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Expanding Secondary Education for Sub-Saharan Africa: Where are the Teachers?

Introduction

Pressure on governments in Sub-Saharan Africa (SSA) to expand secondary education is growing. Increasing numbers of students flowing from expanded primary education and the need to improve the educational levels of the labor force to benefit from a globalizing economy make it inevitable that governments in SSA will turn their attention to expanding and improving secondary education (Alvarez, 2003; Mulkeen, 2005; SEIA, 2007; World Bank, 2006; World Bank, 2007). The dilemma these countries face is multifaceted. Many countries will need to continue to devote resources to expanding and improving primary education to achieve the goals of Education for All. A realistic conversation about greater access to secondary education in Sub-Saharan Africa will need to confront the present status of education systems in terms of their capacity to sustain the growth and improvement of primary education, as well as their existing limitations in terms of capacity and financing to simultaneously expand and improve secondary education.

There is consensus in the literature that secondary education—long neglected—is now the fastest growing segment of the education sector (SEIA 2001; UNESCO 2001; Mulkeen 2005; World Bank 2005; Di Gropello 2006; World Bank 2007). In many countries, movement away from seeing primary education as the terminal level of education towards policies that envision widespread completion of junior secondary and upper secondary as the goals of education system development is well underway, but has only recently begun in Sub-Saharan Africa (De Ferranti 2003; World Bank 2005). Many challenges to expanding secondary are particular to, and particularly pronounced in SSA.

This paper looks at the mounting demographic pressure to expand secondary access and contrasts it to the limited ability of current education systems to produce and deploy the necessary numbers of teachers to respond to that pressure.

Secondary Access is Currently Low and Inequitable

Participation rates for secondary education in Sub-Saharan Africa are lower than any region of the world, with access biased in favor of the wealthier populations (SEIA 2001). The lack of access to secondary education is increasingly seen to constrain countries' abilities to pursue effective economic growth and development strategies, which is leading governments and the funding community to place increased emphasis on the expansion of secondary education (SEIA 2001; UNESCO 2001; World Bank 2005)

Governments in Sub-Saharan Africa and their financial partners are increasingly looking to make secondary education more widely accessible, more relevant, and of higher quality. Secondary participation rates in SSA have increased from 19 percent in 1999 to 30 percent in 2004 (SEIA 2007). However, the region faces many challenges in meeting the goal of further expansion of secondary education. Only a handful of countries in the region—Botswana, Cape Verde, Mauritius, and South Africa for example—have achieved secondary education access rates as high as 80 percent for junior secondary. Some countries, such as Burundi, Burkina Faso, and Rwanda, have not even achieved rates of 20 percent (UNESCO, 2006 as cited in SEIA, 2007). The following table shows the range of average gross enrollment rates for selected SSA countries.



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Table I: Primary and Secondary GER, 2005

Country	Primary GER	Secondary GER
<i>Sub-Saharan Africa</i>	94.9%	31%
Botswana	106%	73%
<i>Cape Verde</i>	108%	68%
Ethiopia	93%	31%
<i>Ghana</i>	88%	44%
Kenya	112%	49%
<i>Lesotho</i>	132%	39%
Malawi	122%	28%
<i>Mauritius</i>	102%	88%
Namibia	99%	56%
<i>Senegal</i>	78%	21%
South Africa (2000)	106%	85%
<i>Uganda</i>	119%	19%
Zambia	111%	19%

In addition to differences across countries, within most countries secondary education largely benefits wealthier groups in urban areas. Girls and rural populations are at a particular disadvantage as they are impacted more than other groups by both supply (lack of available spaces, fees, biased selection processes) and demand (opportunity costs, social roles) factors (SEIA, 2007; World Bank, 2005). Governments that want to expand access to secondary education will need to confront the same issues faced in primary education when it comes to meeting the needs of chronically underserved segments of the population. These issues include reshaping how schools are organized, by whom they are governed, where they are located, and how they operate in order to make it easier for rural, poor children, and especially girls, to have viable opportunities to learn.

Resources for Expansion Are Already Stretched Thin

While rethinking the basic components of education supply, governments will also need to confront the resource requirements of maintaining growth in primary education while launching expansion of secondary education. It is not clear whether adequate resources have been mobilized to fully realize governments' existing plans for primary education. Those resources are already competing with other demands on the public sector, making it difficult for governments to mobilize additional resources to accelerate the expansion of secondary education (SEIA 2007). In addition, the cost of expanding the capacity of teacher training colleges (TTCs) by increasing the number of faculty, spaces, and candidates to meet the needs of a growing secondary education sector places even more financial pressure on already stretched education budgets.

Quality and Relevance Will Need to Be Addressed While Expanding

In addition to access and financing issues, the literature indicates that secondary education curricula are outdated, irrelevant, or poorly implemented. According to SEIA (2007), the content of programs has rarely changed to match countries that are dealing with democratization, HIV/AIDS, and changing labor market demands. In addition, the time students spend in the classroom learning (time-on-task) is significantly reduced in secondary education. For example,

in Kenya, students and teachers spend on average 18 hours per week at school (SEIA, 2007). The reduced classroom time impacts teacher's ability to complete coverage of the curriculum, in turn leading to low achievement levels for many students (SEIA, 2007). The low achievements are demonstrated through the performance of eighth graders on the 2003 TIMSS study. In 2003, the international average score for eighth graders in Math was 466 out of a possible 800 points. Students in Botswana, Ghana, and South Africa scored 366, 276, and 264 respectively on the test. By comparison, the highest score was achieved by eighth graders in Singapore who scored an average of 605 on the mathematics exam (TIMSS, 2003). Without significant improvements in quality and relevance, expansion of secondary education could consume vast amounts of resources without leading to the hoped for benefits of improved social and economic development.

Teachers Are Already in Short Supply

Finally, teacher recruitment, retention, and deployment are insufficient and inefficient. Lewin (2001) indicated that to achieve even the goals of universal primary enrollment (UPE) requires increasing the teacher supply by up to four times current levels. According to World Bank simulations based on UNESCO statistics, Sub-Saharan Africa will need more than 1,361,000 new teachers between 2000 and 2015 to meet the demands of primary education (Schwille 2007). As more countries feel they are reaching their UPE goals and begin expanding secondary education, the requirements for additional teachers will increase pressure on an already stretched system (i.e. training institutions, public expenditures), making the challenge seem insurmountable.

While the issues of financing, curriculum, and access are all expounded in the literature, how to contend with issues of teacher supply as a critical constraint to secondary expansion is barely addressed. The literature fails to directly take on the most basic constraint to secondary education expansion: will there be sufficient teachers and if not, how will the increased demand for additional education be handled in developing countries? To better identify the conditions that would allow secondary education expansion to be successful, it is important to start by assessing the current institutional capacities in these systems and analyzing their impact on teacher training policy and practice (Lewin 2001; OECD 2002; OECD 2004; Mulkeen 2005).

This paper uses existing demographic and education system data from six African countries to quantify demand for teachers. It examines the capacity of the education systems to produce teachers and discusses whether existing supply mechanisms and inefficiencies prevent countries in Sub-Saharan Africa from expanding access to secondary education. Using data from the most recent Global Monitoring Report, Education Policy and Data Center, UNESCO Institute of Statistics (UIS), World Bank, and other existing sources, the paper looks at how primary completion, transition to secondary, secondary completion, entry to post-secondary teacher training, and/or higher education combine to determine the pool of potential teachers at the secondary level. These data are then used to illustrate how conditions inherent in the traditional system create a bottleneck at critical points of entry, in particular showing how completion and transition rates constrain the generation of adequate teacher supply. The paper concludes with a discussion of the policy implications for teacher preparation and recommendations for addressing the secondary teacher gap.

Overview of the Cases

The six cases researched over the last six months represent countries in Sub-Saharan Africa where the government is advocating for expanded secondary education.



Table II: Secondary Education Country Overview

Country	Structure of Secondary Education	Current Secondary Student Enrollment	Current Secondary Education Teacher Supply	Transition Rate to Lower Secondary	Pupil-Teacher Ratio
Ghana (2005)	6+3+3 system with six years of primary education; three years of lower secondary education; and three years of upper secondary education.	919,334 in lower secondary	51,419 in lower secondary	95% grade 6 to 7	18:1 in lower secondary
		338,664 in upper secondary	16,527 in upper secondary	53% grade 9 to 10	22:1 in upper secondary
Kenya (2005)	8+3 system with eight years of basic education and three years of secondary education.	946,559 in secondary education	47,584 in secondary education	47%	Not Available
Malawi (2005)	8+2+2 system with eight years of basic education (P1–P8); two years of junior secondary (S1–S2) and two years of senior secondary (S3–S4)	108,654 in lower secondary	6,079 in lower secondary	36%	20:1 in both levels of secondary education
		75,200 in upper secondary	2,096 in upper secondary		
Senegal (2004)	6+4+3 system with six years of basic education; four years of lower secondary; and 3 years of upper secondary.	277,106 in lower secondary	10,357 in lower secondary	49%	27:1 in lower secondary
		78,626 in upper secondary	3,297 in upper secondary		
Uganda (2004)	7+4+2 system with seven years of primary education (P1–P7); four years of junior secondary (S1–S4 – O-Level) and two years of senior secondary (S5–S6 – A level).	599,177 in lower secondary	32,649 in lower secondary	37%	19:1 in both levels of secondary education.
		98,330 in upper secondary	4,664 in upper secondary		
Zambia (2005)	7+2+3 system with seven years of primary education; two years of lower secondary; and three years of upper secondary.	262,810 in lower secondary	9,047 for lower secondary	56%	32:1 in lower secondary
		136,192 in upper secondary	4,549 for upper secondary		

Five of the six education systems are structured in three-levels: primary, lower secondary, and upper secondary. Kenya’s education system is an 8+3 system with eight years of basic education and three years of secondary education. Secondary gross enrollment rates range from 25 percent in Malawi to 77 percent in Ghana and transition rates from primary to lower secondary range from a low of 36 percent in Malawi to 95 percent in Ghana. The teacher training systems, while different in each country, generally require at least two years of education in a diploma or certificate program for primary education and a Bachelors degree for secondary education.

Table II summarizes basic information about the secondary education systems in each country. Details about the structure of the education systems, and in particular about teacher training for each country, can be found in Annex I.

Secondary Education Teacher Recruitment and Retention in SSA

In Sub-Saharan Africa as well as in developing countries in other regions, the projected demand for teachers exceeds the projected supply required for expanding secondary education (World Bank 2006). The literature generally acknowledges the lack of teachers, but fails to quantify the teacher gap. Among the constraints are the limited number of potential teacher candidates and the lack of space and funding in the teacher training colleges, which together currently prevent countries from producing sufficient numbers of qualified teachers. In addition to limited capacity to produce teachers, governments are also constrained in their ability to assign and keep teachers in remote and otherwise underserved areas where they are most desperately needed. Add to that the fiscal constraint of meeting the higher wage bill implied by a dramatic expansion of the teaching force (DeStefano 2006).

Teacher recruitment and retention is one of the most critical factors to ensure students have access to secondary education. Recent publications and studies highlight the following challenges facing teacher recruitment and retention in secondary education across developing countries (Lewin 2001; OECD 2002; Mulkeen 2005; World Bank 2005; SEIA 2007; World Bank 2007):

- **High Attrition:** Low salary and poor teaching conditions cause teachers to leave the field within 1–3 years of entering the service. Those teachers posted to rural areas often seek immediate transfer back to urban areas or fail to show-up to teach on a consistent basis.
- **Difficulties attracting teachers to hard to reach areas:** These difficulties arise because of low compensation (e.g., other professions requiring similar educational qualification offer higher compensation); poor working conditions; lack of professional development opportunities; little mobility to better positions; inadequate professional support and supervision; unprofessional treatment of teachers; and lack of incentive systems to stimulate and motivate teachers to remain in the teaching field (Mulkeen 2005; DeStefano 2006; Terway 2007)
- **Bottlenecks in teacher preparation systems:** High rates of attrition throughout the education system (i.e., continuation to secondary education; lack of space in teaching colleges; failure to pass relevant tests) dramatically constrain the numbers of students successfully advancing through secondary education, thereby reducing the pool of potential teacher candidates for secondary education.
- **Lack of teachers in specific subject areas like mathematics and science:** Secondary education teachers require more subject-specific knowledge and few choose or are able to successfully specialize in science and math.

This paper quantifies the impact of teacher demand. Data are insufficiently disaggregated to allow an analysis of the supply and demand of teachers within specific subject areas.

Using data from the most recent Global Monitoring Report, Education Policy and Data Center, UIS, World Bank, and other existing sources,

The Projection Model

To quantify the overall demand and supply of teachers for this study, data from the UIS, the most recent Global Monitoring Report, the Education Policy and Data Center, the World Bank, and from ministries of education were gathered and analyzed. A cohort methodology was used to estimate current and future student enrollments. The enrollment projections served as the basis for the quantification of the supply of teachers. Repetition, drop out, and transition rates were used to develop scenarios of improved student flow and transition from primary to secondary education in each country.



Three main scenarios were developed and analyzed for the study:

- 1. Scenario 1, Baseline Projection: Gross Intake Rate (GIR) for Primary Education Reaching 100 percent by 2015.** Internal flow (dropout and repetition rates) and transition rates from one level to the next are held constant. For the five countries with GIR currently exceeding 100 percent, the rates were gradually lowered to 100 percent during the projection time period. This implies the systems stabilizing at 100 percent of entry age students entering primary school and no longer having large numbers of overage students needing to enter the primary cycle. In Ghana, where the current GIR is 86 percent, the baseline scenario assumes it increases to 100 percent by 2015.
- 2. Scenario 2, Moderately Improved Flow and Transition:** This scenario began with the baseline projection, and added a 25 percent reduction in dropout and repetition rates for all levels and a 25 percent increase in transition rates (from primary to lower secondary and lower to upper secondary). This assumes that improvements in the factors that lead to reduced inefficiency will also lead to improved transition—because more students are able to succeed and because better flow creates greater pressure for higher rates of transition.
- 3. Scenario 3, Dramatically Improved Flow and Transition:** This scenario models a 50 percent reduction in dropout and repetition rates and a 50 percent increase in transition rates.

In all the scenarios, the pupil-teacher ratios were held constant at the base year levels. Furthermore, the affects of HIV/AIDS, conflict, unforeseen policy changes, changes in economic conditions, and other factors that could alter the development of the education system are not reflected in the projections. Lastly, teacher projections are not disaggregated by subject-matter. The literature affirms that shortages of math, science, and technology teachers for secondary education are expected to continue.

The Results of the Projections

The aggregate results for the six countries show that approximately 321,561 new lower secondary teachers will be needed to meet the demands if these systems improve student flow and transition by just 25 percent (scenario 2). This scenario leads to expected shortfalls of teachers during the next decade that range from under 5,000 lower secondary teachers in Malawi to more than 71,000 in Kenya. If student flow and transition improve by 50 percent (scenario 3), approximately 391,711 new teachers will be needed to meet increased student enrollment in lower secondary education in the six countries.

Table III illustrates the results of the projection scenarios, showing in the first column the current number of secondary teachers, followed by the projected number of teachers that will be required by 2015 in each of the three projection scenarios.

Based on the moderate scenario of improved flow and transition, Malawi and Kenya will need to nearly double the number of teachers in lower secondary education to meet the demands of an expanding system. In 2005, the Ministry of Education in Kenya announced that it would be focusing on increasing the transition rate into secondary education from 47 percent to 70 percent by 2008. Assuming there are no changes to GIR, student-teacher ratios, or student flow through

primary education, our projection model shows that Kenya will need more than 96,000 new teachers this year to meet that goal.

Table III: Additional Secondary Teachers Required for Expansion (2015)

Country	Number of Teachers in Base Year	Number of Teachers Needed in 2015			Historical Annual TGR (1999-2005)	Required Annual TGR (2005-2015)
		Scenario 1 GIR to 100%	Scenario 2 Improved Flow and Transition by 25%	Scenario 3 Improved Flow and Transition by 50%		
Ghana lower secondary	51,419	90,053	90,053	94,507	5%	5-5.6%
Ghana upper secondary	16,527	35,250	35,250	36,459	6%	7-7.4%
Kenya	47,584	94,321	118,818	144,708	3%	7-12%
Malawi lower secondary	6,079	6,821	11,147	16,468	-3%	10%
Malawi upper Secondary	2,096	3,870	5,314	7,089	-4%	14-23%
Senegal lower secondary	10,357	17,632	23,866	30,811	11%	5-10%
Senegal upper secondary	3,297	6,896	8,300	9,816	-0.5%	7-10%
Uganda lower secondary	32,649	37,876	56,399	80,171	3.4%	1-9%
Uganda upper secondary	4,664	5,573	6,991	8,610	3.4%	2-6%
Zambia lower secondary	9,047*	17,520	21,278	25,046	5%	7-10%
Zambia upper secondary	4,549*	14,580	16,897	19,231	N/A	21-25%

TGR = Teacher Growth Rate

*Of 13,596 total teachers in lower and upper secondary schools, EQUIP2 projected disaggregated figures using teacher qualification data.

More moderate improvements in flow and transition rates in Kenya over a longer period of time (25 percent from 2006–2015) would lead to a demand for 118,818 additional teachers in secondary education in 2015—a gap of approximately 71,234 teachers based on the historical rate of growth in teacher supply. To meet this projected additional enrollment, the annual growth rate in teacher supply would need to increase from 3 percent to approximately 8 percent per annum. Scenario 3, which projects a 50 percent improvement in flow and transition, would require a 12% annual growth rate in the supply of teachers for 10 years to ensure that over 97,000 new teachers can be hired.

The historical teacher supply growth rate for lower secondary education in Malawi from 1999–2004 was approximately -3 percent. Despite the negative growth rate for teachers, the education system continued to expand, primarily through dramatically increased class sizes. Moderate improvements in current student flow and transition rates will require significant growth in teacher supply in lower secondary education—approximately 11,147 new teachers by 2015. The teacher training colleges would need to increase the supply of teachers by 10 percent each year to



meet the increased demand.

The historical teacher supply growth rate for lower secondary education in Uganda from 1999–2004 was approximately 3.4 percent. Based on the various scenarios, moderate improvements in student flow and transition rates would translate into a need for between 37,876 and 56,399 additional teachers by 2015 and a required growth rate in teacher supply of 5–6 percent per year. An improvement of 50 percent over the next ten years in both flow and transition would require Uganda to supply more than 80,000 new teachers, translating into a 9 percent net annual growth rate in teacher supply. It is important to note that the high estimates of improved flow and transition increase the lower secondary transition rate to 55 percent. As policy makers in Uganda move towards the establishment of a policy of universal access to secondary education these projections significantly underestimate the number of teachers that will be needed to meet the needs of universal secondary education in Uganda. If Uganda moved to a policy of universal lower secondary by 2015, the country would need approximately 141,000 additional teachers in 2015. To meet this demand would require a 14 percent net growth rate in the supply of teachers to the lower secondary system each year. To meet universal secondary by 2010 would require approximately 90,000 new teachers and an annual growth rate of 15 percent.

In Zambia, moderate improvements in student flow and transition to secondary education would lead to a shortfall of approximately 21,258 teachers in 2015. To meet the shortfall would require net annual growth rates of approximately 8 percent—a percentage increase of 60 percent over the existing rate of growth in teacher supply. Like Uganda, Zambia has set a target of reaching 70 percent transition into lower secondary by the end of 2007. To meet this target would require nearly 12,000 additional new teachers for lower secondary.

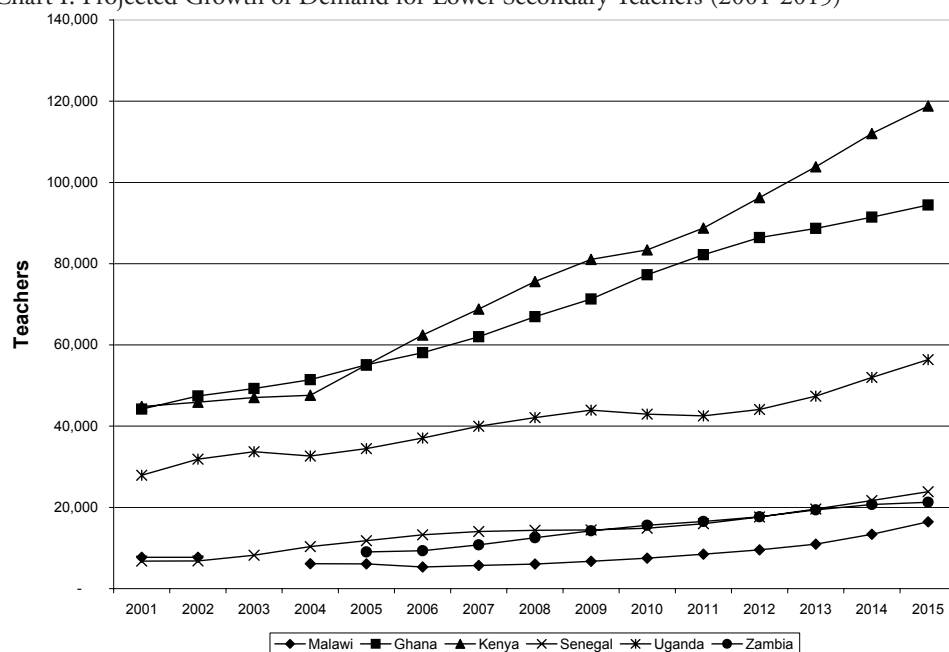
Chart I illustrates the growth required to expand lower secondary education in each country based on moderate improvements to student primary flow and transition to lower secondary scenarios.

Based on the moderate projections, Kenya and Ghana will require the most number of teachers to meet the expanding needs of secondary education. Uganda is close behind Kenya however, and should the country move to universal secondary education, the demand for new teachers will severely stress the system. In all of the cases included in this analysis, it is highly unlikely that existing teacher training colleges and current policies regarding teacher qualifications and recruitment will enable these countries to produce the numbers of teachers they are projected to need, even under moderate assumptions about improved transition into secondary education. It is most likely that pressure to increase enrollment will mean that students will be admitted to secondary school anyway, and class sizes will increase, as has been the case in Uganda, Malawi, and Kenya under free primary education. The investments needed to assure the annual rates of growth in teacher supply would compete with the resource requirements of expanding secondary facilities, making it unlikely that either can be done well.

It has been stated that secondary education is the most rapidly expanding sector within education (Wils, 2007). As countries increasingly reach universal primary education and the labor market begins to require increasing skill levels of its employees, the confluence of the push-pull factors in education will continue to force countries to expand secondary options for young people. As these projections have shown, many countries would need to significantly increase the annual output of their training institutions, often doubling what have been their historical growth rates in teacher supply, or find alternative sources of potential teachers to meet these demands. The following section discusses the contributions of pre-service teacher training colleges and the

constraints that prevent the current education system from meeting the expanding need for teachers in secondary education.

Chart I: Projected Growth of Demand for Lower Secondary Teachers (2001-2015)



Inefficiencies in Teacher Stock and Flow

Qualified teachers in both the developed and developing world are quickly becoming the hardest segment of the teaching profession to attract and retain—and are the most expensive to educate (World Bank 2005). Yet, relatively few studies have analyzed the shortfall of qualified teachers as an impediment to growth in the system, particularly for secondary education (Scott 2001; Lewin 2002). As the projection analyses demonstrate, the six countries included in this study will need to more than double their teaching force to meet the needs of expanding secondary education. In most developing countries, and particularly in Africa, the teacher shortage—especially in the areas of math, sciences, and technology—will compromise the concomitant goals of expanding and enhancing the quality of secondary education to meet the goals of economic development (World Bank 2005).

The looming shortfall in teachers for secondary education is fueled by limitations inherent in the education system. These limitations derive from two features of the way education systems are organized.

The first limitation derives from the fact that education systems must produce their own future labor forces. The degree to which schools can efficiently move learners through primary, secondary, and further education determines whether an education system will have the person-power necessary for its own future expansion. Too often in SSA, the performance of education systems is so poor in terms of the quality of instruction and the results for students that the ability to produce large numbers of highly qualified teachers is limited. High repetition, high dropout, and low rates of completion are the manifestations of poor teaching and learning. These inefficiencies due to poor quality primary schools are compounded by poor quality at the secondary level. The flow of students all the way through the system is therefore constrained.



The second limitation is the existing approach to teacher development. Pre-service teacher training as it is currently organized in most of SSA is constrained by several factors, such as:

- Limited space in teacher training colleges, residential colleges in particular;
- The length of time needed to train secondary teachers;
- The high cost of running teacher training colleges, again especially those that are residential;
- The competition for students who, being some of the few who have completed secondary school, have multiple options open to them including other areas of further education and/or entering the labor market; and
- The impact of HIV/AIDS in some countries.

In Ghana, for example, the pre-service program is designed to provide a three-year Diploma in Basic Education consisting of Programs A and B to prepare teachers for teaching in primary and junior secondary schools. Trainees in the programs spend the first two years on the college campus and the third year in a supervised placement at a school. Limited residential slots, the number of qualified faculty available to teach at the teacher training colleges, and the limitations on the number of supervised placements that can be managed combine to constrain the number of students who can be accommodated each year in Ghana. Senior secondary teachers are required to complete a four-year Bachelor's in Education degree, which adds several years to the time required before a teacher is able to be placed in the classroom. This requirement also means that to become a secondary school teacher in Ghana, you must meet the entry requirements of the university, successfully complete your degree, and then accept a teaching job. The pool of people in Ghana who can meet these criteria, and who are willing to pursue teaching careers instead of other options at the university, is by definition limited.

In Kenya, the pre-service primary teacher training curriculum lasts for two years and includes the study of 13 compulsory subjects. To qualify for a teacher's certificate the trainee must pass at least eight of the thirteen required subjects and satisfy the teaching practice component. While this set of requirements ensures that teachers have certain expertise, the process also greatly reduces the number of teachers who successfully graduate and enter the teaching force. University degree programs are also required for secondary school teachers who must specialize in at least two subjects.

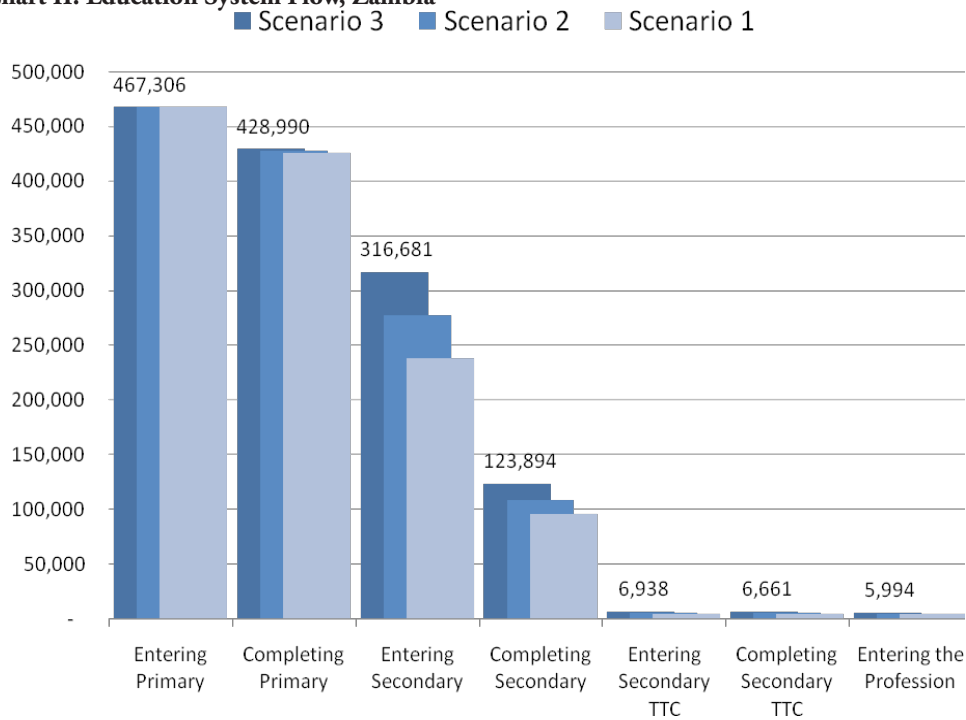
The combination of poor quality and therefore high rates of inefficiency in flow through the education system, and the post-secondary training requirements for secondary school teachers makes it nearly impossible to dramatically increase the future supply of teachers by relying solely on existing policies and institutions for pre-service development of teachers.

Chart II illustrates how in Zambia, constricted flow through the system due to dropout and low transition rates limits the possible pool of people who can re-enter the education system as qualified (under existing definitions) teachers. Each bar represents the number of students making it to each point in the system under each of the three projection scenarios presented above.

In Zambia, approximately 467,000 students entered grade 1 in 2005. Under the assumptions of scenario 3—an increase of 50% in flow and transition throughout the system—only 123,894 of those first graders will go on to complete secondary schooling. Of the secondary education completers, approximately 6,938 are projected to enroll in teacher training colleges in 2015 to become secondary education teachers. Only 6,661 of those TTC enrollees are projected to graduate, and only 5,994 of them are projected to enter the teaching profession. Even under the

best case scenario that is modeled here, there are big drop-offs in the number of students working their way through the system at the transition from primary to secondary, and between entry to secondary and completion. And only a small percentage of secondary completers enter secondary teacher training colleges. Compared to the 6,661 TTC graduates, there are 123,894 secondary completers—a pool of potential lower secondary teachers that is 19 times greater.

Chart II: Education System Flow, Zambia

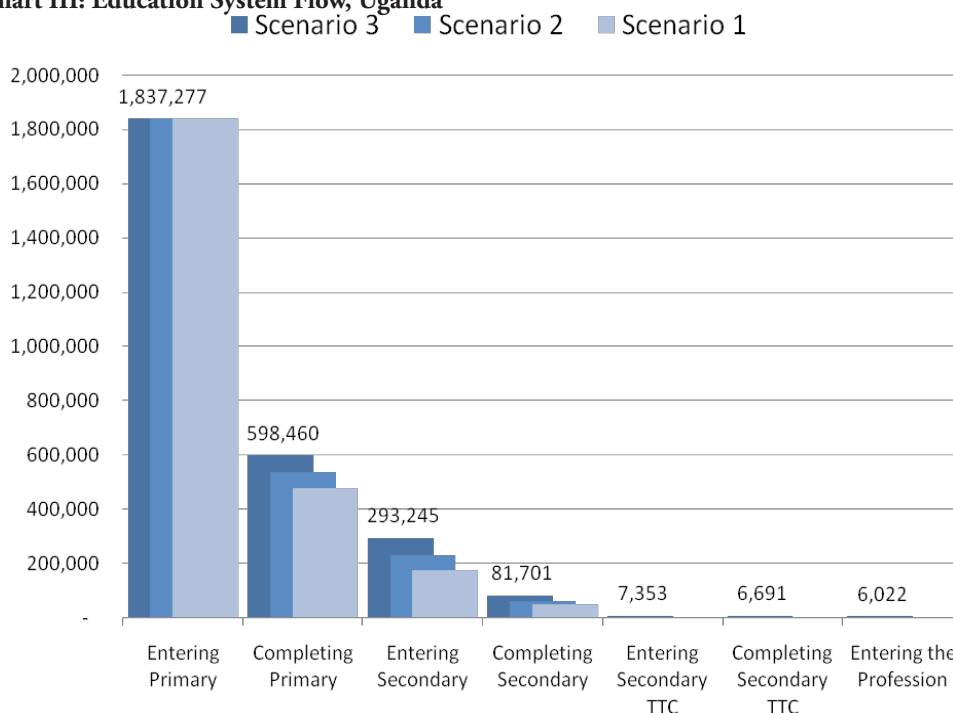


The case is similar in Uganda, with even greater drop off in the number of students advancing through the system. In 2005, 1.8 million children entered first grade, but only 50,080 are projected to complete secondary under scenario 1, improving to 81,701 under the assumptions of scenario 3. On an annual basis the teacher training system in Uganda produces 7,080 primary qualified teachers that pass the Grade III licensing exam and 3,518 lower secondary qualified teachers who pass the Kyambogo Secondary Education Graduation exam. Approximately 7,373 graduates obtain education degrees. Despite the seemingly large number of trained teachers in Uganda, only a percentage of teachers qualifying annually accept positions in the schools. The projections suggest that 75 percent of those earning Grade V and 20 percent earning degree qualifications proceed to become lower and upper secondary teachers respectively.

Chart III demonstrates that of the 81,701 estimated secondary education completers under scenario 3, approximately 7,353 are projected to enroll in teacher training colleges and 6,022 are projected to enter the secondary education teaching force. Under scenario 3, the required teaching force for lower secondary education would be 80,171, and the system will, under its existing policies and practices at TTCs, produce 37,876, leaving a shortfall of over 42,000 teachers in 2015. The production of some 6,000 teachers that year would not come close to meeting the projected deficit of teachers. Recruitment of upper secondary graduates to teach in lower secondary would expand the pool of potential teachers to over 81,000 people, more than enough to meet the projected deficit. Needless to say, if Uganda moved to a policy of universal secondary education, then the shortfall in teachers would almost triple.



Chart III: Education System Flow, Uganda



Inefficiencies in the Uganda Primary Teacher Colleges (PTCs) include inadequate staffing, lack of funding and high failure rate of students, averaging around 40 percent (MoESd, 2003). Primary diploma-holders can continue their education and become secondary school teachers. According to government documents, the Ministry can only afford to employ an additional 2,000 teachers per annum which is insufficient to keep pace with expected enrolment growth under Universal Post-Primary Education and Training (UPPET).

As these two cases demonstrate, the existing systems for formal teacher pre-service education will continue to fall short of the requirements for expansion unless potential teachers are drawn from different points in the education system, or alternatives are developed to complement the current pre-service teacher training systems.

Policy Implications

Given the growing demand for teachers at the secondary level, what are the options for tapping larger pools of potential teachers? What alternatives are there to lengthy pre-service training in teacher training colleges? What might be required to appropriately support alternatively recruited teachers? Are there lessons from complementary education programs that illuminate alternative policies and practical options for expanding lower secondary education? What lessons have complementary programs generated for how to manage and facilitate transitions between formal and non-formal educational settings?

The literature discusses two broad approaches that have been traditionally taken to address teacher shortages in developing countries: accelerate pre-service teacher training; or permit the recruitment of unemployed graduates with no formal teacher training (World Bank 2005). Accelerating the pre-service program shortens the amount of time required to get a teacher into

the classroom and reduces the per student costs. However, in some cases, this approach has also impacted the quality of education and has increased regional differences (World Bank 2005). Similar concerns about quality have been raised when using contract teachers, or teachers with no formal training.

In 2006, a team of researchers completed a nine case study analysis on complementary education models. The researchers found that alternative approaches to recruiting and supporting teachers play a major part in the ability of complementary models to cost effectively assure access, completion, and learning in primary schools (DeStefano 2006; Terway 2007). The complementary basic education programs studied all relied on less educated and minimally compensated teachers. The programs recruited and trained these teachers and then provided them with ongoing supervision and support (DeStefano 2006). The research showed that the resources which programs saved through reduced teacher compensation allowed them to fund the provision of an extensive on-the-ground network of teacher and school support and supervision. Supervisors were better able to provide on-the-spot feedback, direct instructional support, and professional development to teachers. Research by Lewin (2003) provided further evidence that school-based in-service training and mentoring of novice teachers was more effective and less costly than traditional pre-service training programs. The key lesson that can be taken away from research into complementary basic education programs is that teachers with lower qualifications can provide effective instruction if they are adequately and appropriately assisted through regular, on-site support.

Can similar approaches be used to address likely shortfalls in the potential pool of qualified secondary school teachers? A response to this question will differ when discussing lower versus upper secondary education and the response will depend in part on the curricular content and degree of subject area specialization in lower secondary schools. Responses will also depend on whether the discussion focuses on formal, traditional secondary education or alternative, non-formal or complementary post-primary educational programs.

Teacher Supply for Lower Secondary in the Case of Existing Models of Secondary Schooling

The projected shortfalls in secondary teachers for the six SSA countries included in this paper are a product of the existing approach to secondary and teacher education. Countries that want to expand access to formal, academically oriented secondary schools will be faced with the kinds of teacher shortages that the projections in this paper predict. If the lower secondary curriculum remains sub-divided into areas of academic specialization—math, science, language, social studies, etc.—then it is hard to foresee how lower qualified teachers could be recruited and supported across a variety of subject areas. Teacher workloads dictated by instructional requirements for different subject areas create inefficiencies in teacher deployment and use. Aggregate student to teacher ratios tend to be reasonable for secondary education (e.g., averaging about 22–23 to 1 for the countries included in this analysis), yet class sizes can be extraordinarily large because teachers are responsible only for the hours of instruction in their subject area. Some teachers may only teach a few hours. While targeting secondary school students for teaching careers, employing contract teachers, and increasing salaries may alleviate some pressure on the profession, it will only slightly lower the gap in secondary education (Mulkeen, 2005). One possible policy option is to restructure the lower secondary curriculum towards a more general extension of basic education. This could allow a) more efficient use of existing teachers and b) the system to recruit and support teachers with less formal pre-service training (e.g., teachers with only senior secondary education). Several World Bank and OECD reports indicate that this process is already beginning to take



place as lower secondary increasingly becomes an extension of primary education (OECD, 2004; World Bank, 2005; World Bank, 2006)

Teacher Supply for Lower Secondary in the Case of More General, Basic Secondary Curriculum

If governments are willing to move towards a lower secondary education that is an extension of basic education—for example focused primarily on language and math skills—then it may be possible for ministries of education to tap potential teachers at earlier points in the education system, such as upper secondary. These upper secondary students would not be required to have subject-specific knowledge and would therefore require less pre-service training. The training these students received could be accelerated and focused on pedagogy, instructional skills, and slightly advanced numeracy and literacy instruction. In addition, teacher support personnel could be efficiently deployed to support these teachers since the support personnel would not have to address all the specialized subjects like science, history, geography, or technology. Under these circumstances, the lessons from complementary programs could be applied to lower secondary education: recruit teachers locally; establish local governance and management of schools; and partner with NGOs to provide on-the-ground networks of support personnel who can help teachers with specific instructional strategies for reinforcing students' reading, writing, and basic math skills.

Ministries of education could also utilize existing teachers more efficiently by increasing teaching loads (i.e., the minimum number of hours spent teaching); having teachers teach multiple subjects; and sharing teachers across schools (World Bank 2005). In Kenya, it was estimated that the following changes would enable a 50 percent increase in secondary education enrollments without adding new teachers:

- Increase teaching load from 18 to 25 hours;
- Use part time teachers for subjects that are taught only a few periods a week;
- Increase student to teacher ratios to 45:1;
- Expand existing schools to at least three parallel streams; and
- Share teachers across schools.

Teacher Supply for Lower Secondary in the Case of Alternative, Non-Formal Post-Primary Education

Non-formal forms of post-primary education require teachers/facilitators with something besides academic training and teacher certification. The one example from the complementary education cases referred to earlier in this paper that profiles non-formal lower secondary education is the Educatodos program in Honduras. In Educatodos, non-formal centers offer primarily overage students opportunities to obtain the equivalent of a lower secondary education. Centers are organized in whatever settings are available—work places, churches, other community buildings—and community members are recruited on an ad hoc, voluntary basis to serve as facilitators in the centers. This kind of alternative program opens up a wealth of possibilities for lower cost, less formal approaches to secondary education, and for which a variety of different actors can serve as teachers. In addition, distance education technologies—in the case of Educatodos radio broadcasts—can enhance the instructional repertoire of less trained, not formally certified teachers.

Reaching large numbers of secondary students may depend on the development of similar alternative approaches to the organization of secondary schooling and therefore the potential

sources of teachers. As illustrated by the Uganda and Zambia examples, the pools of secondary school graduates that could be tapped to be teachers are 10 to 20 times greater than what the pools of TTC graduates are projected to be. The policy implications of any of these approaches are significant.

First, pre-service teacher training needs to accelerate its programs, getting teachers into schools more quickly, and they need to incorporate the use of distance education to provide training to less qualified teachers (who can then begin to teach sooner in their qualification process). Distance learning would be particularly suited for situations where teachers are needed to provide subject specific coursework.

Second, policies on who becomes a teacher should adapt to allow the education system to tap students at earlier points in the system. As the case studies of Zambia and Uganda illustrate, the number of students in upper secondary is much larger when compared to the number of students entering TTCs. Countries can develop policies that encourage and reward the system for drawing on this younger population and then utilize the alternative training mechanisms to ensure that over time, these candidates gain both content and pedagogical expertise. In addition, as lower secondary becomes more general in nature, ministries of education need to consider policies that allow for communities to use local capacity to teach lower secondary. Programs such as *Educatodos* can serve as models for developing effective in-service training and support systems that allow communities to deliver quality secondary education. The community-based complementary programs also provide examples of how to develop learning communities for teachers that support them in improving and sharing effective practices.

Finally, financial resources are a challenge. As Lewin (2003) notes, in most developing countries, secondary education is publicly financed and as donor support has favored primary education, secondary education has gotten squeezed. International evidence increasingly shows that differences in investments in secondary education impact economic growth making secondary education an area of needed investment. Complementary models have shown that they can deliver education to students in a less costly and more cost-effective manner. Drawing on the lessons of these complementary models—including hiring teachers locally, investing in support services, and drawing on community resources—can allow secondary education to expand within the existing tight resources faced by many of these countries.

As this study has shown, countries in SSA will face large shortages of qualified teachers as policies begin to move towards universal secondary education. New approaches to the recruitment, training, and utilization of teachers are needed if countries in SSA are to effectively expand the reach of secondary education. The findings and recommendations synthesized above are intended to provide policymakers and donors with ideas for creative policy development and for the development of strategies that can increase the reach, quality, and effectiveness of secondary education.



Annex I: Country Profiles

Ghana: Ghana has a high rate of transition into Junior Secondary School, 94 percent in 2004 and GER for Junior Secondary School has increased from 70 percent to 77 percent between 2003 to 2006. Teacher training programs in Ghana require completion of secondary school for all candidates. There are 38 Teacher-Training Colleges offering pre-service basic education teacher training. The program is designed to provide a three-year Diploma in Basic Education consisting of Programs A and B to prepare teachers for teaching in primary and junior secondary school. Trainees in the program spend the first two years on the college campus and the third year in a supervised placement at a school. University of Cape Coast also provides a 3 year distance learning program that leads to a Diploma in Basic Education. Senior Secondary teachers are required to have a 4 year Bachelors in Education.

Kenya: Free primary education was announced in 2003, which led to an increased GER of 94.1 percent in 2002 to 110.5 percent in 2003. GER for secondary school has also increased from 39.2 percent in 2000 to 48.8 percent in 2005. There are 21 Government maintained primary teacher training colleges and 7 private colleges which offer pre-service courses to the teacher trainees. Pre-service primary teacher training curriculum lasts for two years and requires a teacher to study 13 subjects - all compulsory. To qualify for the award of a teachers certificate the teacher trainee is expected to pass at least eight of the thirteen subjects. The trainee is also required to pass the teaching practice component. Secondary school teachers are trained at the diploma and degree level at three diploma colleges: Kagumo (language teachers); Kenya Sciences (Science oriented teachers); and Kenya Technical Teachers College (technical teachers). Five additional public universities offer B.Ed. degree courses for both Science and Art oriented secondary teachers. The universities also offer training programs for secondary school teachers. The teacher trainees in both diploma and university level specialize in at least two academic subjects as well as the education units which emphasize the methodology of teaching.

Malawi: Free Primary Education was introduced in 1994, leading to an increase in primary GER from 89 percent to 133 percent between 1993 and 1994 enrollment. The Ministry capped intake into secondary schools at 50 pupils for S1 classes in 2000 to avoid overcrowding in secondary schools. Primary GIR, GER and NER in 2005 were: 203 percent; 122 percent; and 95 percent respectively. Secondary GER has declined from 32 percent to 28 percent from 2000 to 2005. Malawi has six public and three private Primary TTCs that train primary teachers with an annual of training capacity of 2220. Teachers are trained through the Initial Primary Teacher Education (IPTE) Programme. This is a two-year program with the first year of residential and the second year, school-based. Malawi has three colleges and universities training secondary school teachers. Domasi College of Education offers a Diploma in Secondary Education and a Distance learning Diploma program. The programs qualify 180 and 300 lower secondary teachers annually. Chancellor College and Mzuzu Univeristy offer Bachelors Degrees in Secondary Education and produce up to 400 qualified secondary teachers annually, but the Chancellor plans to extend capacity to 600.

Senegal: Senegal's education system is based on the French model and comprises a formal sector and a non-formal sector, which includes pre-school education, elementary, general middle school, general secondary, and technical and professional training. The existing capacity (Facilities and teaching staff) for pre service training is concentrated at "Ecole Normale Superieure (ENS)". This training institution set up in the early seventies has trained most of the teachers in lower and upper secondary schools. Recently due to a change of strategy and given the limited number of teachers trained by ENS, a new stock of teachers called "vacataires" have been recruited in great number without training to face the demand for teachers resulting from the booming enrolment.

Because of limited absorption capacity, ENS has developed a strategy to train them year after year and in small groups during the summer vacations.

Uganda: In 1997, Uganda introduced Free Primary Education, which led to an enrollment increase of over million students into the system. Gross Enrollment Rate (GER) increased from 76 to 128 percent from 1996-1997. By 2005, Primary gross Intake Rate (GIR) and GER were: 163 percent and 119 percent respectively. GER for remains low at 19 percent. Teacher supply in Uganda has increased steadily at both the primary and secondary levels. Trained teachers make up over 60 percent of the primary teaching force; and a minority of the secondary teaching force. Uganda has 47 Primary Teachers Colleges (PTCs) all of which provide a two-year training course leading to the Primary Teaching Certificate Exam leading to Grade III qualification [the minimum required qualification]. Twenty-three 'core' PTCs are authorized to offer a three-year, part-time in-service training program for unqualified teachers, delivered through 539 affiliated Coordinating Centers [CCs]. Individuals can go directly to a primary teacher college after passing O-Level exams. Primary diploma-holders can continue their education and become secondary school teachers. Certified secondary school teachers have either obtained a two year diploma in secondary education (DES) offered in six national teachers colleges (NTCs) or a three year degree level course offered in public and private universities. The minimum standard professional qualification for secondary teachers is grade V.

Zambia: Free Primary Education was introduced in 2002, which led to an increase in primary GER from 89 percent to 111 percent between 1995 and 2005. GER for Lower secondary has increased from 33 percent to 44 percent from 2000 to 2005 while GER for upper secondary has increased from 14 percent to 17 percent in the same years. Teacher education in Zambia is offered at fourteen public and ten private teacher training colleges. In addition, the University of Zambia (UNZA) offers degree programs enabling UNZA students to qualify as teachers. Of the fourteen public TTCs, ten train secondary school leavers to become basic school teachers; two [Nkrumah STTC in Central Province, and Copperbelt STTC] train secondary school leavers to become teachers for high schools; and two TTCs specialize in training teachers for the disabled, and for serving teachers and lecturers. All ten private TTCs train basic school teachers. In recent years, the public TTCs have enrolled approximately 8900 GRZ-sponsored students and 3400 self-sponsored students, yielding total public enrollment about 12,300 students. In 2004, about 9100 students took the examination at the end of the first year of Teacher College.

Each of these countries currently has a transition rate into lower secondary of less than 50 percent, with the exception of Ghana (94 percent) and Zambia (56 percent). Recently, Uganda announced that it plans to move towards universal secondary education, and Kenya has set a target of 70 percent GER in secondary education by 2008. The implication is that these – and other systems will soon begin to experience large numbers of students entering a system that has maintained low class sizes at the secondary levels for decades. As more and more students enter lower secondary education teachers will be forced to teach larger class sizes unless the teacher preparation colleges can begin to recruit and retain teachers at a quicker pace. One constraint to producing more teachers is the already lower number of secondary students in the system, which leads to fewer teacher candidates, thus impacting training institutions and their ability to recruit sufficient numbers of candidates into the system. The following section discusses and quantifies the number of teachers that will be needed to meet the growing demands for lower secondary education in SSA.



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