

EFFECTIVENESS OF ACCESS POLICIES IN ADDRESSING INEQUALITIES OF ACCESS
AND QUALITY OF LEARNING IN EAST AFRICA

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A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Educational Policy—Doctor of Philosophy

2021

ABSTRACT

EFFECTIVENESS OF ACCESS POLICIES IN ADDRESSING INEQUALITIES OF ACCESS AND QUALITY OF LEARNING IN EAST AFRICA

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Under the Education for All international commitment of the 1990s and early 2000 to ensure universal primary education by 2015, countries implemented school feeding programs, cash transfers, and abolishing mandatory fees. The East African countries implemented the Free Primary Education Policies (FPE) at different times – Uganda in 1997, Tanzania in 2001, and Kenya in 2003. Since FPE policies are meant to address inequalities in access, such as by SES, gender, and place of residence, I investigate the implications of the policies mitigating the inequality in access to schooling and learning quality and how the school environment changed. I explore these issues by taking advantage of two different rounds (2000 and 2007) of the Southern and Eastern Consortium for Monitoring Education Quality (SACMEQ) data.

The evidence showed that Uganda continued to increase access among the rural poor and sustained the urban rich children's access to education after implementing its policy in 1997. Kenya's school access increased among the rural poor, while Tanzania increased access more among the urban poor. I did not find any significant changes in girls' representation in rural and urban schools in Kenya and Tanzania after implementing their FPE policies. However, rural girls' school access improved over the country's policy period in Uganda.

Although FPE policies improved school access in East Africa, the evidence indicates that schools' human and physical resources did not improve to accommodate the increasing number of students. While school access improved in East Africa, the quality of learning, especially of

rural girls, suffered. In all three countries, boys performed better than girls, but there were no gender differences in urban schools' performance.

Tanzania's improvements in students' composition and reading scores after the FPE policy indicate a 'success' story. It is only in Tanzania where the number of students from disadvantaged backgrounds increased, and the average reading scores improved nationally and in rural and urban schools. This is notable since these overall improvements were not accompanied by improved physical and human resources in the schools. I thus did not find specific evidence in the data that explained why Tanzania performed best among the East African countries over time. More research is needed to investigate Tanzania's 'success story' and whether differential FPE policy planning explains the differences in educational outcomes across the countries.

The study has the following key implications for policy discussions. First, the study's primary policy implication is that 'free' is not enough unless other initiatives to improve education quality support such a policy. All three countries have free primary education, and Uganda had a decade of 'free' education (the period within this study's focus), but there are no overall positive trends on the relationship between access and education quality in East Africa. Second, the evidence indicates that rural children attended schools with fewer resources, and they came from families with fewer resources than urban families, which subjected rural children to double jeopardy in their learning opportunities. Since most children in East Africa still reside in rural areas, improving school participation and raising the learning levels of rural children must be at the forefront of the policies to achieve sustainable development goals in East Africa. Third, I only found evidence of the gender-achievement gap in rural schools, not in urban ones. The East African countries should commission studies to examine the reasons for rural girls' poor performance and identify ways of correcting them.

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To my late dad, James Wambua.

ACKNOWLEDGMENTS

I received a lot of support from people and organizations throughout the dissertation journey. I would like to thank the following, who without their help, this dissertation would not have been possible.

Special thanks go to my dissertation committee members, Dr. Amita Chudgar, Dr. Lynn Paine, Dr. Bethany Wilinski, and Dr. Amy Jamison, for their guidance throughout the conceptualization, research, and writing phases of this dissertation. My advisor and dissertation chair, Dr. Chudgar, thank you for encouraging me to pursue academically rigorous research. I greatly appreciate your support, guidance, and dedication to my academic growth. All your advice, editing, and listening were critical for every step of the dissertation. Thank you for being a great mentor and advisor. I'm so grateful for the opportunity to study under your guidance.

I'm grateful to the College of Education, the Graduate School, and the Afrobarometer Project at Michigan State University for generous financial support during the doctoral program and funding that made this dissertation possible. I'm also grateful to Mastercard Foundation Fellows program, whose financial support enabled me to Michigan State University for the first time for a master's degree program. Without their financial support, I wouldn't have afforded to study at MSU.

I would also like to thank my friends who provided me with much encouragement, advice, and support. Titus Orina, thank you for all your support and being a family away from home; I will forever be grateful. Dr. Njora Hungi, thank you so much for helping me access the data I used in this dissertation. You made my dissertation research possible, and I would have been lost without your support. Michelle Solorio, thank you for being my mentor since day one in the education policy program. Thank you for responding to my emails promptly and offering

guidance on the dissertation process. To all my friends and colleagues who helped me, my friendships with you gave me sustenance during hard times and made my memories at MSU special. Thank you.

Lastly, I would like to thank my family for their unconditional love and support throughout the years. The greatest thanks for my success go to my mother, Agnes Wambua. Thank you so much for your unconditional love and for always being there for me. My son, Tony Mwanzia, you sacrificed my physical presence so that I could go to school; I'll always be grateful. Thank you for cheering me on. I love you. To my adopted son, Emmanuel Kyama, thank you for making me smile during our conversations; you always lightened my mood when I felt low. I love you too. My siblings Charles and Joyce, I appreciate your support. Finally, I regret that my father, James Wambua, did not live long enough to share this accomplishment with me; I dedicate it to him.

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CHAPTER ONE: INTRODUCTION

At the global level, policies aimed at ensuring educational equity have focused on increasing access. Since the world conferences on Education for All (EFA) at Jomtien in 1990, such policies have aimed at universalizing primary school education. Similarly, in 2000, world leaders endorsed two landmark commitments to primary education: the six goals of Education for All by the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Universal Primary Education (UPE) objective of the broader Millennium Development Goals (MDGs) by the World Bank. The second MDG on universal primary education, a reformulation of the second EFA goal, states that “by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling” (World Bank, 2016:228). In response to EFA and MDGs, countries implemented policies such as abolishing school fees, conditional cash transfers, and school-feeding programs to increase enrollment and retention (UNESCO, 2015; World Bank, 2016).

Many sub-Saharan countries worked with international organizations to increase access to schooling by eliminating school fees and other compulsory contributions in line with the Dakar Framework Commitment that primary education should be “free of tuition and other fees” (UNESCO 2014). The logic for such a policy change was clear: if the cost of schooling were too high, poor parents would not send their children to school. Therefore, eliminating compulsory charges would lower the cost of education and increase the number of children in school. Since the 1990s, more than 75% of sub-Saharan African countries have adopted legislation abolishing school fees to increase student enrollment. For instance, Malawi abolished user fees in 1994, Uganda in 1997, Kenya in 2003, Mozambique in 2004, and Ghana in 2005 (Bold et al., 2013).

With many sub-Saharan countries abolishing school fees, many children who had been out of school were re-enrolled and able to pursue education (Abuya et al., 2015).

The global educational discourses fostered by the Post Education for All by 2015 initiative focused on both access and learning outcomes. For instance, goal 4 of sustainable development goals urges countries to “ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes” (United Nations, 2015: p19). Countries’ progress towards achieving this goal at the primary school level is measured by the proportion of children at the end of primary education achieving at least minimum proficiency in reading and mathematics by gender (UNESCO, 2016).

Although most literature looks at access to schooling or quality of education separately, these concepts are interrelated. On the one hand, rapid expansion in enrollment may deteriorate education quality (Wils et al., 2005). On the other hand, quality education can encourage students to remain in school and help them move through primary school grades (Langsten, 2017). Therefore, quality is an essential supplement to ensuring all children have access to and can complete primary education. It’s against this background that this study seeks to understand the relationship between access to schooling and learning outcomes in East Africa, with a specific interest in understanding the influence of fee-free primary education policies in three countries: Kenya, Uganda, and Tanzania.

1.1 Problem statement

Since governments implemented FPE policies to provide education to all school-going-age children, the policies can also be viewed as a tool to address a schooling imbalance in society. The assumption is that FPE gives all children equal opportunity to access schooling. However, as Nakabugo (2008) notes, equality in schooling does not necessarily mean equality in

learning outcomes. In this regard, this study investigates the implications of government policies in East Africa that provide universal access to schooling and what that access means for the quality of learning, as measured by test scores. Specifically, I seek to understand how these access policies have influenced students' actual access and learning outcomes by socioeconomic status, gender, and school location.

Empirical studies on this topic indicate a trade-off between access and the quality of education (Deininger, 2003; Hoogeveen & Rossi, 2003; Grogan, 2008). Several of these relationships are of interest to my study. Historically, in terms of access, especially in developing countries, females have had less access to education than their male counterparts (Lewin, 2009; Kalindi, 2015). It is possible that fee abolition influences boys' and girls' enrollments differently. If girls were kept out of school for financial reasons, whereas boys were kept out for other reasons (i.e., lack of interest or family needs), a reduction in the cost of schooling may, on the "margin," have a more significant impact on female enrollment. Similarly, urban-rural access patterns may vary in light of FPE. Traditionally, urban areas enjoy better enrollments. Therefore, rural areas in East Africa, which tend to have lower SES than urban areas (Zhang, 2006; Johannes, 2010; Kalindi, 2015), may experience higher enrollment gains than urban areas after abolishing school fees.

In terms of quality of education (or learning), it is foreseeable that improved access and the changing composition of schools, in terms of student demographics (influx of students from disadvantaged backgrounds), may reduce average scores if learning outcomes remain unaffected (Taylor & Spaul, 2015). A reduction in learning levels is also possible due to rapid enrollment expansion if schools do not have enough teachers, books, and classrooms to accommodate sudden growth (Wils et al., 2005). These patterns of learning level changes can be complicated

further by the changing male-female and urban-rural enrollment patterns, as noted above.

Through this study, I seek to understand how free primary education policies influenced these relationships.

Specifically, I investigate the influence of FPE policies on the relationship between access and quality of learning in Kenya, Tanzania, and Uganda. Since FPE policies are meant to address inequalities in access, such as by SES, gender, and place of residence, I investigate the implications of such policies in addressing these inequalities and whether the increased access translated into greater learning competencies. I explore these issues by taking advantage of different rounds of the Southern and Eastern Consortium for Monitoring Education Quality (SACMEQ) data in Kenya, Uganda, and Tanzania. The countries are similar in many ways, but they abolished fees at different points in time. The SACMEQ data was collected in 2000, 2007, and 2014, providing a unique glimpse into each of these countries at different stages before and after the fee abolition (see Table 1).

Table 1: Fee abolition and SACMEQ surveys

Country	Fee abolished in	SACMEQ II (2000) (Years since FPE)	SACMEQ III (2007) (Years since FPE)
Kenya	2003	-	4
Tanzania	2001	-	6
Uganda	1997	3	10

Note: SACMEQ IV was collected in 2014, but I did not have access to the data at the time of this study.

Since the East African countries introduced access policies at different times, we would expect differential effects on school demographics (students' socioeconomic status, gender, and place of residence) and learning outcomes. Uganda waived school fees three years before the SACMEQ II surveys in 2000. Therefore, we would expect Uganda to have more heterogeneous student demographics and maybe more variation in students' education outcomes compared to Kenya and Tanzania at the time of SACMEQ II survey in 2000. During the 2007 SACMEQ

surveys, Uganda was ten years into the fee-free primary school education initiative, while Kenya and Tanzania were four and six years in, respectively. At that time, there was a possibility that the countries were struggling with different challenges from increased access. Uganda might have implemented more measures to address the increased enrollment compared to Kenya and Tanzania. These aspects provide an interesting comparative context for investigating how access and quality of learning in different countries was affected by the fee abolition by comparing within and across countries over time.

1.2 Motivating country selection: Education and the economy

Kenya, Uganda, and Tanzania are both similar and different in ways that offer a compelling case for comparative analysis. Before Kenya's independence in 1963, the responsibility for ensuring primary education laid almost exclusively in the hands of communities and non-governmental organizations. The colonial government provided education along racial lines, and there were high attrition rates among the small number of African children who went to school, as compared to European and Asian students (Sifuna, 1990). Therefore, the new independent government not only had the responsibility of Africanizing the syllabus but also of training enough people to staff their economic and administrative units. Hence, the motivation for the expansion of education at the time was politically inclined. It was within such an atmosphere that Kenya, like other newly independent African governments, formulated its educational programs (Sifuna, 1990; Ngugi et al., 2015).

Christian missionaries introduced formal education in Uganda in the 1880s when it was still a British Protectorate. The school system was intended for a smaller population, mainly the chiefs' children, to provide functionaries for the British colonial government (Ssewamala et al., 2011). In the 1920s, the government decided to take over responsibility for education by

providing financial support to the missionary schools and establishing new public schools in regions where the missions did not meet the education needs (Ssewamala et al., 2011).

Westernized education models were introduced in Tanzania around the 1840s in the form of Christian missionary schools that sought to inculcate Western and Christian value systems in the population (Weaver, 2011). Germany colonized Tanzania from 1885 until the end of World War I, and under German control, non-religious government schools were built in the central and coastal regions. After the war, the territory came under British rule, and the education of Africans was brought in line with Britain's colonial policies in East Africa (Zuze, 2008). Most students in Tanganyika, as it was known then, came from Arab and Indian communities. As elsewhere in Africa, government schools began to welcome children of local chiefs who, in return, supported the colonial administration (Buchert 1994).

Tanzania gained independence in 1961, Uganda in 1962, and Kenya in 1963. After independence, these East African countries implemented similar but slightly different initiatives to expand access to education. The next chapter discusses the various initiatives adopted by the three countries between independence and the FPE policies of 1997 in Uganda, 2001 in Tanzania, and 2003 in Kenya. In 1967, the three countries formed the East African Community. In so doing, they adopted a single education system, the 7-4-2-3, which consisted of seven years of primary education, four years of lower secondary, two years of upper secondary, and at least three years of university education. Students sat for a joint regional examination known as the East African Certificate of Primary Education (EACPE). With the collapse of the East African Community (EAC) in 1977, each country continued with an independent education system. The EAC was revived in 1999, with Rwanda and Burundi joining in 2007, and South Sudan in 2016

(<https://www.eac.int/eac-history>). However, these countries no longer have a similar education system.

While Uganda and Tanzania have maintained the same education system, Kenya has made two significant changes. In 1985, Kenya changed its education system to an 8-4-4 system of education, comprised of 8 years of primary school, 4 years of secondary school, and at least 4 years of university education (Okech & Rolleston, 2007). In 2018, the 6-3-3-3-education system was rolled out in grades 1-3 and is expected to take full effect at all levels of education by 2024¹ (Table 2).

The three East African countries are poor and plagued by inequality, with low gross domestic products (GDP) per capita and high Gini indexes (where a higher index indicates a higher inequality). They also have centralized systems of education with a centralized curriculum and system of teacher employment. These countries rely more on trained than untrained teachers but have large class sizes, although at varying levels. Based on World Development Indicators, for instance, Tanzania has the highest number of trained teachers (99.2%), followed by Kenya (96.8%) and Uganda (79.6%). However, Kenya has a more developed economy and spends more than Uganda and Tanzania do on education. Besides, the three countries have abolished fees for primary school, but at different years (Table 2).

¹ <https://informationcradle.com/kenya/new-education-system-in-kenya/>

Table 2: Background statistics/information on Kenya, Uganda, and Tanzania

Education system			
	Level	Age	Duration in years
Tanzania	Pre-primary	4-6	1
	Primary	6-12	7
	Lower secondary	12-16	4
	Upper secondary	16-18	2
	Tertiary	18 +	3
Uganda	Pre-primary	4-6	1
	Primary	6-12	7
	Lower secondary	12-16	4
	Upper secondary	16-18	2
	Tertiary	18 +	3
Kenya (current)	Pre-primary	4-6	1
	Primary	6-14	8
	Lower secondary	14-18	4
	Tertiary	18 +	3
Kenya (proposed change)	Pre-primary	4-6	2
	Primary	6-12	6
	Lower secondary	12-15	3
	Upper secondary	16-18	3
	Tertiary	18 +	3
Other comparisons			
	Kenya	Uganda	Tanzania
Economy (2019 GDP per capita)	\$1,817	\$776	\$1,122 ⁱ
Gini Index	40.8 (2015)	42.8 (2016)	37.8 ⁱ (2011)
Curriculum	Centralized- the ministry of education, science, and technology develops education policy documents	Centralized- the ministry of education and sports co-ordinates and promotes quality of education	Centralized- through the ministry of education and vocational training
Teacher employment (centralized)	Teacher Service commission of Kenya- recruits, employs, promote and transfer teachers	Education Service Commission	Teacher Service commission of Tanzania
Free primary education	2003	1997	2001 ⁱⁱ
Education expenditure as % of GDP (2017)	5.2	2.6	3.5 ⁱ
Education expenditure as % of total government expenditure (2017)	17.6	12.0	17.3 ⁱ
Trained teachers in primary education (%)	96.8 (2009)	79.6 (2017)	99.2 ⁱ (2016)
Pupil-teacher ratio, primary (2017)	56.6 (2012)	42.7 (2017)	50.6 ⁱ (2018)
Adult literate population (2014)	78.7%	70.2%	77.9% ⁱ

ⁱ World Bank Development Indicators

ⁱⁱ Harding & Stasavage (2013)

1.3 Conclusion

In this study, I aim to understand the implications of fee-free primary education policies in East Africa on the relationship between access to schooling and quality of learning. I explore how the policies influence inequalities in access (by gender, socioeconomic status, and rural/urban divide) and what that access meant for the quality of learning measured by test scores. The fact that the countries introduced the FPE policies at different times provided an exciting opportunity to investigate these relationships within and across countries at various fee abolition stages.

This chapter also shows that international policies play a significant role in shaping national education systems. For instance, global commitment under Education for All influenced the access policies that East African countries adopted. Whereas such policies improved equality in access to education, they did not necessarily lead to equality in learning outcomes. These issues lie at the core of my investigation.

I organize the rest of the study as follows. Chapter Two provides a background of the post-colonial initiatives to expand access to education before the current FPE policies, an overview of free primary education in East Africa, and the literature on the influence of the policies on access and academic performance. I also discuss previous research concerning how social-economic status, gender, and place of residence influence students' access to schooling and academic achievement. Chapter Three describes the data and statistical techniques I used in the analysis. In Chapter Four I discuss the within-country results, and I compare the findings across the three countries in Chapter Five. Chapter Six provides a summary of the main findings, the study's implications for policy, recommendations for future research, and the study's limitations.

CHAPTER TWO: LITERATURE REVIEW

In this chapter, I review the literature on the post-independence initiatives the East African countries implemented to expand primary education between independence and adopting the current fee-free primary education policies. I also provide an overview of the Fee-Free Primary Education Policy in East Africa and reviewing research on the influence of the policy on education outcomes (access and academic performance). Besides, I provide a summary of what quality of means in this study and potential problems related to such definition. Lastly, I discuss the literature on how the school environment, socioeconomic status, gender, and place of residence influence students' access to schooling and academic performance with a specific focus on Sub-Saharan Africa. For each covariate, I summarize previous empirical studies' findings, methodological challenges in those studies, and gaps in the literature. In this study, access refers to students' ability to have equal opportunities to enroll, attend, and complete primary or secondary education levels. I begin the chapter by discussing the literature specific to sub-Saharan Africa and the three countries then the broader literature on access and quality of learning.

2.1 Literature specific to Sub-Saharan and East Africa

In this section, I review the literature on the East African countries' post-independence initiatives to expand primary education between independence and adopting the current fee-free primary education policies. I also provide background on the Fee-Free Primary Education policies and the literature on how the school environment changed after countries abolished the mandatory school fees.

2.1.1 Post-independence education context of the East African Countries

Independence and the development of education in the three East African countries were intertwined, but they differed on how the countries emphasized and implemented policies for expanding access to schooling. The three countries adhered to a framework agreed during the 1961 Addis Ababa conference of African States on the Development of Education in Africa. At the meeting, member states and their colonial representatives discussed educational problems. They came up with a plan for educational development that sought to place education in the context of national social and economic development (Thompson, 1981). The conference recommended that primary education should be compulsory and free, and at the same time, it prioritized the expansion of secondary and tertiary education to meet the workforce requirements (Thompson, 1981). Besides, the three governments identified ‘ignorance’ and illiteracy as two main problems they needed to tackle, which implied the expansion of primary education (Oketch & Rolleston, 2007). In this section, I discuss some of the post-independence initiatives the East African countries implemented to expand education between independence and adopting the current fee-free primary education policies.

Tanzania

After independence in 1961, under President Julius Nyerere, the Tanzanian government developed a Three-Year Development plan for 1961-64 to compact the country’s professionals’ shortage. However, the plan was primarily based on the views of the World Bank and the United States Agency for International Development (USAID) consultants who worked on it (Varvus, 2007). This plan was followed by a Five-Year Plan from 1964-1969 that further encouraged the development of a capitalist economy, with farming and production for the export remaining in private hands (Samoff, 1987). The first two development plans, however, did not emphasize the

expansion of primary schools. The initial growth in primary schools was due to the Tanganyika African Parents Association (TAPA) efforts and initiatives by the Local Education Authorities and politicians, but not government planning. Tanzania emphasized secondary education as it believed primary education expansion did not have direct economic benefits (Oketch & Rolleston, 2007).

The Tanzanian government prioritized primary education after the Arusha Declaration of 1967, a blueprint for a socialist approach to national development (Wolhuter, 2004; Varvus, 2007). The declaration had four components: the nationalization of large parts of the industrial sector, the end to the private accumulation of wealth by those in government; priority to the development of rural areas; and the establishment of *ujamaa* ('familyhood') by building villages to promote communal agricultural production (Varvus, 2007; p.54). The declaration provided an expanded role of the state in the economic sphere, and by the mid-1970s, almost two-thirds of earning jobs in Tanzania were controlled by the government (Tripp, 1997; Sifuna, 2007).

A month after the Arusha declaration, president Nyerere introduced *the Education for Self-Reliance (ESR)* policy statement, a component of his *ujamaa* program. Through revisioning primary school education, ESR was meant to reduce regional, ethnic, and class inequalities in the school system. It also emphasized that the curriculum should focus on the needs of the majority who did not have access to secondary education (Sifuna, 2007; Varvus, 2007). Nyerere saw education as a powerful instrument for radical social change. Schools were to prepare people for life and service in rural areas, and students were expected to remain in rural areas and contribute to its development.

Therefore, people saw primary schooling as a preparation for rural life and rarely a steppingstone to further education (Wolhuter, 2004; Zuze, 2008). Besides, primary schooling

was to instill a ‘pre-colonial’ mindset based on unity and community. In particular, schools at the primary and post-primary levels became economically self-reliant through farm and workshop projects. The cultivation of crops on school farms, for instance, was an integral part of school activities (Varvus, 2007; Zuze, 2008). To promote self-reliance, the government emphasized public schooling. From 1967 to 1979, Varvus (2007) notes that the number of students enrolled in schools at all levels increased, with a marked rise in primary school enrollments. The government nationalized all schools in 1970, except for a few private secondary schools.

Tanzania’s shift to attain universal primary education was targeted in the Musoma Declaration of 1974, which also focused on eradicating adult illiteracy. The declaration perceived education as a fundamental human right. While the government recognized the importance of quality education, it also prioritized access to schooling (Sifuna, 2007). To achieve the goal, the Tanzania government pledged to make primary education free and compulsory, remove grade four and seven examinations, and adopt a seven-year primary education cycle. The government made the commitments to ensure full participation in schooling by all citizens irrespective of their social and economic status (Sifuna, 2007). Therefore, the Musoma Resolution became a framework for growth in primary school expansion. The expansion was achieved with little donor assistance and nationalization of missionary schools, giving the government almost the sole responsibility for providing education. The resolution also extended the idea of social responsibility by requiring students to perform two years of community service before university (Zuze, 2008).

Due to *ujamaa*’s economic failure, the government could not support the expanding education system (Sifuna, 2007). Besides, Tanzania was not immune to the global economic decline of the 1970s compounded by the costs of a 1978/79 war with Uganda. To stabilize the

economy, the international community pressured the government to accept structural adjustment reforms that included trade liberalization, the Tanzanian currency's devaluation, and agricultural reforms (Zuze, 2008). The Economic Recovery Program of 1989-93 dismantled the state's control and moved towards a free-market orientation. In education, SAPs increased parents' and guardians' responsibility to cover the costs of children's schooling as privatization and cost-sharing programs expanded. To reduce its costs in the education sector, the government removed restrictions on private education imposed during the *ujamaa* period and increased education-related expenses covered by students (Varvus, 2007). The cost-sharing measures resulted in a growing inequality of access at all levels and quality disparities (Sifuna, 2007; Oketch & Rolleston, 2007).

In the late 1990s, the government produced the Basic Education Master Plan for the period 1998-2002 to address declining access and quality of education. The plan occurred together with the formulation of the Education Sector Development Programme (ESDP) process that began in 1998. The ESDP led to the Primary Education Development Plan (PEDP) development, whose underlying principles were access, equity, and quality for all the children (Oketch & Rolleston, 2007). A critical policy decision on access and equity was abolishing school fees and other mandatory contributions so that no child would access schooling. The Primary Education Development Plan (PEDP), which eliminated school fees in Tanzania, was formally launched in July 2001 (Sifuna, 2007).

Kenya

Kenya gained independence in 1963. Like many other newly independent African countries, the new government emphasized that education was critical for national development and immediately began developing policies that would address education access and equity. The

main focus was producing skills needed to facilitate economic development (Lelei & Weidman, 2012). The First National Development Plan 1964-1969 highlighted the role of education in national development and emphasized its expansion (Republic of Kenya, 1964). Sessional Paper No. 10 of 1965 also included education as an instrumental part of Kenya's development strategy. However, it emphasized the economic value rather than the social value of education (Republic of Kenya, 1965).

In 1964, the new Ministry of Education set up its first national commission to assess the education system, review policy needs, and recommend improvements to the government. The commission recommended increasing access to schooling by establishing schools with funds generated from the community (Republic of Kenya, 1964). When President Kenyatta addressed the nation, he urged Kenyans to work together to build the country as an extension of the African family spirit of "*Harambee*," a Swahili word meaning pulling together in the tradition of mutual social responsibility (Lelei & Weidman, 2012). From that time on, the *Harambee* school movement became a unique aspect of expanding the education system. Through this scheme, the government encouraged local communities to construct and manage schools. Since the system grew relatively unchecked, the schools' quality varied considerably depending on where they were situated (Buchmann 1999). Although the quality of education at *Harambee* schools generally lagged behind government-owned institutions, they provided opportunities for children from poor and rural locations to get primary education (Zuze, 2008; Lelei & Weidman, 2012).

Besides the expansion of schools through the *Harambee* movement, the commission also recommended free primary education. The disparities between regions also necessitated the need to formulate policies for universal education. The government believed that education could be a means to mitigate the inequalities that had existed during the colonial period (Republic of Kenya,

1964). The colonial government did not provide education to regions with low potentials, such as semi-arid areas. Neither did Christian missionaries provide or build schools in areas that had already experienced Arabic or Islamic influences (Oketch & Rolleston, 2007; Mackatiani et al., 2016).

In 1971, President Kenyatta issued a presidential decree that abolished tuition fees for all geographically disadvantaged districts. Such districts were generally poor, and the payment of school fees prevented a large proportion of children from attending school. A second presidential decree of December 1973 eliminated fees for children in grades one to four in all the districts across the country. A subsequent decree in 1978 extended fee abolition to primary school grades (Sifuna, 2007; Oketch & Rolleston, 2007). Although the government abolished school fees, no countermeasures were put in place to replace lost revenue. Consequently, primary schools resorted to a “building levy,” which in most cases turned out to be higher than the school fees charged previously. Enrolments initially doubled in most districts but fell back to their original levels following the “building levy” (Oketch & Rolleston, 2007). The government also introduced a short-lived school milk program in 1979 to attract children from semi-arid regions to attend school (Mukudi 2004). The program provided free milk to students who were attending state-owned schools. The scheme increased enrollment, but this came at the expense of other educational inputs such as books and stationery (Zuze, 2008).

The government responded to declining enrollment by restructuring the education system in 1985. The education system moved away from the British model of 7 years of primary school, up to 6 years of secondary school, and 3 years of university. The new structure consisted of 8 years of primary school, 4 years of secondary school, and 4 years of tertiary training. The curriculum paid particular emphasis on technical and vocational subjects (Lelei & Weidman,

2012). Policymakers expected that including technical training in the curriculum would better absorb students into the labor market.

In the late 1980s, the government implemented the World Bank's Structural Adjustment Programs (SAPs) that introduced cost-sharing policies to reduce the recurring education budget's growth rate. Communities and parents took on more responsibility to pay for the building of schools and teachers' houses. Parents also had to meet the costs of books, uniforms, exercise books, and other fees, while the government's primary responsibility remained the payment of teachers' salaries (Sifuna, 2007; Lelei & Weidman, 2012). Many children stopped going to school, and enrollment figures began to decline significantly. Kenya re-introduced free primary education to reverse low enrollment numbers when the National Rainbow Coalition (NARC) government took office in December 2002. In fulfillment of a presidential campaign promise for free primary education to all Kenyans, the new government implemented the FPE policy in January 2003 (Atuhurra 2015).

Uganda

Uganda became independent in 1962. However, the country's early commitment to primary education was less rigorous compared to Kenya and Tanzania. According to Oketch & Rolleston (2007), Uganda devoted less of her budget to primary school education than her two neighbors. The 1963 Castle Commission was the first major effort by the new government to expand the education system. Its duty was to review the education system to ensure it can meet the challenges in independent Uganda. Besides addressing shortages in the qualified workforce, it recommended expanding secondary school education from where graduates would proceed to do university courses (Ssekamwa, 1997). However, nothing in the commission's recommendations reflected universal primary education or expansion of primary schooling.

Apart from suggesting that primary school education should last seven years instead of six, the commission dwelled mostly on the curriculum and education quality (Oketch & Rolleston, 2007).

Based on the commission's report, Uganda placed heavy emphasis on secondary and tertiary institutions as it believed they were the most efficient way to meet the country's developmental goals. Budget allocation to primary schooling tended to fade into the background. (Zuze, 2008). Scholars like Ssekamwa and Lugumba (2001) criticized the commission's focus on increasing primary education quality when many primary school-age children had no opportunity to go to school. At the same time, in 1963, the government enacted an Education Act that placed most schools under its control. The Act excluded racial groups and religious groups from managing schools as it was during the colonial days (Mino, 2011). The take-over was meant to create unity among Ugandans as schools administered through racial and religious lines were perceived to divide people and enable the government to meet qualified workforce targets (Ssekamwa, 1997)

Between 1971 and 1980, Uganda experienced a series of internal and external shocks that affected educational development. Regional conflicts and political strife during President Idi Amin's military regime affected the education sector. Many academic programs and projects, supported by Britain and the US in the 1960s, stopped as the countries lost faith in the regime (Ssekamwa, 1997). Amin remained in power until he was overthrown in 1979. During his rule, Asians were expelled from the country (many of whom ran prosperous businesses), mass murder was carried out, and the economy was run into the ground. Many teachers were drawn into the turmoil, and some died (Mushemeza 2003). The educational infrastructure was severely damaged by two decades of instability, instructional materials became scarce, and many teachers

left the country. The number of teaching staff fluctuated dramatically in the 1990s (Zuze, 2008). Like Kenya and Tanzania, Uganda was subjected to the World Bank Structural Adjustment Programs in the 1980s, further affecting education provision.

The government set up the Education Policy Review Commission in 1987 to review the whole education system and recommend adjustments (Ssekamwa, 1997, Zuze, 2008). One of the commission's main recommendations was to introduce universal primary education (UPE) (Zuze, 2008). A government White Paper followed in 1992, and reforms in preparation for UPE began in 1993, including teacher and management development, curriculum and assessment reform, instructional materials development, and new arrangements for monitoring progress. Enrollment figures did not grow substantially until 1996 when Uganda held the first direct presidential election (Oketch & Rolleston, 2007). Uganda became the first of East African to introduce UPE in 1997 as promised during the elections. As Ssekamwa (1997) notes, for 32 years (between 1963 and 1995), Uganda's education system was working according to the recommendations of the Castle Education Commission of 1963. This was a long time for an education system to remain unreviewed, given the changing situations nationally and globally. I provide an overview of the FPE policies and how the school environment changed after the East African countries implemented them in the next section.

2.1.2 Background on free fee primary education in East Africa

Free primary education is often associated with Jomtien and Dakar conferences of 1990 and 2000, respectively, which set the Education for All targets. However, as I discussed in the previous section, the idea of Universal Primary Education in East Africa can be traced to the 1961 Conference of African States on the Development of Education in Africa, held in Addis Ababa. The conference's primary purpose was to provide a forum for African states gaining

independence to decide on their priority educational needs to promote economic and social development in Africa (Oketch & Rolleston, 2007). Kenya, Uganda, and Tanzania were represented at the conference.

After independence, the countries pursued several policies to facilitate rapid access to those who were excluded. However, the need to expand educational access was more robust in Kenya and Tanzania than in Uganda. Kenya took rigorous initiatives to expand access to primary school education immediately after independence. For instance, the country's first national development plan emphasized the need to expand primary education (Republic of Kenya, 1964). Besides, the country's first education commission recommended free primary education and expansion of primary schools (*Harambee schools*) through funds generated from the community. The *Harambee-schools* initiative was implemented, especially in rural areas, but education was not free as the government deemed it an expensive recommendation (Republic of Kenya, 1964; Lelei & Weidman, 2012). In the 1970s, presidential decrees abolished fees in geographically disadvantaged districts first, then grades one to four before the government extended the policy to all primary school grades. However, Kenya rolled back the initiative in the early 1980s due to cost-related reasons (Sifuna, 2007; Oketch & Rolleston, 2007).

Unlike Kenya, Tanzania did not prioritize the immediate expansion of primary education. Parents, politicians, and local education authorities led the first primary school education growth initiatives immediately after independence (Oketch & Rolleston, 2007). The government emphasized public primary education from 1967 through its Education for Self-Reliance and later through the Musoma Declaration of 1974 that made primary school education free and compulsory. These two initiatives increased enrollments (Sifuna, 2007; Varvus, 2007; Zuze,

2008). Failure of *ujamaa*, global economic decline, and war with Uganda in the 1970s eliminated the access gains the country had made.

Uganda's early commitment to the expansion of primary education was not rigorous compared to Kenya and Tanzania. The country's first commission on education did not recommend expanding primary schooling or the idea of free primary school education but emphasized secondary and tertiary education (Ssekamwa, 1997; Oketch & Rolleston, 2007). Besides, the internal conflict and war with Tanzania of the 1960s and 70s negatively affected primary school education expansion (Ssekamwa, 1997; Mushemeza, 2003). The country's active commitment to free primary education was in the late 1980s and early 1990s through education commissions and government white papers (Ssekamwa, 1997). These commitments translated to the free primary education policy of 1997.

The implementation of economic structural adjustment programs in the 1980s, promoted by the World Bank and International Monetary Fund (IMF), eroded the East African countries' initial schooling access gains. The World Bank and IMF had considered Structural Adjustment Programmes (SAPs) as necessary policies for readjusting and revitalizing African economies. SAPs reduced government in service provision and increased the market's role in determining economic activities and policies (Voutsaa et al., 2014; Oketch & Rolleston, 2007). Consequently, the education sector was severely affected when the countries introduced cost-sharing and required parents to carry some of the burdens of educating their children. Parents had to contribute more towards educating their children through the cost-sharing program since governments lacked adequate resources. They were responsible for buying school uniforms, textbooks, and other instructional materials for their children, as well as constructing buildings and providing other equipment to schools. The governments retained the role of recruiting and

paying teachers for their services. The cost-sharing system reduced students' enrolment and completion rate and increased grade repetition and dropout rates (Oketch & Rolleston, 2007; Muyanga et al., 2010; Ogola, 2010).

The governments introduced nationwide Free Primary Education (FPE) policies to reverse the low school enrollment trends. Uganda was the first to declare and implement FPE in 1997. Tanzania followed in 2001, and Kenya implemented its FPE in 2003 (Harding & Stasavage, 2013). A common characteristic of FPE across the three countries was the use of capitation grants to fund schools based on the number of students (UNESCO, 2015). However, the amount of capitation was usually lower than what schools had collected from parents before the policy, forcing them to manage more students with fewer resources (Nishimura et al., 2009). Generally, the countries used FPE policies to reduce the financial burden of all families without explicitly targeting the poor. However, parents and guardians are responsible for (or must pay for) several other schooling expenses, such as the cost of educational materials (books and supplies), uniforms, food, and transportation (Grogan, 2008).

FPE in Uganda

Uganda was the first East African country to adopt a universal primary education policy. It eliminated school fees after a long period of neglect of the education sector under dictatorship and amid civil war in the northern part of the country (Grogan, 2008; Lincove, 2012). Under the rule of dictator Idi Ami, Lincove (2012) notes that all central funding for schools disappeared, and schools were financed through local communities' commitment only. Ugandan government's decision to abolish primary school fees was through a presidential election campaign manifesto commitment. President Yoweri Museveni won the December 1996 elections, and in January 1997, he fulfilled the promise by announcing that his government would eliminate primary

school fees for all students (Stasavage, 2005; Grogan, 2008). The principal aim of the FPE policy was to enable all Ugandan children not only to enter and remain in school but also to complete the primary school level of education (Ssewamala et al., 2011).

FPE in Kenya

Kenya re-introduced free primary education when the National Rainbow Coalition (NARC) government took office in December 2002. In fulfillment of a presidential campaign promise for free primary education to all Kenyans, the new government implemented the FPE policy in January 2003 (Atuhurra 2015). The country re-introduced the policy to achieve universal education as espoused under the Dakar Framework of Action, which advocated for education for all by 2015 (Muyanga et al., 2010; Oketch & Rolleston, 2007). However, there was little consultation with the stakeholders. After the policy's political declaration, the government expected school heads to implement it without prior preparations. On the ground, the policy caught school heads and education officers unawares; even the government itself was unprepared for the initiative since it implemented it on short notice. The primary objective was to provide enrolment opportunities enrollment opportunities for those children who were out of primary school due to school cost constraints (Muyanga et al., 2010; Atuhurra, 2015)

However, as noted earlier, the 2003 FPE program was not the first initiative to achieve universal primary education. It was first introduced in 1974 and abolished in the 1980s (Abuya et al., 2015).

FPE in Tanzania

Unlike Kenya and Uganda, Tanzania's free primary education was not tied to politics but was part of a Poverty Reduction Strategy Paper (PRSP). The 2001 PRSP made an explicit connection between debt relief and poverty reduction through the medium of primary schooling.

It stated that the Tanzanian government would enhance education access by eliminating school fees so that children, primarily from low-income families, attend school (Varvus & Moshi, 2009). Other documents also affirmed that the country had abolished school fees. For instance, the International Monetary Fund (IMF) and the International Development Association (IDA) published its Joint Staff Assessment of Tanzania's PRSP in November 2001. The assessment praised the country's PRSP and the abolition of fees. It indicated its support for other primary schooling changes that would appear the same year as the Primary Education Development Plan (PEDP). The report stated that "during 2000/01 [Tanzania] also abolished school fees at the primary level, increased the budget allocation for education significantly, introduced capitation grants and an investment fund to support schools at the local level directly, and established an education fund to support children from very poor families" (IMF & IDA, 2001, p. 2).

The country launched the Primary Education Development Program (PEDP) in 2001, which was financed by the World Bank. The program aimed to deliver sustainable, primary education of good quality to all by making education affordable by abolishing tuition fees and other mandatory parental contributions to schools (Ridell, 2003; Hoogeveen, 2013). Tanzania envisaged that, by offering free education, all parents (rich and poor) would send their children (boys and girls) to school in time (Hoogeveen, 2013). To avoid having a trade-off between increasing enrolment and enhancing quality, Hoogeveen (2013) notes that PEDP set aside significant resources for teacher recruitment and training, classroom rehabilitation, and construction to support increased enrolment and allocated considerable funds to improving the quality of teaching and learning. In the next section, I discuss how the school environment changed after the countries implemented the FPE policies.

2.1.3 Effect of abolishing school fees on school environment

This section reviews the literature and trends on how the school environment changed in terms of students' composition and physical and human resources. I begin this section by providing trends in enrollment, pupil-teacher ratio, and expenditure in education some years before and after fee abolition, in order to assess changes that relate to the implementation of FPE policy in East Africa. However, there are a lot of missing data as the World Bank data relies on information sent by countries, but some states do not send their data on time to be included in the analysis. I also add empirical research on the topic. As discussed earlier, the effects of FPE on education outcomes indicate a trade-off between access to schooling and the quality of education.

Positive effects

Fee abolition had a strong positive influence on enrolment and completion rates either during the year of elimination or in subsequent years. As indicated in Table 3, school enrollment spiked the year school fees were abolished or in the ensuing years. Uganda had the highest increase where enrollment increased by 67 percentage points the year fee was abolished, and about 9 and 15 percentage points in Tanzania and Kenya, respectively.

Besides gross enrollment ratios, there is an agreement in empirical studies that Free Fee Primary Education (FFPE) policies had a significant effect on access, although it was unevenly distributed across and within the countries (Oketch and Rolleston 2007; Riddell 2003). Outside East Africa, analysis of experiences in Ethiopia, Ghana, Kenya, Malawi, Mozambique showed that fee abolition increased the likelihood of students enrolling. Eliminating school fees also increased the enrolment of disadvantaged groups such as girls and orphans (World Bank and UNICEF, 2009). In Uganda, for instance, school enrollment increased from 2.8 million in 1997

to 7.6 million in 2004. Besides, net enrollment rates increased from 62.3% in 2000 to 91.4% of girls and 95.3% of boys in 2007 (Chapman et al., 2010).

Other studies in Uganda found that fee abolition for primary education reduced late entry into schooling, incentivized enrollment, and reduced dropout, particularly for girls and children in rural areas (Grogan, 2008; Nishimura et al., 2009). Besides, Ssewamala et al. (2011) note that the increase in enrollment in Uganda included children who had no financial means to afford school before abolishing mandatory fees, especially children from low-income families and orphans (Ssewamala et al., 2011). Similarly, in Tanzania (Hoogeveen & Rossi, 2013) note that the 2001 initiative enhanced enrollment, with girls and children from low-income families benefiting the most. In Kenya, the 2003 FPE yielded a 35% boost to grade 1 enrolment (Oketch and Somerset, 2007), while the overall primary school population rose from around 6.1 million in 2002 to 7.2 million in 2003 (Oketch and Rolleston 2007; Riddell 2003).

Negative effects

Although most studies reported impressive participation impacts, other studies highlight several challenges that compromised education quality after abolishing school fees. The rapid expansion hurt retention and learning because schools may not have enough teachers, books, and classrooms to accommodate sudden growth (Wils et al., 2005). According to Avenstrup et al. (2004), FPE led to a massive influx of children into the schools in Kenya, Lesotho, Malawi, and Uganda, which resulted in an “access shock.” The shock led to overcrowded classrooms, learning in double and triple shifts, overage pupils, and acute shortages of teachers and teaching materials like textbooks.

Table 3: Enrollment, pupil-teacher ratio, and education expenditure in East Africa/1995-2013

Education Indicator	Country	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2006	2007	2008	2009	2010	2011	2012	2013
School enrollment, primary (% gross)	Kenya	89.2	...	...	90.4	89.0	93.2	94.4	88.2	101.8	100.4	96.3	102.4	102.3	103.9	...	...	109.4	...
	Tanzania	69.1	68.4	68.5	66.6	67.4	68.8	74.8	89.4	95.8	101.1	109.0	111.3	112.4	106.7	102.8	97.2	94.2	90.0
	Uganda	69.5	70.6	117.7	124.4	130.2	131.5	133.7	137.7	138.3	129.4	121.6	120.7	123.5	124.7	122.0	114.3	113.9	112.0
Over-age students, primary (% of enrollment)	Kenya	...	...	...	...	30.5	30.7	30.4	31.8	29.5	30.0	27.6	22.0	26.0	26.0	...	...	26.0	...
	Tanzania	28.5	27.6	27.1	25.7	25.8	22.2	22.2	18.2	14.8	14.8	11.1	...	11.7	...	7.9	...	4.9	5.4
	Uganda	...	...	...	...	...	...	...	...	...	...	...	...	...	23.2	22.3	16.2	...	13.9
Pupil-teacher ratio, primary	Kenya	...	...	...	28.5	32.2	34.4	34.4	34.4	38.0	39.5	41.5	42.0	43.5	43.3	...	...	56.6	...
	Tanzania	36.8	36.2	36.9	38.0	40.3	...	46.0	53.0	56.9	58.3	52.4	53.1	52.4	53.7	50.8	...	45.8	43.4
	Uganda	35.2	37.6	59.4	58.5	57.3	59.4	54.3	52.7	52.4	50.1	49.0	49.6	49.9	49.3	48.6	47.8	48.8	45.6
Government expenditure on education, total (% of GDP)	Kenya	...	...	...	...	5.3	5.2	5.2	6.2	6.5	6.8	7.0	...	...	...	5.5	5.3	5.5	5.4
	Tanzania	...	2.5	2.5	2.2	...	...	...	...	...	3.6	3.0	4.0	4.2	4.0	4.5	...	...	...
	Uganda	...	...	...	...	...	2.5	...	...	...	5.0	...	...	...	...	2.4	3.0	2.5	2.2

Source: World development indicators <https://databank.worldbank.org/source/world-development-indicators>

Key: Year waived school fees

Uganda waived school fees
Tanzania waived school fees
Kenya waived school fees

In most cases, the dramatic increase in primary school attendance was not accompanied by a commensurate increase in teachers, resulting in large pupil-teacher ratios (Deininger, 2003). Besides, countries eliminated school fees before carrying out infrastructural improvements in the school system.

Therefore, the access shock created by eliminating school fees resulted in a substantial initial decrease in resources available per pupil and a significant increase in the pupil-teacher ratio (Grogan, 2008). For instance, the teacher-pupil ratio rose from 1:40 pupils per class to 1:60 in Kenya (Abuya et al. 2015), further exacerbating the difficulty of delivering lessons in the classrooms for teachers. In a study on UPE impacts in Uganda, using a nationally representative household survey, Deininger (2003) attributed the high end-of-cycle exam failure rates in 1999 to the excessively overcrowded classes that resulted in extreme pupil-to-teacher ratios (PTRs).

Large class size notwithstanding, teachers continued to grapple with increased heterogeneity among pupils regarding age and ability. A study carried out by UNESCO (2005) showed that about 44% of the pupils who were enrolled in schools when Kenya introduced FPE were overage by two years. Gross enrollment, which is the ratio of total enrollment to the total population of primary school students' theoretical age, can exceed 100% due to overage. As indicated in Table 3, primary school gross enrollment exceeded 100% during or after fee abolition, suggesting an increase of overage students. Children who enroll above the typical age of entry may miss learning experiences when they are most receptive to learning necessary skills and establishing secure foundations for subsequent cognitive development. Several studies suggest that the more overage a child is within a grade, the more likely they will underachieve (Hungu & Thuku, 2010).

Despite increased government spending on education, as indicated in Table 3, the UPE system experienced inadequate instructional materials, including textbooks. For example, in 2007, the student-to-textbook ratio in Uganda was one textbook per three students, a challenge that directly impacted student learning, performance, and overall educational quality (Grogan, 2008).

Generally, FPE increased participation rates and reduced the number of resources available per child. The pressure on school resources due to access shock affected learning quality. For instance, in Uganda, while Grogan (2008) finds that the abolition of school fees increased the probability of enrolment by the age of 9 by 3%, Deininger (2003) shows that there were noticeable reductions in the quality of education. In Tanzania, Hoogeveen & Rossi (2003) found that enrolment rates went up significantly, that many more children enroll at the appropriate age, and that even though all children benefited, girls and children from more impoverished families benefited most. They used nationally representative household survey data collected before (2001) and after (2007) the policy. However, they also found that achievement deteriorated, with students in rural areas and from low-income families more affected. In East Africa, a regional education initiative in East Africa – “Uwezo” – has since 2009 conducted annual learning assessments measuring the basic literacy and numeracy competencies of six to sixteen-year-olds in Kenya, Tanzania, and Uganda. The Uwezo assessments revealed that even after several years of schooling, most children in the region remain functionally illiterate at a grade-two level based on 2011 and 2012 results (Jones et al., 2014).

Insights from reviewing literature specific to Sub-Saharan Africa

Sub-Saharan African countries have emphasized compulsory and free primary education since independence, but most of these initiatives did not succeed in the long term. For instance, the 1961 Addis Ababa conference on the Development of Education in Africa recommended that primary education be compulsory and free. After independence, the East African countries pursued several policies to expand primary school education and ensure rapid access of those excluded by the colonial governments.

The three countries unsuccessfully eliminated mandatory school fees before they implemented the current FPE policies. However, the need to improve educational access was more robust in Kenya and Tanzania than in Uganda. Kenya expanded primary school access through the *Harambee school* initiative that generated funds from the community. Unlike Kenya, Tanzania did not prioritize the immediate expansion of primary education. Parents, politicians, and local education authorities led the first primary school education growth initiatives immediately after independence. Kenya and Tanzania also eliminated school fees in the 1970s but rolled back the initiatives due to cost-related reasons. Uganda's early commitment to the expansion of primary education was not rigorous compared to Kenya and Tanzania. The country's active commitment to free primary education was in the late 1980s and early 1990s, translating to the free primary education policy of 1997. The structural adjustment programs in the 1980s eroded the East African countries' initial school access gains when the countries introduced cost-sharing and required parents to carry some of the burdens of educating their children. The governments introduced nationwide Free Primary Education (FPE) policies to reverse the low school enrollment trends.

Abolishing mandatory school fees increased school participation rates in East Africa and other Sub-Saharan African countries during elimination and subsequent years. However, countries eliminated the school fees without investing in school resources or carrying out school infrastructural development to accommodate the dramatic school access. The pressure on school resources due to the access shock affected learning quality.

In the next section, I review the broader literature on access and quality of learning. Specifically, I review research on how school environment, socioeconomic status, gender, and place of residence influence students' school access and academic performance. These four

factors are central to this study, and previous studies provided the background within which I situated this study, the literature gaps, and questions that remained unanswered.

2.2 Broader literature on access and education quality

In this section, I review the literature on how the school environment, socioeconomic status, gender, and place of residence influence students' access to schooling and academic performance with a specific focus on Sub-Saharan Africa. For each covariate, I summarize previous empirical studies' findings, methodological challenges in those studies, and gaps in the literature. I begin the section by providing an overview of what quality of means in this study and potential problems related to such definition.

2.2.1 Problem of using learning outcomes as a measure quality of education

Over the years, educators have debated on how the quality of education should be measured. Some of the measures advanced in the literature include using school resources, internal processes and practices such as classroom practices, and student learning outcomes (Ladd & Loeb, 2013). Although there is no agreed measure of the quality of education, studies and education reports continue to use standardized tests to measure the quality of education systems. For instance, international standardized tests such as SACMEQ, the Trends in International Mathematics and Science Survey (TIMSS), and the Program of International Student Achievement (PISA) are increasingly used to influence educational policy on a global scale and to recommend educational reforms (Carnoy, Khavabson, & Ivanova, 2013; Taylor & Spull, 2015). Besides, researchers use the term 'quality of education' when they imply test scores (Deininger, 2003; Wils et al., 2005; Grogan, 2008; Hoogeveen & Rossi, 2013; Taylor & Spaul, 2015; Spaul & Taylor, 2015; Langsten, 2017). However, scholars such as Popham (1999), Koretz (2011), and Ladd & Loeb (2013) have criticized the use of test scores as a measure of

education quality. They posit that students do tests to judge how well they do in them (Koretz, 2011) and that the tests provide evidence of student's knowledge and skills relative to those of other students (Popham, 1999). Therefore, they note that educators should use standardized tests to make comparative interpretations but not to measure education quality, as that's not what they're supposed to do.

The critics of using the tests to measure education quality provide three reasons. First, standardized tests contain many items that are not aligned with what's instructionally emphasized in a particular setting (Popham, 1999). For instance, a study by Freeman et al. (1983) found a mismatch between what is taught locally and what is tested nationally tested in Mathematics standardized tests. They concluded that between 50 and 80 percent of what was measured on the tests was not adequately addressed in the textbooks. Due to such mismatches, they argue that standardized tests should not determine the effectiveness of a school or a teacher.

Second, the tests can measure only a small subset of education goals (Koretz, 2011) and do not capture the breadth of student outcomes that individuals and society value (Ladd & Loeb, 2013). Due to the desire for variance in standardized tests, examiners may exclude items on which students perform well. Therefore, the critics posit that it is unfair to test teachers' instructional effectiveness using assessments that avoid important content.

Lastly, students' performance in standardized tests is often influenced by factors not linked to instructional quality (Popham, 1999; Ladd & Loeb, 2013). Factors that influence a student's performance relate to what's taught in school, a student's intellectual ability, and a student's out-of-school learning. Popham (1999) argues that some tests require students to tap into their innate intellectual skills or experiences growing up, but not what they learned in school. Ladd & Loeb (2013) also note that although most empirical models of student outcomes

adjust statistically for differences in achievement gains by family background, such adjustments cannot eliminate components of test scores not linked to instructional quality. While I acknowledge these limitations, I use test scores to measure the quality of education as it's the only internationally comparable measure that other studies use.

2.2.2 School environment and education outcomes

This section reviews research on the effect of the school human and physical resources on student outcomes. This literature provided background information on the relationship between school resources and education outcomes. School resources are essential for schooling yet studies that investigate the role of school factors in explaining student outcomes indicate mixed findings. Some studies on this subject were carried with a relative comparison with the effect of family background on education outcomes. Heyneman & Loxey's (1983) study of seventh grade from twenty-nine countries, found significant effects of school facilities and weak effects of family background on academic achievement in Uganda. They believed that the results were due to the greater variance in schools' physical facilities and smaller social class variance in the country. Continuing with the hypothesis of inequality, Chudgar & Luschei (2009) revisited the HL effect using 2003 TIMSS data from fourth-grade students from 25 countries. To give a new insight into this debate, they introduced the Gini index to assess the different levels of inequality between countries, and they generated a Gini coefficient based on the educational capital in the student's home to evaluate inequality within a country. Using the Hierarchical Linear Modeling technique, their results found a relationship between the country's economic status and income inequality and the importance of schools. That is, schools are essential in predicting education outcomes in developing countries and more important in unequal countries.

Studies have shown a positive relationship between school resources and academic performance (Greenwald et al., 1996; Lee, 2005). For instance, Greenwald et al. (1996) found that having small schools and low student-teacher ratios positively impacted student outcomes. Lee et al. (2005) analyzed the effects of several school-level factors on sixth graders' reading in 14 Sub-Saharan countries (including Kenya, Uganda, and Tanzania) using the SACMEQ II data. Their multilevel regression analysis showed that students in better-resourced schools achieved high scores, and those with smaller sixth-grade classes had higher scores than those in schools with few resources.

However, in an analysis of 1995 TIMSS data, Hanushek & Luque (2003) did not find support for the argument that school resources are more important in developing countries than in wealthier ones. Their results indicated a negative relationship between achievement and expenditure per pupil as the proportion of GDP devoted to public education. In another study, Hanushek (2003) found that improving school inputs led to little improvement in students' achievement. He argued that lowering class sizes, increasing school expenditures, or hiring highly qualified teachers did not improve student outcomes after controlling for family background. Glewwe, Hanushek, Humpage, & Ravina (2011) conducted a meta-analysis of 80 studies published on the topic between 1990 and 2010 in developing countries. Their analysis indicated that school resources most teacher characteristics did not influence student outcomes.

Many developing countries experience severe teacher shortages in staffing public schools (Lee & Zuze, 2011). Almost three decades ago, Lockheed and Verspoor (1991) estimated that over 3 million teachers were required to provide universal access to primary education in developing countries. The relationship between class size and student outcomes has been widely studied, primarily in the U.S and Europe. However, there is no agreement in the empirical

literature on the relationship between the two. One body of research supports smaller classes' effectiveness, while the other argues that small classes are not beneficial.

The Tennessee Student-Teacher Ratio (STAR) experiment, conducted in 1985-1989, provided the most convincing case for class size. The study found that students in small classes performed substantially better in various subjects than those in large classes (Finn & Achilles, 1999). Besides, there was no interaction with gender, but the benefits were substantially higher for minority students and economically disadvantaged students (Finn & Achilles, 1999; Whitehurst & Chingos, 2005). Rivkin, Hanushek, and Kain (2005) found positive effects of smaller class sizes on reading, and mathematics in fourth grade, a smaller but statistically significant effect in fifth grade, and little or no effect in later grades in Texas.

Other studies outside the United States also provide positive evidence of the effect of class size reduction. For example, Case & Deaton (1999) found that schools with a high pupil-teacher ratio performed poorly in South Africa, although the authors noted variations in teacher quality might moderate the strength of their findings. Similarly, an investigation in five francophone countries by Michaelowa (2001) showed that high performance in Mathematics and French were associated with reduced class size, but very small classes were linked to lower academic achievement.

The positive influence of the pupil-teacher ratio is not limited to academic performance. Ruff (2016) examined the effect of pupil-teacher ratio on completion rates in 45 sub-Saharan countries and found that as the number of teachers per student goes up, the likelihood of primary school completion goes down. The pupil-teacher ratio also affects student enrolment (Case & Deaton, 1999) and dropout (Ruff, 2016).

Some empirical studies had mixed findings. For example, Woessmann and West (2006) examined class-size effects on performance in 11 countries using the Third International Mathematics and Science Study (TIMSS). They found beneficial effects of smaller classes in only two countries but no statistically significant effect of class size in the other countries. Besides, their study observed class-size effects in only countries with relatively low teacher salaries. Dee and West's (2011) analysis of eighth-grade students using nationally representative data in the United States found no overall impact of class size on test scores but found a positive effect on test scores in urban areas.

In addition to these positive and mixed findings, other studies find that small classes are not beneficial. For instance, Hanushek has disputed whether small classes are effective. Based on his review of several studies, he stated: "almost 300 econometric investigations of the determinants of achievement have failed to provide any consistent evidence that higher teacher-pupil ratios have a positive effect. When disaggregated to the smaller set of high-quality studies within individual classrooms, there is even less support for general class size reduction policies" (Hanushek, 1999, p158). Hoxby (2000) examined natural class size variation in Connecticut resulting from population variation and found no relationship between achievement in fourth and sixth grade. Hoxby did not find class size effects at schools that served disproportionately large shares of disadvantaged or minority students. In Kenya, experimental evidence from primary schools in the western part of the country found that a reduction in class size from 82 to 44 did not improve test scores for grade 1 pupils (Duflo et al. 2015). The authors note that this could be because a class size of 44 was still too big for learning to take place.

There is no agreement in the literature on the influence of school resources and education outcomes. On the one hand, one body of the literature indicates that having better resources

schools with small classes improved students' performance. On the other hand, other studies suggest that school resources are not significant predictors of student outcomes. I used this background to examine how changes in the school environment influenced East African students' reading scores after implementing the FPE policies. In the next section, I discuss another covariate that I focus on in this study—the relationship between socioeconomic status and education outcomes.

2.2.3 Socioeconomic status and education outcomes

Socioeconomic status (SES) is one of the widely used contextual variables in education research. However, there seems to be an ongoing dispute about its conceptual meaning and empirical measurement in studies. Many researchers use SES and social class interchangeably, without any rationale or clarification, to refer to students' social and economic characteristics (Sirin, 2005). In general, however, SES describes an individual's or a family's ranking on a hierarchy according to access or control over some combination of valued commodities such as wealth, power, and social status. White (1982) carried out one of the earliest meta-analytic studies on this subject. The author focused on studies published before 1980 that examined the relation between SES and academic achievement and showed that the relationship varies significantly by the type of SES and academic achievement measures. While there may be disagreement on the conceptual meaning of SES, there seems to be an agreement with the definition that parental income, education, and parental occupation are the main indicators of SES (Sirin, 2005).

Questions about how socioeconomic status (SES) and educational outcomes relate have long been of interest to educational researchers, and questions about whether these relations are dependent upon country-specific factors have spurred decades of debate. These questions

became highly visible through the Coleman (1966) and Plowden (1967) reports, which argued that family background (aka SES) played a significant role in student outcomes than schools in the US (via Coleman) and the UK (via Plowden). Following these reports, Heyneman (1976) sought to test whether this relationship held steady in lesser-developed Uganda and Heyneman and Loxley (1983) continued this study in 29 countries to explore the relationship between SES and achievement relative to country wealth more systematically. The resulting Heyneman-Loxley (HL) effect argued that in lesser-developed countries, schools matter more than family background (aka SES) in determining student achievement, spurring decades of re-testing and debates about whether Coleman and Plowden or Heyneman and Loxley are correct. In determining student achievement, are school effects or family effects more important?

Generally, family SES sets the stage for students' academic performance by directly providing resources at home and indirectly providing the social capital necessary to succeed in school (Sirin, 2005). There's an agreement that socioeconomic background has a significant influence on students' schooling outcomes. Students whose families have high SES are more likely to attend school and have higher learning outcomes (Buchmann & Hannum, 2001). Similarly, Baker et al. (2002) show that a family's SES has a positive and significant relationship with student performance in mathematics and science.

Children from poor households are more likely to be out of school than those in the wealthiest households, as they may not afford the direct and indirect schooling costs (Zhang, 2006). Low-income families have fewer resources to invest in their children's education. Even with fee-free primary education, some households cannot afford school uniforms or need their children to take care of younger siblings or work to supplement household income (Moyi, 2013). For instance, although free primary education policies increased student enrollment in East

Africa, the most recent Demographic Health Surveys conducted between 2014 and 2016 indicate the policies have not all gotten all children of school-going age in school, especially among the very poor. The surveys suggest that children of primary school-going age from poor households in the East African countries were less likely to attend school than their wealthy counterparts. However, the gap was highest in Tanzania (31.8 percentage points higher for children from wealthy households), followed by Kenya (21.2 percentage points). At the same time, Uganda had the lowest gap at 14.1 percentage points (Table 4).

Table 4: Net enrollment ratio in East Africa by household wealth

Wealth Quintile	Kenya			Uganda			Tanzania		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Lowest	71.0	71.1	71.0	77.5	73.9	75.7	56.1	61.5	58.7
Second	86.9	89.5	88.2	82.5	85.0	83.8	64.0	76.5	70.3
Middle	89.4	91.6	90.5	85.4	85.4	85.4	77.3	80.8	79.1
Fourth	91.0	93.0	92.0	84.1	87.1	85.6	84.1	87.2	85.7
Highest	91.6	92.6	92.2	88.8	90.7	89.8	91.4	89.7	90.5
Total	84.8	86.7	85.7	83.3	84.1	83.7	72.9	78.4	75.7
Gap	20.6	21.5	21.2	11.3	16.8	14.1	35.3	28.2	31.8

Source: Kenya DHS survey 2014, Uganda DHS survey 2016, Tanzania DHS survey 2016

Besides, there was a bigger gap in girls' access from the lowest and highest wealth quintiles than there was among boys in Kenya and Uganda and vice versa in Tanzania. For instance, as indicated in Table 4, girls from wealthier households in Kenya had enrollment rates of 21.5 percentage points higher than girls from low-income households. In comparison, boys from wealthy families had enrollment rates of 20.6 percentage points higher than boys from low-income families. In Uganda, the gap in favor of girls from wealthy households was 16.8 percentage points, while the difference in favor of boys from rich homes was 11.3 percentage points than their counterparts from low-income families. In Tanzania, however, the gender access gap by household wealth was wider among boys (35.2 percentage points) than girls (28.2 percentage points).

Empirical studies from East Africa also show a significant influence of family socioeconomic status on access to schooling and academic performance. In Kenya, Kabubo-Marirara & Mwabu (2007) investigated the determinants of demand for schooling using a nationally representative 1997 Welfare Monitoring survey data in Kenya. Their study found that girls from poor backgrounds were less likely to enroll in school than boys from poor households. The authors note that the findings could be due to parental preference for boys over girls' education. Similarly, using a nationally representative 2006 DHS data in Uganda, Moyi (2013) found that children from wealthy families were more likely to remain in school, while those from low-income families were less likely to enroll and were more likely to drop out before completing the primary cycle. However, the access differences between the poorest and wealthiest households were higher for girls than boys, suggesting that low-income families were more likely to keep girls at home than boys. Likewise, Hedges et al. (2016) analyzed the relationship between household wealth and education outcomes among pastoral communities in Northern Tanzania. Using a multilevel analysis approach, they found that wealthier households were likely to send children to school, as they were able to bear the costs of schooling.

Regarding academic performance, Nzomo et al. (2001) found a positive relationship between the socioeconomic status of grade six pupils and their learning achievement in Kenya, using SACMEQ I data. Their results also indicate that families with higher socioeconomic status could provide their children with the necessary facilities and materials to improve their test scores. Another study in Kenya by Hungi & Thuku (2010) employed multilevel analysis to examine family and school factors that influenced pupil achievement. They found that pupils from wealthy backgrounds performed better in mathematics and reading than pupils from poor backgrounds. Besides, the study further found that low SES parents had little or no interest in their children's

schoolwork. In Tanzania, Kapinga's (2014) study found that children from low SES families were at a higher risk than advantaged children to have low test scores and repeat grades. The same study also found that poor households were likely to withdraw children from school to participate in income-generating activities.

These studies show that the relationship between socioeconomic status (SES) and educational outcomes continues to draw attention among researchers. There are several theories about why this question is so actively debated: either the methods used are incorrect, how SES is measured is incorrect or incomparable across countries, or the student achievement is the wrong outcome variable. The methods used in the studies vary just as much as the data source. Regarding data sources, Heyneman & Loxley (1983) used IEA data in conjunction with country-level data from non-IEA participants for a total of 29 countries. They constructed the socioeconomic status variable by mother's education, father's education, father's occupation, number of books at home, and a cultural measure of consumption such as the dictionary, dishwasher, record player in the home, and OLS method to investigate the relationship. Other studies that used IEA data (Baker et al., 2002) and SACMEQ data (Nzomo, 2001; and Hungi & Thuku, 2010) were limited to what countries could be included and used SES variables provided by each data source. The Buchmann and Hannum (2001) study reviewed all studies on the matter, including single case studies, to identify long-term patterns about the relationship. Regarding data methods, they range from OLS (Heynman, 1976; Heynman & Loxley, 1983; Baker et al., 2002, Nzomo, 2001) and HLM (Baker et al. 2002; Hungi & Thuku, 2010) (some studies use both OLS and HLM to re-test the HL effect and to advance methods to test the HL effect differently).

Generally, there's an agreement in the literature that socioeconomic background influences students' outcomes. However, the access gap by family wealth varies by country and student's gender. In most cases, the access gap between the poorest and wealthiest households was higher for girls than boys, suggesting that low-income families were more likely to keep girls at home than boys. However, none of the studies reviewed conducted a comparative analysis of the three East African countries. The methodological issues discussed in this section show how the analytical method used could influence study findings, and therefore researchers should highlight the limitations of the method used.

2.2.4 Trends in Gender Differences in Education Outcomes

In this section, I review the literature on the gender differences in access and academic performance.

Gender and access to education

Gender parity aims at achieving equal participation for girls and boys. It is measured using the Gender Parity Index (GPI), the value of a given indicator for girls divided by boys' value. A GPI value of 1 signifies that there is no difference in the indicators for girls and boys. A GPI of less than 1 indicates that an indicator's value is higher for boys than for girls and higher for girls than boys when the GPI is greater than 1 (UNESCO, 2011).

Gender parity, as the measure of gender equality in schooling, is widely used in the World Bank and UNESCO reports. However, scholars have criticized its use as a measure of equality (Unterhalter, 2005; Unterhalter, 2012; Para-Mallam, 2010; Subrahmanian, 2005). Unterhalter posits that gender equality is not just about counting equal numbers of boys and girls in school, that focusing on the number of children accessing schools leaves significant areas of education provision unaddressed, and that gender parity misses out structural relations of power

and inequality (Unterhalter, 2005; Unterhalter, 2012). Similarly, Subrahmanian (2005) notes that gender parity neither includes education processes nor acknowledges that women and men start from different positions of advantage and are constrained in different ways. Likewise, Par-Mallam (2010) argues that gender equality should not imply the elimination but the celebration of difference in such a way that men and women can be both different and equal. Despite these criticisms, empirical studies and education reports use gender parity, as it's the only internationally comparable measure available.

Evidence from sub-Saharan Africa indicates that substantial gender gaps favoring boys still exist at the regional level (Kuepie et al., 2013; Kalindi, 2015; UNESCO, 2015). In the region², gender parity in primary enrolment has improved since 1999, but it has not been eliminated. For instance, gender parity increased from 0.85 to 0.92 between 1999 and 2012 (UNESCO, 2015). It implies that only 92 girls per 100 boys were in primary schools in the region in 2012. More current data indicate that boys are still more advantaged at the regional level. The World Bank development indicators suggest that at the regional level, boys are more likely to enroll in school, complete, and are less likely to drop out of school. For instance, in 2018, 70% of boys compared to 67% of girls, and 41% of boys and 34% of girls in sub-Saharan Africa completed primary and secondary school, respectively. Similarly, 81% of primary-school-age boys and 76% of girls were enrolled in school in 2018.

Despite these trends indicating boys' advantage in access to education, primary school completion rates for girls increased much faster higher. For instance, trend analysis in 33 Sub-Saharan countries by Lloyd & Hewett (2009) indicated that girls' primary completion rates had risen much higher than that of boys within 20 years. The boy's primary school completion rates

² In this proposal, region means at the sub-Saharan level

increased by 16 percentage points (from 46% to 60%), while that for girls rose by 26 percentage points (from 30% to 56%). Similarly, the 2015 Global Education Monitoring Report indicates that, while girls remain less likely than boys to enter school, in some countries, boys are at higher risk of failing to progress and complete a cycle of education (UNESCO, 2015).

However, group averages mask a considerable difference in access across countries. In East Africa, boys are now at a higher risk of being out of school. For instance, the most recent Demographic Health Survey conducted in 2014 in Kenya and 2016 in Uganda and Tanzania indicate that girls were more likely than boys to attend school. In Kenya, a slightly higher number of girls (87%) than boys (85%) of primary-school-going age were attending school in 2014. In Uganda, 84% of girls and 83% of boys of primary-school-going age were attending school in 2016, while in the same year, 78% of girls and 73% of boys of school-going age were attending school in Tanzania.

Similarly, the World Bank development indicators show that East Africa has achieved gender parity in enrollment at both primary and secondary education levels. Girls are more likely to enroll and complete primary education and are less likely to drop out of school; for instance, in 2017, more girls than boys were more likely to enroll and complete school in East Africa. The primary school gross enrolment rate in Kenya was 103.1% for boys and 103.4% for girls, 101.3% for boys, and 104.1% for girls in Uganda, while in Tanzania, primary school enrollment was 87.7% for boys and 90.8% for girls. In the same year, 99.3% of boys and 100.1%³ of girls completed primary school in Kenya, 53.8% of boys and 55.7% of girls, and 57.3% of boys and 66% of girls of school-going age completed primary school in Uganda and Tanzania

³Primary completion rate is the total number of new entrants (male/female) in the last grade of primary education, regardless of age, expressed as a percentage of the total population of the theoretical entrance age to the last grade of primary. The ratio can exceed 100% due to over-aged and under-aged children who enter primary school late/early and/or repeat grades

respectively. Based on these numbers, children in Kenya are likely to enroll and complete primary school compared to Uganda and Tanzania. Besides, these trends support the argument that, in some countries, when girls are enrolled, they stand an equal or better chance than boys of continuing to the upper grades of primary school (Kalindi, 2015; UNESCO, 2015).

The increasing female education in East Africa has taken place within a broader context of development campaign, which often focuses on girls' education in order to achieve gender equity in education. Historically, females have had less access to education than their male counterparts. It shaped discussions and policies on gender equality that have focused on helping girls catch-up with boys regarding access, completion, and educational attainment. At the global level, incentives for households to send girls to school include conditional cash transfers, girl's scholarships, and school feeding programs (Lewis & Lockheed, 2008). In Africa, international bodies and educationists began to look into how girls and women were fairing in education in the 1960s. By the 1970s, some African governments started pro-female initiatives to encourage girls in schools were started (Onsarigo, 2014). In East Africa, governments and local communities in partnership with religious organizations, international and local Non-Governmental Organizations (NGOs) have implemented targeted interventions to promote girls' education. Such initiatives include taking affirmative action to support girls' education, scholarships for girls, provision of sanitary towels, school uniforms, and books, and support to create gender-responsive environments (Onsomu et al., 2006).

These trends and studies indicate that boys have been and continue to be advantaged relative to girls regarding enrollment, attendance, completion, and dropping out of school at the regional level over the years. However, in East Africa, the raw numbers and empirical studies on gender disparities in access to schooling indicate that girls are less likely to drop out of school

and more likely to enroll, attend, and complete school. These trends in East Africa stand in stark contrast with historical patterns in developing countries where females have had less access to education than their male counterparts. Overall access, however, varies by country, where children in Kenya are likely to enroll and complete primary school compared to Uganda and Tanzania.

Gender and academic performance

Achieving gender equality requires that girls and boys have an equal chance to participate in education and that there are minimal disparities in all education outcomes, including those reflected by academic performance measures. Like in access, historically, boys in sub-Saharan Africa were advantaged in academic achievement as measured by test scores and other exams. Studies show that girls generally outperform boys in languages, while boys perform better in mathematics (UNESCO, 2009; Kalindi, 2015; Dickerson et al., 2015). Studies on the gender differences in academic performance in Sub-Saharan Africa indicate mixed results. In a study using nationally representative Southern and Eastern African Consortium for Monitoring Educational Quality (SACMEQ) III data from 15 countries, Hungi (2011) found that boys outperformed girls in both reading and mathematics in six countries (Kenya, Malawi, Mozambique, Tanzania, Uganda, and Zambia) while girls outperformed boys in the two subjects in Seychelles after controlling for student and school factors. In Mauritius, Namibia, and Zanzibar, girls did better than boys in reading while boys did better in mathematics. However, the study found no significant gender differences in Botswana, Malawi, Swaziland, South Africa, and Zimbabwe. This study indicates few diversions from the expectation that boys do well in mathematics and girls in reading. First, girls lagged in both subjects in six of the fifteen countries. Second, there was no significant difference in performance in five countries, and third,

girls outperformed boys in both subjects in only one country. In only three of the fifteen countries, girls performed better in reading, and boys performed better in mathematics.

Other cross-country studies indicate boys continue to outperform girls in mathematics. A study by Dickerson et al. (2015) using SACMEQ and Program for the Analysis of Education Systems (PASEC) data for 19 sub-Saharan Africa countries examined the gender differences in mathematics amongst primary school children. Their analysis also included GDP per capita, national fertility rates, and data from demographic health surveys. They found a significant difference in math test scores in favor of boys in both datasets after accounting for home environment and school characteristics, with gender difference higher in the PASEC dataset. In the SACMEQ data, boys scored 0.09 standard deviations higher on average than girls, while in the PASEC data, boys scored 0.010 standard deviations higher. The study controlled for a wide range of pupil characteristics to account for differential selection into enrollment between boys and girls. However, this study did not investigate country-specific gender differences in math test scores.

The gender differences in East Africa's academic performance are also seen in within-country test scores and examination results. In Kenya, Onsomu et al. (2006), using a representative sample of all school districts in Kenya, found that boys performed better than girls in both mathematics and reading. Their regression analysis only included student demographics and socioeconomic status leaving school-level factors that may influence learning outcomes. Similarly, Hungi & Thuku (2010), using a nationally representative sample, found that boys outperformed girls in mathematics and reading across all provinces in Kenya.

In Uganda, studies also indicate boys' advantage in mathematics performance. Kiwanuka et al. (2015), using data from 49 randomly selected schools in central Uganda, found that boys

outperformed girls in Mathematics after controlling for student demographics and school-level characteristics. However, the study did not include home environment characteristics, which leads to biased findings. Opolot-Okurut (2005) also reports similar findings of boy's advantage in mathematics using data collected from nine schools. The results, however, are biased as the schools were not randomly selected, and the analysis did not control for either student- or school-level factors.

Why should stakeholders be concerned about gender disparity in achievement? Any gender disparity in performance, especially when it emerges early, is likely to be perpetuated or spill over into other educational outcomes (Cobb-Clark & Moschion, 2017). There are suggestions, for example, that girls' underperformance in mathematics linked to them being less likely to enroll in advanced math and science classes in high school (Penner & Paret, 2008), complete science and technology degrees in university, and subsequently be employed in technology-related occupations such as engineering or computer science (Lavy & Sand, 2015). Boy's weaker literacy skills relative to girls is linked to higher grade repetition and dropout rates, lower lifetime earnings, higher unemployment and incarceration rates, and more dependency on welfare (Entwisle et al. 2007). So far, I have discussed how school environment, socioeconomic status and gender influence students' access to schooling and academic performance. In the next section, I review the literature on urban-rural differences and education outcomes, which is the final covariate central to this study.

2.2.5 Rural-urban school differences in access and performance

In this section, I review the literature on the urban-rural difference in access and academic performance.

School location and access to education

There's an agreement in the literature that urban areas typically have greater access to school (high enrollment and attendance and low dropout rates) than their rural counterparts in sub-Saharan Africa (Kuepie et al., 2013). This suggests that other things equal, children in rural areas are less likely to enroll in school and more likely to drop out than urban children. Using Demographic Health Survey data from 12 sub-Saharan countries, Kuepie et al. (2013) found that access to schools was distinctly lower in rural areas than urban areas after controlling for student demographics and household characteristics. They also found that the rural-urban enrollment gap was widest at the youngest ages, indicating that late entry is prevalent in rural children. Further, their analysis suggests that more youth from rural areas (20 percent) never attend school compared to urban youth (10 percent). Kuepie et al. (2013) also found differences vary across countries. For example, rural-urban gaps in enrollment rates are low in Kenya and Namibia but quite large in Guinea, Niger, Senegal, and Sierra Leone.

Similarly, a UNICEF's (2015) study raw numbers indicate that 16% of children in urban areas and 35.7% of those in rural areas aged 6 and 14 years in 14 countries in Central and West Africa were out of school. However, the study also found that 6.8 times more children were excluded from schooling in rural areas than urban areas. Another study by Roby et al. (2016), using Demographic Health Survey data from Malawi, Mozambique, Niger, Uganda, and Zimbabwe found that, in the five countries, children residing in urban centers are nearly twice as likely to be enrolled in school as children living in rural areas. However, after accounting for

student's demographics and household wealth in the analysis, rural children from wealthy households in Uganda were more likely to attend school than their urban counterparts; in the other three countries, urban children were still advantaged.

Using a nationally representative 2007/08-gender productivity survey in Uganda, Ssewanyana (2010) employed multivariate analysis to examine gender differences in educational attainment. The study found that boys of primary-going age were more likely than girls to enroll in school, and children in urban areas were more likely to enroll than those in rural areas. Another study by Moyi (2013), using Uganda's 2006 DHS data, found that children in rural areas were less likely to enroll in school and were more likely to drop out of school before completing the school cycle than those in urban areas. However, their study indicated that the gender gap was higher in urban areas than in rural areas. For instance, 13% of rural girls and 12% of rural boys had dropped out of school compared to 15% of urban girls and 8% of urban boys.

In Tanzania, Al-Samarrai & Reilly (2000) found that primary school enrollment and attendance gaps between urban and rural areas were statistically significant, with urban children more likely to attend school after controlling for pupil demographics, household characteristics, and differences in regional endowments. However, it is not clear from the paper how the authors measured differences in regional endowments that influence school attendance. Besides, this study relied on data from the early 1990s, and Tanzania has experienced a significant level of urbanization since then. Another study by Hedges et al. (2016) using data from 19 villages in Northern Tanzania indicates that among the pastoralists, who predominantly live in rural areas were least likely to invest in schooling (after controlling for household wealth) as they needed the children to tend their animals. A study in Kenya also indicates similar trends. Using a

national Welfare Monitoring Survey data in Kenya, Kabubo-Marirara & Wambu (2007) found that rural children are less likely to enroll in school and have lower grades than urban children after accounting for individual and household factors.

Recent Demographic Health Surveys conducted between 2014 and 2016 in East Africa indicate three main findings regarding rural-urban differences in school attendance. First, in Kenya, more children in both urban and rural areas attend school than in Uganda and Tanzania. Second, in the three countries, children in urban areas are more likely than those in rural areas to attend school. Third, in rural and urban areas, girls are more likely than boys to attend schools in the three countries. For instance, in Kenya, 90% of girls and 88% of boys of primary school-going age in urban areas attended school in 2014 compared to 85% of girls and 83% of boys in rural areas. In Uganda, 87% of girls and 85% of primary school-going boys in urban areas attended school in 2016. However, an equal number of girls and boys (83%) of school-going-age in rural areas attended school. In Tanzania, 87% of girls and 85% of boys of primary school-going age in urban areas participated in school in 2016 compared to 76% of girls and 69% of boys in rural areas.

Raw numbers and empirical studies in East Africa confirm other findings that show that children in urban areas have higher access than their rural counterparts. As Moyi (2013) posits, rural areas have to contend with poor-quality schools, poor infrastructure, and a higher poverty concentration that make it difficult for children to attend school. However, the rural-urban differences in access vary by country and gender. In both urban and rural areas, Kenyan children are more likely to participate in school than their counterparts in Uganda and Tanzania. Besides, urban and rural girls are more likely than boys to attend school.

School location and academic performance

There is an agreement in the literature that schools in urban areas perform better than those in rural areas, like access to schooling. In South Africa, Kyei & Nemaoroni (2014) found that school location influenced students' performance, with urban schools performing better than rural schools. However, the study relied on data from only four high schools, and the analysis did not account for other factors. Likewise, in Nigeria, Yusuf & Adigun (2010) found that school location significantly influenced performance in national exams among secondary school students. The study indicates that students in schools in urban areas performed better than in rural areas. However, both studies reported raw numbers without accounting for variations due to the pupil or school characteristics.

Zhang (2006) employed multilevel regression methods to study urban-rural literacy gaps and the relative effects of SES and school quality on the literacy gaps across 14 sub-Saharan African countries that included Kenya, Uganda, and Tanzania. The author's analysis using SACMEQ data showed that rural students lagged behind their urban counterparts in reading ability after accounting for the pupil, household, and school factors. Besides, the evidence indicates that rural-urban gaps in literacy are even larger than the differences between most countries. The author also found that rural students tended to be older than their urban counterparts resulting in late entry into the school system, a higher incidence of grade repetition, or both. Further, the rural students had lower family SES levels and had less home support for their academic work.

Urban-rural achievement differentials in developing countries exist because schools in urban areas enjoy more endowments than their rural counterparts, and therefore their students enjoy more benefits from these endowments (Zhang, 2006; Johannes, 2010). For instance, rural

schools may have fewer teaching and learning supplies, poor infrastructure, and inadequate teachers—conditions that are associated with better academic achievement (Johannes, 2010). For instance, in Zhang's (2006) study, Kenya and Tanzania were among the countries with a high rural-urban gap where rural students lagged behind their urban counterparts by more than half a standard deviation in scores' distribution. However, the rural-urban differences in students' reading scores disappeared in most countries after accounting for school resources.

Although there's an agreement in the literature that children in urban areas are likely to enroll in school and perform better relative to their rural counterparts, decomposing the rural-urban differences by gender in the studies reviewed produced mixed findings. Some studies suggest that boys' advantage in education outcomes in both urban and rural areas. In rural Ethiopia, for instance, using nationally representative rural household survey data Haile & Haile (2012) found that male children were more likely to attend school than their female counterparts after controlling for student demographics, household characteristics, and household wealth. Similarly, Olaniyan's (2011) study based on the Multiple Indicator Cluster Survey (MICS) in Nigeria shows that boys were likely to enroll in school in both rural and urban areas. However, the gender gaps were more pronounced in rural areas than in urban areas after accounting for individual, household, and community characteristics. This implies that although girls in rural and urban areas were less likely to enroll than their male counterparts, girls in the study of rural regions were most disadvantaged.

Other studies indicate a male advantage in rural areas but not in urban areas. For instance, using nationally representative survey data in Kenya, Kabubo-Marirara & Wambu (2007) found that boys performed better than girls in rural areas. However, there was no statistically significant difference in performance between boys and girls in urban areas after accounting for

individual and household factors. However, some studies found a girl's advantage in rural areas but not in urban areas. A study by Chege et al. (2013) in eight school districts (four rural and four urban) in Kenya indicates that in three of four rural schools selected for their study, girls outperformed boys in academic performance, school attendance, and completion. This was not the case for urban schools where girls outperformed boys in only one of the four urban schools. However, these results are biased and may not portray the actual rural-urban gender differences as the study only reported raw numbers without controlling for student or school factors. Conversely, other studies found girls an advantage in both urban and rural areas. In Tanzania, for instance, Al-Samarrai & Reilly (2000) found that girls in both urban and rural areas were more likely to attend school, with the gender effects more pronounced in urban areas than in rural areas after controlling for pupil demographics and household characteristics.

The quality of the studies reviewed varies. Some use nationally representative data controlling for student and school factors while others do not. Failure to use a representative sample or to control for some explanatory variables leads to biased results. Studies by Kyei & Nemaoroni (2014), Yusuf & Adigun (2010), Chege et al., 2013 and UNICEF (2015) do not control for any student or school factors. Only Zhang (2006) adequately controls for the pupil, household, and school factors. The other studies—Haile & Haile, 2012; Olaniyan, 2011; Al-Samarrai & Reilly, 2000; and Kabubo-Marirara & Wambu, 2007—account for the pupil, household/community characteristics, leaving out school factors. Failure to use a representative sample or to control for some explanatory variables leads to biased results.

2.3 Summary of the Literature

In this chapter, I have provided an overview of what quality of education means in this study and the potential problems that result from using test scores to measure education quality. Educators have debated how to measure education quality, and I highlighted the limitations of narrowing the measure to test scores. I also reviewed some of the post-independence initiatives the East African countries implemented to expand primary education between independence and adoption of the current fee-free primary education policies. These post-independence initiatives provided the country background contexts within which the countries adopted the FPE policies. I also provided an overview of the Fee-Free Primary Education Policy in East Africa and reviewed research on how the policy influenced the school environment. I highlighted the differences and similarities of the policies across the three countries and how the school environment changed after the policy implementation. Lastly, I discussed the literature on how school environment, socioeconomic status, gender, and place of residence influenced students' access to schooling and academic performance with a specific focus on Sub-Saharan Africa. I provided the background within which I situated this study and the literature gaps/questions that remained unanswered.

The literature indicates that international policies are instrumental in shaping education systems. Since the world conferences on Education for All (EFA) at Jomtien in 1990 and Dakar in 2000, most developing countries have implemented programs to universalize primary education. These global commitments under Education for All by 2015 influenced the East African countries' access policies. The logic for such a policy change was clear: if the cost of schooling were too high, poor parents would not send their children to school. Therefore, eliminating compulsory charges would lower the cost of education and increase the number of

children in school. After the conclusion of the Education for All by 2015 initiative, the focus shifted to include both access and learning outcomes. Whereas Free Primary Education (FPE) policies improved equality in schooling access, this does not imply they led to equality in learning outcomes.

Most literature on access and education quality looks at access to schooling or quality of education separately, but both concepts are related. On the one hand, rapid expansion in enrollment may deteriorate education quality (Wils et al., 2005). On the other hand, quality education can encourage students to remain in school and move more through primary school grades (Langsten, 2017). Therefore, quality is an essential supplement to ensuring all children have access to and complete primary education. Although countries implemented the FPE policies to address inequalities in education, such as inequalities by socioeconomic background, gender, and rural-urban divide, the increased participation rates may affect the quality of education through the influx of students from disadvantaged backgrounds and by stretching school resources. Empirical studies on the effects of FPE on education outcomes indicate a trade-off between access to schooling and education quality. Therefore, I investigate the relationship between access to schooling and learning outcomes in East Africa, with a specific focus on the influence of fee-free primary education policies in Kenya, Uganda, and Tanzania.

Although pre-2015 education policies at the international level did not emphasize learning outcomes, it is important to understand how such access policies influenced learning. Such policies were meant to ensure universal access to schooling, but we do not know whether the students who joined the schools acquired the necessary learning competencies. Whereas most studies on FPE policies have examined the impact that elimination of school fees in East African countries has had on enrollment, attendance, and retention (Oketch and Rolleston 2007; Riddell

2003; Chapman et al., 2010; Hooegeveen & Rossi, 2013), few studies have examined their effects on learning outcomes. Besides, such studies do not investigate the relationship between access and quality of education or compare the three countries. In this regard, this study explores the implications of government policies in East Africa to provide universal access to schooling and what that access means to quality of learning, as measured by test scores. Because Kenya, Uganda, and Tanzania share some similarities but also diverge in other ways, their comparative analysis allows us to understand the implications of abolishing school fees on actual access and learning outcomes.

Access to schooling in East Africa was problematic during colonial administration as many Africans were denied education both for practical and political reasons. In practical terms, the rural subsistence economy may not have required people to be well educated. In political terms, an educated population may not have served the interests of the colonial system. Once the three countries attained independence, they pursued several policies to facilitate rapid access to schooling for those who had been excluded. An immediate policy initiative to expand access in the three countries included the abolition of racial schooling systems, which had existed during the colonial period, and the development of one national education system. However, abolishing racial schools did not expand education access for the majority, who had been excluded due to lack of money to pay school fees.

The need to expand educational access was more robust in Kenyan and Tanzania than in Uganda. Whereas Kenya and Tanzania implemented some free primary education policies in the 1970s and later abolished them in the late 1980s, Uganda did not implement such strategies until its current one, which began in 1997. Uganda's and Kenya's FPE policies were political pronouncements without prior planning, while Tanzania planned its policy before

implementation. The Ugandan government's decision to abolish primary school fees stemmed from a presidential election campaign pledge. Similarly, Kenya re-introduced free primary education when the National Rainbow Coalition (NARC) government took office in December 2002. In fulfillment of a presidential campaign promise for free primary education to all Kenyans, the new government implemented the FPE policy in January 2003. On the ground, the policy caught school heads and education officers unaware; even the government itself was unprepared for the initiative since it implemented it on short notice (Muyanga et al., 2010).

Unlike Kenya and Uganda, Tanzania's free primary education was not tied to politics but was part of a Poverty Reduction Strategy Paper (PRSP). The 2001 PRSP made an explicit connection between debt relief and poverty reduction through the medium of primary schooling. To avoid having a trade-off between increasing enrolment and enhancing quality, Hoogeveen (2013) notes that PEDP set aside significant resources for teacher recruitment and training, classroom rehabilitation, and construction to support increased enrolment and allocated considerable funds to improving the quality of teaching and learning.

There is a possibility that the differential commitment to expanding primary school education contributed to differences in access after the countries implemented the current FPE policies. Moreover, variance in planning for the FPE policy could have contributed to differences in schools' physical and human resources. Although it is hard to investigate this aspect using SACMEQ data, I acknowledge that the differentials in the countries' historical education contexts could partly explain variations in access or quality of learning.

Studies policies and raw numbers on access policies indicate that FPE policies increased school participation rates but reduced the physical and human resources available per child. Whereas most studies discussed in this chapter examined the effect of eliminating school fees on

enrollment, attendance, and retention in East African countries, few studies have examined their effect on learning outcomes. Besides, the reviewed studies that examine the impact of FPE on learning outcomes do not use SACMEQ data. Further, these studies do not investigate the relationship between access and quality of education or compare the three countries that my study analyzes.

Generally, family SES sets the stage for students' academic performance by directly providing resources at home and indirectly providing the social capital necessary to succeed in school. There is an agreement in the literature that socioeconomic background has a significant influence on students' schooling outcomes. Overall, the key findings in the literature on the relationship between SES and education outcomes are that methods matter, how variables such as SES are created matter, and the choice of educational outcome matters. What remains are questions about whether there are differences in how a study is conducted (methods, data sources, and country selection) and how key variables are conceptualized. In line with the literature reviewed, I investigate whether there were changes in schools' socioeconomic demographics after the three East African countries abolished mandatory school fees and whether such changes influenced student outcomes.

Regarding trends in gender differentials in education outcomes, studies reviewed indicate that while gender gaps favoring boys in education outcomes persist in sub-Saharan Africa as a whole, group averages mask a considerable difference in access across countries. In East Africa, for instance, the persistent gender gaps have reversed: now, boys are more likely to drop out of school and girls are more likely to enroll, attend, and complete school in the three countries. However, access varies by country, where children in Kenya are more likely to enroll and complete primary school compared to Uganda and Tanzania. These trends in East Africa stand in

stark contrast to other developing countries, which have historical patterns of females having less access to education than their male counterparts. Gender differences in education outcomes in East Africa provide an interesting puzzle. While raw numbers and empirical studies indicate that girls are more likely than boys to attend school, the reviewed studies show that boys continue to outperform girls in mathematics and reading. However, none of the studies conducted a comparative analysis of the three East African countries or compared gender differences in access and academic performance in a single study.

There is an agreement in the literature that primary school children in rural areas of East Africa are less likely to attend school and consistently underperform their urban counterparts. However, limited studies investigate rural-urban gender differences in academic performance, and those that exist provide mixed results or do not use nationally representative data. Since rural families have fewer resources than urban families, especially in developing countries, they lag behind their urban counterparts in education outcomes even when they attend similar schools. Furthermore, rural children in less developed countries generally attend schools with few resources, therefore subjecting rural children to double jeopardy in their learning opportunities (Zhang, 2006). Most children in East Africa still reside in rural areas. Thus, improving school participation and raising the learning levels of rural children must be at the forefront of the policies aimed at achieving sustainable development goals in these countries. This study investigates the gender differentials in education outcomes by place of residence.

Although there is no agreed measure of the quality of education, studies and education reports continue to use standardized tests to measure the quality of education systems. Those who are critical of using tests to measure education quality provide three reasons. First, standardized tests contain many items that do not align with the instructional emphasis in a

particular school setting (Popham, 1999). Second, the tests can measure only a small subset of education goals (Koretz, 2011) and do not capture the breadth of student outcomes that individuals and society value (Ladd & Loeb, 2013). Third, students' performance in standardized tests is often influenced by factors not linked to instructional quality (Popham, 1999; Ladd & Loeb, 2013). While I acknowledge these limitations, I used test scores to measure education quality, as it is the only internationally comparable measure that other studies use.

The quality of the studies I reviewed varies. Some use nationally representative data controlling for student and school factors, while others do not. Failure to use a representative sample or to control for some explanatory variables leads to biased results. Therefore, findings from some studies are more significant than others. The literature reviewed shows consistency in the relationship between education outcomes and school environment, socioeconomic status, gender, and place of residence in East Africa, but the relationship varies by country. I contribute to the existing literature by investigating these relationships in Kenya, Uganda, and Tanzania after the countries abolished mandatory school fees. I investigated within and between-country differences in educational outcomes.

Since the East African countries introduced the current access policies at different times, we would expect differential effects on school demographics (students' socioeconomic status, gender, and place of residence) and learning outcomes. These aspects provided an interesting comparative context of investigating the question by comparing within and across countries over a seven-year period. In the next, section I list research questions I sought to answer in this study.

2.4 Research Questions

This study sought to answer the following research questions:

- i. What implication did Free Primary Education policies in East Africa have for mitigating unequal access to schooling? Specifically, I ask:

National analysis from 2000 to 2007

- a. How did the student composition in terms of SES and gender change from 2000 to 2007 in Kenya, Tanzania, and Uganda nationally and within rural and urban schools after introducing FPE?
- b. Was there a pattern in student composition changes within each country, as countries adjust with the implications of FPE?

Cross-national analysis from 2000 to 2007

- c. How did students' composition differ in 2000 and 2007 across Kenya, Tanzania, and Uganda?
- d. Was there a pattern from the cross-national comparisons?

- ii. What implication did FPE policies in East Africa have for the school environment?

- a. How did the school environment change nationally and within rural and urban schools after Kenya, Tanzania, and Uganda implemented FPE policies?
- b. How did the school environment changes differ over time across Kenya, Tanzania, and Uganda?

- iii. What implication did increasing school access due to FPE policies in East Africa have for the quality of learning as measured by test scores? Specifically, I ask:

National analysis from 2000 to 2007

- a. How did urbanicity-achievement gaps, SES-achievement gaps, and gender-achievement gaps change over time nationally in Kenya, Tanzania, and Uganda?

- b. How did SES-achievement gaps and gender-achievement gaps change within rural and urban schools in Kenya, Tanzania, and Uganda?
- c. Was there a pattern in these associations with achievement within each country?

Cross-national analysis from 2000 to 2007

- a. How did urbanicity-achievement gaps, SES-achievement gaps, and gender-achievement gaps differ across Kenya, Uganda, and Tanzania?
- b. Was there a pattern from the cross-national comparisons?

Chapter three discusses the methods I used to answer the research questions.

CHAPTER THREE: DATA AND METHODS

3.1 Data

Description of the SACMEQ Data

SACMEQ is an international non-profit organization composed of sixteen ministries of education in Southern and Eastern Africa that work together to share experiences and expertise in developing the capacities of education planners to apply scientific methods to monitor and evaluate the conditions of schooling and the quality of education (from website description)⁴. It is modeled similarly to the International Association for the Evaluation of Educational Achievement's (IEA) and Trends in International Mathematics and Science Studies (TIMSS). The consortium receives technical and financial assistance from UNESCO's International Institute for Education Planning (IIEP) and the government of the Netherlands, respectively.

Since 1995, SACMEQ has completed four school-based international studies (1995, 2000, 2007, and 2014) that involved administering standardized tests in reading⁵ to grade six pupils and their teachers in the sixteen-member countries⁶. The primary purpose of SACMEQ surveys is to collect information on the general schooling conditions and the reading achievement levels of Grade 6 learners and their teachers (Wasanga et al. 2012). As Zhang (2006) notes, a unique feature of the SACMEQ projects is that they are designed to address five policy concerns in participating countries. The policy concerns include inequalities in students' characteristics and learning environments, teacher characteristics and viewpoints, school heads'

⁴ Organization's description obtained from SACMEQ Website <http://www.sacmeq.org/?q=about-us> on January 3rd, 2020

⁵ In addition, the SACMEQ surveys collect mathematics data, but I focused on the reading data

⁶ The first survey (SACMEQ 1) was conducted in only seven countries—Kenya, Malawi, Mauritius, Namibia, Zambia, Zanzibar, and Zimbabwe (Atuhura, 2015). The other nine countries are Angola, Botswana, Lesotho, Seychelles, South Africa, Swaziland, Tanzania, and Uganda.

characteristics and viewpoints, equity in the allocation of human and material resources, and the reading achievement levels of students and their teachers.

At the national level, the SACMEQ surveys sampled schools using a stratified two-stage cluster sample design. At the first stage, schools were selected in each region (province) in proportion to the number of pupils in the region who were in the defined target population. In the second stage, a simple random sample of about twenty-five grade six pupils was generated from those present at school on the first day of the survey, using the selected schools' attendance register. The pupils completed the two tests and a pupil questionnaire in two days (Hungu, 2011). The respective grade six mathematics and reading teachers also completed their teacher tests and a questionnaire. Besides, the school headteacher completed a questionnaire that solicited information on the school head's characteristics and other school variables (Atuhurra, 2015; Wasanga et al., 2015). A Probability Proportional to Size (PPS) sampling technique was applied to ensure the selected schools reflected a fair representation of national shares by school type and location (Wamala et al., 2013).

The desired target population for the SACMEQ projects consisted of all Grade 6 students attending either mainstream government or non-government schools in the first week of the eighth month of the academic calendar (Ross et al., 2005). The projects focused on Grade 6 for three reasons. First, this grade represented a point near the end of primary schooling, where school participation rates are relatively high. Second, the Grade 6 level allowed sufficient time to elapse between the early grades of teaching in local languages in most SACMEQ countries and the switch to instruction in the official national language. Third, Grade 6 students were considered mature enough to provide accurate information about their home background, which is used to develop a socioeconomic status summary scale (Wasanga et al., 2012).

However, schools for the disabled and very small schools (i.e., those with fewer than 15 or 20 sixth grade students) were excluded from the study due to their low representation in the total student population. Besides, these schools were mostly located in isolated areas and were thus associated with high data collection costs. As earlier mentioned, SACMEQ has carried four waves of surveys: SACMEQ I (1995-1999), SACMEQ II (2000-2004), SACMEQ III (2006-2011), and SACMEQ IV (2012-2014). Uganda and Tanzania did not participate in SACMEQ I. For comparison purposes, I did not use SACMEQ I data. Besides, I did not have access to SACMEQ IV data. Table 5 shows the number of pupils and schools involved in SACMEQ II and III for each country.

Table 5: Number of grade 6 pupils and schools in SACMEQ II and III project

	SACMEQ II		SACMEQ III	
	Pupils	Schools	Pupils	Schools
Kenya	3299	185	4436	193
Uganda	2642	163	5407	264
Tanzania	2854	181	4194	196
<i>East Africa total</i>	<i>8795</i>	<i>529</i>	<i>1407</i>	<i>453</i>

3.2 Description of variables

Outcomes of interest (Dependent measures)

SACMEQ surveys based the reading tests on standard domains from the International Association for the Evaluation of Educational Achievement (IEA). However, the test designers modified the domains to correspond to what was being taught in SACMEQ schools. The surveys standardized the literacy tests to an average of 500 and a standard deviation of 100 across countries. The test's goal was to assess as practically as possible how well students understood different reading dimensions. Specifically, the definition for reading literacy was “the ability to understand and use those written language forms required by society or valued by the individual” (Ross et al., 2005, p.74). The reading tests covered narrative prose, expository prose, and

documents. Narrative prose assessed a student's grasp of basic information, while expository prose tested the understanding of the text with descriptions and explanations. The documents domain assessed whether students could deduce facts based on different pieces of information within the text (Ross et al. 2005). The *Reading achievement variable* was the reading test score for Grade 6 students.

Independent measures

Variables of focus:

Social background: The SACMEQ data has a *socioeconomic status* variable constructed using the Rasch approach. The approach based on information that described information on home possessions (newspaper, magazine, radio, television, video cassette recorder, cassette player, telephone, fridge, car, water, electricity, and a table), parents' education, and the structural quality of a student's house (the primary source of light in the home, the material used for the floor, walls and roof). The SES score was set at 500 with a standard deviation of 100. In this study, I divided the SES distribution as follows: The low SES group represented pupils below the 25th percentile, while the high SES group represented pupils above the 75th percentile within each country. The levels were in reference to the SES within each of the countries. Although studies have shown that the way SES measured may influence its relationship with educational outcomes, this study was limited to the SES variable available in the dataset.

Student sex: It was a dummy variable coded '1' for female and '0' for male.

School location: The School Head questionnaire asked them about their perception of their schools' location according to four categories — isolated, rural, near a small town, and

large town or city. The survey transformed these categories into two coded as ‘1’ for urban and ‘0’ for rural.

Control variables

I grouped the control variables into three categories: pupil individual and home environment, those about the personalized learning support that a pupil received, and those related to the school environment.

Pupil individual characteristics and home environment: The variables in this category included pupil’s age, grade repetition, how often students spoke the language of instruction at home, and whether pupil engages in non-school activity at home.

Age: The surveys measured pupil age in months

Grade repetition: Schools face decisions about how to improve the performance of their weakest students. Although studies have shown that repetition does improve students’ performance in the long term (Brophy, 2006), some countries use grade repetition as a standard response for low performance (Lee et al., 2005). It is not entirely wrong as students learn more each time through the same grade, but Hanushek (1995) argues that grade repetition is an expensive way to improve student learning. Since SACMEQ includes no prior achievement measure, I used grade repetition as a proxy for prior achievement. I used the *grade repetition variable* as a control to represent student ability. It was a dummy variable coded ‘1’ if the pupil had repeated a grade at least once and ‘0’ otherwise.

Speaking the language of instruction at home: English is the language of instruction in Kenya and Uganda, and Swahili in Tanzania. In the SACMEQ surveys, this variable is coded ‘0’ for never speaking the language of instruction at home, ‘1’ for sometimes, ‘2’ for most of the time, and ‘3’ all the time.

Household tasks factor: It was the sum of pupils' involvement in various household activities such as doing laundry, fetching water, collecting firewood, and livestock duties. SACMEQ II surveys did not collect this information.

Personalized learning support: These variables measured the extent of academic support that a student received to aid his schooling. They included whether a pupil attended preschool, whether they received extra tuition, and whether they had learning materials.

Pre-school attendance: It was a dummy variable coded '1' if the pupil attended a preschool and '0' if they did not. However, SACMEQ II surveys did not collect this information.

Extra tuition: It was a dummy variable coded '1' if a pupil had extra tuition for the subject and '0' if they did not.

Pupil learning resources: It was a sum of at least one of eight essential learning materials: an exercise book, a notebook, a pencil, a sharpener, an eraser, a ruler, a pen, and a file.

School environment: The variables in this category were a variety of school-related characteristics. They included class size, school resources, teacher experience, teacher behavior and attendance problems, whether the school had a feeding program, and whether parents made any financial contribution to schools, and pupil behavior problems.

Class size: Finn & Achilles (1999) define class size as the number of students regularly in a teacher's room for whom the teacher is responsible each day of the school year. I based this variable on information from Grade 6 reading teachers on the number of students in their class. I calculated the class size by dividing the total grade six enrollment by the number of grade six classes.

School resources: The SACMEQ data contains a variable on school resources, which is a composite measure of physical resources the availability of 22 facilities in a school. The facilities include a library, hall, staff room, office of the school head, storeroom, sports ground, garden, cafeteria, computers, and photocopiers, among others.

Teacher experience: The SACMEQ surveys have a teacher experience variable, measured in years.

Teacher education level: I coded the variable ‘0’ for primary graduate, ‘1’ for junior secondary, ‘2’ for senior secondary, ‘3’ A-level, and ‘4’ for a university graduate.

Availability of feeding program: It was a dummy-coded variable based on a school head response on the availability of a school-feeding program in the school. I coded the variable ‘1’ if there was a school feeding program and ‘0’ otherwise. SACMEQ II surveys did not collect this information

Student behavioral problem factor: The variable was the sum of behavioral problems among pupils such as lateness, skipping classes, class disturbance, abusive language, student theft, fighting, and vandalism.

Teacher behavioral problem factor: This variable was the sum of behavioral problems among teachers such as lateness, absenteeism, skipping classes, abusive language, drug abuse, and alcohol abuse.

Parent financial contribution factor: I calculated the sum of the presence of parents’ contribution towards fourteen school activities, including construction and maintenance of school buildings, construction, and repair of school furniture, provision of school meals, payment of examination fees, buying of textbooks, stationery and supplies, cost of teacher salaries, and extra-curriculum activities.

I used the weight variable available in the data—the sampling weight adjusted for missing data and differences in selection probabilities due to the multistage sampling design.

Table 6 provides a summary of the variables used for this study.

Table 6: List of variables, description, and measurement

	SACMEQ III	SACMEQ II	Variable Description	Type of Variable
Dependent variable	zralocp	zralocp	Standardized reading score	Continuous
Variable of focus	PSEX	psex	Pupil Gender	Dummy
	ZPSESSCR	zpsesscr	Pupil SES score	Continuous
	zsloc	zsloc	School located in town/city	Dummy
Control variables				
Individual and home variables	zpagemon	zpagemon	Pupil Age in Months	Continuous
	zprepeat	zprepeat	Repeated grade	Dummy
	zpenglis	zpenglis	Speak English outside school at home	Ordinal
	zptasktot	-	Household tasks (max=14)	Continuous
Personalized learning support	zpnurser	-	Pupil attended preschool	Dummy
	zpexteng	pexteng	Extra tuition English	Dummy
	zpextmat	pextmat	Extra tuition Math	
	zpmattot	zpmattot	Pupil lack of learning materials (max=8)	Continuous
School Environment	clsize	clsize	Class size	Ratio
	zsrtot22	zsrtot22	Total school resources (max=22)	Continuous
	zspupptot	zspupptot	Pupil behavioral problem (max=17)	Continuous
	zstchptot	zstchptot	Teacher behavioral problem (max=9)	Continuous
	SSFP	-	Feeding program	Dummy
	zscommtot	zscommtot	Financial contribution	Continuous
	XNUMYRS	xexper	Teaching experience for Reading teacher (years)	Continuous
	XQACADEM	xqacad	Reading teacher's level of education	Ordinal
	XSEX	xsex	Reading teacher gender	Dummy
	pweight2	pweight2	The weight variable	
Sample Size	KE N= 4436 UG N=5407 TZ N=4194	KE N=3299 UG N=2642 TZ N=2854		

3.3 Analytic framework

As discussed in chapters one and two, I investigated the implications of free fee primary education policies in East Africa on addressing access inequalities (by gender and socioeconomic status) and what that access meant for the quality of learning as measured by test scores nationally, and within rural and urban areas. Specifically, I sought to answer several questions as outlined in chapter two. To answer the questions, I carried out separate analyses for each country, but using identical approach. Separate analyses were feasible due to three reasons. First, the three countries have different historical, economic, and different expenditures on education. Second, there are substantial variations in the student and school sample sizes within and across the countries. Third, the countries eliminated fees at different times. Uganda was the first to implement FPE in 1997, Tanzania followed in 2001, and Kenya implemented its FPE in 2003. SACMEQ data was collected in 1995, 2000, 2007, and 2014⁷. Uganda waived school fees three years before the 2000 SACMEQ II surveys. During the 2007 SACMEQ surveys, Uganda was ten years into the free fee primary school education, while Kenya and Tanzania were four and six years, respectively (Table 7).

Table 7: Access policies and SACMEQ surveys

Country	Fee abolished in	SACMEQ II (2000) (Years since FPE)	SACMEQ III (2007) (Years since FPE)
Kenya	2003	-	4
Tanzania	2001	-	6
Uganda	1997	3	10

As Table 7 shows, there are six data points (two times in each of the three countries). In each of the data points, I reported on six things nationally, and in rural and urban areas (three on access and eight on quality of learning).

⁷ Currently, I do not have access to SACMEQ IV data, and Uganda and Tanzania did not participate in SACMEQ I. Therefore, the discussion is limited to SACMEQ II and III.

- i. Socioeconomic status composition
- ii. Gender Composition
- iii. Changes in school environment
- iv. Overall reading test scores
- v. Variation on reading test scores by socioeconomic status
- vi. Variation on reading test scores by gender

Equity implications of FPE policies on actual access: I assessed the implications of FPE on mitigating the inequality in access to schooling by focusing on the following questions.

National analysis over time

- a. How did the student composition in terms of SES and gender change over time in Kenya, Tanzania, and Uganda nationally and within rural and urban schools in Kenya after introducing FPE?
- b. Is there a pattern in the changes in student composition within each country over time as countries adjusted to the implications of FPE?

Cross-national analysis over time

- c. How did students' composition differ over time across Kenya, Tanzania, and Uganda?
- d. Is there a pattern from the cross-national comparisons overtime?

To answer these questions, I ran descriptive statistics, t-test, and analysis of variance (ANOVA) to estimate differences in access within and across groups. Besides, I also ran crosstabs between variables. For instance, SES by rural/urban, and gender by rural/urban divide.

Since the East African countries introduced access policies at different times, we would expect differential effects on school demographics (students' socioeconomic status, gender, and place of residence) within and across countries. In 2000, for instance, we would expect Uganda

to have more heterogeneous student demographics compared to Kenya and Tanzania, which had not implemented FPE policies. Besides, we would expect Kenya and Tanzania to have a more diverse student population in 2007 than in 2000.

Equity Implications of FPE policies on school environment: I examined the implications of the FPE policies on the school environment by focusing on the following questions:

- a. How did the school environment change over time nationally and within rural and urban schools after Kenya, Tanzania, and Uganda implemented FPE policies?
- b. How did the school environment changes differ over time across Kenya, Tanzania, and Uganda?

To answer these questions, I ran descriptive statistics and a t-test to test whether changes in the school environment were statistically significant. I also ran an analysis of variance to estimate whether the school environment differed across countries in 2000 and 2007.

Equity implications of FPE policies on quality of learning: I analyzed the implications of increased access due to FPE policies on learning quality by looking at the following questions.

National analysis overtime

- a. How did urbanicity-achievement gaps, SES-achievement gaps, and gender-achievement gaps change over time nationally in Kenya, Tanzania, and Uganda?
- b. How did SES-achievement gaps and gender-achievement gaps change over time within rural and urban schools in Kenya, Tanzania, and Uganda?
- c. Is there a pattern in these associations with achievement within each country over time?

Cross-national analysis over time

- d. How did urbanicity-achievement gaps, SES-achievement gaps, and gender-achievement gaps differ over time across Kenya, Uganda, and Tanzania?

- e. Is there a pattern from the cross-national comparisons overtime?

To answer the questions, I calculated the mean and standard deviation for the overall reading test scores in each country over time. In addition to descriptive statistics, I ran crosstabs or correlation between test scores and each of the variables of interest (SES, gender, and urbanicity). I also conducted a t-test to test if changes in reading scores were statistically significant and an analysis of variance to estimate whether the performance differed across the countries.

Further, I estimated Ordinary Least Squares (OLS) regression with standard errors clustered at the school level to investigate the possible factors among the main variables (SES and gender) and school environment indicators that explained the variation in reading performance within a specific year. Using clustered standard errors controlled for the fact that students are clustered within schools and ensured that the estimated standard error was robust. I analyzed rural and urban schools' performance differences separately.

I estimated a series of similar regression models for rural and urban schools in each year. In the first model, I controlled for the study's main variables (SES and gender), school characteristics, and student background characteristics. For pupil i , in school j , at time t , Z_{ijt} was the standardized reading score, where $t = 2000$ or 2007 . First, I estimated a model where I control for the study's main variables (SES and gender), a vector for pupil characteristics, personalized support, and home environment, C_{ijt} , and a vector for school environment characteristics, S_{jt} (equation 1). ε_{it} was a student-specific error term that represents unobservable variation across students.

$$Z_{ijt} = \beta_0 + \beta_1 SES_{ijt} + \beta_2 FEMALE_{ijt} + \beta_3 C_{ijt} + \beta_4 S_{jt} + \varepsilon_{it} \quad (1)$$

The main focus was on coefficients β_1 and β_2 . If coefficient β_1 was positive and significant, it indicated that the higher the pupil SES score is, the higher the test scores are likely to be. Besides, if coefficient β_2 was positive and significant, it indicated that being a female student is associated with higher test scores. Further, I discussed how the home and school characteristics influenced reading performance. However, these relationships were associations, not causation. It's hard to predict the relationship I expect to find between increased access and the learning outcomes as countries may have implemented measures (which are not the focus of this study) to mitigate the adverse effects of the influx of students in schools.

Lastly, I recognize that the variables I controlled for cannot fully account for how education outcomes changed over time and across countries. Such changes could be policy initiatives or other measures (beyond the scope of this study) that governments introduced and which, in one way or another, influenced education outcomes. To estimate how test scores varied over time and across countries after accounting for other variables, I introduced time and country dummies in the second model.

A time dummy variable provided an idea of how things changed over time after accounting for other variables. That is, it showed how reading test scores changed over time in ways that could not be explained by either the key variables (SES, urbanicity, and gender) or the control variables. I also introduced an interaction between the key variables and the time dummy to estimate how the influence of key variables on test scores varied overtime. For instance, to test whether SES's influence on reading in 2000 was different from SES's influence in 2007. In this case, I estimated equation (2), where Y is a year dummy variable.

$$Z_{ijt} = \beta_0 + \beta_1 Y + \beta_2 SES_{ijt} + \beta_3 FEMALE_{ijt} + \beta_4 Y * SES_{ij} + \beta_5 Y * FEMALE_{ij} + \beta_6 C_{ijt} + \beta_7 S_{jt} + \varepsilon_{ijt} \quad (2)$$

Coefficient β_1 indicated the amount of change in reading scores between 2000 and 2007 due to other reasons not accounted for in the model. Further, coefficients β_4 and β_5 showed how the influence of SES and gender on test scores, respectively, vary over time.

Similarly, I introduced country dummy variables to estimate how things changed across the three countries in model three. That is, how the test scores changed across countries in ways not explained by the variables I included in the specifications. I also added an interaction between the key variables and country dummies to test whether the relationships between the key variables and test scores are different across countries. Such interaction indicated whether, for instance, the influence of gender on test scores differed across countries. Here, I estimated equation (3), where X was a vector of country dummy variables.

$$Z_{ijt} = \beta_0 + \beta_1 X + \beta_2 SES_{ijt} + \beta_3 FEMALE_{ijt} + \beta_4 X * SES_{ij} + \beta_5 X * FEMALE_{ij} + \beta_6 C_{ijt} + \beta_7 S_{jt} + \varepsilon_{ijt} \quad (3)$$

Coefficient β_1 indicated the amount of difference in test scores between countries due to other reasons not accounted for in the model. Besides, coefficients β_4 and β_5 indicated how the relationships between SES, gender, and test scores varied across countries.

In cases where results indicated education outcomes varied over time and across countries due to other reasons not accounted for in the data, I reviewed the literature to understand what could have happened in the specific countries during those years. If I did not find an explanation from the literature, I acknowledged such limitations and recommended further research. To estimate equations (2) and (3), I combined the datasets for each country separately and then the three-country datasets together. I also ensured that the variables in both datasets had a similar name.

I estimated the descriptive statistics, correlations, t-test, analysis of variance, and the regression models about six times for each subject: for each of the three countries in 2000 and the same in 2007. I compared the results within and across countries during the specific year and overtime.

CHAPTER FOUR: ACCESS POLICIES AND CHANGES IN ACCESS, SCHOOL ENVIRONMENT AND QUALITY OF LEARNING WITHIN EAST AFRICAN COUNTRIES

Introduction

I present the findings to the research questions outlined in Chapter Three in Chapters Four and Five two chapters. As a reminder, I seek to understand how the access (Free Primary Education) policies in Kenya, Uganda, and Tanzania influenced the inequalities of access to schooling (by socioeconomic status, rural/urban divide, and gender) and what these changes in access meant for quality of learning as measured by test scores. Specifically, I present the results on how access to schooling, school environment, and reading performance changed after the countries implemented the FPE policies in the 1900s and 2000s. In this chapter, I focus on changes within each country, and in the following chapter, I compare these changes across the three countries. As discussed in the preceding chapters, I explore these issues by taking advantage of the Southern and Eastern Consortium for Monitoring Education Quality (SACMEQ) data collected in 2000 and 2007. The East African countries introduced the access policies at different times: Uganda in 1997, Tanzania in 2001, and Kenya in 2003. Therefore, Uganda waived school fees three years before the SACMEQ II surveys in 2000. During the 2007 SACMEQ surveys, Uganda was ten years into the free fee primary school education, while Kenya and Tanzania were four and six years, respectively.

I divide the chapter into three sections. In the first section, I focus on the FPE policy as it relates to access, school environment, and quality of learning changes within Kenya over time, and within Tanzania in section two, and Uganda in section three. I start each section with a

summary of how these aspects changed within each East African country nationally and how they changed in rural and urban areas, followed by a detailed discussion of such changes.

4.1 Changes in access, school environment and quality of learning in Kenya

Kenya's FPE policy increased access for students from low-income families between 2000 and 2007, especially in rural areas. However, there was no significant increase in school access in urban areas. I did not find any changes in girls' representation in schools in either rural or urban schools.

With more students accessing school, class sizes increased but school resources and the proportion of buildings in good condition declined, which suggests that the Kenyan government did not implement initiatives to improve school infrastructure and physical resources to cushion schools from the access shock. During the same period, the proportion of reading teachers with post-secondary education improved, but two in every three teachers lacked tertiary training. However, rural schools in Kenya had an inferior school environment compared to urban schools in 2000 and 2007. Urban schools had bigger classes (which indicates higher access), more school resources and buildings in good condition, and a higher proportion of reading teachers with post-secondary training. Therefore, the Kenyan government did not have equal investments in rural and urban schools before and after implementing the FPE policy.

While school access improved, the quality of learning, as measured by changes in reading performance, declined after Kenya implemented the FPE policy. The performance declined most among rural girls. However, I did not find evidence of a significant decline in performance among boys, or within SES categories.

When I analyze the data within the regression framework, I find that among the study's main variables (SES and gender), students from economically advantaged families performed

better than those from financially disadvantaged families before and after the policy was initiated. Further, the gender achievement gaps appeared in Kenya's rural schools after the country implemented the FPE policy, but there were no gender gaps in urban schools' reading performance in either year. Among the home factors, students' age, grade repetition, and speaking the language of instruction at home were essential predictors of rural and urban Kenyan students' achievement before and after the FPE policy implementation. Among the school covariates, only class size influenced rural students' performance before and after the policy, while school resources influenced students' scores only after the FPE policy.

Lastly, parents contributed less to school activities in Kenya after the country implemented the FPE policy. Since FPE policies were meant to reduce parents' financial burden in educating their children, these patterns align with how we would expect such contributions to change. I provide a detailed discussion of these findings in the following sections.

4.1.1 Changes in access to schooling in Kenya

This section seeks to answer the following research question:

- i. What implication did Free Primary Education policies in Kenya have for mitigating unequal access to schooling? Specifically, I ask:
 - a. How did the student composition in terms of SES and gender change over time nationally and within rural and urban schools in Kenya after introducing FPE?
 - b. Was there a pattern in student composition changes in the country over time as it adjusted to the implications of FPE?

I focus on overall changes in students' composition by socioeconomic status and gender, nationally and within rural and urban schools over the course of seven years.

Table 8 shows the student composition by socioeconomic status and gender in 2000 and 2007. It also indicates how students' SES and gender composition changed overtime in rural and urban areas in Kenya.

Table 8: Students' composition over time| Kenya

	<i>National</i>			<i>Rural</i>			<i>Urban</i>		
	<i>2000</i>	<i>2007</i>	<i>Change</i>	<i>2000</i>	<i>2007</i>	<i>Change</i>	<i>2000</i>	<i>2007</i>	<i>Change</i>
SES score	470.2	466.8	-3.40***	454.6	449.7	-4.9***	502.6	498.	-3.9
Proportion of girls in school	50	49	-1	49.6	50.6	1.0	52.2	46.8	-5.4
N	3282	4436		1818	2756		1464	1680	

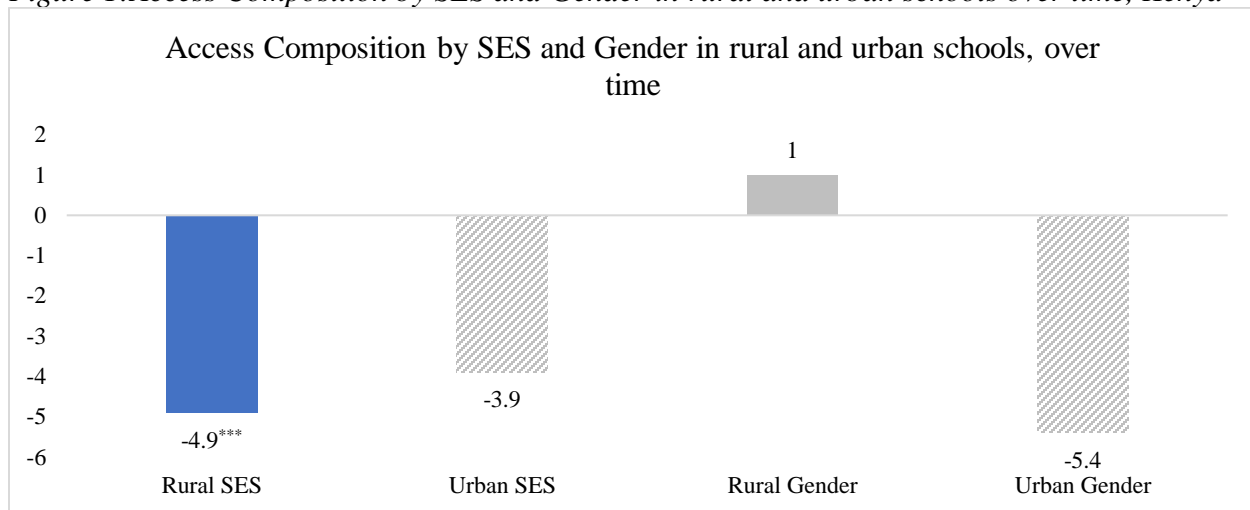
Key: (Green) implies improved access over time along the specific dimension; not colored implies the change between 2000 and 2007 was not statistically significant. I ran a t-test on whether 2000 and 2007 SES and gender by school location differences were statistically significant: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Changes in students' composition by SES

The average students' SES score in Kenya declined after the country implemented the FPE policy in 2003. It dropped by 3 points in seven years, from 470 in 2000 to 467 in 2007 (Table 8). This change implies that more Kenyan students from low-income families were in school in 2007 than in 2000. Therefore, as Kenya lowered the cost of schooling, more parents could afford to send their children to school.

Although the average SES within rural and urban schools was lower in 2007 than in 2000 (which was expected), rural schools had more students from low-income families over this period. The average SES within rural schools declined by 5 points from 454 to 449, but the change within urban schools was not statistically significant (Table 8 & Figure 1). This pattern implies that abolishing school fees increased access most for the rural poor in Kenya. While access among the urban poor increased, the change was not statistically significant.

Figure 1: Access Composition by SES and Gender in rural and urban schools over time, Kenya



Note: Gray color/pattern indicates the change was not significant. I ran a t-test on whether 2000 and 2007 SES and gender by school location differences were statistically significant: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Changes in students' composition by gender

The change in access to schooling by gender was not statistically significant in Kenya. The difference in gender composition in rural and urban schools indicates that girls' proportion in rural schools increased, but it decreased in urban schools between 2000 and 2007. However, these gender changes in rural and urban schools were not statistically significant (Table 8 & Figure 1).

4.1.2 Changes in school environment in Kenya

In this section, I discuss how the school environment changed nationally and within rural and urban schools after Kenya implemented the FPE policy. Specifically, I look at how some of the school variables changed between 2000 and 2007.

Changes in school environment nationally

Table 9 indicates that the average school resources, class size, and the proportion of school buildings in good condition declined between 2000 and 2007. The average amount of school resources declined slightly from 7.4 to 7.3. The average class size increased by 7 from 37

to 44, indicating that more students were in school after Kenya implemented the FPE policy. The proportion of school buildings in good condition decreased by 27 percentage points from 67% to 40%. This pattern suggests that although more students accessed school, the Kenyan government did not implement initiatives to improve school infrastructure after abolishing school fees. The proportion of reading teachers with at least post-secondary training and parents' financial contributions improved between 2000 and 2007. Although the proportion of reading teachers with at least post-secondary training increased, most teachers did not have post-secondary training. The proportion of reading teachers with at least post-secondary training grew by 10 percentage points from 21% to 31%. Parents contributed less to school activities in Kenya after the country implemented FPE policies. They contributed to an average of 9 out of 14 activities in 2000 and to only 5 in 2007 (Table 9). Since FPE policies were meant to reduce parents' financial burden of educating their children, these patterns align with how we would expect such contributions to change.

Table 9: Changes in school environment over time, Kenya

	National			Rural			Urban		
School characteristics	2000	2007	Change	2000	2007	Change	2000	2007	Change
Total school resources	7.44	7.37	-0.07***	6.75	6.51	-0.24***	8.863	8.96	0.097
Class size	37.17	44.46	7.29***	36.87	41.93	5.06***	37.78	49.18	11.4***
Buildings in good condition	67	40	-27***	62.5	33.8	-28.7***	76.8	51.5	-25.3***
Reading teachers with post-secondary	21	31	10***	20.6	25.8	5.2***	21.0	41.3	20.3***
Parents' financial contribution	9.11	4.94	-4.17***	9.46	4.92	-4.535***	8.41	4.98	-3.431***
N	3282	4436		1818	2756		1464	1680	

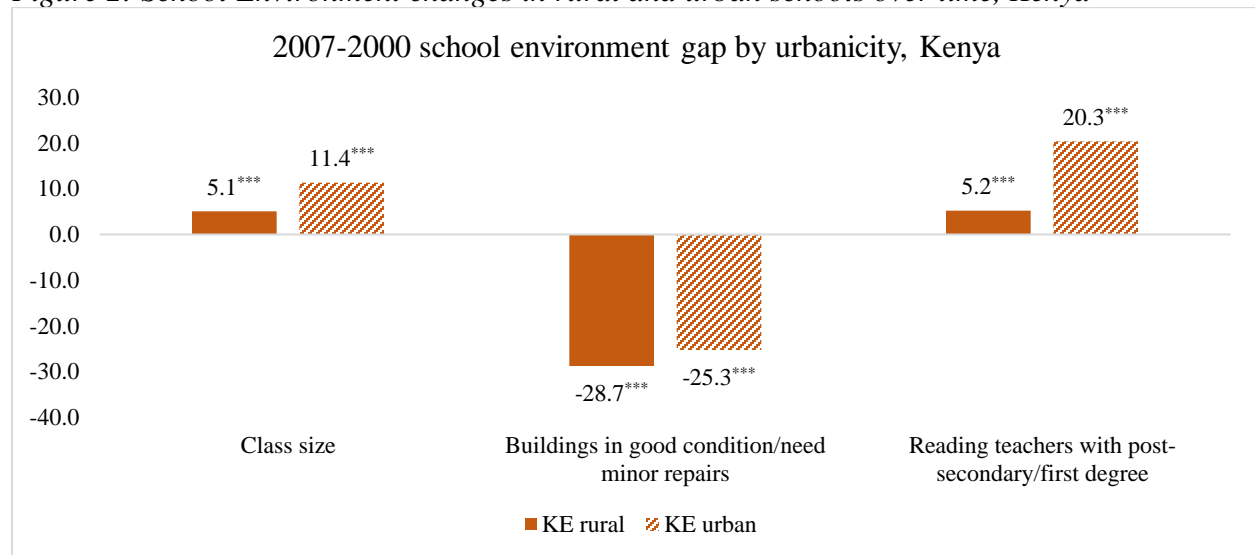
Key: (Green) (Green) Implies school environment improved over time; (Red) (Red) implies school environment worsened over time along specific dimension; not colored implies the change between 2000 and 2007 was not statistically significant
Standard deviation in parentheses. I conducted a t-test on whether 2000 and 2007 differences were statistically significant: * $p < .05$; ** $p < .01$; *** $p < .001$

Changes in rural and urban schools' environment

In this section, I discuss how rural and urban school environments changed after Kenya implemented its FPE policy. I did not include the changes in school resources and parents' financial contribution in the charts as the numbers were small.

Rural schools in Kenya had an inferior school environment compared to urban schools in 2000 and 2007. Urban schools had bigger classes implying higher access, more buildings in good condition, and a higher proportion of reading teachers with post-secondary training (Table 9 & Figure 2).

Figure 2: School Environment changes in rural and urban schools over time, Kenya



Note: I conducted a t-test on whether 2000 and 2007 differences were statistically significant: * $p < .05$; ** $p < .01$; *** $p < .001$

Most of the school characteristics changed within rural and urban schools between 2000 and 2007 are statistically significant. The rural and urban schools' class sizes were bigger in 2007 than in 2000, but the increase was greater in urban schools. This connotes that school access increased more in urban than rural schools in Kenya. As discussed earlier, school infrastructural development decreased in Kenya, but it declined more in rural schools than urban ones. The proportion of reading teachers with at least post-secondary training increased more in urban schools. These patterns indicate that the Kenyan government did not have equal investments in rural and urban schools before and after implementing the FPE policy.

4.1.3 Changes in quality of learning in Kenya

In this section, I investigate the implication of increasing access to education due to FPE policy on the quality of learning as measured by reading test scores. Specifically,

- a. How did urbanicity-achievement gaps, SES-achievement gaps, and gender-achievement gaps change nationally in Kenya from 2000 to 2007?
- b. How did SES-achievement gaps and gender-achievement gaps change within rural and urban schools in Kenya from 2000 to 2007?
- c. Was there a reading performance pattern in these associations within the country from 2000 to 2007?

To answer these questions, I divide this section into two parts. In the first part, I provide descriptive statistics on how reading scores changed nationally and in rural and urban schools over time. In the second section, I present the regression results and explore the possible factors that explain the variations in reading scores within rural and urban schools.

4.1.3.1. Changes in reading performance in Kenya

Table 10 provides Kenya's national average reading performance scores and the performance by SES, gender, and school location in 2000 and 2007. It also indicates how the reading scores varied by SES and gender within rural and urban schools over time. The national average reading achievement decreased by 3 points from 546 in 2000 to 543 in 2007. The average reading scores within rural and urban areas declined, but the changes were not statistically significant.

Table 10: Reading performance in 2000 and 2007, Kenya

Table 10: Reading performance in 2000 and 2007, Kenya											
National Performance											
2000	2007	change									
546.5	543.3	-3.2*									
National performance by urbanicity											
Rural			Urban								
2000	2007	Change	2000	2007	Change						
530.8	525.6	-5.2	578.9	575.6	-3.3						
National performance by SES											
Lowest			Highest								
2000	2007	Change	2000	2007	Change						
516.2	516.8	0.6	614.7	608.3	-6.4						
Performance in rural and urban schools by SES											
Rural						Urban					
Lowest			Highest			Lowest			Highest		
2000	2007	Change	2000	2007	Change	2000	2007	Change	2000	2007	Change
514.8	516.5	1.7	590.8	573.3	-17.5	522.1	518.0	-4.1	628.4	629.7	1.3
National performance by Gender											
Boy			Girl								
2000	2007	Change	2000	2007	Change						
546.4	544.1	-2.3	546.6	542.1	-4.5***						
Performance in rural and urban schools by Gender											
Rural						Urban					
Boy			Girl			Boy			Girl		
2000	2007	Change	2000	2007	Change	2000	2007	Change	2000	2007	Change
532.1	527.7	-4.4	529.5	523.6	-5.9***	577.6	572.4	-5.2	580.1	579.3	-0.8

Key: (Red) implies change worsened over time

Standard deviation in parentheses. I conducted a t-test on whether 2000 and 2007 differences were statistically significant: * p < .05; ** p < .01; *** p < .001. I also ran a t-test on whether 2000 and 2007 achievement differences by SES, gender, and urbanicity were statistically significant: * p < 0.05, ** p < 0.01, *** p < 0.001

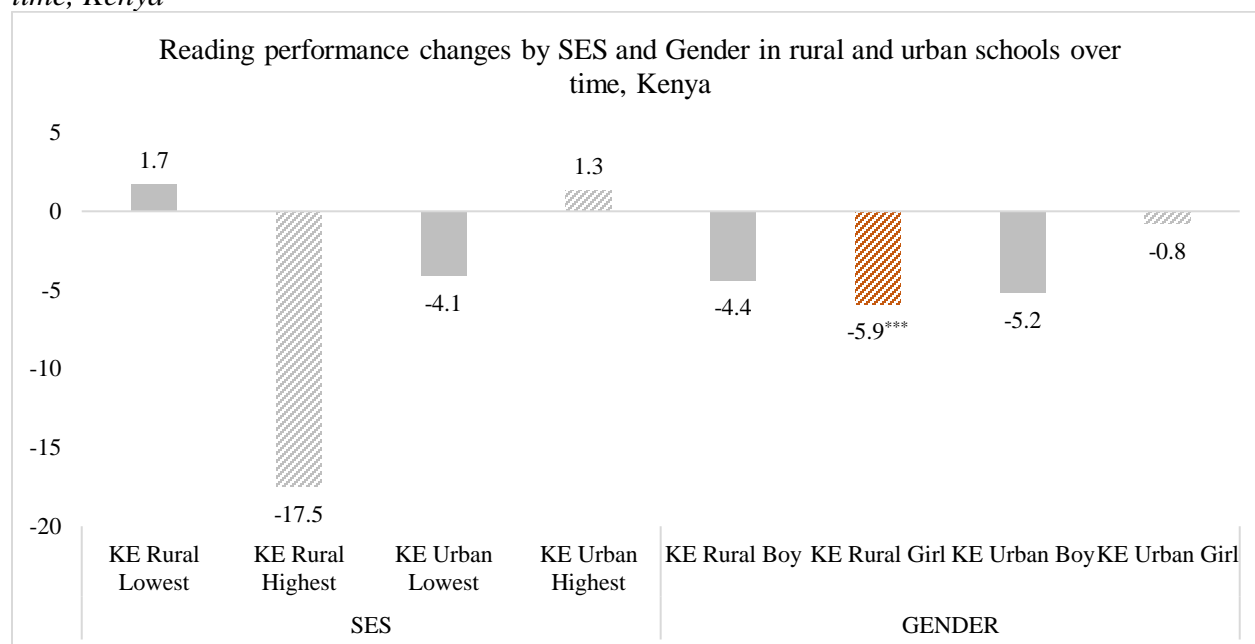
Changes in reading performance by SES

Students from high-income families performed better than those from low-income families in 2000 and 2007. The lowest SES group represents pupils at the 25th percentile and below, while the highest SES group represents pupils from the 75th percentile. Student performance from the lowest SES improved, while that of students in the highest SES worsened between 2000 and 2007, but the changes were not statistically significant (Table 10).

Comparing reading performance by SES within rural and urban schools over time provides interesting findings. The performance of the rural poor improved while that of the rural rich declined. In urban schools, the performance of the urban poor worsened, and that of the

urban rich improved. However, over the seven-year period, reading performance changes in rural and urban schools were not statistically significant (Table 10 & Figure 3).

Figure 3: Reading performance changes by SES and Gender in rural and urban schools over time, Kenya



Note: Gray color/pattern indicates the change was not significant. I run a t-test on whether the achievement gaps within the categories over time were statistically significant: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Changes in reading performance by gender

In terms of gender, girls' performance reduced by 4 points from 546 in 2000 to 542 in 2007, but the boys' decline in reading scores was not statistically significant (Table 10). Reading scores of rural and urban boys and girls worsened over time, but only the rural girls' performance change was statistically significant. Their reading scores reduced by 6 points over the seven-year period (Table 10 & Figure 3).

These patterns suggest that reading scores did not statistically change among the economically advantaged and disadvantaged students or rural and urban students. However, girls' scores declined after Kenya implemented its FPE policy, but boys' performance did not

statistically change. The decline in performance was higher among rural girls than their urban counterparts.

4.1.3.2. Influence of main variables and school environment on reading in Kenya

The above discussion indicates that there were reading score disparities in rural and urban schools in 2000 and 2007. In this section, I investigate the possible factors among the main variables and school environment indicators that explain the variation in reading performance within a specific year. I also examine whether other factors not accounted for in the analysis explain the changes in rural and urban schools' performance between 2000 and 2007. I analyzed rural and urban schools' performance differences separately. I estimated an ordinary linear regression (OLS) specification with standard errors clustered at the school level for each year in rural and urban schools. I will start by providing the summary statistics of all the factors I controlled for in the regression analysis. I will briefly describe the changes in students' characteristics and support in 2000 and 2007 since I discussed the other factors in previous sections.

Table 11: Summary statistics of variables included in regression analysis, Kenya

	Rural			Urban		
Main independent variables	2000	2007	Change	2000	2007	Change
SES score	454.6	449.7	-4.9***	502.6	498.	-3.9
Proportion of girls in school	49.6	50.6	1.0	52.2	46.8	-5.4
Student characteristics and support						
Pupil age in months	170.5	166.2	-4.3***	164.2	163.2	-1
Grade repetition (%)	67.2	51.4	-15.8***	57.3	42.2	-15.1***
Speak English at home (%)	85.4	88.8	3.4***	88.1	94.8	6.7***
Extra Reading Tuition (%)	41.6	55.1	13.5***	50.5	64.8	14.3***
Total pupil learning material	4.97	5.82	0.848***	4.82	6.02	1.205***
School characteristics						
Total school resources	6.75	6.51	-0.24***	8.863	8.96	0.097
Class size	36.87	41.93	5.06***	37.78	49.18	11.4***
Buildings in good condition	62.5	33.8	-28.7***	76.8	51.5	-25.3***
Reading teachers with post-secondary	20.6	25.8	5.2***	21.0	41.3	20.3***
Parents' financial contribution	9.46	4.92	-4.535***	8.41	4.98	-3.431***
N	1818	2756		1464	1680	

Key: (Green) Implies school environment improved over time; (Red) implies school environment worsened over time along specific dimension; not colored implies the change between 2000 and 2007 was not statistically significant Standard deviation in parentheses. I conducted a t-test on whether 2000 and 2007 differences were statistically significant: * p < .05; ** p < .01; *** p < .001

The average students' age and grade repetition were lower in 2007 than in 2000, but the decrease was greater in rural schools (Table 11). Therefore, although Kenya's rural schools had an inferior school environment, parents enrolled students in school on time and teachers ensured that fewer students repeated grades. The proportion of students who spoke the language of instruction at home and received tuition increased, but the increase was higher in urban schools than in rural ones. Urban areas had more ethnically diverse communities, which could explain why the urban school students were more likely to speak English at home. Lastly, students had more learning materials in 2000 than in 2007, but the increase was higher in urban schools than rural ones (Table 11).

Influence of main variables and school environment on reading performance in rural schools

Columns 1 and 2 in Table 12 show the association between rural students' reading performance, this study's main variables, and school and home factors in 2000 and 2007, respectively. The results indicate that the higher the family SES score, the higher the student's reading score was after controlling for gender, home, and school factors. Boys performed better than girls in 2007, but there was no statistically significant difference in reading scores between boys and girls in 2000. This pattern suggests that gender gaps in rural students' reading scores appeared after Kenya implemented the FPE policy. However, the SES-achievement gaps in Kenya's rural schools existed even before the FPE policy.

Concerning pupil characteristics and the learning support they received, pupil's age, grade repetition, speaking the language of instruction at home, and availability of learning materials influenced reading performance (Columns 1 and 2, Table 12). The older the student was in 2000 and 2007, the lower the reading score was likely to be. Students who spoke the language of instruction at home in both years performed better than those who did not. Further,

students who had more learning materials had higher reading scores in 2000 than those who had less. Learning resources did not influence reading achievement in 2007. Lastly, rural students who repeated a grade in 2007 were more likely to perform poorly than those who did not repeat. However, performance did not vary for grade repeaters in 2000. The only factor that did not influence rural students' reading performance in either year was receiving extra tuition.

Table 12: Association between main variables, school environment and reading achievement in Rural schools 2000 and 2007, Kenya

	(1) Home and school factors Rural 2000	(2) Home and school factors Rural 2007	(3) With year dummy Rural	(4) Interaction of main vars & Year dummies Rural
Pupil SES score	0.181**	0.163**	0.172***	0.189**
Female	-7.787	-10.61**	-9.964**	-8.960*
Pupil's age in months	-1.012***	-0.903***	-0.943***	-0.942***
Grade repetition	-3.094	-10.12*	-5.95	-5.89
Speaking language of instruction at home	20.46*	22.36**	22.53***	22.49***
Extra Reading Tuition	1.579	3.594	2.004	1.976
Total pupil learning material	4.963*	-1.348	0.175	0.187
Class size	-1.060**	-0.619*	-0.732***	-0.732**
Total school resources [max=22]	1.399	2.531	1.683	1.64
School buildings condition	10.28	-6.084	3.853	3.797
Total parents' financial contribution	-0.872	0.29	-1.496	-1.482
Reading Teacher Years of Teaching	0.0922	0.381	0.444	0.453
Reading Teacher Academic Qualification	-7.988	19.34*	10.02	10.11
Year 2007			-8.442	5.5
2007 # Pupil SES score				-0.0287
2007 # girl				-1.746
constant	677.7***	547.4***	612.5***	589.7***
R-squared	0.232	0.153	0.156	0.156
N	1691	2756	4447	4447

Notes: Regressions were estimated with standard errors clustered at the school level and sampling weights to produce robust estimates of standard errors and make estimates nationally representative. Other variables included in regressions are teacher's gender, student behavioral problems, and teacher's behavioral problems. * p < 0.05, ** p < 0.01, *** p < 0.001

Regarding the school characteristics, only class size and teacher qualification influenced rural Kenyan students' reading scores (Columns 1 and 2, Table 12). The larger the class that a student attended in 2000 and 2007, the lower their reading score was likely to be. Besides, students taught by teachers with higher academic qualifications were likely to have higher reading scores. However, teacher qualification did not influence reading scores in 2000. Reading scores in 2000 and 2007 did not vary based on school resources, school buildings' condition, the teacher's experience, or parents' financial contributions.

The year dummy coefficient is not statistically significant (columns 3, Table 12). This implies that rural students' reading scores in Kenya did not decline between 2000 and 2007 due to other factors not accounted for in the model. Besides, the interaction between the study's main variables and year dummies is not statistically significant (columns 4, Table 12), which suggests that the influence of SES and gender on rural students' reading performance in 2000 and 2007 did not vary due to other reasons not accounted for in the specifications.

Influence of main variables and school environment on reading performance in urban schools

Columns 1 and 2 in Table 13 show the association between urban students' reading performance, the study's main variables, and school and home factors in 2000 and 2007, respectively. The results indicate that the higher the family SES score, the higher the student's reading score was likely to be in both years after controlling for gender, home, and school factors. Unlike in rural schools, urban students' reading performance did not vary by gender. This pattern reveals that the SES-achievement gaps among urban students continued even after Kenya implemented the FPE policy. However, there were no gender-achievement gaps among urban students before and after the policy.

Concerning pupil characteristics and the learning support they received, pupil's age, grade repetition, speaking the language of instruction at home, and learning materials' availability influenced reading performance (Columns 1 and 2, Table 13). In 2000 and 2007, urban Kenyan students who were younger, did not repeat a grade, or spoke the language of instruction at home performed better than those who were older, repeated grades, or did not speak the language of instruction at home, respectively. Further, students who had more learning materials had higher reading scores in 2000 than those who had less. Learning resources did not

influence reading achievement in 2007. As in rural schools, receiving extra tuition was the only factor that did not influence urban students' reading performance in either year.

Table 13: Association between main variables, school environment and reading achievement in Urban schools 2000 and 2007, Kenya

	(1) Home and school factors Urban 2000	(2) Home and school factors Urban 2007	(3) With year dummy Urban	(4) Interaction of main vars & Year dummies Urban
Pupil SES score	0.359***	0.247***	0.333***	0.349***
Female	-1.325	-6.469	-3.662	1.084
Pupil's age in months	-1.084***	-1.016***	-1.033***	-1.038***
Grade repetition	-15.91*	-22.95***	-21.70***	-21.66***
Speaking language of instruction at home	24.04*	26.10*	26.57**	26.60**
Extra Reading Tuition	13.89	3.731	10.55	10.34
Total pupil learning material	5.934*	0.684	1.19	1.234
Class size	-0.66	-0.482	-0.478	-0.487
Total school resources [max=22]	4.096	5.487*	4.709**	4.723**
School buildings condition	-11.94	5.665	-1.306	-1.183
Total parents' financial contribution	-1.471	-0.083	-0.248	-0.233
Reading Teacher Years of Teaching	-0.446	0.0599	-0.0851	-0.075
Reading Teacher Academic Qualification	0.89	-7.892	-6.215	-6.27
Year 2007			-3.376	12.88
2007 # Pupil SES score				-0.0241
2007 # girl				-7.847
constant	541.6***	651.9***	578.6***	552.7***
R-squared	0.313	0.395	0.341	0.342
N	1391	1680	3071	3071

Notes: Regressions were estimated with standard errors clustered at the school level and sampling weights to produce robust estimates of standard errors and make estimates nationally representative. Other variables included in regressions are teacher's gender, student behavioral problems, and teacher's behavioral problems. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Like in rural schools, the year dummy coefficients are not statistically significant (columns 3, Table 13). This implies that urban students' reading scores did not decline between 2000 and 2007 due to other factors not accounted for in the model. Additionally, the interaction between the study's main variables and year dummies is not statistically significant (columns 4, Table 13), suggesting that the effect of SES and gender on urban Kenyan students' reading performance in 2000 and 2007 did not vary due to other reasons not accounted for in the model.

4.2 Changes in access, school environment and quality of learning in Tanzania

I found evidence that as Tanzania lowered the cost of schooling, more low-income families sent their children to school, which increased school access from 2000 to 2007.

However, unlike Kenya, abolishing school fees increased access more among the urban poor in Tanzania. Urban schools had more socio-economically diverse students in 2007 than rural schools. I did not find any significant changes in girls' representation in schools in either rural or urban schools, which was similar to my findings for Kenya.

With more students accessing school after Tanzania implemented the FPE policy in 2001, class sizes increased, but school resources and the proportion of buildings in good condition declined. During the same period, there was no significant increase in the proportion of reading teachers with post-secondary education. This tells us that, as in Kenya, the Tanzanian government did not implement initiatives to improve school infrastructure and human resources to accommodate the increased access to schooling. Rural schools in Tanzania had an inferior school environment compared to urban schools in 2000 and 2007. Urban schools had bigger classes, which suggest higher access, more school resources, more buildings in good condition, and a higher proportion of reading teachers with post-secondary training. Therefore, like Kenya the Tanzanian government also did not invest equally in rural and urban schools before and after implementing the FPE policy.

As access to schooling increased in Tanzania, the quality of learning measured by changes in reading performance improved, mostly among rural children from low-income families. Therefore, Tanzania's economically disadvantaged children benefited most from the elimination of mandatory school fees, as the policy enabled them to access school, leading to improvement of their reading performance.

When I analyzed the data within the regression framework, I found that among the study's main variables (SES and gender), students from economically advantaged families performed better than those from financially disadvantaged ones. Boys performed better than

girls in reading in rural schools in both years, but the urban students' performance did not vary by gender. Therefore, unlike Kenya—where rural schools' gender-achievement gaps appeared after the implementation of FPE policy—there were gender gaps in Tanzania's rural schools, but not in urban ones, before and after the government implemented its FPE policy. In Tanzania, SES- achievement gaps continued in both rural and urban schools after the country abolished mandatory fees.

Among the home covariates, grade repetition and speaking the language of instruction at home were essential predictors of rural and urban Tanzanian students' reading achievements before and after the FPE policy implementation. Interestingly, rural and urban student's performance before and after the FPE policy did not vary by any of the school covariates. This is surprising since the rural and urban students' reading scores improved between 2000 and 2007.

As in Kenya, Tanzanian parents contributed less to school activities after the country implemented the FPE policy. Since the government implemented the policy to reduce parents' financial burdens for educating their children, this pattern matches the changes we would expect to see. I provide a detailed discussion of these findings in the next sections.

4.2.1 Changes in access to schooling in Tanzania

I focus on overall changes in students' composition by socioeconomic status and gender, nationally and within rural and urban schools. Table 14 shows the student composition by socioeconomic status and gender in 2000 and 2007. It also indicates how students' SES and gender composition changed over time in rural and urban areas in Tanzania.

Table 14: Student composition in rural and urban schools over time/ Tanzania

	National			Rural			Urban		
	2000	2007	Change	2000	2007	Change	2000	2007	Change
SES score	450.0	434.2	-15.80***	427	419	-8.0***	507.4	467	-40.4***
Proportion of girls in school	52	51	-1	52.3	50.4	-1.9	52.1	52.0	-0.1
N	3282	4436		1818	2756		1464	1680	

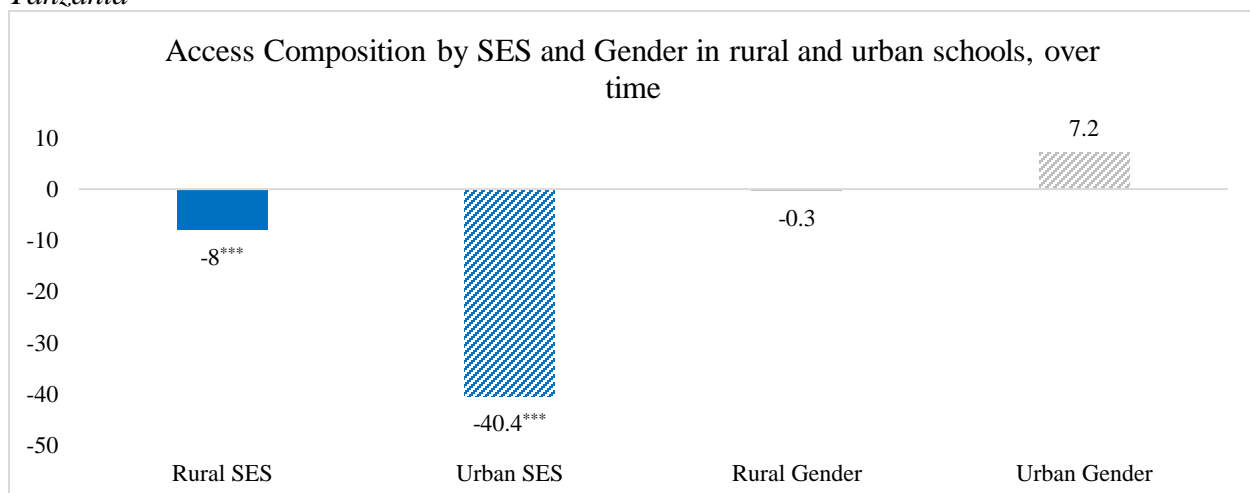
Key: (Green) implies improved access over time; not colored implies the change between 2000 and 2007 was not statistically significant. Standard deviation in parentheses. I ran a t-test on whether 2000 and 2007 SES and gender by school location differences were statistically significant: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Changes in students' composition by SES

The average students' SES score in Tanzania fell by 16 points from 450 in 2000 to 434 in 2007 after implementing the FPE policy in 2001 (Table 14).

Changes in students' composition by SES within rural and urban schools were statistically significant. In both cases, there were more students from disadvantaged backgrounds in 2007 than there were in 2000. However, urban schools had a greater decline in average SES than rural schools. The average SES in urban schools declined by 40 points from 507 in 2000 to 427 in 2007, while that of rural schools fell by 8 points from 427 to 419 (Table 14 & Figure 4). This implies that abolishing school fees in Tanzania increased access most among the urban poor. The urban schools had more diverse students in 2007 relative to their rural counterparts.

Figure 4: Access Composition by SES and Gender in rural and urban schools over time, Tanzania



Note: Gray color/pattern indicates the change was not significant. I ran a t-test on whether 2000 and 2007 SES and gender by school location differences were statistically significant: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Changes in students' composition by gender

In Tanzania, the change in national access to schooling by gender and the change in gender composition within urban and rural schools were not statistically significant. Further, there was no statistically significant difference in average SES within gender categories (Table 14 & Figure 4).

4.2.2 Changes in the school environment in Tanzania

In this section, I discuss how the school environment changed nationally and within rural and urban schools after Tanzania implemented the FPE policy. Specifically, I look at how school characteristics changed between 2000 and 2007.

Changes in school environment nationally

Table 15 indicates the changes in Tanzania's school environment in 2000 and 2007. As in Kenya, the average school resources, class sizes, and the proportion of school buildings in good condition declined. However, the proportion of reading teachers with at least post-secondary training and parents' financial contributions improved over time. The average school resources reduced from 5.5 in 2000 to 4.9 in 2007. The average class size increased by 13 from 42 to 55, connoting that more students were in school in 2007. The proportion of school buildings in good condition fell by 9 percentage points from 50% to 42%. This suggests that the Tanzanian government did not improve school infrastructure to accommodate the increased access to schooling after implementing its policy.

A very small proportion (at most 4%) of Tanzania's reading teachers had at least a post-secondary education. Parents contributed less to school activities in Tanzania after the country implemented FPE policies. They contributed to an average of 6 out of 14 activities in 2000 and 4 in 2007 (Table 15). Since FPE policies were meant to reduce parents' financial burdens in

educating their children, these patterns align with the way we would expect such contributions to change.

Table 15: Changes in school environment over time, Tanzania

	National			Rural			Urban		
School characteristics	2000	2007	Change	2000	2007	Change	2000	2007	Change
Total school resources	5.55	4.93	-0.62***	5.05	4.70	-0.35***	6.80	5.44	-1.36***
Class size	42.12	55.1	12.98***	37.88	51.08	13.2***	52.73	63.77	11.04***
Buildings in good condition	50	41	-9***	45.7	40.5	-5.2*	58.9	43.3	-15.6***
Reading teachers with post-secondary	3	4	1	3.0	0.9	-2.1***	1.2	9.8	8.6***
Parents' financial contribution	6.30	4.73	-1.57***	6.17	4.70	-1.474***	6.63	4.80	-1.83***
N	2854	4194		2179	2938		675	1256	

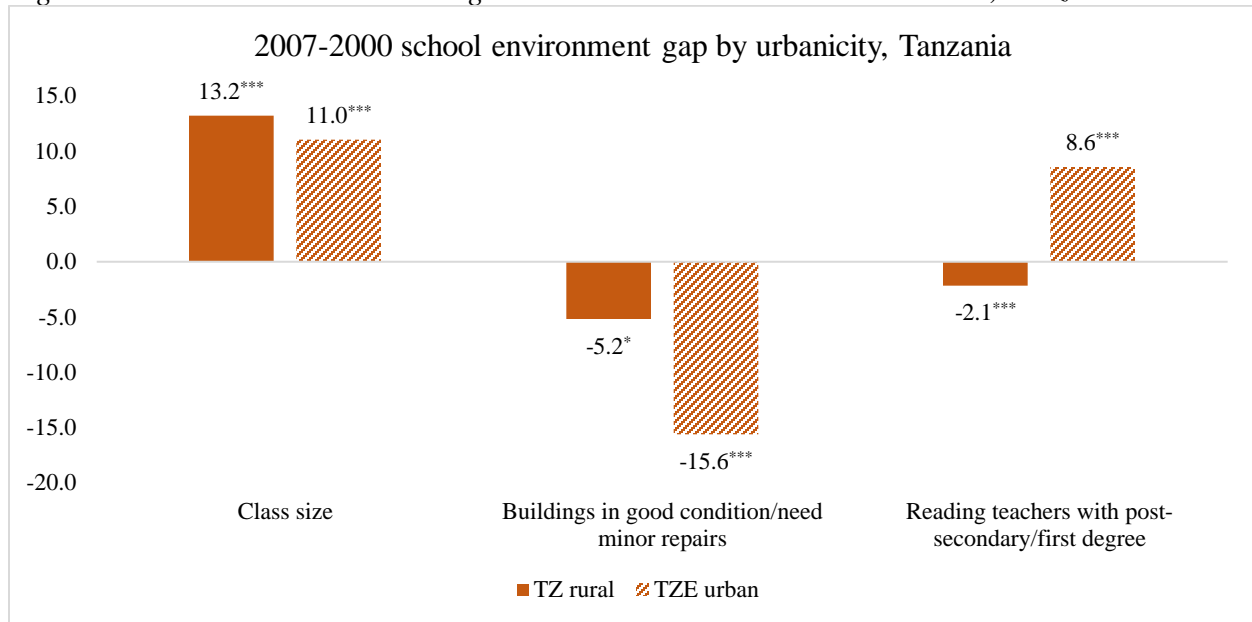
Key: (Green) Implies school environment improved over time; (Red) implies school environment worsened over time along specific dimension; not colored implies the change between 2000 and 2007 was not statistically significant
Standard deviation in parentheses. I conducted a t-test on whether 2000 and 2007 differences were statistically significant: * p < .05; ** p < .01; *** p < .001

Changes in rural and urban schools' environment

Like in Kenya, Tanzania's rural schools had an inferior school environment compared to urban schools in both years. Urban schools had bigger classes (implying more access), more buildings in good condition, and a higher proportion of reading teachers with at least post-secondary training except in 2000, when rural schools had a higher proportion of reading teachers with at least post-secondary training (Table 15).

Most of the school characteristic changes within rural or urban schools between 2000 and 2007 are statistically significant. Class sizes increased more in rural areas, while buildings in good condition declined more in urban areas. The proportion of reading teachers with post-secondary education increased in urban schools but decreased in rural ones (Table 15 & Figure 5). These patterns indicate that the Tanzanian government did not provide equal investments in rural and urban schools before and after implementing the FPE policy.

Figure 5: School Environment changes in rural and urban schools over time, Tanzania



Note: I conducted a t-test on whether 2000 and 2007 differences were statistically significant: * $p < .05$; ** $p < .01$; *** $p < .001$

4.2.3 Changes in quality of learning in Tanzania

In this section, I investigate the implication of increasing access to education due to FPE policy on the quality of learning as measured by reading test scores. I divide the section into two parts. I examine how reading scores changed nationally and in rural and urban schools over time in the first part. In the second section, I present the regression results and explore the possible factors that can explain the variations in reading scores within rural and urban schools.

4.2.3.1 Changes in reading performance in Tanzania

Table 16 provides Tanzania's national average reading performance scores by SES, gender, and school location in 2000 and 2007. It also indicates how the reading scores varied by SES and gender within rural and urban schools over time. The national average reading achievement improved by 31 points from 546 in 2000 to 577 in 2007. The average reading scores within rural and urban schools improved over time, but that of rural students improved by 29 more points. It improved by 38 points in rural schools and 8 points in urban ones (Table 16).

Table 16: Reading performance in 2000 and 2007, Tanzania

National Performance											
2000	2007	change									
546.2	577.8	31.6***									
National performance by urbanicity											
Rural			Urban								
2000	2007	Change	2000	2007	Change						
525.1	563.9	38.8***	597.9	607.6	8.7***						
National performance by SES											
Lowest			Highest								
2000	2007	Change	2000	2007	Change						
500.0	555.4	55.4***	595.8	613.0	17.2***						
Performance in rural and urban schools by SES											
Rural						Urban					
Lowest			Highest			Lowest			Highest		
2000	2007	Change	2000	2007	Change	2000	2007	Change	2000	2007	Change
498.2	549.0	50.8***	565.8	595.7	29.9***	531.5	581.3	49.8***	609.8	622.8	13***
National performance by Gender											
Boy			Girl								
2000	2007	Change	2000	2007	Change						
554.3	586.1	31.8***	538.2	569.7	31.5***						
Performance in rural and urban schools by Gender											
Rural						Urban					
Boy			Girl			Boy			Girl		
2000	2007	Change	2000	2007	Change	2000	2007	Change	2000	2007	Change
536.3	574.8	38.5***	514.8	553.3	38.5***	599.1	611.5	12.4***	596.8	604.0	7.2***

Key: (Green) implies change improved over time; not colored implies the change between 2000 and 2007 was not statistically significant.

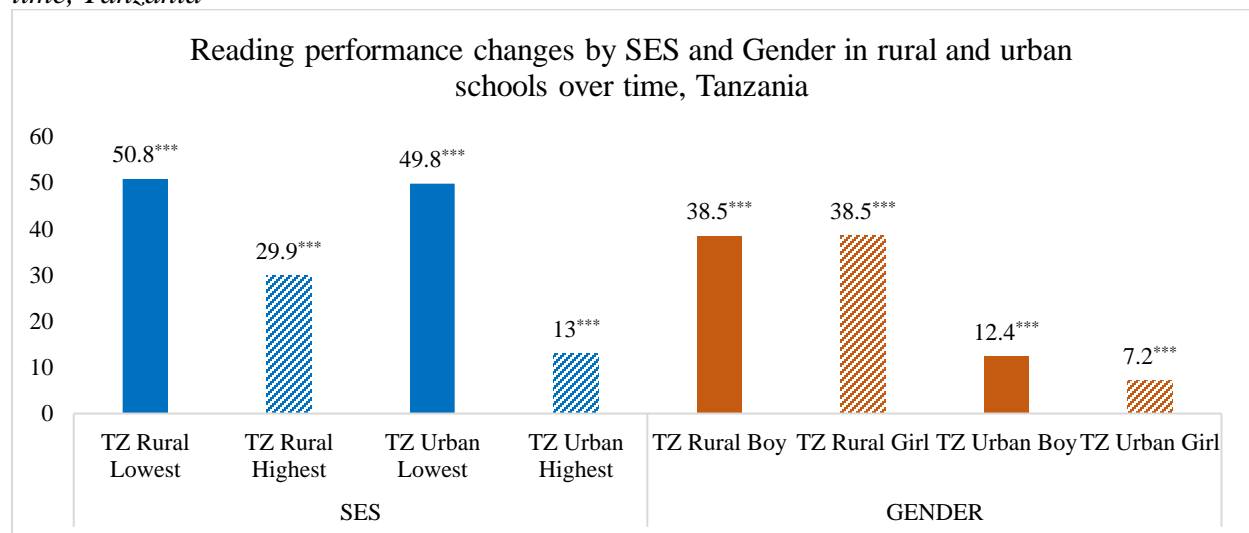
Standard deviation in parentheses. I conducted a t-test on whether 2000 and 2007 differences were statistically significant: * $p < .05$; ** $p < .01$; *** $p < .001$. I also ran a t-test on whether 2000 and 2007 achievement differences by SES, gender, and urbanicity were statistically significant: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Changes in reading performance by SES

Students from high-income families performed better than those from low-income families in both 2000 and 2007. Unlike in Kenya, in Tanzania, reading scores of lowest and highest SES students improved, but they improved more among the lowest-SES category. Tanzanian students' average reading scores from low-income families improved by 38 points more than that of high-income families. It improved by 55 points among students in the lowest SES category and by 17 points among their counterparts in the highest SES category (Table 16).

Comparing reading performance by SES in rural and urban schools over time indicates that scores improved within all SES categories. As in the national average performance, the reading scores improved more among the rural and urban poor than among their wealthy counterparts. In rural schools, scores of the rural poor improved by 50 points while that of the rural rich improved by 29 points. In urban schools, they improved by 49 points among the urban poor and 13 points among the urban rich (Table 16 & Figure 6).

Figure 6: Reading performance changes by SES and Gender in rural and urban schools over time, Tanzania



I run a t-test on whether the achievement gaps within the categories over time were statistically significant: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Changes in reading performance by Gender

Boys' and girls' reading performance improved between 2000 and 2007 by almost equal points. That of boys improved by 31.8 points and that of girls by 31.5 points (Table 15).

Comparing reading performance by gender within rural and urban schools over time indicates that scores improved within all gender categories. It increased by equal points (38.5) among boys and girls in rural schools. However, boys had higher reading scores than girls in both years. In urban schools, boys' performance improved more than that of girls. The reading scores increased by 12 points among urban boys and 7 points among urban girls (Table 16 & Figure 6).

These patterns suggest that, although academic performance improved over time within all categories, the reading scores increased more among rural students and low-income families nationally and in rural and urban schools after Tanzania implemented the FPE policy. Furthermore, reading scores improved equally within gender categories, but the improvements were higher among rural boys and girls than among their urban counterparts.

4.2.3.2. Influence of main variables and school environment on reading in Tanzania

In this section, I investigate the possible factors among the main variables and school environment indicators that explain the variation in reading performance within a specific year. I also look at whether other factors not accounted for in the analysis explain the changes in rural and urban schools' performance between 2000 and 2007. I analyzed rural and urban schools' performance differences separately. I will start by providing the summary statistics of all the factors I controlled for in the regression analysis. I will briefly describe the changes in students' characteristics and support in 2000 and 2007 since I discussed the other factors in previous sections.

Table 17: Summary statistics of variables included in regression analysis, Tanzania

	Rural			Urban		
Main independent variables	2000	2007	Change	2000	2007	Change
SES score	427	419	-8.0***	507.4	467	-40.4***
Proportion of girls in school	52.3	50.4	-1.9	52.1	52.0	-0.1
Student characteristics and support						
Pupil age in months	183.8	177.4	-6.4***	172	169.8	-2.2***
Grade repetition (%)	24.9	21.1	-3.8***	19.4	18.9	-0.5
Speak English at home (%)	86.8	90.0	3.2***	97.5	97.5	0
Extra Reading Tuition (%)	34.5	25.8	-8.7***	29.3	33.4	4.1*
Total pupil learning material	4.56	6.05	1.491***	4.81	6.37	1.559***
School characteristics						
Total school resources	5.05	4.70	-0.35***	6.80	5.44	-1.36***
Class size	37.88	51.08	13.2***	52.73	63.77	11.04***
Buildings in good condition	45.7	40.5	-5.2*	58.9	43.3	-15.6***
Reading teachers with post-secondary	3.0	0.9	-2.1***	1.2	9.8	8.6***
Parents' financial contribution	6.17	4.70	-1.474***	6.63	4.80	-1.83***
N	2179	2938		675	1256	

Key: (Green) Implies school environment improved over time; (Red) implies school environment worsened over time along specific dimension; not colored implies the change between 2000 and 2007 was not statistically significant
Standard deviation in parentheses. I conducted a t-test on whether 2000 and 2007 differences were statistically significant: * $p < .05$; ** $p < .01$; *** $p < .001$

The average students' age and grade repetition were lower in 2007 than in 2000, but the decrease was higher in rural schools. The proportion of students who spoke the language of instruction at home increased more in rural areas, and there was no statistically significant change in urban areas. The number of students who received reading tuition increased in urban areas but decreased in rural areas (Table 17). These patterns suggest that rural schools improved more in enrolling students to school early, reducing grade repetition, and speaking the language of instruction. Urban families did well in getting their children extra tuition. The lack of significant change in the language of instruction in urban areas could be because more urban families spoke Swahili at home, which was also the language of instruction in schools. Lastly, students had more learning materials in 2000 than in 2007, but the increase was higher in urban schools than in rural ones (Table 17).

Influence of main variables and school environment on reading performance in rural schools

Columns 1 and 2 in Table 18 show the association between Tanzanian rural students' reading performance, the study's main variables, and school and home factors in 2000 and 2007,

respectively. The results indicate that in both years students from high SES families had higher reading scores after controlling for gender, home, and school factors. Besides, boys performed better than girls in 2000 and 2007. This pattern implies that the SES- and gender-achievement gaps among rural students continued even after Tanzania implemented its FPE policy.

Regarding student background characteristics, only grade repetition, speaking the language of instruction, and receiving extra tuition influenced rural students' reading scores after controlling for SES, gender, school factors, and other background characteristics of students (Columns 1 and 2, Table 18). Students who spoke the language of instruction at home or did not repeat a grade performed better than those who did not speak the language of instruction or repeat in 2000 and 2007. Students who received extra reading tuition performed better in 2000 than those who did not, but their reading scores depended on getting extra tuition in 2007. The scores did not vary by students' age or access to learning materials in either year.

Table 18: Association between main variables, school environment and reading achievement in Rural schools 2000 and 2007, Tanzania

	(1) Rural 2000	(2) Rural 2007	(3) With year dummy Rural	(4) Interaction of main vars & Year dummies Rural
Pupil SES score	0.336***	0.260***	0.300**	0.363***
Female	-21.59***	-20.96***	-21.42***	-21.41***
Pupil's age in months	-0.127	0.0955	0.00432	0.0000814
Grade repetition	-21.29***	-29.63***	-25.63***	-25.58***
Speaking language of instruction at home	38.31***	24.22**	32.38***	32.00***
Extra Reading Tuition	-10.62*	11.48	0.17	0.754
Total pupil learning material	2.802	-0.48	0.735	0.739
Class size	-0.564	0.00304	-0.0447	-0.0433
D:/ total school resources [max=22]	0.928	0.335	0.019	-0.00404
School buildings condition	2.875	-3.195	0.423	0.031
Total parents' financial contribution	1.077	1.207	1.681	1.61
Reading Teacher Years of Teaching	-0.016	-0.298	-0.186	-0.208
Reading Teacher Academic Qualification	-5.029	6.814	1.709	1.566
Year 2007			38.50***	84.74*
2007 # Pupil SES score				-0.109
2007 # girl				-0.00505
constant	393.7***	402.5***	317.9***	247.1***
R-squared	0.146	0.093	0.143	0.144
N	2137	2938	5075	5075

Notes: Regressions were estimated with standard errors clustered at the school level and sampling weights to produce robust estimates of standard errors and make estimates nationally representative. Other variables included in regressions are teacher's gender, student behavioral problems, and teacher's behavioral problems. * p < 0.05, ** p < 0.01, *** p < 0.001

None of the school characteristics influenced rural students' reading scores in 2000 or 2007 after controlling for SES, gender, student background characteristics, or other school factors (Columns 1 and 2, Table 18). It is surprising that although rural Tanzanian students' reading performance improved between 2000 and 2007, none of the school factors explained the performance variation in either year. Besides, only three of the five home background factors influenced reading performance in 2000, and two affected the performance in 2007.

The year dummy is positive and statistically significant (columns 3 and 4, Table 18). The result implies that rural Tanzanian students' reading scores improved between 2000 and 2007 due to other reasons not accounted for in the model. However, the interaction between the study's main variables and year dummies is not statistically significant (columns 4, Table 18), suggesting that the effects of SES and gender on rural students' reading performance in 2000 and 2007 did not vary by other reasons not accounted for in the model.

Influence of main variables and school environment on reading performance in urban schools

Columns 1 and 2 in Table 19 show the association between Tanzanian urban students' reading performance, the study's main variables, and school and home factors in 2000 and 2007, respectively. The results indicate that in both years students from high SES families had higher reading scores after controlling for gender, home, and school factors. Unlike in rural schools, urban students' reading performance did not vary by gender. This pattern implies that the SES-achievement gaps among urban students continued even after Tanzania implemented the FPE policy. However, there were no gender-achievement gaps among urban students before and after the policy.

Regarding student background characteristics, only grade repetition and speaking the language of instruction influenced urban students' reading scores after controlling for SES, gender, school factors, and other background characteristics of students (Columns 1 and 2, Table 19). Students who did not repeat a grade performed better than those who repeated a grade in 2000 and 2007. Students who spoke the language of instruction at home had higher reading scores in 2007 than those who did not, but their reading scores depended on speaking the language of instruction at home in 2000. The scores did not vary by students' age, grade repetition, or having learning materials in either year.

Table 19: Association between main variables, school environment and reading achievement in Urban schools 2000 and 2007, Tanzania

	(1) Urban 2000	(2) Urban 2007	(3) With year dummy Urban	(4) Interaction of main vars & Year dummies Urban
Pupil SES score	0.248***	0.181**	0.226***	0.302***
Female	-6.673	-11.64	-9.008	-3.801
Pupil's age in months	-0.331	-0.27	-0.329*	-0.333*
Grade repetition	-17.22*	-20.30**	-16.82**	-17.44***
Speaking language of instruction at home	-13.22	32.51*	18.78	19.67
Extra Reading Tuition	-1.45	2.878	2.081	2.251
Total pupil learning material	5.482	-0.71	0.934	1.008
Class size	0.234	-0.117	-0.0519	-0.0528
D:/ total school resources [max=22]	3.745*	1.388	2.311	2.379
School buildings condition	8.945	14.46	15.28*	14.63*
Total parents' financial contribution	-3.521	2.26	-0.46	-0.616
Reading Teacher Years of Teaching	0.517	0.13	0.248	0.279
Reading Teacher Academic Qualification	15.17	2.095	4.032	4.356
Year 2007			18.82	85.15*
2007 # Pupil SES score				-0.128
2007 # girl				-7.998
constant	455.8***	506.1***	464.3***	354.9***
R-squared	0.169	0.11	0.11	0.112
N	621	1252	1873	1873

Notes: Regressions were estimated with standard errors clustered at the school level and sampling weights to produce robust estimates of standard errors and make estimates nationally representative. Other variables included in regressions are teacher's gender, student behavioral problems, and teacher's behavioral problems. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Concerning the school characteristics, only school resources influenced Tanzanian urban students' reading scores after controlling for SES, gender, student background characteristics, or other school factors (Columns 1 and 2, Table 19). Students who attended schools with more resources in 2000 were likely to have higher reading scores than those who attended schools with

fewer resources. However, school resources did not influence reading scores in 2007. None of the school factors influenced urban students' reading scores in 2000. In 2007, the performance did not vary based on class size, school buildings' condition, the teacher's experience, teachers' academic qualifications, or parents' financial contributions. Although urban students' reading performance improved between 2000 and 2007, none of the school factors explained the performance variation in 2007. Besides, only one of the five home background factors influenced reading performance in 2000, and two affected the performance in 2007.

The year dummy is positive and statistically significant (columns 3 and 4, Table 19). The result suggests that urban Tanzanian students' reading scores improved between 2000 and 2007 due to other reasons not accounted for in the model. However, the interaction between the study's main variables and year dummies is not statistically significant (column 4, Table 19). It implies that the effects of SES and gender on urban students' reading performance in 2000 and 2007 did not vary by other reasons not accounted for in the model.

4.3 Changes in access, school environment, and quality of learning in Uganda

I did not find evidence of significant school access changes in Uganda during the country's policy period. The data indicate that Uganda continued to increase access among the rural poor and sustained the urban rich children's access to education after implementing its policy in 1997. Further, the proportion of rural girls in school increased over the policy period.

As students continued to access school during Uganda's policy period, class sizes increased, but school resources declined. At the same time, the proportions of both buildings in good condition and of reading teachers with post-secondary education improved. However, less than 30% of school buildings were in good condition and three in five teachers did not have tertiary training. This evidence suggests that the Ugandan government implemented initiatives to

improve school infrastructure and human resources but did not invest in other physical resources during the policy period. However, it is interesting that the class sizes increased over time despite the school buildings' improvement. Like its East African counterparts, Uganda's rural schools had an inferior school environment compared to urban ones in both years. Urban schools had bigger classes (implying greater access), more school resources and buildings in good condition, and a higher proportion of reading teachers with post-secondary training. Therefore, the Ugandan government did not equally invest in rural and urban schools during the FPE policy period.

Although there was no significant increase in school access, the quality of learning declined over the policy period. The reading performance declined most among rural rich students and rural girls. When I analyzed the data within the regression framework, I found that among the study's main variables (SES and gender), family SES influenced only urban schools' performance three years after Uganda abolished mandatory school fees. Ten years after, the family SES was not a significant predictor of rural and urban students' reading performance. Boys performed better than girls in reading in rural schools, but the urban students' performance did not vary by gender. Therefore, as in Tanzania, there were gender gaps in reading in rural schools but not in urban schools during Uganda's FPE policy period.

All the home covariates predicted rural students' performance during the country's FPE policy period. However, speaking the language of instruction at home and getting extra tuition did not influence urban students' reading scores during the same period. School resources only explained the variation in rural Ugandan students' reading scores during the policy period. It is interesting that although the rural students' performance declined over time, the other school covariates did not explain the reading score variations. Among urban schools, school buildings'

conditions predicted performance three years after the government implemented its FPE policy, while school resources and teacher's academic qualifications influenced reading scores ten years after the policy was initiated.

Unlike in Kenya and Tanzania, parents' contributions to school activities in Uganda did not change significantly during the policy period. Since Uganda eliminated school fees before 2000 and the FPE policy was supposed to reduce parents' financial burdens of educating their children, this pattern aligns with what we expect. I provide a detailed discussion of these findings in the following sections.

4.3.1 Changes in access to schooling in Uganda

In this section, I focus on overall changes in students' composition by socioeconomic status and gender, nationally and within rural and urban schools. Table 20 shows the student composition by socioeconomic status and gender in 2000 and 2007. It also indicates how students' SES and gender composition changed overtime in rural and urban areas in Uganda.

Table 20: Student composition in rural and urban schools over time, Uganda

	<i>National</i>			<i>Rural</i>			<i>Urban</i>		
	<i>2000</i>	<i>2007</i>	<i>Change</i>	<i>2000</i>	<i>2007</i>	<i>Change</i>	<i>2000</i>	<i>2007</i>	<i>Change</i>
SES	440.8	443.6	2.80	433.2	425.9	-7.3***	470.7	490.6	19.9***
Proportion of girls in school	45	51	6***	42.9	50.2	7.2***	50.7	52.2	1.5

Key: (Green) implies improved access over time; (Red) implies worsened access over time not colored implies the change between 2000 and 2007 was not statistically significant. Standard deviation in parentheses. I ran a t-test on whether 2000 and 2007 SES and gender by school location differences were statistically significant: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

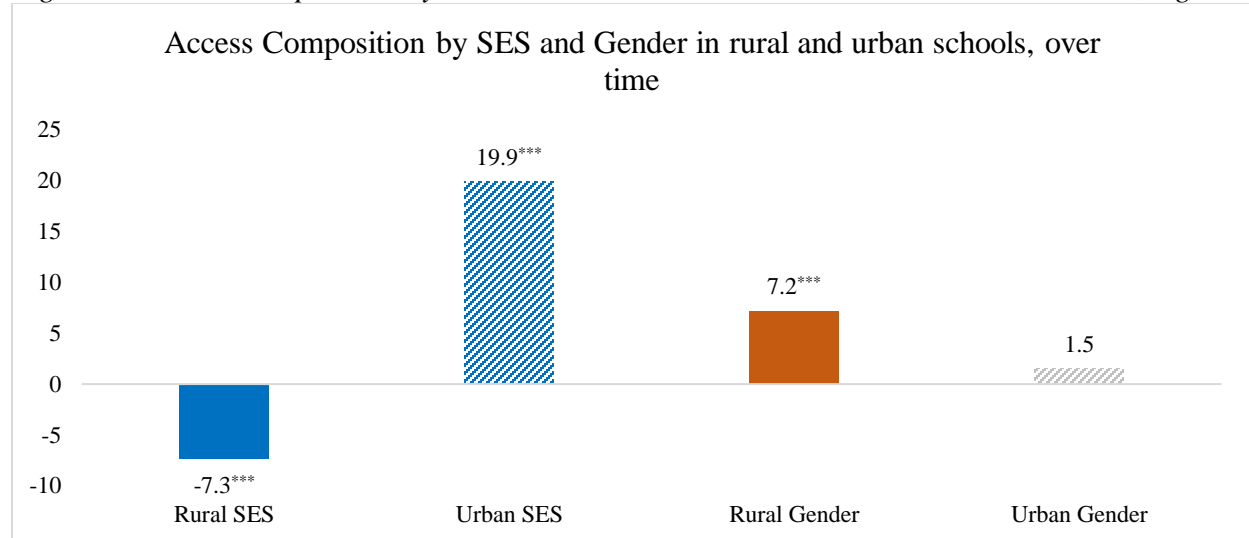
Changes in students' composition by SES

Uganda implemented its policy in 1997 before the country collected 2000 SACMEQ data, and the change in Uganda's average SES score was not statistically significant (Table 20).

The SES changes within rural and urban schools were statistically significant. While the average SES reduced over time within rural schools, that of urban schools increased. The

average SES within rural schools declined by 7 points from 433 in 2000 to 426 in 2007, while that of urban schools improved by almost 20 points from 470 to 490 (Table 20 & Figure 7).

Figure 7: Access Composition by SES and Gender in rural and urban schools over time, Uganda



Note: Gray pattern indicates the change was not significant. I ran a t-test on whether 2000 and 2007 SES and gender by school location differences were statistically significant: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

After eliminating mandatory school fees, we would expect more students from low-income families to be in school. However, the pattern suggests that abolishing school fees in Uganda continued to increase access among the rural poor and sustained the urban rich children's access to education after implementing its policy in 1997. In 2007, it was ten years since the implementation of the FPE policy in Uganda, and it is possible that education was more universal, which enabled all students, irrespective of their economic backgrounds, to afford education.

Changes in students' composition by gender

Unlike in Kenya and Tanzania, there was a statistically significant increase in girls in Ugandan schools. The proportion increased by 6 percentage points from 45% in 2000 to 51% in 2007 (Table 20). Comparing how gender composition within rural and urban areas changed, there is a statistically significant difference in girls' proportion in rural schools, but not in urban schools. In rural areas, the proportion of girls in school increased by 7.2 percentage points over the seven-year period. The proportion also increased in urban schools, but the change was not statistically significant. These patterns suggest that the FPE policy in Uganda enabled more girls to access school, and rural girls benefited the most.

4.3.2 Changes in school environment in Uganda

In this section, I discuss how the school environment changed nationally and within rural and urban schools during Uganda's FPE policy period. Specifically, I look at how the school characteristics changed between 2000 and 2007.

Changes in school environment nationally

Table 21 shows that the average school resources and class size were worse over time. The proportion of school buildings in good condition and the proportion of reading with at least post-secondary training improved. Uganda had fewer school resources and bigger classes in 2007 than in 2000. The class size increased by 30 from 38 to 68, indicating a rapid increase in school students over the policy period. Unlike its East African counterparts, the proportion of school buildings in good condition improved by 6 percentage points from 22% to 28%. This pattern indicates that the Ugandan government implemented initiatives to improve school infrastructure during the policy period. However, it is interesting that the class sizes grew over time despite the school buildings' improvements. Uganda had the highest number of reading

teachers with at least post-secondary training, increasing by 4 percentage points from 39% to 43% for reading. There were no statistically significant changes in parents' contributions (Table 21).

Table 21: Changes in school environment over time, Uganda

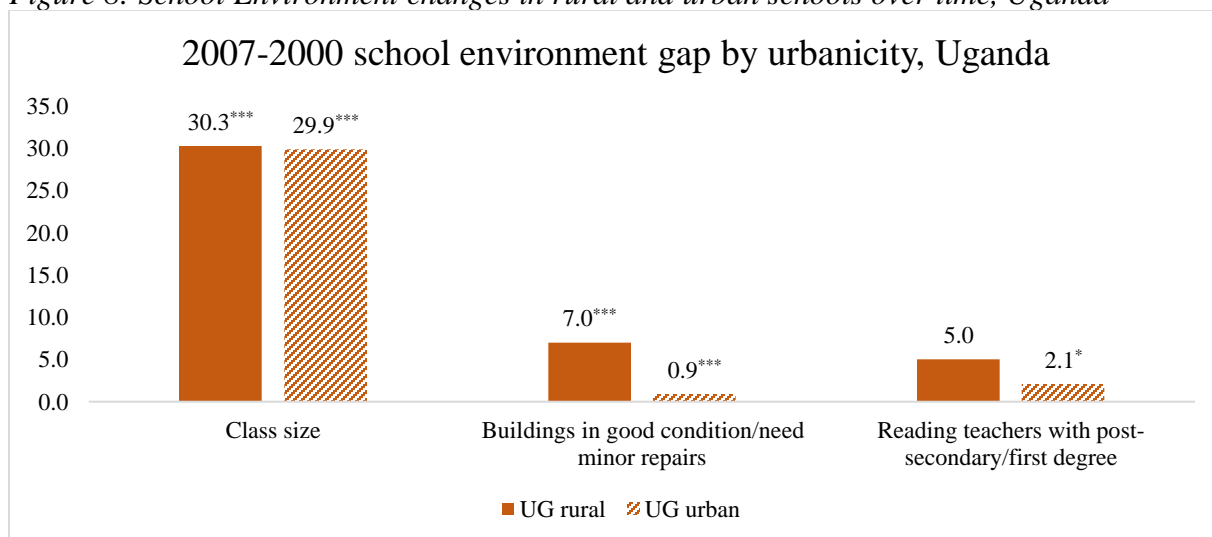
School characteristics	National			Rural			Urban		
	2000	2007	Change	2000	2007	Change	2000	2007	Change
Total school resources	6.82	6.23	-0.59***	6.20	5.45	-0.75***	9.26	8.33	-0.93***
Class size	38.68	68.81	30.13***	38.76	69.01	30.25***	38.36	68.28	29.92***
Buildings in good condition	22	28	6**	17.4	24.4	7***	37.9	38.8	9***
Reading teachers with post-secondary	39	43	4**	37.8	42.8	5	43.0	45.1	2.1**
Parents' financial contribution	4.68	4.67	-0.01	4.42	4.10	-0.315**	5.72	6.19	0.469
N	2642	5307		1959	3872		683	1435	

Key: (Green) Implies school environment improved over time; (Red) implies school environment worsened over time along specific dimension; not colored implies the change between 2000 and 2007 was not statistically significant Standard deviation in parentheses. I conducted a t-test on whether 2000 and 2007 differences were statistically significant: * $p < .05$; ** $p < .01$; *** $p < .001$

Changes in rural and urban schools' environment

Like its East African counterparts, Uganda's rural schools had an inferior school environment compared to urban schools in both years. Most of the school characteristic changes within rural and urban schools between 2000 and 2007 are statistically significant. Class sizes increased more in urban areas and the proportion of buildings in good condition and reading teachers' qualifications also increased more in urban areas (Table 21 & Figure 8).

Figure 8: School Environment changes in rural and urban schools over time, Uganda



Note: Gray color/pattern indicates the change was not significant. I conducted a t-test on whether 2000 and 2007 differences were statistically significant: * $p < .05$; ** $p < .01$; *** $p < .001$

4.3.3 Changes in quality of learning in Uganda

In this section, I investigate the implication of increasing access to education due to FPE policy on the quality of learning as measured by reading test scores. I divide the section into two parts. I look at how reading scores changed nationally and in rural and urban schools in the first part. In the second section, I provide the regression results and explore the possible factors that explain the variations in reading scores within rural and urban schools.

4.3.3.1 Changes in reading performance in Uganda

Table 22 provides Uganda's national average reading performance scores and the performance by SES, gender, and school location in 2000 and 2007. It also indicates how the reading scores varied by SES and gender within rural and urban schools over time. The national average reading achievement decreased by 4 points from 482 in 2000 to 478 in 2007. The average reading scores in rural schools declined by 12 points over time, but the decline in urban schools was not statistically significant (Table 22).

Table 22: Reading performance in 2000 and 2007, Uganda

National Performance											
2000	2007	change									
482.7	478.7	-4.0**									
National performance by urbanicity											
Rural			Urban								
2000	2007	Change	2000	2007	Change						
475.0	462.9	-12.1***	511.4	520.9	9.5						
National performance by SES											
Lowest			Highest								
2000	2007	Change	2000	2007	Change						
468.1	459.2	-8.9***	536.8	522.8	-14***						
Performance in rural and urban schools by SES											
Rural						Urban					
Lowest			Highest			Lowest			Highest		
2000	2007	Change	2000	2007	Change	2000	2007	Change	2000	2007	Change
469.5	456.1	-13.4*	518.4	491.9	-26.5***	458.9	490.3	31.4*	565.9	542.1	-23.8**
National performance by Gender											
Boy			Girl								
2000	2007	Change	2000	2007	Change						
479.6	481.5	1.9	485.9	475.9	-10**						
Performance in rural and urban schools by Gender											
Rural						Urban					
Boy			Girl			Boy			Girl		
2000	2007	Change	2000	2007	Change	2000	2007	Change	2000	2007	Change
474.5	465.7	-8.8***	475.7	460.0	-15.7***	502.9	525.6	22.7***	519.7	516.5	-3.2

Table 22 (cont'd)

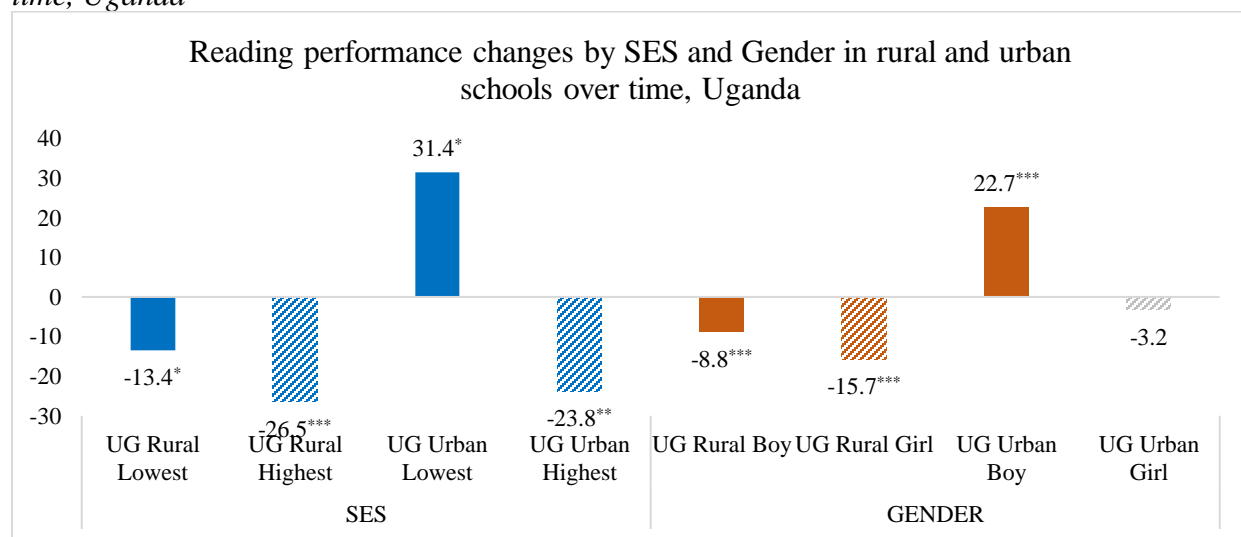
Key: (Green) implies change improved over time; (Red) implies change worsened over time
Standard deviation in parentheses. I conducted a t-test on whether 2000 and 2007 differences were statistically significant: * $p < .05$; ** $p < .01$; *** $p < .001$. I also ran a t-test on whether 2000 and 2007 achievement differences by SES, gender, and urbanicity were statistically significant: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Changes in reading performance by SES

Students from high-income families performed better than those from low-income families in both 2000 and 2007. The lowest and highest SES students' reading scores worsened over time, but they declined more among the highest-SES category. The average reading score of students from high-income families dropped by 14 points and that of students from low-income families declined by 8 points (Table 22).

Comparing reading performance by SES within rural and urban schools over time indicates that scores declined within all SES categories, except among the urban poor. As in the national average performance, the reading scores declined more among the rural and urban rich than among their poor counterparts. In rural schools, scores of the rural rich declined by 26 points while that of the rural poor declined by 13 points. In urban schools, they fell by 23 points among the urban rich but improved by 31 points among the urban poor (Table 22 & Figure 9).

Figure 9: Reading performance changes by SES and Gender in rural and urban schools over time, Uganda



Note: Gray pattern indicates the change was not significant. I run a t-test on whether the achievement gaps within the categories over time were statistically significant: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Changes in reading performance by Gender

Girls' reading scores declined by 10 points from 2000 to 2007, but the reading performance changes among Ugandan boys were not statistically significant (Table 22). Comparing reading performance by gender in rural and urban schools over time indicates that boys performed better over time than girls. In rural schools, it decreased by 12 points among girls and 8 points among boys. In urban schools, boys' performance improved by 22 points, and girls' performance declined. However, the changes in rural girls' reading scores over time were not statistically significant (Table 22 & Figure 9).

These patterns suggest that, although academic performance declined within all categories during the FPE policy in Uganda, the performance declined most among students from high-income families, girls, and those in rural schools. However, the performance of urban boys improved during the country's FPE policy.

4.3.3.2 Influence of main variables and school environment on reading in Uganda

In this section, I investigate the possible factors among the main variables and school environment indicators that explain the variation in reading performance within a specific year. I also look at whether other factors not accounted for in the analysis explain the changes in rural and urban schools' performance between 2000 and 2007. I analyzed rural and urban schools' performance differences separately. I will start by providing the summary statistics of all the factors I controlled for in the regression analysis. I will briefly describe the changes in students' characteristics and support in 2000 and 2007 since I discussed the other factors in previous sections.

Table 23: Summary statistics of variables included in regression analysis, Uganda

	Rural			Urban		
Main independent variables	2000	2007	Change	2000	2007	Change
SES	433.2	425.9	-7.3**	470.7	490.6	19.9**
Proportion of girls in school	42.9	50.2	7.2***	50.7	52.2	1.5
Student characteristics and support						
Pupil age in months	172.5	172.3	-0.2	167.2	161.6	-5.6**
Grade repetition (%)	53.4	54.9	1.5	51.1	46.8	-4.3
Speak English at home (%)	82.1	82.6	0.5	83.5	89.0	5.5*
Extra Reading Tuition (%)	41.9	38.7	-3.2**	37.3	49.5	12.2**
Total pupil learning material	4.36	5.59	1.225***	4.43	6.07	1.635***
School characteristics						
Total school resources	6.20	5.45	-0.75***	9.26	8.33	-0.93***
Class size	38.76	69.01	30.25***	38.36	68.28	29.92***
Buildings in good condition	17.4	24.4	7***	37.9	38.8	9***
Reading teachers with post-secondary	37.8	42.8	5	43.0	45.1	2.1**
Parents' financial contribution	4.42	4.10	-0.315**	5.72	6.19	0.469
N	1959	3872		683	1435	

Key: (Green) Implies school environment improved over time; (Red) implies school environment worsened over time along specific dimension; not colored implies the change between 2000 and 2007 was not statistically significant
Standard deviation in parentheses. I conducted a t-test on whether 2000 and 2007 differences were statistically significant: * p < .05; ** p < .01; *** p < .001

The average students' age decreased in urban areas, but the change in rural areas was not statistically significant (Table 23). The change in grade repetition was not significant in either urban or rural areas. Speaking the language of instruction increased in urban areas, but the change in rural areas was not statistically significant. The number of students who received reading tuition increased in urban areas but decreased in rural ones. Lastly, students had more learning materials in 2000 than in 2007, but the increase was higher in urban schools (Table 23).

Influence of main variables and school environment on reading performance in rural schools

Columns 1 and 2 in Table 24 show the association between rural Ugandan students' reading performance, the study's main variables, and school and home factors in 2000 and 2007, respectively. The results indicate that in both years performance did not vary significantly by SES after controlling for gender, home, and school factors. However, boys had higher reading scores than girls in both 2000 and 2007. This pattern implies that the gender-achievement gaps among rural students continued even over Uganda's FPE policy period. However, there were no SES-achievement gaps among rural students during the same time.

All the student background characteristics and the home support they received influenced rural students' reading scores after controlling for SES, gender, school factors, and other background characteristics of students (Columns 1 and 2, Table 24). In 2000 and 2007, rural Ugandan students who were younger, those who did not repeat a grade, and those who spoke the language of instruction at home or had more learning resources performed better than those who were older, repeated grades, did not speak the language of instruction at home or had fewer learning resources, respectively. Furthermore, students who received extra reading tuition had higher reading scores in 2007 than those who did not. However, the performance did not vary due to receiving extra tuition in 2000.

Table 24: Association between main variables, school environment and reading achievement in Rural schools 2000 and 2007, Uganda

	(1) Rural 2000	(2) Rural 2007	(3) With year dummy Rural	(4) Interaction of main vars & Year dummies Rural
Pupil SES score	0.065	0.0404	0.0544	0.069
Female	-10.21*	-7.912**	-9.114***	-11.10*
Pupil's age in months	-0.267*	-0.344***	-0.304***	-0.306***
Grade repetition	-23.41***	-11.65***	-17.18***	-17.09***
Speaking language of instruction at home	35.73***	15.10***	22.52***	22.52***
Extra Reading Tuition	-9.246	10.67*	2.191	2.21
Total pupil learning material	7.016**	2.291**	3.518***	3.527***
School type	-21.65	33.85*	18.71	19.01
Class size	0.223	-0.125	-0.154	-0.155
D:/ total school resources [max=22]	6.803**	3.942***	5.203***	5.207***
School buildings condition	1.531	-4.009	-6.259	-6.279
Total parents' financial contribution	0.306	-0.908	-0.219	-0.22
Reading Teacher Years of Teaching	0.156	-0.0285	0.0117	0.017
Reading Teacher Academic Qualification	-0.942	1.374	0.972	0.986
Year 2007			-3.813	4.416
2007 # Pupil SES score				-0.0223
2007 # girl				2.937
constant	409.4***	486.4***	463.9***	450.2***
R-squared	0.18	0.108	0.112	0.112
N	1831	3727	5558	5558

Notes: Regressions were estimated with standard errors clustered at the school level and sampling weights to produce robust estimates of standard errors and make estimates nationally representative. Other variables included in regressions are teacher's gender, student behavioral problems, and teacher's behavioral problems. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Regarding school characteristics, only school resources influenced rural Ugandan students' reading scores after controlling for SES, gender, student background characteristics, or

other school factors (Columns 1 and 2, Table 24). Students who attended schools with more school resources in 2000 and 2007 were more likely to have higher reading scores. The performance did not vary based on class size, school buildings' conditions, teacher's experience, teachers' academic qualifications, or parents' financial contributions in either year.

The year dummy coefficient is not statistically significant (columns 3, Table 24). This suggests that rural Ugandan students' reading scores did not decline between 2000 and 2007 due to other factors not accounted for in the model. Besides, the interaction between the study's main variables and year dummies is not statistically significant (columns 4, Table 24), which implies that the effects of SES and gender on rural students' reading performance in 2000 and 2007 did not vary by other reasons not accounted for in the model.

Influence of main variables and school environment on reading performance in urban schools

Columns 1 and 2 in Table 25 show the association between urban Ugandan students' reading performance, the study's main variables, and school and home factors in 2000 and 2007, respectively. The results indicate that the higher the family SES score, the higher the student's reading score was likely to be in 2000 after controlling for home and school factors. However, SES influence was not statistically significant in 2007. Unlike in rural schools, urban students' reading performance did not vary by gender. This pattern implies the SES-achievement gaps among urban students disappeared during Uganda's FPE policy period. Besides, there were no gender-achievement gaps during the time.

Unlike in rural schools where all the student background characteristics and the home support they received influenced rural students' reading scores, only pupils' age, grade repetition, and availability of learning materials influenced urban students' reading scores after

controlling for SES, gender, school factors, and other background characteristics of students (Columns 1 and 2, Table 25). In both 2000 and 2007, urban Ugandan students who were younger or did not repeat grades performed better than those who were older or repeated grades, respectively. Additionally, students who had more learning materials had higher reading scores in 2000 than those who had less. But, learning resources did not influence reading achievement in 2007. Urban Ugandan students' reading scores did not vary by speaking the language of instruction or by receiving extra tuition in either year.

Table 25: Association between main variables, school environment and reading achievement in Urban schools 2000 and 2007, Tanzania

	(1)	(2)	(3)	(4)
	Urban 2000	Urban 2007	With year dummy Urban	Interaction of main vars & Year dummies Urban
Pupil SES score	0.308***	0.0788	0.148**	0.331***
Female	-7.297	-6.493	-4.86	-6.647
Pupil's age in months	-0.654**	-0.749***	-0.733***	-0.693***
Grade repetition	-15.05*	-11.84*	-11.78**	-12.44**
Speaking language of instruction at home	18.71	19.43	16.58	16.54
Extra Reading Tuition	-5.721	4.284	0.936	1.26
Total pupil learning material	9.477***	1.743	4.110***	4.179***
School type	43.93	36.05	34.45*	35.84*
Class size	-0.865	-0.141	-0.174	-0.163
D:/ total school resources [max=22]	1.303	5.414**	4.610**	4.397**
School buildings condition	52.72*	-2.28	7.396	6.182
Total parents' financial contribution	-0.575	0.798	1.46	1.352
Reading Teacher Years of Teaching	-0.604	0.311	-0.448	-0.511
Reading Teacher Academic Qualification	13.33	-16.45***	-10.77*	-9.985*
Year 2007			-2.884	124.5*
2007 # Pupil SES score				-0.269**
2007 # girl				0.65
constant	420.0***	587.9***	536.5***	318.1***
R-squared	0.442	0.258	0.264	0.273
N	660	1364	2024	2024

Notes: Regressions were estimated with standard errors clustered at the school level and sampling weights to produce robust estimates of standard errors and make estimates nationally representative. Other variables included in regressions are teacher's gender, student behavioral problems, and teacher's behavioral problems. * p < 0.05, ** p < 0.01, *** p < 0.001

Regarding school characteristics, school resources, school buildings' conditions, and teacher's academic qualifications all influenced urban students' reading performance after controlling for SES, gender, student background characteristics, or other school factors (Columns 1 and 2, Table 25). Students who attended schools with buildings in good condition in 2000 were

likely to have higher reading scores. School buildings' conditions did not influence performance in 2007. In 2007, the more resources a school had or the higher the teachers' academic qualifications, the higher the students' reading scores were likely to be. However, the performance did not vary by amount of school resources or teacher's academic qualifications in 2000. Further, the reading scores did not depend on class size, school buildings' conditions, the teacher's experience, or parents' financial contributions in either year.

The year dummy is positive and statistically significant (column 4, Table 25). Although reading scores did not significantly improve, the result implies that urban Ugandan students' reading scores increased between 2000 and 2007 due to other reasons not accounted for in the model. Additionally, year dummy and family SES interactions were negative and statistically significant (column 4, Table 25), implying that other factors not accounted for in the model reduced the SES influence on reading scores between 2000 and 2007. As earlier discussed, reading scores among the urban rich declined by 23 points but improved by 31 points among the urban poor. This finding suggests that other factors reduced the reading achievement gap between high-SES and low-SES urban students over time. The interaction between the year dummy and gender is not statistically significant.

CHAPTER FIVE: ACCESS POLICIES AND CHANGES IN ACCESS, SCHOOL ENVIRONMENT, AND QUALITY OF LEARNING ACROSS EAST AFRICAN COUNTRIES

Introduction

In this chapter, I compare how access to schooling, school environment, and reading performance changed across three East African countries after implementing FPE policies. I discuss how these aspects changed nationally and within rural and urban schools. I start with a summary of how access to education, school environment, and reading achievement compared across these East African countries in 2000 and 2007, followed by a detailed discussion of these changes.

Parents in the three countries contributed less to school activities in 2007 than in 2000. Ugandan parents contributed to fewer school activities than those in Kenya and Tanzania in both years. Since countries implemented the FPE policies to reduce parents' financial burdens of educating their children, these changes align with the ways we would expect such contributions to change. For instance, we would expect parents to contribute less in 2007 than in 2000 in Kenyan and Tanzania, which abolished fees in 2003 and 2001, respectively. Similarly, we would expect Ugandan parents to contribute the least to school activities as the country implemented its policy earlier than its East African counterparts.

School access for students from low-income families (as indicated by SES changes) increased in Kenya and Tanzania, but there was no significant increase in school access for students in Uganda. Kenya had the highest SES in both years, Uganda had the lowest SES in 2000, while Tanzania had the lowest in 2007. Two reasons can explain why Ugandan schools had the lowest average SES. First, only Uganda had abolished school fees by 2000, which could

mean more students from low-income families could enroll in schools than Kenya and Tanzania. The second reason relates to the differences in the three countries' economies, where Uganda had the lowest GDP per capita, and Kenya had the highest. Therefore, everything else being equal, Ugandan schools were likely to have the lowest average SES and Kenya the highest average SES. Since Tanzania is not the poorest economy among the three countries, the decline in average SES could be due to greater access to schooling by children from low-income families after eliminating school fees in 2001. Although Uganda had abolished school fees by 2000, it had the lowest proportion of girls enrolled in rural schools, while Tanzania had the highest. Thus, Tanzania seemed to have increased access in terms of gender and SES the most by 2007.

The physical and human resources available nationally and in rural and urban schools were statically different across the three countries: Kenya had the most physical school resources and the most buildings in good condition in both years, while Uganda had the highest number of teachers with post-secondary training in both years. The evidence on school environment changes within each country indicates the following. First, the three countries had fewer school resources and larger classes in 2007 than in 2000. Second, although Uganda was the only country that had implemented FPE by 2000, the Kenyan government had invested more in school infrastructure by that time. Third, the proportion of school buildings in good condition decreased in Kenya and Tanzania after their governments implemented their FPE policies, but this proportion increased in Uganda over its policy period. Fourth, although the proportion of teachers with at least post-secondary training in East Africa increased between 2000 and 2007, most teachers did not have post-secondary training. Uganda had the highest proportion of teachers with at least post-secondary training, while Tanzania had the lowest. For instance, in 2007, 43% of reading teachers in Uganda had at least post-secondary training, 31% in Kenya,

and only 4% in Tanzania. Lastly, rural schools had an inferior school environment compared to urban schools in all countries. It is noteworthy, therefore, that Uganda saw the greatest infrastructural improvement and the greatest increase in number of qualified teachers over time, despite it being the poorest nation of the three.

Generally, the quality of learning (as measured by reading scores) declined in Kenya and Uganda but improved in Tanzania from 2000 to 2007. Kenyan students had the highest reading scores in 2000 and Tanzanian students had the highest in 2007. Further, Tanzania's rural and urban schools performed better than their East African counterparts after abolishing mandatory fees, while Ugandan schools had the lowest performance during the policy period.

The regression analysis indicates the following. First, family SES was a significant predictor of rural and urban students' reading scores, except in Uganda. Second, boys in rural schools performed better than girls in reading both before and after the FPE policy implementation in Kenya and Tanzania, but not until years into the FPE policy in Uganda. Third, there were no gender-achievement gaps in urban schools before and after the FPE policy in Kenya and Tanzania or during the policy period in Uganda. Fourth, among the home background factors, grade repetition and speaking the language of instruction stood out as significant predictors of rural and urban students' reading performance in all three countries before, during, and after FPE policy implementation.

In conclusion, Tanzania performed best among the three countries over time in terms of access and performance. After the government implemented its FPE policy, it increased enrollment of students from disadvantaged backgrounds in school and improved the average reading scores nationally and in rural and urban schools, although schools' physical and human resources did not improve. Furthermore, although the representation of girls in school did not

significantly increase, Tanzania increased girls' reading performance the most by 2007. Kenya increased the number of students from underprivileged backgrounds, but the average reading performance worsened after eliminating mandatory school fees. Similarly, the proportion of girls in Kenyan schools did not significantly increase, but their performance declined after the policy. The lack of significant SES changes in Uganda (which implemented FPE before 2000) implies that access to education was more universal compared to their East African counterparts and that in Uganda, education was not just for wealthy families. However, the country's average reading performance declined over the policy period, especially in rural schools. Uganda improved rural girls' school access, but their performance declined the most ten years after the country's FPE policy. I provide a detailed discussion of these findings in the next sections.

5.1 Changes in students' composition across countries over time

In this section, I present the findings on how changes in students' composition differed across Kenya, Tanzania, and Uganda and whether there is a pattern from the cross-national comparisons over time. The average SES declined in Kenya and Tanzania, but there was no significant change in Uganda. However, comparing the average SES changes across countries, the differences are statistically significant within each year. Uganda had a lower average SES in 2000 compared to Kenya and Tanzania (Table 26). The differences in rural and urban schools' SES across the three countries were also statistically significant within each year. Tanzania's rural schools had the lowest SES compared to those in Kenya and Uganda in 2000, while Uganda's urban schools had the lowest SES the same year (Table 26).

The differences in the proportion of girls in school across countries were only significant in 2000. Although Uganda had abolished school fees by 2000, it had the lowest proportion of girls and Tanzania had the highest (Table 26).

Table 26: Student composition by SES and Gender in 2000/ Across countries

	<i>Nationally</i>			<i>Rural</i>			<i>Urban</i>		
	<i>Kenya</i>	<i>Tanzania</i>	<i>Uganda</i>	<i>Kenya</i>	<i>Tanzania</i>	<i>Uganda</i>	<i>Kenya</i>	<i>Tanzania</i>	<i>Uganda</i>
SES	470.2	450.0	440.8***	454.6	427	433.2***	502.6	507.4	470.7***
Proportion of girls in school	50	52	45***	49.6	52.3	42.9***	52.2	52.1	50.7

Key: Darker shade indicates the leading country in increased access to school in the specific category. I tested the mean differences across countries under a one-way ANOVA: Kenya 2000 vs. Tanzania 2000 vs. Uganda 2000 ~ * $p < .05$; ** $p < .01$; *** $p < .001$. I also tested SES and gender by school location differences across countries under a one-way ANOVA: Kenya Rural 2000 vs. Tanzania Rural 2000 vs. Uganda rural 2000; Kenya Urban 2000 vs. Tanzania Urban 2000 vs. Uganda urban 2000 * $p < .05$; ** $p < .01$; *** $p < .001$

Tanzania had a rapid decline in average SES (by 16 points), making it the country with the lowest average SES in 2007. Similarly, Tanzania's rural and urban schools had the lowest SES in 2007 (Table 27).

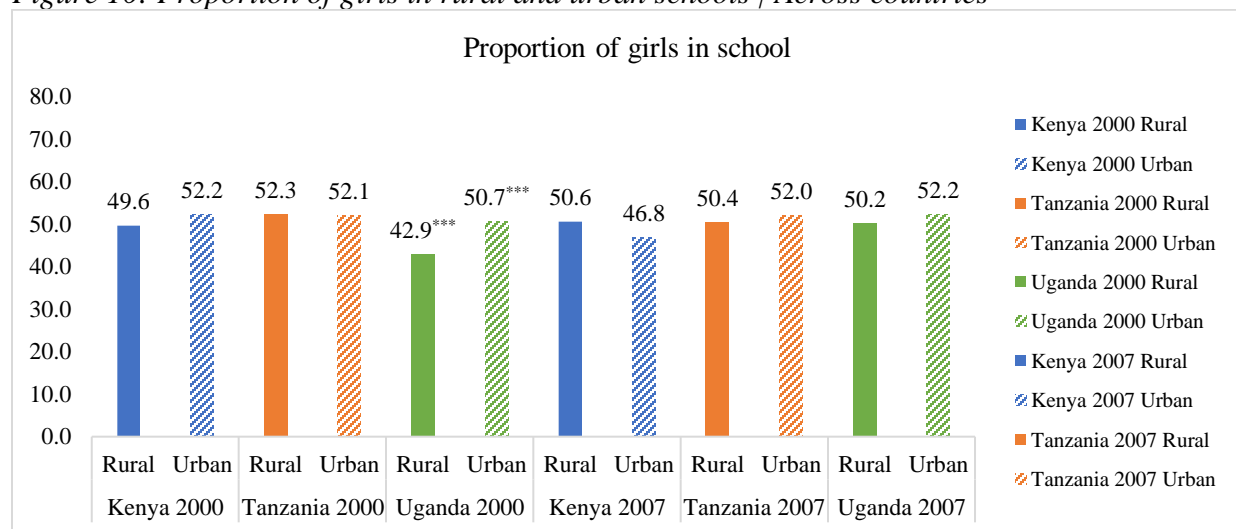
Table 27: Student composition by SES and Gender in 2007/ Across countries

	<i>Nationally</i>			<i>Rural</i>			<i>Urban</i>		
	<i>Kenya</i>	<i>Tanzania</i>	<i>Uganda</i>	<i>Kenya</i>	<i>Tanzania</i>	<i>Uganda</i>	<i>Kenya</i>	<i>Tanzania</i>	<i>Uganda</i>
SES	466.8	434.2	443.6***	449.7	419	425.9***	498.7	467	490.6***
Proportion of girls in school	49	51	51	50.6	50.4	50.2	46.8	52.0	52.2

Key: Darker shade indicates the leading country in increased access to school in the specific category. I tested the mean differences across countries under a one-way ANOVA: Kenya 2007 vs. Tanzania 2007 vs. Uganda 2007 ~ * $p < .05$; ** $p < .01$; *** $p < .001$. I also tested SES and gender by school location differences across countries under a one-way ANOVA: Kenya Rural 2007 vs. Tanzania Rural 2007 vs. Uganda rural 2007; Kenya Urban 2007 vs. Tanzania Urban 2007 vs. Uganda urban 2007 * $p < .05$; ** $p < .01$; *** $p < .001$

However, the gender differences by school location across countries were only significant in 2000. Although Uganda had already abolished school fees by that year, it had the lowest proportion (42.9%), while Tanzania had the highest proportion (52.3%) of girls enrolled in rural schools (52.3%) (Table 26 & Figure 10).

Figure 10: Proportion of girls in rural and urban schools / Across countries



I run a t-test on whether 2000 and 2007 the Urban-rural gender gaps and one-way ANOVA to test whether the gaps across countries were statistically significant: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Summary of changes in school access between 2000 and 2007

Table 28 summarizes how access changed nationally and within rural and urban schools in East Africa between 2000 and 2007. I use color green to indicate that access improved and color red to show that access declined. NS indicates that the change was not statistically significant. If a country improved its access to school, we would expect color green.

Table 28: Summary of changes in access to school between 2000 and 2007

		Kenya	Tanzania	Uganda
Average SES	National			NS
	Rural schools			
	Urban schools	NS		
proportion of girls in school	National	NS	NS	
	Rural schools	NS	NS	
	Urban schools	NS	NS	NS

Key: (Green) implies access improved; (Red) implies access worsened; NS implies the change between 2000 and 2007 was not statistically significant

The average pupil's SES score declined in Kenya and Tanzania, indicating more students were in school after abolishing school fees. However, school access improved more among the rural poor in Kenya and among the urban poor in Tanzania. The change in the proportion of girls

in school nationally and within rural and urban schools in both countries was not statistically significant as earlier discussed. In Uganda, the average pupil's SES score declined over time, but this change was not statistically significant. The access improved among the rural poor and the urban rich, implying that the FPE policy in Uganda enabled all students to access school irrespective of their family's economic backgrounds. Besides, the proportion of girls in Ugandan schools, especially in rural areas, increased over the policy period (Table 28).

5.2. Changes in school environment across countries over time

In this part, I discuss how the school environment changes differed across Kenya, Tanzania, and Uganda and whether a pattern emerges from the cross-national comparisons.

Changes in school environment nationally across countries over time

All the differences in average school environment indicators across the three countries were statistically significant within each year. Among the school characteristic indicators, Kenya had more school resources, smaller class sizes, and more school buildings in good condition than Tanzania and Uganda in 2000. However, Uganda had the highest number of teachers with post-secondary education and parents who contributed to the least amount of school activities in the same year (Table 29). The differences among rural schools had similar patterns. Kenya's rural schools had more school resources, smaller class sizes, and more school buildings in good condition. In contrast, Uganda's rural schools had more teachers with a post-secondary education and parents paying for fewer school activities than their East African counterparts (Table 29). Among the urban schools, Kenya's had the smallest class sizes and the most buildings in good condition, while Uganda's had the most school resources, the most teachers with a post-secondary education, and parents paying for the least amount of school activities (Table 29).

Table 29: Changes in school environment in 2000 / Across countries

	Nationally			Rural			Urban		
	Kenya	Tanzania	Uganda	Kenya	Tanzania	Uganda	Kenya	Tanzania	Uganda
<i>School characteristics</i>									
Total school resources	7.438	5.547	6.82***	6.747	5.046	6.197***	8.863	6.798	9.258***
Class size	37.17	42.12	38.68***	36.87	37.88	38.76***	37.78	52.73	38.36***
School buildings' condition	67	50	22***	63	46	17***	77	59	38***
Reading teachers with post-secondary	21	3	39***	21	3	38***	21	1	43***
Parents' financial contribution	9.11	6.30	4.68***	9.46	6.17	4.42***	8.41	6.63	5.72***

Key: Darker indicates the leading country in the specific category. I tested mean differences across countries under a one-way ANOVA: Kenya 2000 vs. Tanzania 2000 vs. Uganda 2000 ~ * p < .05; ** p < .01; *** p < .001. I also tested the school environment by school location differences across countries under a one-way ANOVA: Kenya Rural 2000 vs. Tanzania Rural 2000 vs. Uganda rural 2000; Kenya Urban 2000 vs. Tanzania Urban 2000 vs. Uganda urban 2000 * p < .05; ** p < .01; *** p < .001

Like in 2000, Kenya had more school resources, smaller class sizes, more school buildings in good condition in 2007, while Uganda had the highest number of teachers with post-secondary education, and parents contributed to fewer school activities. The differences across rural and urban schools' environments had similar patterns except in a few cases (Tables 30).

Table 30: Changes in school environment in 2007 / Across countries

	Nationally			Rural			Urban		
	Kenya	Tanzania	Uganda	Kenya	Tanzania	Uganda	Kenya	Tanzania	Uganda
<i>School characteristics</i>									
Total school resources	7.366	4.932	6.234***	6.508	4.697	5.447***	8.96	5.439	8.332***
Class size	44.46	55.10	68.81***	41.93	51.08	69.01***	49.18	63.77	68.28***
School buildings' condition	40	41	28***	34	41	24***	52	43	39***
Reading teachers with post-secondary	31	4	43***	26	1	43***	41	10	45***
Parents' financial contribution	4.94	4.73	4.67***	4.92	4.70	4.10***	4.98	4.80	6.19***

Key: Darker indicates the leading country in the specific category. I tested mean differences across countries under a one-way ANOVA: Kenya 2007 vs. Tanzania 2007 vs. Uganda 2007 ~ * p < .05; ** p < .01; *** p < .001. I also tested the school environment by school location differences across countries under a one-way ANOVA: Kenya Rural 2007 vs. Tanzania Rural 2007 vs. Uganda rural 2007; Kenya Urban 2007 vs. Tanzania Urban 2007 vs. Uganda urban 2007 * p < .05; ** p < .01; *** p < .001

Summary of changes in East Africa's school environment between 2000 and 2007

Table 31 summarizes how the overall school environment changed nationally and in rural and urban schools in three East African countries between 2000 and 2007. I use the color red to indicate the school environment indicator deteriorated and the color green to show that the school environment indicator improved between 2000 and 2007. NS indicates that the change

was not statistically significant. If a country improved its school environment, we would expect a green color.

In summary, the class size in the three countries increased, suggesting that there was improved access to education. It also means that the East African governments eliminated school fees without adequate planning or infrastructural improvement. Uganda saw improvement in the categories of human and physical resources covered in this section, except in the overall school resources. In addition to school resources, the condition of school buildings deteriorated in Kenya and Tanzania. The proportion of reading teachers increased, and parents' financial contribution decreased over time in the three countries (Table 31).

Table 31: Summary of changes school environment between 2000 and 2007

	Kenya			Tanzania			Uganda		
	National	Rural	Urban	National	Rural	Urban	National	Rural	Urban
Total school resources			NS						
Class size									
School buildings' condition									
Reading teachers with post-secondary				NS				NS	
Parents' financial contribution							NS		NS

Key: (Green) implies school environment improved, or the gaps narrowed over time; (Red) implies school environment worsened along the specific dimension, or the gaps widened over time; NS implies the change between 2000 and 2007 was not statistically significant

In conclusion, Kenya improved three of the five school environment indicators in rural schools and three in urban ones after implementing the FPE policy. Tanzania improved two in rural schools and three in urban ones after its FPE policy. Uganda, which had an FPE policy before 2000, improved three school environment indicators in rural schools and three in urban ones over its policy period.

5.3. Changes in reading performance across countries over time

This section explores how the urbanicity-achievement gaps, SES-achievement gaps, and gender-achievement gaps differed across Kenya, Uganda, and Tanzania in both 2000 and 2007.

The differences in achievement in both subjects across countries are statistically significant in each year. Besides, the differences in average reading performance across rural and urban schools in East Africa were statistically significant. In 2000, Kenyan students had the highest reading scores, while Tanzanians had the highest in 2007. Ugandan students had the lowest reading performance in both years (Table 32).

Table 32: Reading performance in 2000 and 2007 / Across countries

	<i>Nationally</i>			<i>Rural</i>			<i>Urban</i>		
	<i>Kenya</i>	<i>Tanzania</i>	<i>Uganda</i>	<i>Kenya</i>	<i>Tanzania</i>	<i>Uganda</i>	<i>Kenya</i>	<i>Tanzania</i>	<i>Uganda</i>
2000	546.5	546.2	482.7***	530.8	525.1	475.0***	578.9	597.9	511.4***
2007	543.3	577.8	478.7***	525.6	563.9	462.9***	575.6	607.6	520.9***

Key: Darker indicates the leading country in the specific category. I tested mean differences across countries under a one-way ANOVA: Kenya 2000 vs. Tanzania 2000 vs. Uganda 2000; Kenya 2007 vs. Tanzania 2007 vs. Uganda 2007 ~ * $p < .05$; ** $p < .01$; *** $p < .001$. I tested achievement by school location differences across countries under a one-way ANOVA: Kenya reading 2000 vs. Tanzania reading 2000 vs. Uganda reading 2000 * $p < .05$; ** $p < .01$; *** $p < .001$

Similarly, Kenya's rural and urban schools had the highest scores in 2000 and Tanzanian rural and urban students had the highest scores in 2007. Uganda's rural and urban schools had the lowest reading performance in both years (Table 32).

Summary of changes in reading performance between 2000 and 2007

In Table 33, I summarize how the overall academic performance changed between 2000 and 2007. I also indicate how the performance changed nationally and in rural and urban schools by SES and gender in Kenya, Tanzania, and Uganda. I use the color green to indicate that performance improved and the color red to show that performance declined. NS indicates that the change was not statistically significant. If a country improved its reading scores, we would expect a green color.

The average reading scores declined in Kenya nationally, implying that Kenyan students performed worse after the FPE policy. Kenya's rural and urban schools' performance also declined over time, but the changes were not statistically significant. Besides, Ugandan students

performed worse in 2000 and 2007—three and ten years, respectively, since the country abolished school fees. Reading scores also declined in the country’s rural and urban schools, but the urban schools’ decline was not statistically significant. However, the average reading scores improved nationally and in rural and urban schools after Tanzania implemented its FPE policy, but the improvement was greater in rural schools (Table 33).

Students from high-income families in the three countries performed better than those from low-income families in 2000 and 2007. In Kenya, changes within SES categories nationally and in rural and urban schools were not statistically significant. In Tanzania, reading scores of the lowest and highest SES students improved, but they improved more among the lowest SES category. Performance by SES in the country’s rural and urban schools improved within all SES categories but improved more among the rural and urban poor. Conversely, in Uganda, the lowest and highest SES students’ reading scores worsened over time, but they declined more among the highest SES category. It also fell by SES within rural and urban schools but declined more among the wealthy rural and urban students (Table 33).

Table 33: Summary of academic performance changes between 2000 and 2007

		Kenya		Tanzania		Uganda	
Reading average score	National						
	Rural schools	NS					
	Urban schools	NS				NS	
		Lowest	Highest	Lowest	Highest	Lowest	Highest
Reading score by SES	National	NS	NS				
	Rural schools	NS	NS				
	Urban schools	NS	NS				
		Boy	Girl	Boy	Girl	Boy	Girl
Reading score by gender	National	NS				NS	
	Rural schools	NS					
	Urban schools	NS	NS				NS

Key: (Green) implies academic performance improved or the gaps narrowed over time; (Red) implies academic performance worsened or the gaps widened over time; NS implies the change between 2000 and 2007 was not statistically significant

In terms of gender, Kenyan girls' performance declined from 2000 to 2007, especially among rural girls, but the decline of boys' performance was not statistically significant. Similarly, in Uganda, rural girls' performance declined over time. That of the rural boys declined, but urban boys' reading scores improved. However, In Tanzania, boys' and girls' performance improved nationally and in rural and urban schools during the policy period (Table 33).

5.4. Influence of main variables and school environment on reading across countries

The above discussion indicates that reading performance across the countries was statistically significant within a specific year. This section discusses how the factors that explain reading performance variation within each country compare across the East African countries. I also look at whether factors not accounted for the analysis explain the differences across countries in 2000 and 2007. I start with a summary of how factors that explain reading scores' variation within each country compare across countries.

The regression analysis results across countries indicate that SES was a significant predictor of rural and urban students' reading scores, except in Uganda (Table 34). Kenyan and Tanzanian rural and urban students from high-SES families had higher scores than those from low-SES families before and after the countries implemented their FPE policies. Uganda is the only country that had implemented its FPE policy before 2000, and family SES influenced only the urban Ugandan students' reading scores in 2000. As previously discussed, the change in Ugandan average family SES between 2000 and 2007 was not statistically significant. Besides, the rural poor and the urban rich continued to access schooling during Uganda's policy period. This finding might suggest that education in Uganda was not just for wealthy families, a fact which distinguished itself from its East African counterparts.

Boys in rural schools performed better than girls in reading before and after the FPE policy implementation in Kenya and Tanzania as well as during some years into the FPE policy in Uganda. However, in urban schools, boys' and girls' performance was not statistically different in 2000 and 2007 in the three countries (Table 34). Therefore, the gender-achievement gaps continued in rural schools in East Africa even after abolishing school fees. However, there were no gender-achievement gaps in urban schools before and after the FPE policy in Kenya and Tanzania or during the policy period in Uganda.

Table 34: Summary of regression-based association between main variables, school environment and reading achievement in 2000 and 2007 across countries

	Kenya				Tanzania				Uganda			
	Rural		Urban		Rural		Urban		Rural		Urban	
	2000	2007	2000	2007	2000	2007	2000	2007	2000	2007	2000	2007
Pupil SES score	Y	Y	Y	Y	Y	Y	Y	Y	NS	NS	Y	NS
Female	NS	-Y	NS	NS	-Y	-Y	NS	NS	-Y	-Y	NS	NS
Pupil's age in months	-Y	-Y	-Y	-Y	NS	NS	NS	NS	-Y	-Y	-Y	-Y
Grade repetition	N	-Y	-Y	-Y	-Y	-Y	-Y	-Y	-Y	-Y	-Y	-Y
Language of instruction	Y	Y	Y	Y	Y	Y	NS	Y	Y	Y	NS	NS
Reading Tuition	NS	NS	NS	NS	-Y	NS	NS	NS	N	Y	NS	NS
Pupil learning material	Y	NS	Y	NS	NS	NS	NS	NS	Y	Y	Y	NS
Class size	-Y	-Y	N	NS	NS	NS	NS	NS	NS	NS	NS	NS
Total school resources	NS	NS	NS	Y	NS	NS	Y	NS	Y	Y	NS	Y
School buildings condition	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Y	NS
Parents' financial contribution	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Teacher Experience	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Teacher Qualification	NS	Y	NS	NS	NS	NS	NS	NS	NS	NS	NS	Y
R-Squared	0.232	0.153	0.313	0.395	0.146	0.093	0.169	0.11	0.18	0.108	0.442	0.258

Among the home background factors, grade repetition and speaking the language of instruction stood out as significant predictors of rural and urban students' reading performance in all the countries before and after the FPE policy or years into the policy (Table 34). Younger rural and urban students in Kenya and Uganda performed better than older ones, but performance did not vary by students' age in rural and urban schools in Tanzania. There are mixed findings on the effect of receiving extra reading tuition. Getting extra tuition only influenced rural students in Tanzania and Ugandan in 2000. In 2000, rural Tanzanian students who received extra tuition had lower scores than those who did not. However, rural Ugandan students who received extra tuition had higher scores than those who did not in the same year. The reading scores did not

vary by access to or amount of private tuition among rural and urban Kenyan students, urban Tanzanian students, or Uganda's urban schools. Similarly, the effect of pupil learning resources on learning outcomes indicates mixed findings. The learning resources influenced rural and urban Kenyan students' reading scores in 2000, rural Ugandan students in both years, and urban Ugandan students' in 2000. The reading performance did not vary by the availability of learning resources among urban Ugandan students in 2007 or rural and urban Tanzanian students in either year.

Among the school covariates, class size, school resources, school buildings' conditions, and teachers' academic qualifications influenced students' scores (Table 34). Students who attended small classes, schools with more resources, schools with buildings in better condition, or had teachers with high academic qualifications were likely to have higher test scores. However, the findings varied significantly in rural and urban schools and across countries. In Kenya, class size influenced rural students' reading performance before and after abolishing mandatory school fees. A teacher's academic qualifications were a predictor of rural Kenyan students' performance in 2007 only. In Kenyan urban schools, only school resources influenced students' performance in 2007. However, none of the school covariates explained the variation in urban Kenyan students' reading scores before and after implementing its FPE policy. None of the school factors in Tanzania explained the variation in rural and urban schools' reading performance before and after implementing its FPE policy. Although reading scores improved over time in rural and urban schools in Tanzania, none of the school factors influenced the performance, except in 2000. In 2000, only school resources affected students' performance among urban schools. In Uganda's rural schools, reading performance varied only by school resources in both years. In Ugandan urban schools, only school buildings' conditions influenced

reading scores in 2000. In 2007, the performance varied by school resources and teachers' academic performance. Therefore, although rural Ugandan students' scores declined over time, most school factors did not explain the performance variations.

The analysis so far indicates that reading test scores varied across the East African countries, and there is a variation in the factors that explain the differences in performance within each country. I introduced country dummy variables to estimate whether the test scores changed across countries in ways not explained by the variables I controlled for. Therefore, a country dummy variable indicates how reading performance changed across countries in ways that cannot be explained by either of the key variables (SES and gender) or the control variables. I also added an interaction between the key variables and the country dummies to test whether the relationships between the key variables and test scores were different across countries. For instance, such an interaction shows whether gender's influence on test scores differs across countries.

5.4.1. Rural schools reading regression analysis results with country dummies

The findings show that the Tanzania country dummy is positive and statistically significant in 2007 only, while that of Uganda is negative and significant in both years (columns 1 and 3, Table 35). Therefore, the rural students' reading scores were higher in Tanzania than in Kenya in 2007 due to other reasons not accounted for in the model. However, their scores were lower in Uganda than in Kenya in both years due to different reasons not accounted for in the model. Conversely, the rural students' reading scores were not higher in Tanzania than in Kenya in 2000 due to other reasons not accounted for in the model.

Table 35: Association between main variables, school environment and reading achievement in Rural schools 2000 and 2007 with country dummies

	(1)	(2)	(3)	(4)
	with country dummies 2000	Interaction of main vars & country dummies 2000	with country dummies 2007	Interaction of main vars & country dummies 2007
Pupil SES score	0.193***	0.202**	0.170***	0.230***
Female	-13.78***	-6.293	-12.84***	-7.23
Pupil's age in months	-0.397***	-0.403***	-0.437***	-0.439***
Grade repetition	-16.67***	-17.03***	-15.96***	-15.74***
Speaking language of instruction at home	33.29***	33.22***	19.86***	19.95***
Extra Reading Tuition	-6.758	-5.971	6.008	6.178
Total pupil learning material	5.785***	5.786***	1.005	1.109
Class size	-0.710**	-0.733**	-0.209*	-0.214**
Total school resources [max=22]	4.817**	4.945**	3.186**	3.233**
School buildings condition	6.665	5.931	-7.734	-7.76
Total parent financial contribution	-0.401	-0.54	-0.502	-0.434
Reading Teacher Years of Teaching	0.294	0.229	-0.132	-0.14
Reading Teacher Academic Qualification	-3.342	-3.33	6.076	6.191*
TAN	7.116	-35.51	54.70***	66.97
UGA	-39.43***	26.47	-44.95***	18.42
TAN # Pupil SES score		0.12		-0.00303
UGA # Pupil SES score		-0.15		-0.144
girl # TAN		-16.23*		-17.60**
girl # UGA		-4.542		-0.269
constant	488.6***	484.8***	480.6***	449.8***
R-squared	0.213	0.219	0.277	0.281
N	5659	5659	9421	9421

Notes: Regressions were estimated with standard errors clustered at the school level and sampling weights to produce robust estimates of standard errors and make estimates nationally representative. Other variables included in regressions are teacher's gender, student behavioral problems, and teacher's behavioral problems. * p < 0.05, ** p < 0.01, *** p < 0.001

The results also show that the interaction between the Tanzanian country dummy and gender is negative and statistically significant in 2000 and 2007 (columns 2 and 4, Table 35). Therefore, other factors not accounted for in the model reduced the gender-achievement gap between rural Kenyan students and their Tanzanian counterparts in both years. The other interactions were not statistically significant.

5.4.2. Urban schools reading regression analysis results with country dummies

The findings indicate that the Tanzanian country dummy is positive and statistically significant, while that of Uganda is negative and significant in both years (columns 1 and 3, Table 36). Therefore, urban students' reading scores were higher in Tanzania than in Kenya in 2000 and 2007 due to other reasons not accounted for in the model. However, their scores were

lower in Uganda than in Kenya in both years due to different reasons not accounted for in the model.

Table 36: Association between main variables, school environment and reading achievement in Urban schools 2000 and 2007 with country dummies

	(1) with country dummies 2000	(2) Interaction of main vars & country dummies 2000	(3) with country dummies 2007	(4) Interaction of main vars & country dummies 2007
Pupil SES score	0.323***	0.346***	0.221***	0.349***
Female	-3.126	1.069	-7.919**	-4.929
Pupil's age in months	-0.784***	-0.792***	-0.820***	-0.815***
Grade repetition	-16.54***	-15.94***	-20.33***	-20.59***
Speaking language of instruction at home	16.3	15.15	24.91**	27.70**
Extra Reading Tuition	4.885	4.532	3.449	4.084
Total pupil learning material	7.056***	7.158***	1.438	1.284
Class size	-0.285	-0.235	-0.394**	-0.364**
Total school resources [max=22]	3.580*	3.331*	6.270***	5.855***
School buildings condition	10.21	11.04	9.055	8.168
Total parents' financial contribution	-1.516	-1.607	-0.00105	0.522
Reading Teacher Years of Teaching	-0.373	-0.359	-0.112	-0.112
Reading Teacher Academic Qualification	9.324	9.092	-11.12**	-10.92**
TAN	35.12***	98.04*	64.46***	165.9***
UGA	-49.06***	-69.57	-42.23***	84.29*
TAN # Pupil SES score		-0.119		-0.201**
UGA # Pupil SES score		0.0572		-0.258***
girl # TAN		-7.772		-10.24
girl # UGA		-10.41		-0.304
constant	458.8***	448.7***	594.9***	524.6***
R-squared	0.349	0.351	0.352	0.36
N	2672	2672	4296	4296

Notes: Regressions were estimated with standard errors clustered at the school level and sampling weights to produce robust estimates of standard errors and make estimates nationally representative. Other variables included in regressions are teacher's gender, student behavioral problems, and teacher's behavioral problems. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results also show that none of the interactions between the key variables and country dummies were statistically significant in 2000. In 2007, the interactions between Tanzania and Uganda country-dummy and family SES are negative and statistically significant (columns 2 and 4, Table 36), which implies that other factors not accounted for in the model reduced the SES-achievement gap between urban Kenyan students and their Tanzanian and Ugandan counterparts. The other interactions between country dummies and the study's main variables are not statistically significant. The country dummy coefficients in 2007 increase significantly after adding the interactions. Besides, the Ugandan country dummy, which is negative in specification 3, becomes positive (column 4, Table 36). Therefore, reading scores were higher among urban

schools in Uganda than in Kenya in 2007 due to other reasons not accounted for in the model after adding the interactions.

In summary, the differences in test scores in rural and urban schools varied across countries in both 2000 and 2007. The average rural and urban students' reading scores varied across the countries by SES and gender. The results suggest that the reading scores were higher in Tanzania's rural and urban schools than among Kenya's rural and urban schools in both years due to other reasons not accounted for in the model, except among rural students in 2000. Conversely, the reading scores were lower in rural and urban schools in Uganda than in Kenya for different reasons not accounted for in the model. These reasons could include other policy initiatives, measures (beyond the scope of this study), or variables not available in the SACMEQ data that explain the differences in performance between countries.

Regarding variation in performance by SES and gender across countries, only the gender-achievement gap between Kenya's rural schools and their Tanzania counterparts narrowed in both years due to other factors not accounted for in the model. Among the urban schools, the SES reading achievement gap between Kenyan and Ugandan students narrowed in 2007 due to other factors not accounted for in the model. Further, other factors not accounted for in the model narrowed the gap in SES's influence on reading scores between Kenyan and Tanzanian urban students in 2007. The other interactions between country dummies and the study's main variables were not statistically significant.

CHAPTER SIX: CONCLUSION

Introduction

In this study, I investigated the influence of East Africa's Fee-Free Primary Education (FPE) policies on addressing schooling access inequalities and quality of learning measured by reading test scores. I also examined how the school environment changed within the same period. I explored these issues by using the SACMEQ data collected in 2000 and 2007. The three East African countries introduced the access policies at different times: Uganda in 1997, Tanzania in 2001, and Kenya in 2003. This chapter presents the study's main findings, implications for policy and the literature, recommendations for future research, and the study's limitations. I start by looking at the study's limitations.

6.1 Study limitations

The primary limitation of this study relates to the nature of the data I used to answer the research questions. While SACMEQ data allowed me to conduct a comparative analysis of the three East African countries, the data also has some limitations. First, the data is cross-sectional in design. Since learning is a cumulative process, to evaluate the influence of Free Primary Education policies in East Africa would require comparable longitudinal data that includes information on the same students before and after the implementation of the policy within the individual countries. However, such longitudinal data is not available. To estimate the policy's influence, I attempted to shed light on an array of characteristics associated with expanding school enrollment. Besides, cross-sectional data limits the ability to draw firm causal inferences. To compensate for this limitation, I included a proxy for prior achievements, controlled for a wide array of measures on students and schools, and used statistical methods that captured the data's multilevel nature.

Second, the data could not address why there was a lack of patterns in access or quality of learning over time as countries adjusted to the implications of FPE. To shed light on these questions would require qualitative data through interviews or focus group discussions, which were beyond this study's reach. I partly compensated for this limitation by reviewing the literature to understand what could have happened in these specific countries. However, I recognize that reviewing the literature may not adequately address such questions.

Third, comparing data across countries may not fully account for differences in educational contexts. SACMEQ data, for instance, does not account for the fact that students in the three countries experienced different curricula, different education systems, had differential emphasis on primary education expansion after independence, and were guided by different education policies. Therefore, I recognize that this study does not compare similar student groups. During the analysis, I considered the results and the different educational and cultural contexts in which the countries operated. However, most of these issues were beyond this study's limitations.

Another limitation relates to the study's narrow focus on reading test scores to measure education quality. Although other studies and international reports use standardized tests to measure education quality, it is equally criticized. Therefore, I acknowledge that reading scores alone do not provide a broad overview of how the education quality changed in East Africa after the countries abolished mandatory school fees.

Studies have shown that the way SES is measured may influence the relationship with education outcomes. For instance, Heyneman & Loxley (1983) used the International Association for the Evaluation of Educational Achievement (IEA) data in conjunction with country-level data from non-IEA participants for a total of 29 countries. They constructed the

socioeconomic status variable by mother's education, father's education, father's occupation, number of books at home, and a cultural measure of consumption such as the dictionary, dishwasher, and record player in the home. The Buchmann and Hannum (2001) study reviewed all studies on the matter, including single case studies, to identify long-term patterns about the relationship. However, like other studies that have used SACMEQ data (Nzomo, 2001; and Hungi & Thuku, 2010), this study was limited to the SES variable available in the dataset.

6.2. Main findings on the effectiveness of FPE on access and quality of learning

In this section, I provide a summary of the study's main findings.

6.2.1 Equity implications of FPE policies on actual access

The East African countries abolished mandatory fees in line with the international call for universal primary education to enable children from low-income families to access school. I found evidence that parents contributed less to school activities after Kenya and Tanzania abolished mandatory fees and over Uganda's policy period. Since countries implemented the FPE policies to reduce parents' financial burdens in educating their children, these changes align with the way we would expect such contributions to change.

The findings indicate that the East African governments' decisions to implement FPE policies enabled children from economically disadvantaged families to access school. These findings are similar to those of other studies (Hoogeveen & Rossi, 2013; Oketch & Rolleston, 2007; Sewamala et., 2011). Additionally, enrollment trends indicated that FPE policies increased school participation rates in East Africa. Decomposing the school access changes by school location, the evidence showed that Uganda continued to increase access among the rural poor and sustained the urban rich children's access to education after implementing its policy in 1997.

Kenya's school access increased more among the rural poor, while Tanzania increased access more among the urban poor.

Historically, especially in developing countries, females have had less access to education than their male counterparts (Lewin, 2009; Kalindi, 2015). I did not find any significant changes in girls' representation in rural and urban schools in Kenya and Tanzania after the countries implemented their FPE policies. However, rural girls' school access improved over the country's policy period in Uganda. There was no significant increase in urban girls' school access. Other studies on Uganda (Grogan, 2008; Nishimura et al., 2009) also found that primary education fee abolition reduced late school entry, incentivized enrollment, and reduced dropout, particularly for girls and children in rural areas.

6.2.2 Equity implications of FPE policies on the school environment

Although FPE policies improved school access in East Africa, the evidence indicates that schools' human and physical resources did not improve to accommodate the increasing number of students. This study found that the three countries had fewer school resources and larger classes over the policy period. Therefore, the countries implemented the policies without adequate planning, putting measures in place to improve schools' human and physical resources, or undertaking infrastructural development to absorb enrollment growth. These findings are similar to other studies, which found that most sub-Saharan countries eliminated school fees before carrying out infrastructural improvements in the school system. In most cases, the dramatic increase in primary attendance was not accompanied by a commensurate increase in teachers, resulting in large pupil-teacher ratios (Deininger, 2003). Avenstrup et al. (2004) also found that FPE led to a massive influx of children into schools in Kenya, Lesotho, Malawi, and Uganda, which resulted in an "access shock." The shock led to overcrowded classrooms,

learning in double and triple shifts, overage pupils, and acute shortages of teachers and teaching materials like textbooks.

The school resources and infrastructure were worse in rural schools. Urban schools had more resources and buildings in good condition and a higher proportion of reading teachers with post-secondary training. This evidence indicates that East African governments neglected investing in rural schools before and after implementing the FPE policies. Other studies have found that urban areas enjoy more endowments than their rural counterparts, and their students enjoy more benefits from these endowments (Zhang, 2006). Similarly, Johannes (2010) posits that rural schools have fewer teaching and learning supplies, poor infrastructure, and inadequate teachers—conditions that are associated with better academic achievement.

6.2.3 Equity implications of FPE policies on quality of learning

While school access improved in East Africa, the quality of learning, especially of rural girls, suffered. In all three countries, boys performed better than girls, but there were no gender differences in urban schools' performance. The rural gender-achievement gap in Kenya appeared after the FPE policy, but such gaps existed in Tanzania and Uganda before and after the countries implemented their FPE policies. However, I did not find any specific school resource that explained rural girls' underperformance in Tanzania. Learning in large classes and inadequate school resources only influenced rural school performance in Kenya and Uganda, respectively. This finding supports the body of literature that suggests that most school resources lead to little improvement in student's performance (Hanushek, 2003; Hanushek & Luque, 2003; Glewwe et al., 2007). Conversely, I found evidence that family socioeconomic status, age, grade repetition, and speaking the language of instruction at home were essential predictors of East African students' performance before and after the implementation of the FPE policy.

Tanzania's changes in students' composition and reading scores after the FPE policy indicate a success story. It is only in Tanzania where the number of students from disadvantaged backgrounds increased and the average reading scores improved nationally and in rural and urban schools, although schools' physical and human resources did not improve. Besides, Tanzania increased girls' reading performance the most by 2007. I did not find specific evidence in the data that explained why Tanzania performed best among the East African countries over time. Kenya increased the number of school students from underprivileged backgrounds, but the average reading performance worsened after eliminating mandatory school fees. Uganda did not significantly increase school access for students from low-income families, but the country's average reading performance—especially in rural schools—declined over the policy period.

The relationship between access and quality of learning in Kenya and Uganda is similar to what I expected. For instance, Taylor & Spaul (2015) argue that improved access and the changing composition of school in terms of student demographics (an influx of students from disadvantaged backgrounds) may reduce average scores. However, Tanzania increased economically disadvantaged children's access to schooling after abolishing mandatory fees, and student's reading performance improved over the same period. Tanzania's relationship between access and quality is contrary to what the literature indicates.

In summary, the following are the main findings from this study:

- i. East African parents contributed less to school activities after the countries implemented FPE policies, which is commensurate with the expectations of FPE policy.
- ii. Abolishing mandatory school fees enabled low-income families in East Africa to send their children to school — school access increased more among rural poor in Kenya and Uganda and urban poor in Tanzania.

- iii. There were no significant changes in girl's representation in Kenyan and Tanzanian schools, but girls' access to school improved in Uganda.
- iv. East African schools' human and physical resources did not improve to accommodate the increasing school access after eliminating school fees. Besides, rural schools had fewer resources.
- v. While school access increased after FPE policy in all the countries, rural girls' quality of learning declined in the three countries. There was no gender-achievement gap in urban schools, but boys performed better than girls in rural areas.
- vi. It is only in Tanzania where the number of students from disadvantaged backgrounds increased and the average reading scores improved, although schools' physical and human resources did not improve. However, I did not find specific evidence in the data that explained why Tanzania performed best among the East African countries over time.

6.3 Implications for East Africa's Education policy

The East African governments should take action on the variables that contributed to significant performance differences among students. This study's primary policy implication is that 'free' is not enough unless other initiatives to improve education quality support such a policy. All three countries have free primary education and Uganda had a decade of 'free' education (the period within this study's focus), but there are no overall positive trends on the relationship between access and education quality in East Africa.

Although I cannot make causal claims from the results, this study identified school resources, class size, SES, gender, age, grade repetition, and speaking the language of instruction as significant predictors of students' reading achievement. The evidence indicates that schools' access improved after the Free Primary Education policies, but schools' human and physical

resources declined over the policy period. The school infrastructure was worse in rural schools. Rural families had fewer resources than urban families, and rural children in East Africa generally attended schools with few resources, which subjected rural children to double jeopardy in their learning opportunities. The East African countries used FPE policies to reduce the financial burden of all families without explicitly targeting the poor. As Grogan (2008) posits, parents and guardians are responsible for (or must pay for) several other schooling expenses, such as the cost of educational materials (books and supplies), uniforms, food, and transportation. Even with free primary education policies, rural children will continue to lag behind unless the government provides targeted support for the rural poor. Since most children in East Africa still reside in rural areas, improving school participation and raising the learning levels of rural children must be at the forefront of the policies aimed at achieving sustainable development goals in these countries.

The evidence in this study and previous studies (Zhang, 2006; Johannes, 2010) indicates that the East African governments did not provide equal investments in rural and urban schools before and after implementing the FPE policy. Rural schools had fewer teaching and learning supplies and poor infrastructure, which negatively influenced education quality. This study found that most school resources did not influence reading scores after controlling for student characteristics and other school factors. However, as indicated in Appendix I, there is a positive relationship between the school resources and performance without controlling for other factors. Therefore, East African governments should implement measures to improve rural schools' human and physical resources.

The East African countries can use the existing policies to improve school resources. For instance, Uganda has the School Facilities Grant, designed to assist schools in upgrading their

infrastructure. In Kenya, the Basic Education Infrastructure program under the country's Vision 2030 initiative aims to construct and rehabilitate classrooms in all public schools. Tanzania's National Development Vision 2025 plan commits to improving school infrastructure.

There's nothing much that can be done to minimize the SES's effect on students' performance. However, the East African governments should implement initiatives that ensure students from disadvantaged families receive adequate learning support to improve their academic performance.

Boys outperformed girls in reading in the three countries. However, I only found evidence of the gender-achievement gap in rural schools, not in urban ones. The gender gaps were there before and after Kenya and Tanzania implemented FPE policies and during Uganda's policy period. These East African countries should commission studies to examine the reasons for rural girls' poor performance and identify ways of correcting them. Perhaps these gender differences are linked to the quality of rural schools or the responsibilities that girls have at home.

Being older was a clear disadvantage for students' performance. The expected age for a grade 6 pupil in East Africa is 12 years, but the observed average age in both years was 14 years. Therefore, parents should ensure that all children enter school at the official age. This could be encouraged through education policies emphasizing that children should enter school at the official age.

6.4 How this study connects to other education discourses

In this section, I review the literature on conventional arguments related to different aspects of this study and discuss how it speaks to those arguments. Specifically, I look at discussions around the Free Primary Education policies, school resources, FPE and privatization of Education, language of instruction, and pedagogical choices.

Arguments around Free Primary Education

There is an agreement in the literature and research that Free Primary Education Policies in Sub-Saharan enabled low-income families to access school. However, researchers highlight limitations of the FPE policy that may lead to the students not benefitting fully from these policies. Arguments on the FPE policy limitations focus on the planning and implementation, unintended effects, and the policy's hidden costs.

The FPE in Kenya and Uganda, like in other sub-Saharan African countries, arose from a political agenda and was implemented to fulfill an electoral pledge. Other Sub-Saharan African countries that eliminated school fees as part of a political pledge include, but not limited to Malawi in 1994, Lesotho in 1999, Zambia in 2002, Rwanda in 2003, Burundi in 2005, Liberia in 2006, and Benin in 2007 (Harding & Stasavage, 2013). In countries where the policy was tied to politics, they implemented it quickly without proper evaluation of its desirability, affordability, and feasibility. In addition, there was little consultation with stakeholders (local education officers, schools, teachers, parents, and pupils) on what form the policy should take. Besides, countries did not undertake a systematic analysis of the education sector beforehand to assess the impact of the policy and develop strategies that would be financially sustainable (Muyanga et al., 2010; Kadzamira & Rose, 2003; MacJessie-Mbewe, 2002; Chimombo, 1999). For instance, Chimombo (1999) notes that Malawi's main problem with FPE was the failure to base the policy

on a proper understanding of the forces behind school participation, especially forces embedded in the socio-political and economic settings where schools operate. Similar lack of poor planning and implementation in Uganda and Kenya (Deininger, 2003; Muyanga et al., 2010) could explain why the quality of learning declined after implementing their FPE policies.

The financial implications of implementing FPE were considerable. Although governments and donor resources increased substantially in response to FPE, they continue to be insufficient to ensure quality primary school education for all children. A common characteristic of FPE across Kenya, Uganda, and Tanzania was the use of capitation grants to fund schools based on the number of students (UNESCO, 2015). However, the capitation amount was usually lower than what schools had collected from parents before the policy, forcing them to manage more students with fewer resources (Nishimura et al., 2009). In addition, the abrupt increase in enrolments following FPE implementation stretched school resources that were already limited before the policy. The major side effects of the policy include shortage of qualified teachers, lack of teaching and learning materials, and shortage of infrastructure — that lead to poor quality education (Avenstrup et al. 2004; Deininger, 2003). For instance, MacJessie-Mbewe, (2002) posits that the shortage of classrooms in Malawi forced teachers to conduct classes in the open air and under the trees. Coupled with other socioeconomic factors, he notes that pupils became disinterested in school and dropped out.

Although primary public schooling is technically free, hidden costs make public education expensive for low-income families. Parents and guardians are responsible for (or must pay for) several other schooling expenses, such as the cost of educational materials (books and supplies), uniforms, food, and transportation (Grogan, 2008). Countries used FPE policies to reduce the financial burden of all families without explicitly targeting the poor, and cost-sharing

activities hurt low-income families who struggle to earn their living. After children have enrolled in school, poor households can find the costs associated with schooling prohibitive. As a result, they may choose not to send their children to school since the direct costs may be beyond their means (MacJessie-Mbewe, 2002; Somerset, 2009, Zuilkowski et al., 2018). For instance, a study by Kadzamira & Rose (2003) found that when school stationery and high-quality school uniforms are required, it increased the likelihood of drop-out for economically disadvantaged students. These hidden costs imply that educational policies have been unsuccessful in providing for the poorest, who continue to be under-served by the education system.

Therefore, the limitations of FPE policies could explain why East African countries did not experience universal school access after abolishing school fees and quality of learning, especially for rural girls, declined. Schooling is still not free even in the post-FPE era, and the cost of education continues to be a major reason for children not being in school. Besides, poor planning and implementation of the policy, inadequate financial resources, and insufficient school resources negatively affect school access and education quality.

FPE policies and school resources

There is no agreement in the literature on the influence of school resources and education outcomes. On the one hand, one body of the literature indicates that having better-resourced schools with small classes improved students' performance (Greenwald et al., 1996; Lee et al., 2005; Lee & Zuze, 2011). On the other hand, other studies suggest that school resources are not significant predictors of student outcomes (Hanushek, 2003; Hanushek & Luque, 2003; Glewwe et al., 2007). Moreover, the influence of school resources on student achievement can depend on how school resources are measured. For instance, Chudgar & Luschei (2009) note that measuring and describing relevant school resources may vary on school context and organization.

The school resources variable in the SACMEQ data is a composite measure of the availability of physical resources the availability of 22 facilities in a school. The facilities include a library, hall, staff room, office of the school head, storeroom, sports ground, garden, cafeteria, computers, and photocopiers, among others. However, most rural schools may not have access to these facilities. Therefore, the SACMEQ questionnaire designer should amend it to measure the availability of school facilities common in most sub-Saharan African schools. The questionnaire can also include more school environment indicators used in other studies, such as per-pupil expenditure and pedagogy that teachers use. However, difficulties in measuring relevant school resources present a challenge in any study that examines the role of the school environment.

The present study found that most school resources did not influence reading scores after controlling for student characteristics and other school-environment-related factors. However, there is a positive relationship between the school resources and performance without controlling for other factors. This finding could be related to how the SACMEQ data measures school environment-related variables and the lack of variation in these variables owing to generally poor conditions of most schools. Lack of adequate variation in the school environment variables such as class size, school resources, and teachers with post-secondary may explain the lack of significance after controlling for family background and other school factors. For example, given the large class sizes in most schools, a slight change in class size may not lead to a significant change in students' reading performance.

FPE policies and privatization

East Africa has a long history of private-sector education provision. The traditional private sector education providers include non-governmental organizations, faith-based organizations, community-based providers, and private-for-profit agents (Wamalwa & Burns,

2018; Heyneman & Stern, 2014). However, post-free public primary education saw the growth of low-cost private schools (LCPs), especially in informal urban settlements. These schools are highly unregulated and tailor their low-fee structure to be affordable to poor urban settlements (Wamalwa & Burns, 2018; Heyneman & Stern, 2014; Zuilkowski et al., 2018).

Private schools in East Africa increased after the FPE policy. For instance, in Kenya, private schools increased from 4.6% in 2000 to 10.1% in 2007 and from 5.8% to 11.2% in Uganda. However, the data does not indicate whether the private schools are low-cost or traditional private schools. Tanzania did not collect data on private schools. Research on the growth of low-cost private schools indicates that FPE was the main factor contributing to the privatization of education. On the one hand, some studies found that students are forced into low-cost private schools because of insufficient public schools since the implementation of FPE. The FPE policy triggered a greater demand for education, and some parents who preferred to send their children to free public schools were unable to find a place (Oketch et al., 2010; Heyneman & Stern, 2014). Individuals and small community organizations established low-cost private schools that are easily accessible to parents unwilling to travel long distances to reach the nearest public school (Oketch et al., 2010; Heyneman & Stern, 2014). Therefore, the LCPs in Sub-Saharan Africa increased to meet excess demand resulting from an inadequate supply of public schools. For example, in Kenya (Oketch et al. 2010), Uganda (Kisira, 2008), and Nigeria (Tooley et al. 2008).

On the other hand, other studies conclude that parental perceptions of the high quality in low-cost private schools compared to government schools was the main reason for the demand for LCPs (Dixon & Tooley, 2012). For instance, Zuilkowski et al. (2018) found that Kenyan parents widely believed that the quality of education declined after the country introduced FPE in

2003. Parents' concerns over the quality of education as defined by teaching, textbook availability, class sizes, and students' performance led many to seek options, even among poor households. Further, the parents were willing to pay more to ensure their children attended high-quality school. Another study by Heyneman & Stern (2014) also found that parents in Ghana, Kenya, and Pakistan, chose their children's schools based on perceived quality differences. An analysis of school choice in rural Kenya found that decisions were not solely related to the lack of spaces, but quality-related factors, such as the student-teacher ratio in the local government school (Nishimura & Yamano, 2013). Besides, Tooley (2009) claims that low-cost private schools are likely to provide lower teacher absenteeism (due to increased accountability to parents and school owners), more engaged teachers (due to more local recruitment), smaller class sizes, and more individualized attention.

FPE policies and the language of instruction

Most research on the role of students' proficiency in the language of instruction in educational performance focuses on the use of mother tongue as a language of instruction (LOI). Research supports the point of view that teaching in a child's first language is effective for literacy acquisition (Yohannes, 2009; Piper et al., 2016;). Besides, other research indicates that when children, particularly from disadvantaged backgrounds, learn in familiar languages they are more likely to succeed in school (UNESCO, 2011; Hungi et al., 2018). In addition, Brock-Utne (2007) noted that mother-tongue instruction increases the potential for students to interact with parents around school content. Through expanded use of the mother tongue, students integrate school-acquired knowledge and develop vocabulary through interaction with peers, family, and teachers.

Therefore, proficiency in the language of instruction is an important factor in students' educational achievement. The literature shows that coherence between language at school and language at home gives children the opportunity to apply oral language skills gained at home. As a result, the literature suggests that all things equal, children taught in their mother tongue would acquire reading skills more quickly. In line with research on LOI, this study found that speaking the language of instruction at home helped students attain high reading scores before and after the countries implemented FPE policies. However, it's not feasible to teach in mother tongue given the wide range of languages spoken in East Africa. Education policymakers can sensitize students to speak the language of instruction at home — English in Kenya and Uganda and Kiswahili in Tanzania.

For education authorities to succeed in the sensitization campaigns for students to speak the language of instruction at home will need to involve parents and those in charge of primary schools. It is crucial to involve parents in such campaigns to support their children to practice the language of instruction (Kiswahili and English) at home.

FPE policies and Pedagogical choices

The influx of students in schools following the implementation of the FPE policies led to large class sizes and a shortage of teachers, which compromised teaching and learning quality. Expanding education opportunities to all students created a high demand for teachers to work with the students, leading to massive teacher shortages (Luschei & Chudgar, 2017). To respond to urgent teacher needs arising from increased enrolments, East African governments, like in other developing countries, launched large-scale teacher recruitment programs that involved the widespread appointment of contract teachers (Bramwell et al., 2014; Orodho et al., 2015). These countries were already facing financial constraints and could not afford to recruit new teachers at

the traditional salaries to meet the demand. Compared to a permanent teacher, the contract teacher is characterized not only by a “short term” contract and a significantly reduced salary but also by a lower level of qualification and a shorter duration of pre-service training (Koning, 2013). For instance, Orodho et al. (2015) noted that teacher shortages led some Kenyan school boards to employ unqualified teachers as a source of cheap labor. Generally, contract teachers helped expand school access in most disadvantaged areas. However, as Luschei & Chudgar (2017) note, if teacher qualifications positively correlate with their classroom effectiveness, lowering the qualifications required to join the teaching force negatively affects students’ learning experiences.

Teacher policy and practices in East Africa promote learner-centered pedagogy and curricula that involve students’ active participation through group work, debates, and problem-solving activities (Varvus et al., 2011). However, it was hard for teachers to use techniques that ensure students’ active participation in overcrowded classrooms. Large classes made it difficult for teachers to deliver lessons (Abuya et al., 2015), incapacitated the teachers’ ability to organize and manage classes (Alubisia, 2005), and impaired their ability to provide attention to individual pupils (Wax, 2003). Besides, education officials failed to provide adequate support to teachers as they coped with the access (enrollment) shock in the wake of FPE (Abuya et al., 2015).

Teachers continued to use the traditional teacher-centered methods where they lecture, and it’s almost impossible for students to receive individual attention (Somerset, 2009; Kadzamira & Rose 2003). For instance, a study by Majanga et al. (2011) in central Kenya found that large class sizes after the FPE policy made it difficult for teachers to give personalized attention to all students, give adequate assignments, and control the classroom interaction processes. Their study also found that teachers rushed over lessons interacting only with bright

pupils ignoring weaker and slow learners, did all the work on the chalkboard, and avoided group work. Similarly, Yusuph (2013) found that in Tanzania, teacher-learner classroom interactions were ineffective due to large classes, and students did not get enough individual assistance from their teachers. The author also found that it was difficult for teachers to assess students' learning advancement and capability adequately.

The current study found that schools in East Africa faced challenges that could make it impossible for teachers to use student-centered pedagogy. These challenges include large class sizes, inadequate learning resources, insufficient school infrastructure, and few teachers with post-secondary training. To shift towards a learner-based pedagogy in this challenging context, teachers need additional pedagogical support. The challenge to Kenya, Uganda, Tanzania, and other countries in the global south, is to determine how to provide teachers the guidance and support they need within a country's financial constraints.

6.5 Implication for the school access and education quality literature

This study addressed several gaps in the literature on school access and education quality. Most literature examines access to schooling or quality of education separately, but both concepts are related. On the one hand, rapid expansion in enrollment may deteriorate education quality (Wils et al., 2005). On the other hand, quality education can encourage students to remain in school and move more through primary school grades (Langsten, 2017). Therefore, quality is an essential supplement to ensuring all children have access to and complete primary education. Whereas most studies have examined the impact of the elimination of school fees in East African countries on enrollment, attendance, and retention (Oketch and Rolleston 2007; Riddell 2003; Chapman et al., 2010; Hoogeveen & Rossi, 2013), few studies have analyzed their influence on

learning outcomes. Therefore, by investigating the relationship between access to schooling and learning outcomes in East Africa, this study has contributed to the topic's limited literature.

Further, limited studies investigated rural-urban gender differences in access and academic performance. Examining the gender differentials in education outcomes by school location provided evidence that big categories mask other differences within those groups. For instance, this study found that while access improved in East Africa, the learning quality, especially of rural girls, suffered. Decomposing the rural-urban school access and education quality relationships was a distinct contribution to the literature.

Lastly, the literature reviewed shows consistency in the relationships between education outcomes and school environment, socioeconomic status, gender, and place of residence in East Africa, but the relationships vary by country. I contributed to the existing literature by investigating these relationships in Kenya, Uganda, and Tanzania after abolishing mandatory school fees. A unique contribution is that I looked at these relationships within each country as well as comparing them across the three countries. Most studies reviewed investigated East Africa's changes in school access or education quality only within a specific country.

6.6 Recommendations for future research

In this section, I highlight several issues to consider for future research. The primary recommendations for further research relate to the limitations of this study and of the SACMEQ data. The data is cross-sectional in design, but learning is a cumulative process. Evaluating the influence of the FPE policy in East Africa would require comparable longitudinal data that includes information on the same students before and after the implementation of the policy within each country. However, such longitudinal data is not available. Therefore, I would recommend a study that investigates these issues using longitudinal data. The data could not

address why there was a lack of patterns in access or quality of learning over time as countries adjust to the implications of FPE. Shedding light on these questions would require qualitative data through interviews or focus group discussions, which was beyond this study's scope. Therefore, I would recommend qualitative research that investigates these issues by interviewing education stakeholders in the three countries.

It was only in Tanzania where school access and education quality improved after the country eliminated mandatory school fees, yet the schools' human and physical resources did not improve. However, I could not investigate why Tanzania was a 'success story' based on the SACMEQ data. Further, school resources did not influence students' performance after controlling for home background factors. Family SES, speaking the language of instruction, and grade repetition explained the variations in reading scores. Therefore, there is a possibility that other policy initiatives or measures (beyond the scope of this study) explain Tanzania's story. Based on the literature I reviewed, initial policy planning was the main difference across the three countries. Unlike Kenya and Uganda, Tanzania's free primary education was not tied to politics but was part of a Poverty Reduction Strategy Paper (PRSP). The 2001 PRSP made an explicit connection between debt relief and poverty reduction through the medium of primary schooling. To avoid having a trade-off between increasing enrolment and enhancing quality, Hoogeveen (2013) notes that PEDP set aside significant resources for teacher recruitment and training, classroom rehabilitation, and construction that supported increased enrolment and allocated considerable funds to improving the quality of teaching and learning. However, more research is needed on whether differential FPE policy planning explains the differences in educational outcomes across Kenya, Tanzania, and Uganda.

This study did not fully account for differences in educational contexts. SACMEQ data, for instance, does not account for the fact that students in the three countries experienced different curricula, different education systems, and were guided by different education policies. Understanding these issues will provide a larger context that could explain the differential school access and education quality changes across East Africa. Therefore, I recommend further research on education policy histories in Kenya, Uganda, and Tanzania.

Gender was a significant predictor of rural students' performance in rural areas but not in urban schools in the three countries. Boys in rural schools performed better than girls before and after the FPE policy implementation in Kenya and Tanzania and years into the FPE policy in Uganda. However, boys did not score differently from girls in urban schools. More research is needed to investigate why there were gender-achievement gaps in rural schools but not in urban ones.

Lastly, I would recommend further research that considers more aspects of education quality. In addition to test scores, such a study can assess school resources, classroom practices, and other education inputs. Conducting such research may provide a broader perspective of how education quality changed in East Africa after abolishing mandatory school fees.

APPENDIX

Table 37: Correlation between reading and student background and school characteristics, Kenya

Variable	KE2000 Rural	KE2007 Urban	KE2000 Urban	KE2007 Urban
Pupil SES score	0.270***	0.190***	0.454***	0.477***
Female	-0.0163	-0.0227	0.0127	0.0341
Age	-0.329***	-0.262***	-0.366***	-0.415***
Grade repetition	-0.111***	-0.0967***	-0.234***	-0.252***
Speaking English at home	0.120***	0.0811***	0.167***	0.0922***
Total household tasks	-	-0.108***	-	-0.366***
Pupil preschool	-	0.0463*	-	0.188***
Extra Reading Tuition	0.0551*	0.0207	0.0552*	0.0286
Total pupil learning material	0.117***	0.0488*	0.159***	0.190***
Class size	-0.161***	-0.143***	-0.0223	-0.164***
Total school resources [max=22]	0.159***	0.102***	0.367***	0.472***
School buildings condition	0.150***	-0.0472*	0.0765**	0.152***
Total pupil behavioral problems	-0.199***	-0.0493**	-0.116***	-0.270***
Total teacher behavioral problems	-0.226***	-0.0400*	-0.161***	-0.0980***
School feeding program	-	0.0172	-	0.0448
Total parents' financial contribution	-0.0865***	-0.0490*	-0.123***	-0.0561*
English Teacher Years of Teaching	-0.0102	0.0459*	-0.111***	-0.0172
English Teacher Academic Qualification	-0.0344	0.155***	0.0976***	-0.0179
Reading teacher sex	0.0990***	0.0224	0.131***	0.0757**
Observations	1818	2756	1464	1680

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 38: Correlation between reading and student background and school characteristics, Tanzania

Variable	TZ2000 Rural	TZ2007 Urban	TZ2000 Urban	TZ2007 Urban
Pupil SES score	0.277***	0.175***	0.278***	0.218***
Female	-0.124***	-0.123***	-0.0146	-0.0461
Age	-0.0544*	-0.00462	-0.178***	-0.158***
Grade repetition	-0.116***	-0.138***	-0.0665	-0.122***
Speaking English at home	0.203***	0.112***	0.0104	0.103***
Total household tasks	-	-0.0410*	-	-0.0844**
Pupil preschool	-	0.0478**	-	0.155***
Extra Reading Tuition	-0.0528*	0.0727***	0.00719	0.0356
Total pupil learning material	0.0860***	0.00465	0.135***	0.0425
Class size	-0.0521*	0.00809	0.0780*	0.0208
Total school resources [max=22]	0.0550*	0.0592**	0.195***	0.134***
School buildings condition	0.0801***	-0.018	0.212***	0.135***
Total pupil behavioral problems	0.00647	0.0655***	-0.108**	0.0858**
Total teacher behavioral problems	-0.0479*	0.0181	-0.102**	-0.0251
Total parents' financial contribution	0.105***	0.0592**	-0.0608	0.0233
English Teacher Years of Teaching	0.0483*	-0.0613***	0.0646	0.0845**
English Teacher Academic Qualification	-0.0366	0.0403*	0.113**	-0.00684
Reading teacher sex	0.0936***	0.0656***	0.063	0.0308
Observations	2179	2938	675	1256

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 39: Correlation between reading and student background and school characteristics, Uganda

Variable	UG2000 Rural	UG2007 Urban	UG2000 Urban	UG2007 Urban
Pupil SES score	0.157***	0.151***	0.467***	0.260***
Female	0.00685	-0.0410*	0.0841*	-0.0547*
Age	-0.119***	-0.128***	-0.390***	-0.279***
Grade repetition	-0.147***	-0.116***	-0.157***	-0.170***
Speaking English at home	0.194***	0.102***	0.145***	0.198***
Total household tasks		-0.0303		-0.148***
Pupil preschool		0.0511**		0.142***
Extra Reading Tuition	-0.0453*	0.0964***	-0.0278	0.0634*
Total pupil learning material	0.0446*	0.119***	0.0237	0.127***
Class size	0.0199	0.165***	0.350***	0.256***
Total school resources [max=22]	0.234***	0.166***	0.436***	0.394***
School buildings condition	-0.0285	-0.000818	0.376***	0.0434
Total pupil behavioral problems	0.0253	-0.0824***	-0.00331	-0.0897***
Total teacher behavioral problems	0.0573*	-0.0613***	0.0543	-0.0706**
School feeding program	0.0846***	-0.107***	0.277***	-0.0668*
Total parents' financial contribution	-	0.0684***	-	0.234***
English Teacher Years of Teaching	-0.00923	-0.0212	-0.0984*	-0.0276
English Teacher Academic Qualification	0.0312	0.0556***	0.202***	-0.0967***
Reading teacher sex	-0.0447	0.0691***	0.0935*	-0.024
Observations	1959	3872	683	1435

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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