



Factors contributing to spatial inequality in academic achievement in Ghana: Analysis of district-level factors using geographically weighted regression



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ABSTRACT

Like most Sub-Saharan African countries, Ghana's basic educational system continues to undergo reform, receiving substantial investment to ensure all citizens have access to quality educational opportunities regardless of where they live. Although the reforms have markedly improved access to education at the junior high school level, the overall level of academic achievement among Ghana's population remains low, especially in deprived areas of the country. The low rate of achievement warrants examination because the lack of education hampers social mobility and constrains the ability of pupils from deprived communities to progress up the academic ladder. This study uses spatial modeling tools and district-level data to examine spatial variability in rates of academic achievement among districts in Ghana, and to investigate the differential effects of macro-level factors on academic achievement. Analysis reveals two key findings: (a) the existing pattern of spatial inequality primarily favors academic achievement of students in the Middle and Southern Belt regions of Ghana; and (b) factors contributing to academic achievement vary spatially, with the significance level, magnitude, and direction of relationship varying from one district to another. The study demonstrates the quintessence of an approach to educational development that emphasizes decentralization, thereby allowing educational investments and interventions to be tailored to local needs.

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A key to reducing poverty in Sub-Saharan African countries is ensuring the majority of the citizens of these countries have access to an appropriate and quality education. To meet this need, Ghana has undertaken reforms of the educational system by offering 9 years of free and compulsory basic education. Data from United Nations Development Program show that Ghana is on track to achieving 100% gross and net enrollment ratios at the primary education level by 2015 (UNDP, 2015). Despite this achievement, critical questions remain about the quality of basic education and the factors contributing to educational disparities across geographic regions of the country.

Progression to higher education is possible if students attain grades at the junior high school (JHS) level that allow them to

qualify for senior high school (SHS) admission. Currently, academic achievement at the JHS level is generally low, putting many young Ghanaians at risk of failing to progress to SHS or beyond (Norviewu-Mortty, 2012). Data from 2006 to 2008 showed that more than a third of students who took the Basic Education Certificate Examination (BECE), which is a national standardized examination offered at completion of JHS, did not score high enough to qualify for SHS (Daily Graphic, 2008). A 2013 report by Ghana's Ministry of Education suggests that the transition rate from JHS to SHS has not exceeded 60% since the late 1990s (Ministry of Education, 2013). Many stakeholders have also expressed concern about the low level of learning outcomes (Ansong, 2013; Degue, 2012; United Nations Economic Commission for Africa, African Union, African Development Bank, & United Nations Development Programme, 2014).

The goal of this study is twofold: (a) to examine the spatial dimension of current academic achievement at the basic education level, and (b) to contribute to the knowledge-base from the macro

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and contextual lens by using district-level data to enrich the understanding of district level predictors of spatial disparities in academic achievement in Ghana. Although prior studies, particularly in the fields of geography and political economy, have highlighted spatial inequality in Ghana (Annim, Mariwah, & Sebu, 2012; Senadza, 2012; Songsore, 2003), there are knowledge gaps in the empirical literature. Thus far, extant studies have stopped short of providing empirical insights into the macro factors that predictor academic achievement and whether their predictive power is spatially non-stationary. To contribute to the current body of work, we employ a data analytic strategy that allows us to investigate possible geographical differences in the bivariate relationships between academic achievement and their district level predictors and thereby, shed light on the whether the predictors of poor performance in one area are necessarily the same in another area of the country. Another critical gap in the extant literature is that nearly all education research on academic success at the basic education level in Ghana have examined outcomes and predictors at the student-level but ignored the district level. Our perspective is that it is important to situate the current body of knowledge in the larger contextual domain in which crucial policy and program decisions are made.

Theoretical considerations

What distinguishes this study from other educational outcomes research in Ghana is the emphasis on district-level outcomes and predictors. The theoretical approach underlying an investigation of district-level factors stems from the idea of structural level neighborhood effects championed by urban sociologists of the classical Chicago school. This perspective emphasizes the implications of macro-level predictors on a variety of macro-level outcomes (Sampson & Morenoff, 1997). In particular, Sampson (2008) has extensively researched the overwhelming and disproportional emphasis on individual-level outcomes as compared with research that considers macro-level outcomes, contending that “dual scholarly interventions [both individual and macro-level] move the field forward by providing new analyses, new insights, needed clarifications, and most important, an opportunity to reconsider the very idea of neighborhood effects” (p. 192). This study responds to Sampson's call for research to pursue new analyses and insights into “neighborhood effects” by focusing on a district-level outcomes and predictors.

There are compelling policy reasons for educational research in Ghana to give serious attention to macro units (e.g., districts and regions). Ghana's decentralized education management structure places the responsibility for educational decisions with the District Assemblies and district education offices (Maikish & Gershberg, 2008). District Assemblies' are responsible for the distribution of funds to district schools for furniture, school buildings, and related infrastructural needs in accordance with the districts' priorities. A significant portion of these funds comes from the District Assembly Common Fund, which is revenue from the Central Government. Given that central administrative authority and major public expenditure on education are devolved to the district level (Maikish & Gershberg, 2008), it is critically important that education research does not ignore either district-level outcomes or their predictors that inform major public expenditure and investments.

Spatial inequality in educational outcomes

Although academic achievement is generally low in Ghana, the problem appears to be more acute in some geographical areas, especially rural, disadvantaged areas (Senadza, 2012). The expectation that universal access to education will provide a viable path

out of poverty may not be realized if geographical disparities exist in either the quality of education available to students or how well students perform academically. Generally, access to life enhancing resources in Ghana is unequally divided along an imaginary line between Northern and Southern Belts (Varly, Cummiskey, Kline, & Randolph, 2014). Successive governments in Ghana have pursued targeted programs and strategies to narrow the economic gaps between the Northern and Southern Belts. The most recent effort is the establishment of the Savannah Accelerated Development Authority (SADA) aimed at reducing the incidence of poverty to less than 20% in 20 years and doubling incomes in the Northern belt (SADA, n.d.).

The regional divide and economic gap is also reflected in student academic achievement rates with the poorest performing schools clustered in rural and economically deprived areas (Norviewu-Mortty, 2012). Results of the 2013 National Education Assessment showed the percentage of students who achieved proficiency in math and English was 3 times greater in the Greater Accra region (in the Southern Belt) than in the Northern Belt regions (Varly et al., 2014). In 2007, about 48% of the 320,235 JHS students who took the BECE failed to obtain sufficient grades to qualify for senior high school, with most of the unsuccessful candidates coming from rural and deprived areas across the country (Norviewu-Mortty, 2012).

Overall, the Northern regions of Ghana are under-resourced and substantially poorer as compared with the other regions of the country. Nearly two-thirds of Northern Belt residents are considered poor, whereas only a fifth of those in the Southern Belt are poor (Kunateh, 2011). The ongoing poverty discussion in Ghana suggests that indicators of poor educational achievement in deprived areas reflect the spatial disparity in economic and other social development indicators (Ansong & Chowa, 2013). However, it is unclear whether the predictors of academic outcomes are the same in all regions or districts of the country.

To address this research gap, the present study (a) examined the nature of academic achievement at the district level, (b) identified key district-level predictors of academic achievement, and (c) determined the extent of spatial inequalities in the relationship between academic achievement and the associated district-level predictors. By establishing whether poor academic achievement is a nationwide issue or an isolated problem in certain areas, and revealing whether the predictors of academic achievement are spatially non-stationary, this study has the potential to make an important contribution in the shift towards more contextualized policy responses to educational needs in Ghana.

Factors contributing to inequality in educational outcomes

The neighborhood effects framework emphasizes that differences in neighborhood characteristics are the key factors influencing the production and reproduction of neighborhood outcomes (Duncan & Raudenbush, 1999). In the following section, we discuss several interconnected factors suggested by both theory and empirical studies as having the potential to affect disparities in the educational system (Rodríguez-Pose & Tselios, 2011).

The rate of labor force participation is associated with educational inequality (Doro, 2008), with the direction of the relationship dependent on household size (Barnes, Green, Orton, & Bimrosete, 2005). In general, the expectation is that higher rates of household employment will increase access to disposable household income that can be used for education-related costs, including supplies, services such as afterschool programs, and transportation to and from school. The potential negative effects of household unemployment or underemployment can be exacerbated by other sociodemographic factors such as lower levels of human capital (i.e., educational attainment) (Eccles & Davis-Kean, 2005) and large

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