



Spatial and gender inequality in the Kenya certificate of primary education examination results



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ABSTRACT

Kenya's 8–4–4 system of education consists of 8 years of primary education, 4 years of secondary education, and 4 years of university education. The system was introduced in 1985 with the primary aim of better aligning Kenya's education system with its development aspirations. In particular, the system sought to reduce youth unemployment by offering them life skills training as well as technical and vocational skills. At the completion of 8 years of primary education, students take the national Kenya Certificate of Primary Education (KCPE) exam which tests students in five courses: English, Kiswahili, mathematics, science, and social studies and religious education (SSR). However, since the adoption of the 8–4–4 system, no comprehensive study of the spatial distribution of KCPE exam scores, especially by gender has been done. Thus, this study examines nationwide performance on the 2011 KCPE exam by gender using Geographic Information Systems (GIS) and spatial statistics. Examination scores derived from approximately 17,217 public primary schools and 630,625 students were used in the study. Point pattern analysis was subsequently used to extract useful information from the dataset. A hot spot and cold spot analysis was then performed to see if unusual concentrations of scores exist in space in terms of overall performance, performance by gender, and individual subject scores. Our results show an existence of significant variability in terms of overall performance, performance by gender, and individual subject scores; with males outperforming females in mathematics, science, and SSR. Additionally, we found that proximity to major road networks and urban centers positively influences student performance on the KCPE exam probably because these factors influence the availability of educational resources (such as books and teachers), mastery of English (the language of instruction), teacher supervision, and child teachability.

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Introduction

Education is a key social and economic indicator of national development because it improves people's ability to create wealth, enjoy high political freedom, live a healthy life, and to self-actualize. This is especially apparent in many developed countries where high educational investments have contributed to a high quality of life. Educational outcomes such as a population's literacy, numeracy, and problem-solving skills are, however, partly dependent on the quality of the given country's educational system. Thus, a poor educational system more than likely compromises a

country's entire system of human capital development (Lockheed & Verspoor, 1991).

Kenya adopted a centralized system of education in 1964 soon after gaining independence from Britain in 1963. Since then, its system of education, with a largely uniform national curriculum, has witnessed many structural and curriculum changes. The first system of education that Kenya adopted after independence was the 7–4–2–3 system that was modeled after the British education system. It involved 7 years of primary education, 4 years of secondary education, 2 years of high school, and 3 years of university education. In 1985, the 7–4–2–3 system was replaced by the current 8–4–4 system, which is modeled after the American system of education where students undergo 8 years of primary education, 4 years of secondary education, and 4 years of university education. The 8–4–4 system was adopted in order to improve the employment potential of school leavers by equipping them with more technical and vocational skills (Amutabi, 2003; Eshiwani, 1990). The previous

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system had been criticized for producing elitist school leavers that were more focused on gaining scarce formal sector jobs.

When the 8–4–4 system was introduced in 1985, Kenya had a policy of free primary education (FPE). However, in 1988, only three years into the 8–4–4 system, Kenya adopted the World Bank-IMF structural adjustment programs (SAPs) that, among other things, sought to reduce the government's role in the provision of social services such as healthcare and education. Accordingly, the government's role in the provision of primary school education was reduced to payment of teachers' salaries while parents were charged with the responsibility of providing school uniforms, desks, stationary, school buildings and other infrastructure, and maintenance costs (Bedi, Kimalu, Mandab, & Nafula, 2004). The heavy education costs imposed on parents by SAPs soon led to high rates of school dropouts and non-enrollment (Rono, 2002; Somerset, 2009). Consequently, children from poor families dropped out of school while those from well-to-do families remained in school and thrived, thereby helping to widen existing socioeconomic inequalities.

The FPE policy was reintroduced again in Kenya in 2003 by the then newly elected National Alliance Rainbow Coalition (NARC) government. The aim of the FPE program was to improve social equity by narrowing the educational access gap in the country's various socioeconomic groups. Virtually overnight, the FPE program led to an increase in the Gross Enrollment Ratio (GER) from 88% in 2002 to 103% in 2003 (Bagaka's, 2010; Lewin, 2009). As this GER increase was, however, not accompanied with commensurate increases in the number of teachers, it quickly led to very high student–teacher ratios that soon compromised the quality of education. As a result, many wealthier parents opted for private fee-paying schools which helped to solidify existing social inequalities in access to education (Oketch & Rolleston, 2007).

Educational proficiency in Kenya's primary schools is usually assessed at the end of the 8th year of primary schooling through the national Kenya Certificate of Primary Education (KCPE) examination that is administered by the Kenya National Examination Council (KNEC). The KCPE exam tests students in five subjects: English, Kiswahili, mathematics, science, and social science and religious studies (SSR). A student's overall KCPE exam score either terminates his/her educational journey or determines the type of secondary school that he/she is admitted to. Students with high KCPE exam scores thus gain admission to the country's top boarding secondary schools that perennially produce most of the students that gain entrance into the nation's prestigious universities after topping the ranks of the national Kenya Certificate of Secondary Education (KCSE) exams. Conversely, students with low KCPE exam scores or those with limited financial resources get admitted to low-tier secondary schools where they have little chance of excelling. Many of those that fail the KCPE exam are from poor families, schools, or areas.

Although the number of females enrolled in Kenyan primary schools is nearly equal to that of males, their academic achievement rates lag behind those of males especially in mathematics and the sciences (Hungu & Thuku, 2010). A study by Somerset (2009) on the performance of males and females in science and mathematics in 1979 and in 2003 showed significant inequalities in the distribution of KCPE exam scores by gender and region. These disparities have been attributed to Kenyan communities' cultural differences, gender roles, and economic practices (Bagaka's, 2010). Additionally, mastery of the language of instruction, which is English in Kenya's case, greatly affects students' academic achievement. As Lockheed and Verspoor (1991, p. 153) note:

“Children who speak a language other than the language of instruction confront a substantial barrier to learning. In the

crucial, early grades when children are trying to acquire basic literacy as well as adjust to the demands of the school setting, not speaking the language of instruction can make the difference between succeeding and failing in school, between remaining in school and dropping out.”

Even though English is Kenya's language of instruction, it is often the third language for many students who usually grow up speaking a native language and to a lesser extent Kiswahili (Swahili) – Kenya's national language. Thus, in most parts of Kenya, children in grades 1 to 3 are taught in their native languages even as they are introduced to English and Kiswahili. For grades 4 to 8, they are exclusively taught in English with Kiswahili being one of the subjects they learn. This model of instruction has been adopted in Kenya because:

“... the circumstances prevailing in many developing countries suggest that the most effective approach is to begin with the home language as the medium of instruction and to add or switch to a second language later. With this approach, children are able to acquire basic literacy, learn the fundamentals in various subjects, and adjust to the school and its demands before they confront the task of learning a new language” (Lockheed & Verspoor, 1991, p. 167).

Since English is the language of instruction in Kenya, students who are fluent in the language tend to perform better in national exams. A study by Hungu and Thuku (2010) found that students who speak English outside school had a higher achievement rate than those who rarely spoke English outside school. Glewwe, Kremer, and Moulin (2009), in a study of primary students in Kenya, found that 15% of students in the 3rd grade, 29% in the 4th grade, 62% in the 5th grade, 85% in the 6th grade, 94% in the 7th grade, and 96% in the 8th grade could read a textbook written in English. However, whereas the number of students who are able to read a textbook in English in the 8th grade is 96%, only 90% of these students can answer written questions in the language.

Because access to textbooks and other reading materials greatly influences students' educational proficiency, many international development agencies, e.g., the World Bank and the Department for International Development (DFID), have long used textbook distribution to improve the quality of primary education in developing countries (Ackers, Migoli, & Nzomo, 2001). Nevertheless, recent studies have shown that supplying textbooks to primary schools mostly benefits students who previously had access to high quality childhood education (Glewwe et al., 2009). Moreover, since parents' educational background and socioeconomic status significantly affects children's preparation for schooling; children from wealthy and more educated families perform better in national exams (Hungu & Thuku, 2010).

Thus, in Kenya, children from urban and rural middle-class families tend to do well in school than their poor counterparts because they are more exposed to English and have good nutrition and access to electricity and other infrastructural amenities. Furthermore, many rural children face additional cultural and livelihood challenges (such as the need to help fend for the family by taking care of livestock) that negatively influence their education and contribute to their higher failure and dropout rates (Glewwe et al., 2009; Sigman, Neumann, Jansen, & Bwibo, 1989). Since most wealthy households and educated parents live in or near major urban centers and roads, children that are in schools that are in or near major urban centers and roads can be expected to perform better educationally. Moreover, around the world, urban centers have better educational outcomes because they have better

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