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A spatio-temporal analysis of academic performance at the Basic Education Certificate Examination in Ghana

David Ansong[a,*], Eric K. Ansong[b], Abena O. Ampomah[c], Stephen Afranie[d]

[a] University of North Carolina at Chapel Hill, 325 Pittsboro Street, Chapel Hill, NC 27599, United States
[b] University of East London, United Kingdom
[c] Department of Social Work, University of Ghana, Legon, Ghana
[d] Department of Sociology, University of Ghana, Legon, Ghana

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ABSTRACT

Over the last decade, Ghana has more than tripled investment in its basic education system. Consequently, the country has made huge educational gains, primarily in providing universal access to basic education. However, many stakeholders are worried that academic performance is lagging because of disproportional attention to accessing basic education. Discussion of these concerns is hampered by ongoing disagreement about the true trajectory of academic performance at the basic education level and the widespread nature of students' lagging academic performance. In part, this disagreement stems from the failure of empirical studies to comprehensively examine trends in academic performance standards at the basic education level by concurrently considering a geographical and longitudinal perspective. Thus, this study examines the spatio-temporal trends of academic performance at the junior high school level since 2009 by using multilevel growth curve modeling, spatial statistics, and district-level longitudinal data. Results reveal 3 statistically distinct trajectories of academic performance: erratic, accelerating, and decelerating changes. Results also show that rural–urban gaps explain 31% of the performance trajectories, a trend which is expected to persist in the long term. In addition, we find extreme variations in academic performance within rural areas. Given the varying trajectories and geographical variability in academic performance, we suggest a localized approach to addressing challenges of low academic achievement at the basic education level in Ghana.

1. Introduction

Since the late 1980s, Ghana has substantially expanded its educational system and steadily increased investment in education (Akyeampong, Djangmah, Oduro, Seidu, & Hunt, 2007). Public expenditure on education as a share of the country's gross domestic product (GDP) increased more than 600% from 1.8% in 1980 to 8.14% in 2011, which is well above the current average of 5% GDP for Sub-Saharan Africa (UNESCO, 2015). Ghana also embarked on implementing major educational policies and programs, including the free Compulsory Universal Basic Education (fCUBE) policy, Capitation Grant, and the School Feeding Program. The fCUBE policy has focused primarily on increasing enrollment and improving physical infrastructure at the basic or primary school level that comprises of the first 9 years of formal schooling (Nudzor, 2013). Because of the extent of attention and investment directed toward universal basic school education, the past two decades have witnessed substantial improvement in access to basic education in Ghana (Darvas & Balwanz, 2014). These investments have sought to provide all Ghanaian children with basic education, putting Ghana well on track to achieving its goal of universal access to basic education. This goal is also consistent with the international community's cross-thematic development frameworks such as the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs). MDG Goal 2 seeks to ensure that by 2015, all children will be able to complete primary level schooling without respect to their gender or the area or region in which they live. Similarly, the SDGs push for inclusive and quality education for all (United Nations Economic Commission for Africa [UNECA], 2013). Clearly, the improved access to basic education in Ghana is com-

Abbreviations: JHS, Junior High School; SHS, Senior High School; BECE, Basic Education Certificate Examination; fCUBE, Free Compulsory Universal Basic Education.

* Corresponding author.
E-mail addresses: ansong@email.unc.edu (D. Ansong), e.ansong@uel.ac.uk (E.K. Ansong), aoampomah@ug.edu.gh (A.O. Ampomah), afranie@ug.edu.gh (S. Afranie).

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mendable and deserving of the substantial investments the Ghana government and donor agencies have made.

Despite the goal of the fCUBE policy to improve the access and quality of basic education, improvements in learning outcomes at this level have not kept pace with the remarkable improvement in access (Darvas & Balwanz, 2014; Mettle-Nunoo & Hilditch, 2000). Although stakeholders generally agree that academic performance standards at the basic education level are low and of great concern (Affum-Osei, Asante, & Forkuoh, 2014; Gyan, Mabefam, & Baffoe, 2014), they disagree on the true trajectory of learning outcomes. This issue is clouded by inconsistent claims about whether performance standards are falling, rising, or unchanged. The lack of clarity on the true trajectory of primary level academic achievement is due to, at least in part, most of the assertions being based on snippets of results rather than comprehensive nationwide longitudinal data.

Many in Ghana share the perception that academic achievement is falling (Degue, 2012; Okyerefo, Fiaveh, & Lamptey, 2011). In particular, this perception becomes heightened each year with the release of the annual Basic Education Certificate Examination (BECE) results. BECE is the national standardized examination for students who have completed junior high school (JHS) (i.e., Grade 9). The heightened perception of falling academic achievement is in part because, for instance, 182,000 JHS candidates who sat for the 2013 BECE did not earn a passing grade for at least one core subject, and therefore, did not qualify to enter senior high school. Importantly, some analysts have described this shared perception of a downward trend in academic achievement as a national security threat (Gyasiwaa, 2013).

Many of those who contend that academic achievement is falling have also speculated that the expanded enrollment in the basic education level has come at the cost of the quality of basic education. As noted by Lewin and Akyeampong (2009), "… rapid expansion in enrollments has degraded quality" (p.143). Similarly, the United Nation's 2014 MDG report asserted that Ghana's expanded access to education has steadily weakened the quality of education, and linked the decline in educational quality and student achievement to larger class sizes, the growing number of new schools, and the government's heavy reliance on poorly trained and unqualified teachers (UNECA, 2014). However, significant increase in educational investments does not necessarily have to lead to a trade-off between enrollment (quantity) and learning outcomes (quality). Indeed, data from the late 1980s to the early 2000s support the idea that Ghana's massive investment in education sector in the form of 8000 classroom blocks led to concurrent improvements in enrollment and students' learning outcomes. Why then is there perception that Ghanaian students are on a downward slope of academic achievement?

Simultaneously, many other stakeholders disagree with the assertion that Ghanaian students' academic performance is falling. For instance, even the chief examiners' report of the 2012 BECE suggests that performance trends were mixed (West African Examination Council, n.d.). Other experts and educational scholars contend that the perception of falling performance is false and, not based on data. For instance, Francis Kodzo Amedahe, a professor in educational measurement and statistics at the University of Cape Coast, has contended that "… the issue of falling educational standards in Ghana is a perception rather than a reality" (Ghana News Agency, 2014; para.1). Given conflicting viewpoints on the academic performance trajectory of Ghana, there are important empirical questions that warrant attention. The most pressing unanswered questions include: (a) What are the factual trajectories of academic performance standards at the basic education level? (b) Are the academic performance trajectories generally consistent across Ghana's administrative districts, and are there salient spatial variations in the direction and rate of change in academic performance?

This study aims to help fill this empirical gap in academic performance through systematic assessment of the spatio-temporal dynamics of academic achievement in Ghana at the BECE level. We examine 6 years' of local and nationwide BECE data (collected from 2009 through 2014) to address fundamental questions on whether (a) statistically significant trends exist in academic performance, (b) such trends are sloping upwards or downwards, and (c) whether these trends, if any, favor or disadvantage certain geographical areas of the country. Developing a better understanding of the space-time trends of academic achievement in Ghana is critical because determination of the spatial trajectory of academic performance (and potential disparities) in the country will enable education researchers, administrators, and policy makers to better target their energies to areas in need of attention, especially at the basic education level.

2. Rural–urban differences

Spatial inequality in Ghana is not a new phenomenon. However, concerns are growing among many scholars and practitioners that the extent of spatial inequality in education and other social indicators is widening despite the country's economic growth, investment in socioeconomic development, and falling poverty levels (Annim, Mariwah, & Sebu, 2012; Aryeetey, Owusu, & Mensah, 2009). Like many sub-Saharan African countries (Michaelowa, 2004), significant rural–urban differences exist in Ghana in terms of access to educational resources and the resultant outcomes of these resources. More often than not, the rural–urban gaps in educational outcomes favor urban areas because they have disproportionally more education resources (e.g., good classrooms and school furniture) and favorable living conditions such as good road and accommodation (Ansong, Ansong, Ampomah, & Adjabeng, 2015; Kimosop, Otiso, & Ye, 2015; Senadza, 2012).

Despite the urban advantage, the caveat is that the rural–urban differences may not always be a clear dichotomy. The educational discourses in Ghana often presume that the problem of spatial disparities in educational outcomes is more acute in rural than urban areas (Tsikata & Seini, 2004). However, in the absence of adequate empirical evidence from a contextualized and spatial perspective, this presumption may be an over-simplification of the problem. Although a great deal is known about rural–urban inequalities regarding access to education and related resources, little is known about these inequalities in terms of specific educational outcomes (e.g., academic performance) given the scant nationwide empirical assessment of any such potential spatial disparities. Empirical studies are yet to clarify the temporal nature of academic performance in rural versus urban areas. One of the few studies to have examined the spatial dimension of learning outcomes used data from a random sample of 6000 junior high-school students from across Ghana (Ansong & Chowa, 2013). The study found regional variations in educational performance when measured by math and English scores, but such variations favored predominantly rural areas such as the western and northern regions. However, because the study focused on limited subject areas (i.e., only math and English subjects) and used cross-sectional data, its findings do not offer a holistic overview of the country's space-time trends in academic performance.

The absence of such a holistic overview is not unusual, and the data used to shape conversations on growing spatial inequality are often incomprehensive, non-longitudinal, and inadequately scrutinized. To a large extent, public concerns about falling academic standards at the basic education level have been driven by media reports of the abysmal BECE performance of primary level students. Although these reports are important in initiating conversations about measures for addressing inequalities in learning