respectively. Values shown are percentages.

Table 2A. Demographic and Health Survey Grade 5 Completion Rate, with Standard Errors (%)

Country	National	SE	Males	SE	Females	SE	Poor40	SE	Mid40	SE	Rich20	SE
Benin	62.6	1	70.5	1.1	54.1	1.2	42.6	1.4	67.9	1.2	81.4	1.1
Burkina Faso	36.1	1	41.7	1.3	31	1.1	16.4	1.1	31.6	1.3	66.8	1.4
DRC	81.4	1	89.6	0.9	74.4	1.4	67.5	1.9	84.4	1.1	96	0.8
Ivory Coast	51.9	1.4	61.1	1.7	43.2	1.7	32.5	1.7	52.4	1.9	73.3	2
Senegal	54.7	1.7	58.2	2.2	52	2.1	40.1	2.6	62.6	2.1	70.5	3.5
Togo	77	1.2	84.3	1.1	69.1	1.7	62.9	2.2	82	1.3	88.9	1.2
	Poor40M	SE	Poor40F	SE	Mid40M	SE	Mid40F	SE	Rich20M	SE	Rich20F	SE
Benin	52.6	1.8	30.7	1.8	75.7	1.4	59.1	1.6	88.9	1.5	74.6	1.7
Burkina Faso	20.1	1.4	12.5	1.2	39.2	1.8	24.2	1.5	77.2	2	58.9	1.9
DRC	81.8	1.9	56.9	2.4	91.6	1.1	77.3	1.7	96.7	0.9	95.5	1.1
Ivory Coast	39.9	2.5	26.1	2.3	61.1	2.4	43.3	2.4	85.8	2.1	62.7	2.6
Senegal	42.5	3.1	38.1	3.5	65.3	2.5	60.6	2.7	80.5	4.1	61.6	5
Togo	72.3	2	49.8	3.1	89.9	1.3	73.8	1.9	96.6	1.2	83.1	2

Note: Poor40 refers to the poorest 40% of individuals in the country, Mid40 the middle 40%, and Rich20 the richest 20%. 'SE' is the standard error. An 'M' or 'F' after the wealth bracket refers to 'Males' or 'Females', respectively. Values shown are percentages.

Appendix B Achievement on PASEC Tests

Table 1B. PASEC Grade 2 Literacy Rate, with Standard Errors (%) – Uncorrected For Those Who Do Not Complete Grade 2

Country	National	SE	Males	SE	Females	SE	Poor40	SE	Mid40	SE	Rich20	SE
Benin[a]	32.4	-	33.3	-	31.4	-	28	-	32.7	-	38.6	-
Burkina Faso	41.8	2.9	42.8	2.9	40.4	3.3	35	4	40.1	4.5	50.6	3.5
DRC	70.6	2.7	71.6	3.1	69.5	3	71	4	68.9	3.3	73.2	4.6
Ivory Coast	39.7	2.5	36.9	2.4	42.3	3.5	25.2	2.5	42.2	3	61.9	4.7
Senegal	49.8	2.9	49	3.2	50.7	3.3	35.7	5.8	47.8	3	72	3.7
Togo	33.7	1.8	33	1.9	34.6	2.6	24.1	2.5	31.3	2.4	54.6	3.6
	Poor40M	SE	Poor40F	SE	Mid40M	SE	Mid40F	SE	Rich20M	SE	Rich20F	SE
Benin[a]	30.2	-	23.9	-	32.2	-	30.5	-	39.9	-	44.1	-
Burkina Faso	37.4	4.3	31.5	5.1	42.5	4.5	37.3	5.4	48.7	3.8	53.1	4.2
DRC	73.1	4.4	66.2	4.2	70.1	3.9	68.2	3.9	71.7	4.6	77.7	4.8
Ivory Coast	29.1	2.9	19.7	2.8	36.9	3.1	47	3.8	49.4	4.9	68.1	6.1
Senegal	32.6	7.1	38.7	6.7	46.4	3.9	48.9	3.5	73.8	4	70.4	4.7
Togo	25.8	3	22.2	3.4	28.8	2.5	33.6	3.2	53.1	3.8	56.6	4.9

Note: Poor40 refers to the poorest 40% of individuals in the country, Mid40 the middle 40%, and Rich20 the richest 20%. 'SE' is the standard error. An 'M' or 'F' after the wealth bracket refers to 'Males' or 'Females', respectively. Values shown are percentages. [a]Estimates were run on the unweighted sample.

Table 2B. PASEC Grade 2 Numeracy Rate, with Standard Errors (%) – Uncorrected For Those Who Do Not Complete Grade 2

Country	National	SE	Males	SE	Females	SE	Poor40	SE	Mid40	SE	Rich20	SE
Benin[a]	38.5	-	39.9	-	36.9	-	32.5	-	39.6	-	45.5	-
Burkina Faso	37.4	2.5	40.1	2.8	33.9	2.7	33.5	3	33.3	3.2	47	4
DRC	71.7	2.4	72.1	2.8	71.2	2.7	67.7	3.7	70.5	3	81.2	3.5
Ivory Coast	26.6	2.2	26.6	2.2	26.5	3.3	18.4	1.8	26.5	2.4	42.1	5.8
Senegal	57.5	3	56.4	3.6	58.6	3	43.9	5.6	57.4	3.3	75.1	3.4
Togo	46.3	1.8	49.4	2.1	42.9	2.2	37.3	2.8	44.7	2.1	64.6	3
	Poor40M	SE	Poor40F	SE	Mid40M	SE	Mid40F	SE	Rich20M	SE	Rich20F	SE
Benin[a]	34.9	-	27.1	-	41.4	-	37.2	-	44.6	-	50.3	-
Burkina Faso	35	3.6	31.3	4	37.9	3.4	28.2	3.8	48.3	5	44.8	4.1
DRC	71.5	4.1	63.3	4.1	70	3.6	71.6	3.7	77.5	4.2	84.2	3.3
Ivory Coast	22	2.4	13	1.9	23.5	2.7	28.1	3.3	39.3	4.7	44.1	7.6
Senegal	42.1	7.3	45.6	5.6	54.9	4.2	59.6	3.5	76.4	3.4	74.3	4.3
Togo	41.4	3.1	31.4	3.5	47.9	2.9	41.5	2.9	66.2	3.5	64.3	4.1

Note: Poor40 refers to the poorest 40% of individuals in the country, Mid40 the middle 40%, and Rich20 the richest 20%. 'SE' is the standard error. An 'M' or 'F' after the wealth bracket refers to 'Males' or 'Females', respectively. Values shown are percentages. [a]Estimates were run on the unweighted sample.

Table 3B. PASEC Grade 5 Literacy Rate, with Standard Errors (%)– Uncorrected For Those Who Do Not Complete Grade 5

Country	National	SE	Males	SE	Females	SE	Poor40	SE	Mid40	SE	Rich20	SE
Benin[a]	20.2	-	21.4	-	18.5	-	11.5	-	23.1	-	27.9	-
Burkina Faso	32	2.4	34	2.7	29.3	2.7	24.1	3	26.2	2.9	41.1	3.5
DRC	44.7	3.2	47.5	3.6	41.2	3.4	44.4	4.3	43.7	3.9	46.8	6
Ivory Coast	32.3	2.4	30.7	2.4	34.2	3.2	15.1	2.7	29.4	2.6	52.9	3.9
Senegal	37.2	2.6	38.4	2.8	35.9	3.1	18.4	4.3	37.6	3.2	57.5	4
Togo	21.8	1.8	22.8	1.9	20.4	2.1	9.5	1.7	18	2.1	46.2	3.8
	Poor40M	SE	Poor40F	SE	Mid40M	SE	Mid40F	SE	Rich20M	SE	Rich20F	SE
Benin[a]	14.4	-	6.3	-	22.7	-	24.6	-	29.8	-	24	-
Burkina Faso	24.7	3.9	23.3	3.5	29.1	3.4	22.3	3.6	43.6	4	37.6	3.6
DRC	47.4	4.7	40.7	4.7	45.4	4.8	42.3	4.2	51.9	6.4	40.2	6.4
Ivory Coast	17.1	3.3	13.7	3.2	26.5	2.6	30.7	3.8	49.4	3.8	55.6	4.6
Senegal	20.9	4.5	17.3	4.9	36.7	3.1	34.6	3.4	58.1	4.6	62	5.6
Togo	11.3	2.3	5.2	1.5	17.4	2.3	17.5	2.5	51.4	4.2	43.3	4.8

Note: Poor40 refers to the poorest 40% of individuals in the country, Mid40 the middle 40%, and Rich20 the richest 20%. 'SE' is the standard error. An 'M' or 'F' after the wealth bracket refers to 'Males' or 'Females', respectively. Values shown are percentages. [a]Estimates were run on the unweighted sample.

Table 4B. PASEC Grade 5 Numeracy Rate, with Standard Errors (%)– Uncorrected For Those Who Do Not Complete Grade 5

Country	National	SE	Males	SE	Females	SE	Poor40	SE	Mid40	SE	Rich20	SE
Benin[a]	27.6	-	30.4	-	23.6	-	21.6	-	30.4	-	31.6	-
Burkina Faso	37.5	2.7	40.8	2.9	33.3	3	34.2	3.6	35	3.9	41.6	3.9
DRC	56.2	3.1	57.1	3.3	55.2	3.6	57.2	4.3	56.2	3.9	54.7	5.4
Ivory Coast	14.1	1.5	15.3	1.7	12.7	1.6	7.7	1.8	12.2	1.5	23.1	3.3
Senegal	57.4	3.1	60.4	3.9	54	3.2	40.4	3.5	57	3.3	76.9	4.9
Togo	31.6	1.9	33.9	2.3	28.6	2.2	23.2	3	29.1	2.3	47.9	4
	Poor40M	SE	Poor40F	SE	Mid40M	SE	Mid40F	SE	Rich20M	SE	Rich20F	SE
Benin[a]	24.3	-	16.8	-	33	-	26.8	-	34.7	-	26.9	-
Burkina Faso	37.3	4.3	30.6	4.4	37.7	4.3	30.6	4.4	45.6	4.4	36.7	4
DRC	58.9	4.7	55.6	5	56.3	4.2	56	4.6	55.5	5.8	53.2	6.3
Ivory Coast	11.1	2.3	4.6	1.6	12.7	1.9	11.7	1.9	23.1	3.7	20.7	3.4
Senegal	41.3	4.3	40.7	4.9	59.6	2.8	52	4.3	80.1	6.4	74.9	4.9
Togo	22.7	2.9	20	2.9	32.7	3.2	26.4	3.2	53.9	4.5	42.3	5.1

Note: Poor40 refers to the poorest 40% of individuals in the country, Mid40 the middle 40%, and Rich20 the richest 20%. 'SE' is the standard error. An 'M' or 'F' after the wealth bracket refers to 'Males' or 'Females', respectively. Values shown are percentages. [a]Estimates were run on the unweighted sample.

Appendix C Access to Literacy and Access to Numeracy Rates

Table 1C. PASEC Grade 2 Access to Literacy, with Standard Errors (%)

Country	National	SE	Males	SE	Females	SE	Poor40	SE	Mid40	SE	Rich20	SE
Benin[a]	24.9	-	26.7	-	22.9	-	18	-	27.3	-	34.5	-
Burkina Faso	22.9	3	24.6	3.2	21	3.5	13.3	4.2	23.4	4.7	41.7	3.7
DRC	66.3	2.8	68.4	3.1	64	3	63.5	4.1	65.4	3.3	72.4	4.6
Ivory Coast	28.9	2.7	29.5	2.7	27.8	3.8	17.3	3	30.2	3.4	51.1	5
Senegal	33.8	3.4	33	3.8	34.5	3.9	19.3	6.7	37.1	3.7	60.6	4.9
Togo	30.5	2	30.4	2.1	30.5	2.8	20.4	2.9	29.7	2.5	52.2	3.7
	Poor40M	SE	Poor40F	SE	Mid40M	SE	Mid40F	SE	Rich20M	SE	Rich20F	SE
Benin[a]	21	-	13.8	-	27.7	-	24.6	-	38	-	37.4	-
Burkina Faso	15.3	4.6	10.9	5.3	25.9	4.8	20.7	5.7	42.7	4.1	41.2	4.5
DRC	67.5	4.5	57.2	4.4	67.6	4	63.6	4	71.3	4.6	76.6	4.8
Ivory Coast	21.8	3.4	12	3.7	29.5	3.5	29.7	4.3	44.7	5.1	52.2	6.6
Senegal	17.5	7.6	21.1	8.1	35.8	4.7	38	4.4	64.4	5.8	57.4	6.1
Togo	22.6	3.4	18	3.8	27.6	2.7	31.4	3.4	51.7	3.9	53.5	5

Note: Poor40 refers to the poorest 40% of individuals in the country, Mid40 the middle 40%, and Rich20 the richest 20%. 'SE' is the standard error. An 'M' or 'F' after the wealth bracket refers to 'Males' or 'Females', respectively. Values shown are percentages. [a]Estimates of literacy rates were run on the unweighted sample.

Table 2C. PASEC Grade 2 Access to Numeracy, with Standard Errors (%)

Country	National	SE	Males	SE	Females	SE	Poor40	SE	Mid40	SE	Rich20	SE
Benin[a]	29.5	-	32	-	26.8	-	20.9	-	33.1	-	40.7	-
Burkina Faso	20.5	3	23	3	17.6	2.9	12.7	3.3	19.5	3.5	38.7	4.2
DRC	67.3	2.8	69	2.8	65.6	2.8	60.6	3.8	66.9	3.1	80.4	3.5
Ivory Coast	19.3	2.7	21.2	2.4	17.5	3.7	12.6	2.4	19	2.8	34.7	6
Senegal	39	3.4	38	4.1	39.9	3.7	23.8	6.5	44.6	3.9	63.2	4.6
Togo	41.8	2	45.6	2.3	37.8	2.4	31.6	3.2	42.3	2.2	61.8	3.1
	Poor40M	SE	Poor40F	SE	Mid40M	SE	Mid40F	SE	Rich20M	SE	Rich20F	SE
Benin[a]	24.2	-	15.7	-	35.7	-	30	-	42.4	-	42.7	-
Burkina Faso	14.4	3.9	10.8	4.2	23.1	3.8	15.7	4.1	42.4	5.2	34.8	4.4
DRC	66	4.2	54.7	4.3	67.5	3.6	66.8	3.8	77.1	4.2	83	3.3
Ivory Coast	16.4	3	7.9	3.1	18.7	3.2	17.7	3.9	35.5	5	33.8	8
Senegal	22.7	7.8	24.8	7.1	42.4	5	46.4	4.4	66.7	5.4	60.6	5.8
Togo	36.3	3.6	25.5	3.9	46	3	38.7	3.1	64.4	3.7	60.7	4.3

Note: Poor40 refers to the poorest 40% of individuals in the country, Mid40 the middle 40%, and Rich20 the richest 20%. 'SE' is the standard error. An 'M' or 'F' after the wealth bracket refers to 'Males' or 'Females', respectively. Values shown are percentages. [a]Estimates of numeracy rates were run on the unweighted sample.

Table 3C. PASEC Grade 5 Access to Literacy, with Standard Errors (%)

Country	National	SE	Males	SE	Females	SE	Poor40	SE	Mid40	SE	Rich20	SE
Benin[a]	12.7	-	15.1	-	10	-	4.9	-	15.7	-	22.7	-
Burkina Faso	11.6	2.6	14.2	3	9.1	2.9	4	3.2	8.3	3.2	27.5	3.8
DRC	36.4	3.3	42.6	3.7	30.7	3.6	30	4.7	36.9	4.1	44.9	6
Ivory Coast	16.8	2.8	18.8	3	14.8	3.7	4.9	3.2	15.4	3.2	38.8	4.3
Senegal	20.4	3.2	22.4	3.6	18.6	3.8	7.4	5	23.5	3.8	40.6	5.4
Togo	16.8	2.1	19.3	2.2	14.1	2.7	5.9	2.8	14.8	2.5	41.1	4
	Poor40M	SE	Poor40F	SE	Mid40M	SE	Mid40F	SE	Rich20M	SE	Rich20F	SE
Benin[a]	7.6	-	1.9	-	17.2	-	14.6	-	26.5	-	17.9	-
Burkina Faso	5	4.2	2.9	3.7	11.4	3.8	5.4	3.9	33.6	4.5	22.1	4.1
DRC	38.7	5.1	23.1	5.2	41.6	4.9	32.7	4.5	50.1	6.5	38.4	6.5
Ivory Coast	6.8	4.2	3.6	3.9	16.2	3.5	13.3	4.5	42.4	4.4	34.8	5.3
Senegal	8.9	5.4	6.6	6	24	4	21	4.3	46.8	6.1	38.2	7.5
Togo	8.1	3	2.6	3.5	15.7	2.7	12.9	3.1	49.7	4.4	36	5.2

Note: Poor40 refers to the poorest 40% of individuals in the country, Mid40 the middle 40%, and Rich20 the richest 20%. 'SE' is the standard error. An 'M' or 'F' after the wealth bracket refers to 'Males' or 'Females', respectively. Values shown are percentages. [a]Estimates of literacy rates were run on the unweighted sample.

Table 4C. PASEC Grade 5 Access to Numeracy, with Standard Errors (%)

Country	National	SE	Males	SE	Females	SE	Poor40	SE	Mid40	SE	Rich20	SE
Benin[a]	17.3	-	21.4	-	12.7	-	9.2	-	20.6	-	25.7	-
Burkina Faso	13.6	2.6	17	3.2	10.3	3.2	5.6	3.8	11.1	4.1	27.7	4.1
DRC	45.7	3.3	51.1	3.4	41	3.9	38.6	4.7	47.5	4.1	52.6	5.5
Ivory Coast	7.3	2.8	9.4	2.4	5.5	2.4	2.5	2.4	6.4	2.4	17	3.8
Senegal	31.4	3.2	35.1	4.5	28.1	3.8	16.2	4.4	35.6	3.9	54.2	6.1
Togo	24.3	2.1	28.6	2.6	19.8	2.8	14.6	3.7	23.9	2.6	42.6	4.2
	Poor40M	SE	Poor40F	SE	Mid40M	SE	Mid40F	SE	Rich20M	SE	Rich20F	SE
Benin[a]	12.8	-	5.2	-	25	-	15.9	-	30.8	-	20.1	-
Burkina Faso	7.5	4.5	3.8	4.6	14.8	4.7	7.4	4.7	35.2	4.8	21.6	4.4
DRC	48.1	5.1	31.6	5.6	51.6	4.3	43.3	4.9	53.7	5.8	50.9	6.4
Ivory Coast	4.4	3.4	1.2	2.8	7.8	3	5.1	3.1	19.8	4.3	13	4.3
Senegal	17.5	5.3	15.5	6.1	38.9	3.7	31.5	5	64.5	7.6	46.1	7
Togo	16.4	3.5	10	4.3	29.4	3.4	19.5	3.8	52	4.6	35.2	5.5

Note: Poor40 refers to the poorest 40% of individuals in the country, Mid40 the middle 40%, and Rich20 the richest 20%. 'SE' is the standard error. An 'M' or 'F' after the wealth bracket refers to 'Males' or 'Females', respectively. Values shown are percentages. [a]Estimates of numeracy rates were run on the unweighted sample.

Appendix D Results from Baseline Access and Quality Statistics

Despite the errors that can occur when looking at access and learning rates in isolation, it can still be useful to use these disaggregated statistics to analyse issues within access to school and quality within schools. An in-depth analysis of such is available in the precursor to this work (in the form of a dissertation - Lilenstein, 2016). Here we give a short overview of the pertinent results from this work.

Access disadvantage for females: Females face a statistically significant disadvantage in access to education all countries and both grades, except in Senegal in Grade 2. Females are between four and 14 percentage points less likely to complete Grade 2 than males. Females are between six and 18 percentage points less likely to complete Grade 5 than males. Literacy and numeracy rates – or quality of education – are similar for males and females in Grade 2. Indeed, the available confidence intervals for both Grade 2 and Grade 5 are such that we cannot be sure that any of the differences are not zero. However, mean differences are higher in Grade 5 than Grade 2. The highest mean differences occur in Togo in Grade 2 and in Benin and Burkina Faso in Grade 5 – where males are 7 percentage points more likely to acquire basic numeracy skills than are females in all cases.

Socioeconomic access differentials dwarf gender differentials: Those of lower socioeconomic levels are at a disadvantage in access to education that far outstrips the gender differentials discussed above, and this is seen in all of the six countries studied. Access inequalities are lower for Grade 2 but still extremely high. The smallest differential in access rates between the poorest 40% and richest 20% of individuals occurs in the DRC in Grade 2, where someone from a poor background is 10 percentage points less likely to be in school than someone from a wealthy background. At the other end, the poorest individuals in Burkina Faso are roughly half as likely to complete Grade 2 as the wealthiest individuals. In Grade 5, the lowest levels of inequality are seen in Togo, but in this case there is a 26 percentage point difference between access for the poorest and access for the richest portions of the age cohort. Burkina Faso displays the most inequality and here the poorest 40% of the age cohort are less than half as likely to complete Grade 5 as the richest 20%.

Quality differentials for the poor: Socioeconomic inequalities are also seen in the quality of schooling, in all cases except for the DRC and Benin. In other words, in the DRC and Benin, once in school students of varying socioeconomic backgrounds generally have access to an equal standard of education (or at least, they perform roughly equally). The greatest inequalities in the quality of education are seen in Togo, where the poorest segment of the Grade 5 in-school cohort are 42 percentage points less likely, or less than one-fifth as likely, to achieve basic literacy skills as the richest segment. Literacy inequalities are greater than numeracy inequalities in general. This difficulty with French tests in particular may be related to students not being first-language French speakers and the tendency in developing countries for wealthier individuals to be the ones who speak the colonial language as their first or second language.

Double-disadvantage effects for poor females in education access: Finally, we looked into whether there is a double disadvantage of being female and poor in access to and quality of education received. All countries except Senegal display a statistically significant double disadvantage effect in both grades. This effect is very strong for Benin and the Ivory Coast in Grade 2, and for all countries except Senegal in Grade 5. In the Ivory Coast, the poorest females are 14 percentage points less likely to complete Grade 2 than the poorest males. In the DRC, which has the largest double disadvantage estimate for Grade 5, the richest males and females are equally as likely to complete the grade, while females in the middle are 14 percentage points less likely to complete the grade than males, and the poorest females are 25 percentage points less likely as compared to the poorest males. While the poorest males have a high completion rate of 82%, only 57% of the poorest females complete the same grade. Interestingly, gender discrimination in access is far more prevalent at the high end of the wealth spectrum in Burkina Faso in Grade 5 – with 18 percentage points between the richest males and females – which may be related to the fact that access for the lowest wealth quintile is extremely low regardless of gender (around 16%), thereby leaving little-to-no room for gender disparities to occur at this level. No countries displayed significant double disadvantage effects in literacy or numeracy rates.