Educational progression in Ghana: Gender and spatial variations in longitudinal trajectories of Junior High School Completion rate

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Abstract
Completion of junior high school is a critical milestone in every Ghanaian child's educational trajectory and a critical step toward the transition to higher education. However, the rate of children completing junior high school still lags behind most educational indicators in Ghana. Far more attention is paid to ensuring that students enroll in school, with very little investment or commitment paid toward ensuring that they graduate or complete junior high school. Part of the problem is that there is little to no research on the challenges that children, especially girls, face in completing school. This study aims to bring school completion trends and related challenges to the forefront of research and policy discourse. Thus, the study uses multilevel growth curve modeling, spatial hot spot analysis, and school completion data (from 2009 through 2013) to offer longitudinal insights into (a) the scale and trajectories of junior high school completion in Ghana, and (b) the gender and spatial nuances in the trends. Findings suggest that the completion rate is steadily improving but still low. Findings also reveal unequivocal gender and spatial disparities in the completion rate and the rate's trajectories, although the spatial inequalities between northern and southern Ghana are more severe compared to the gender inequalities. Suggestions for how Ghana's government and its development partners can bridge the gender and spatial gaps are discussed.

Keywords: school completion; gender inequality; spatial disparity; multilevel growth curve modeling; spatial hot spot analysis; Ghana

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Introduction

Education should be a fundamental human right. Access to education benefits individuals and wider society, both socially and economically. Earning an education instills patriotic values, creates a greater sense of community, prevents criminal behaviors, and provides a common language and cultural norms (Gradstein, Justman & Meier, 2004; Ghana News Agency, 2009). Because of substantial interest in the education of all Ghanaian children, successive governments have continually initiated education reforms and policies to ensure that all Ghanaian children have access to a primary education. Between 1996 and 2009, a number of policies and initiatives werre introduced to ensure all school-age Ghanaian children had access to a free basic education (CREATE 2008; i.e. Free Compulsory Universal Basic Education (FCUBE) policy of 1996; the Capitation Grant of 2004; and the School Feeding Program of 2005). Over the years, these interventions have increased enrollments in basic schools such as primary and junior high school (Ministry of Education, 2010).

The expanded enrollment at the basic school level in Ghana is in line with the country's quest to meet Goal 2 (Achieve universal primary education) of the United Nations' Millennium Development Goals (MDG). Data from the United Nations' Development Program (UNDP) indicate that Ghana is on target to meet this goal of universal primary education (UNDP, 2015). Although the percentage of students who enroll in primary and junior high schools (JHS) remains high (94.9% in primary schools; 80.6% in junior high), the percentage who go on senior high school (SHS) is low (33.9%; World Bank, 2011), suggesting a transition problem for children transitioning between the basic school level and higher levels of education. Furthermore, a GER of 79.5% compared to a JHS completion rate of 66% for the academic year 2009-2010 indicates additional challenges for progress. According to a 2010 study by Sabates, Akyeampong, Westbrook and Hunt, school dropout patterns indicate that the period between JHS 2 and 3 is a critical time when many young people in basic school dropout. Moreover, young people who fail to complete their JHS education are unable to transition into senior high education or tertiary education.

The government of Ghana and education stakeholders are also confronted with concerns about spatial and gender inequalities in JHS completion (Darvas & Balwanz, 2014). For example, during the 2008-2009 academic year, there was a 4.2% gender gap in the primary school GER (male = 97%; female = 92.8%) compared with a wider gap of 6.9% at the SHS level (male = 36.7%; female = 30.8%; World Bank, 2011). These gender gaps suggest that by the time students progress from JHS to SHS, a higher percentage of female students will drop out compared to male students (World Bank, 2011). Data from the United Nations Educational, Scientific and Cultural Organization (UNESCO) suggests spatial inequality is extreme compared to the gender gap. For instance, between 1993 and 2011, the rural-urban gap in the JHS completion rate fluctuated between 20% and 32%. Over the same period, the disparity in the completion rate between the highest and lowest performing regions ranged between 46% and 54% (Education for All Global Monitoring Report [EFAGMR], n.d.).

Existing studies regarding basic school completion in Ghana are largely confined to selected geographical regions or limited points in time (Ampiah & Adu-Yeboah, 2009; Ananga, 2013; Senadza, 2012). Findings from selected regions and cross-sectional data do not fully reflect the trends in JHS completion across the country over a longer period. Furthermore, current studies do not show the nature and scale of progress or lack of progress in gender disparities at the district level over time.

However, this study conducted a trend analysis of the nature and scale of inequality of JHS completion at the district level in Ghana. Specifically, in addition to investigating national trends, this study aims to bridge the gap in the limited knowledge regarding gender and spatial trajectories of the JHS completion rate in Ghana. By helping to expand the current body of knowledge, this study can inform policies on where intervention should be focused.

Why basic school completion matters

Young people with education beyond basic school are better equipped with abstract and problem-solving skills to be self-dependent and to compete within the job market (Ajayi, 2012). Thus, high completion rates at the basic and higher levels of schooling are important for the country of Ghana to develop a capable workforce to achieve its middle-income status target by 2020 (Akyeampong, 2010). In other words, basic school education should be the bare minimum level of education required for very young Ghanaian.

From the economic theory of education perspective, the value of education particularly beyond basic school is derived from its ability to (a) build human skills and capacity to enhance productivity, (b) offer an alternative screening mechanism to identify ability, (c) instill societal norms of behavior to build social capital, and (d) develop one's performance value (Gradtein, Justman, & Meier, 2004). Analysis that focuses on the role of education in building human capital views education as an investment that yields future returns (Gradtein, Justman & Meier, 2004). As such, the public and parents should view young people's transition from JHS to higher levels of education as an investment that will yield future benefits. Indeed, empirical literature shows evidence of an increase in returns to education in Ghana from 1987 through 1999 (Ackah, Adjasi, Thurkson, & Acquah, 2014; Canagarajah & Thomas, 1997; Sackey, 2008). The benefits of education more than triples as young Ghanaians progress from basic to higher levels of schooling (Ackah, et al, 2014). Furthermore, Ghanaians with an education beyond JHS earn 80% more compared to those with no education or JHS education (Ackah, et al, 2014).

There is also an incentive for investing in education of all children without regard to gender. As Psacharopoulos and Patrinos' (2002) analysis suggests, women receive higher returns for their schooling investments compared to men. Similar findings from a global study of developed and developing economies, including Ghana, show that the average rate of return to secondary schooling is 8.7% for females compared to 7.1% for males (Montenegro & Patrinos, 2014). Additional evidence specifically from Ghana also shows that, although females generally earn less than males, educated female workers in the public sector earn 13% more in monthly wages compared to their male counterparts (Ackah et al., 2014). Thus, despite cultural challenges that hamper a girl's education, there is good reason to invest in their schooling beyond JHS because as current evidence suggests, education investment beyond basic school level yields returns for all genders but most especially for girls.

The view that holds education as a screening device suggests that education helps employers to identify the potential productivity of prospective employees (Gradtein, Justman, & Meier, 2004). Ghana's education system is designed so that students begin to acquire advanced knowledge, specialized skills, and competencies at the SHS level, all of which are often critical to the hiring needs of most employers in the formal sector. Thus, young people who are unable to acquire advanced knowledge and skills through SHS education are at a higher risk of being screened out by many employers. Indeed, a 2007 job tracking survey showed that more than 80% of available jobs in Ghana's formal employment sector were open only to individuals who had at least a SHS education (Akyeampong, Djangmah, Oduro, Seidu, & Hunt, 2007).

Analyses that focus on the role of education in building social capital emphasize the social returns of education. The education of Ghanaian children results in a host of benefits including: instilling patriotic values in children; developing a sense of community; hindering criminal and other antisocial behaviors, and providing a common language and cultural norms that improve the efficiency of communication (Krueger & Lindahl, 2001; Maliyamkono & Ogbu, 1999). The last analyses focus on the product of education, that is, the educated individual will be valued by society because of the knowledge and experience obtained through education. The educated individual becomes equipped with the relevant knowledge and experience to contribute to the socioeconomic development of the country.

Given the known returns to education across developed and developing economies, the important question is, how has Ghana acted to guarantee education for all? To understand Ghana's level of commitment to education, we must review a history of educational development in the country dating back to the pre-colonial period.

Historical background of education in Ghana

The development of education in Ghana began when the country was colonized by Britain. Before formal education was introduced in Ghana, parents and elders served as teachers within the community and were the primary informal structures that prepared Ghanaian members for citizenship (Eyiah, 2004). Under colonial leadership, the first education ordinance was passed in 1852 in Ghana to provide for the education of the inhabitants of the forts and settlements in southern Ghana. The ordinance did not achieve its intended objectives primarily because people refused to pay the hefty poll tax for education funding. A second education ordinance in 1882 brought two types of primary school into the country: government-run schools and sponsored schools managed by non-governmental organizations (Eyiah, 2004). For the most part, the colonial administration confined educational development to the southern territory until missionaries expanded their activities to the northern territory (Thomas, 1974). This era marked the beginning of serious spatial disparities in educational development that favored the southern part of Ghana. Later in the 1920s, the colonial government established the Educationists Committee and its recommendations saw tremendous expansion to the education system. Two decades later, the colonial government mooted the Accelerated Development Plan for Education, which was the earliest precursor to compulsory basic education in Ghana (Eyiah, 2004).

After Ghana attained independence in 1957, education became a high priority on the government's agenda. The government initiated policies on tuition-free primary and middle school education and pursued programs of teacher training, free textbooks for students, and overhauled education management by creating local education authorities with obligations for buildings, equipment, and maintenance grants for basic schools (Akrofi, 1982). Consequently, the number of primary and middle schools increased dramatically in the 1960s (Eyiah, 2004). Because of the significant investment in the education sector and its successes, the Ghana education system became one of the finest in Africa (Osei, 2012).

However, in the 1970s, Ghana experienced incessant political instability with its resulting poor management, corruption, and general macroeconomic turmoil (Mfum-Mensah,1998, as cited in Eyiah, 2004). These problems had significant negative implications on education in Ghana to the point where the educational system became dysfunctional by the 1980s. In 1988, the military government of President Rawlings implemented wide-ranging reforms that touched all levels of Ghana's education system and attempted to tackle the periodic issues affecting the education system. The reforms reduced pre-university education in Ghana from 17 years to 12 years (i.e., 6 years of primary school and 6 years of secondary school). There was also a national literacy campaign offered as part of a non-formal education program for children who dropped out of school and for adult learners. In 1996, the Rawlings administration implemented the Free Compulsory Universal Basic Education (FCUBE), which focused on basic education access and quality through improving the quality of teaching and learning, efficiency in management, and increasing access and local participation (Eyiah, 2004).

The next administration under President Kufuor launched major reforms in the education sector in 2007, introducing the new structure of JHS and SHS; JHS was no longer seen as a terminal point but a gateway to entering SHS and the tertiary level. Important components of the reform efforts were (a) the modernization of technical and vocational courses at the JHS level to make the courses relevant, and (b) the introduction of support and access programs for females at all levels to promote gender parity (MacBeath, 2010). The next government under President John Evans Atta-Mills continued with the education reforms initiated under President Kufuor (Seshie-Vanderpuije, 2011).

After over a century of educational development and reforms targeted at primary and secondary education, Ghana has made much educational progress, particularly in increasing the number of children who enroll in basic education. Nevertheless, Ghana is still beset with high dropout rates and numerous other challenges, including inequalities related to geography and gender.

Geographic inequality in Ghana

One of the goals of this study is to investigate the spatial inequalities in the JHS completion rate in Ghana. It is worthy of note that access to life-enhancing resources in Ghana is unequally divided along the Northern and Southern sectors of the country (Varley et al., 2014). The incidence of extreme poverty in Ghana is more focused in the Northern Savannah Regions (i.e., Northern = 38.7%, Upper East = 60.1, and Upper West = 79%) compared to the other regions in the middle and southern part of the country (i.e., ranging from 6.2% in Greater Accra to 15.2% in Volta; NDPC & UNDP, 2012).

Apart from the economic inequalities between the northern and southern sectors, economic inequalities are also manifested in terms of rural versus urban areas of Ghana. In 2006, the incidence of extreme poverty in rural areas (25.6%) was nearly 5 times that of urban areas (5.7%; NDPC & UNDP, 2012). Rural areas within the Northern Savannah Regions were reported as the poorest zone, with current studies approximating that 90% of the population is now poor. Factors such as child-under nutrition, adult literacy rates and illiteracy levels are highest in the rural Savannah, and thus pointing to the degree of poverty and underdevelopment within the area (Ghana Statistical Service, 2000, 2005).

The economic inequalities in Ghana based on a southern versus northern divide and based on a rural versus urban divide is manifested in students' academic performance, with the poorest performing schools mostly found in rural and economically disadvantaged areas (Norviewu-Mortty, 2012). The low academic performance of students, particularly at the JHS level, appears to be more pronounced in some geographic parts of the country, especially in rural and disadvantaged areas (Ansong, Ansong, Ampomah, & Adjabeng, 2015; Senadza, 2012). The 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 sector) than in the Northern regions (Varley, 2014). In 2007, 48% of the 320,235 JHS students who wrote the Basic Education Certificate Examination (BECE) failed to obtain sufficient grades to qualify for SHS, with the majority of the students who failed in the BECE coming from rural and disadvantaged areas of Ghana (Norviewu-Mortty, 2012).

Education practices in the northern part of Ghana present many inequalities and disparities of the system of education that the country inherited from the British colonial government. Educational development in the northern part of Ghana is very recent compared to the southern half of the country. In addition, people in northern Ghana are underserved by Ghana's educational system. Northern Ghana receives a fraction of education expenditure compared to other regions (Akyeampong, 2004). The northern part of Ghana has fewer schools than its southern counterpart, especially when compared to the number of school-age children (Mfum-Mensah, 2002). Moreover, the northern part has a high pupil-to-teacher ratio, teachers who lack pre-service training, and comparatively poor school infrastructure (Eyiah, 2004).

The inequalities in economic well-being and academic performance in Ghana is suggestive of spatial disparity in other economic and social development indicators (Ansong & Chowa, 2013). However, existing empirical evidence is not emphatic about possible inequalities in specific educational outcomes such as JHS completion rate and its longitudinal dimension. There is a vital need to fill the gap in literature around the JHS completion rate, especially in reference to the southern versus northern divide and the rural versus urban divide.

Gender inequality in Ghana

Besides examining the national and spatial trends in school completion, this study also aims to investigate the gender dimension of JHS completion rate in Ghana. While gender inequality in Ghana has received much attention from researchers, few empirically driven analyses have been conducted of gender-time trends as it relates specifically to the JHS completion rate. One study by Ntim (2013) examined the cause of the mismatch in academic progression from JHS to SHS between boys and girls in the Ashanti and Brong Ahafo regions of Ghana. The study focuses on the factors that enable students, especially young girls, to leave school early. The study did not address the gender trajectory of the JHS completion rate of students across all regions of Ghana. Gender also interacts with geographical location to affect educational outcomes. Girls who live in rural areas and northern Ghana are more disadvantaged in comparison to girls living in urban and southern areas of the country (Akyeampong, Djangmah, Oduro, Seidu, & Hunt, 2007; Campaign for Female Education [Camfed], 2012). For instance, the number of girls who have never attended school is disproportionally higher in rural Ghana compared to urban Ghana (Akyeampong, 2007).

There are indications that the introduction of education policies such as FCUBE, Capitation Grant, and the 1997 establishment of the Girls' Education Unit (GEU) have narrowed the gender gap in enrollment (Camfed, 2012), although the extent of the gender gap in school completion is still unknown. In 2001, the GEU set a target that no more than 15% of girls would drop out of school, but there are indications of persistent high dropout rate among girls (Sutherland-Addy, 2008).

Method

Data source and sample

The study used district level longitudinal data from the Education Management Information System (EMIS) of the Ghana Education Service (GES). The data provided five years of JHS completion data (from 2009 through 2013) for the administrative districts in Ghana. The analytic sample for the study ranged from 142 districts in 2009 to 169 in 2013. The increasing sample size is due to periodic redistricting exercises to reflect growing population trends. We used multilevel growth curve modeling and spatial hot spots analysis to address the following three research questions: (a) What is the estimated annual growth curves for JHS completion rate for each district? (b) Do girls and boys have equivalent school completion trajectories, and (c) Are the districts experiencing significantly lower school completion rates spatially clustered and during what periods have completion rates plummeted?

Analytical strategy

Multilevel growth curve modeling of change in completion rate. Multilevel growth curve modeling (MGCM) with maximum likelihood estimation method was used to estimate the growth curves of school completion because it handles unbalanced sample sizes efficiently (Luke, 2004). Specifically, the study modeled the process of change in the JHS completion rate over time (i.e., from 2009 through 2013).

The time variable is the academic year (*Year*), which indicates the measurement occasion for each of the five annual data points on JHS completion rate. The main dependent variable, *JHS completion rate*, is a measure of the ratio of the total number of students graduating from the last year of JHS in a given year to the total number of students of official enrollment age in the population. The study examined the moderating effects of two time-invariant variables: *rural* and *south*. *Rural* is a binary measure of whether a district is classified by the GES as rural (deprived) or urban (not deprived). The study included this variable to test for rural-urban variation in school completion rates. *South* is a binary measure of whether a district is located in the northern or southern sector of the country. The northern sector comprises of the three northern regions in Ghana namely, Upper East,

Upper West, and Northern region. The Southern regions are Greater Accra, Eastern, Western, Central, Brong Ahafo, Ashanti, and Volta.

The study used a multigroup approach to compare rural and urban districts, as well as northern and southern districts. Gender differences were assessed by replicating all models with three separate samples: (a) full sample, (b) boys-only sample, and (c) girls-only sample. SPSS version 22 was used to conduct all analyses.

The MGCM was conducted in four steps. The first model (i.e., unconditional model) estimated the inter-district variations in school completion rate and the amount of variance accounted for by the inter-district differences and differences between years. The second model (i.e., unconditional linear growth curve model or the baseline model) examined significant differences in the districts' trajectory over time. The third model examined the higher-order change trajectories by adding a quadratic term ($Year^2$) to examine the rate of acceleration or deceleration in the school completion rate over time. The last model examined the moderating effects of a district's status as either predominantly rural or urban or spatial status as a northern or southern district. In other words, this model tested whether the change trajectories were statistically the same for rural and urban districts as well as northern and southern districts. The formal model is described as follows:

Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}(Year)_{ij} + \beta_{2j}(Year2)_{ij} + r_{ij}$

Level 2: $\beta_{0j} = \gamma_{00} + \gamma_{01}(South)_j + \gamma_{02}(Rural)j + u_{0j}$

$\beta_{1j} = \gamma_{10} + \gamma_{11}(South)_j + \gamma_{12}(Rural)_j + u_{1j}$

$\beta_{2j} = \gamma_{20} + \gamma_{21}(South)_j + \gamma_{22}(Rural)_j$

Spatial hot spot analysis. The study conducted hot spot analysis to examine the spatial variations in completion rate. Specifically, the Getis-Ord Gi* statistic tool in ArcGIS was used to conduct the hot spot analysis to identify spatial clusters of statistically significant high or low rates of JHS completion. Geographically referenced district level data on JHS completion rate were weighted and used to define spatial clusters of districts with higher than average completion rate (classified as hot spots) and clusters of lower than expected completion rates (classified as cold spots).

Results

Descriptive results

Figure 1 presents trends of the JHS completion rate from 2009 through 2013. As depicted in the figure, the somewhat v-shaped nonlinear growth curve for the national averages is similar to the trends in the boys-only and girls-only samples, as well as the Southern and Northern districts. In other words, across all districts, the completion rate decreased sharply from 2009 to 2010 and then increased steadily for the remainder of the observation period. This nonlinear trend is consistent with the justification for modeling quadratic slopes ($Year^2$) to account for possible nonlinear individual growth trajectories of districts in Ghana. Figure 2 presents the interaction between gender and geographical location in the trends of the JHS completion rate. As the trend line indicates, boys have had a more erratic completion rate compared to girls. There is also evidence that girls across the North and South outperformed their male counterparts at one point (in 2010). It is also important to note that on average, compared to boys in the South, boys in the North have had a more consistent recovery since the sharp drop in 2010.

Figure 1. Average JHS completion rate by gender and region from 2009 to 2013.

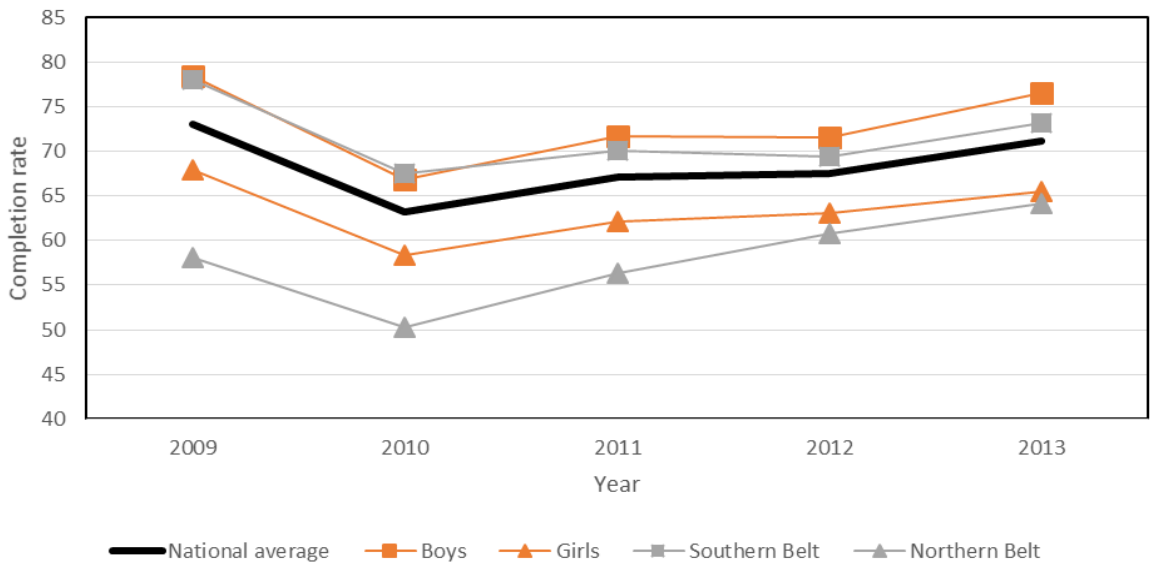
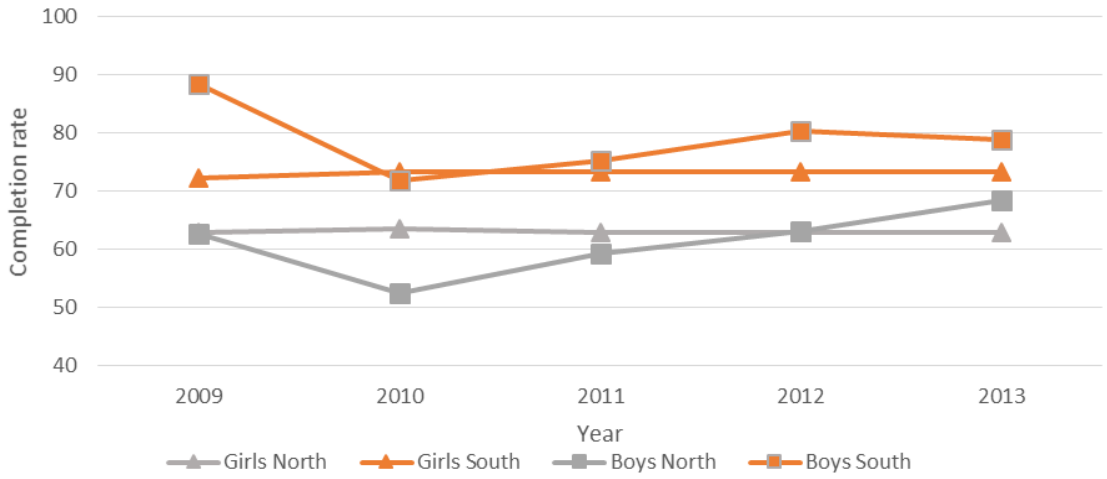


Figure 2. Average JHS completion rate: Interaction between gender and geopgraphical location



Multilevel Growth Curve of JHS completion rate

As shown in Table 1, results of the baseline models indicate high intraclass correlations (ICCs) for the full sample [i.e., 308.61/(308.61 + 156.94) = .66]; boys-only sample [i.e., 317.67/(317.67 + 181.36) = .64]; and girls-only sample [i.e., 315.95/(315.95 + 147.72) = 0.68]. This is an indication that approximately two-thirds of the total variation in the completion rate for all three samples can be attributed to district differences.

In the full sample, the grand mean completion rate in year 2009 (initial status) was 76.74 (β = 76.74, $p < .001$) but there was a statistically significant linear decrease in the overall completion rate after 2009 (β = -13.53, $p < .01$) revealing that the rate of linear growth decreased over time. The significant quadratic effect was positive (β = 2.77, $p < .001$), showing that the rate of growth increased over the long term. This means the decreasing effect gradually diminished after 2009. Compared to the linear change trajectory (-13.53), the rate of quadratic growth (2.77) was small. In

other words, the completion rate for the full sample decreased at the beginning (-13.53), but the downward trajectory slowed later (2.77).

The model using the boys-only sample revealed a trend similar to the models with the full sample. The grand mean completion rate in 2009 was 83.84 (β = 83.84, p < .001), which is higher than the overall average (i.e., full sample average). However, the statistically significant negative linear effect shows that the linear growth in the completion rate after 2009 decreased over time (β = -17.11, p < .01). The rate of decrease in the linear growth over time was steeper compared to the full sample or the female-only sample. Similar to results from the full sample, the quadratic effect for the boys-only sample was significant and positive (β = 3.37, p < .001), showing that the rate of growth in the boys' completion rate increased over the long term. In other words, although the completion rate for the boys decreased at the beginning (-17.11), the rate of decrease slowed in subsequent years (3.37).

The overall trend in the girls-only data is consistent with the v-shaped trends for the full sample and the boys-only sample. For girls, the grand mean completion rate in 2009 was 71.20 (β = 71.20, p < .001), which is lower than the overall average and the boys-only average. Similar to results from the full and boys-only samples, the linear effect in the girls-only sample was statistically significant and negative (β = -10.59, p < .05) and the quadratic effect was significant and positive (β = 2.2, p < .01). This means starting from 2009, the completion rate for girls decreased over time (-10.59) but this decrease slowed in the long term (2.2).

Moderation effects of North-South divide

In the full sample, the North-South divide was a significant predictor of the initial status (β = 23.08, p < .001), but not the linear (β = -3.74, p = .32) and the quadratic changes (β = .02, p = .97) in the completion rate of the full sample. That means the Southern Belt had a significantly higher completion rate of the Northern Belt improved by 6.12 points while the Southern Belt decreased by 4.86 points. However, the rate of changes between the two regional belts was not statistically significant.

In the boys-only sample, the North-South divide was a significant predictor of the initial status (β = 23.43, p < .01) but not the linear (β = -2.44, p = .71) or the quadratic changes (β = -.21, p = .64) in the completion rate. That means the boys in Southern Ghana had a significantly higher completion rate in 2009. However, the rate of changes did not vary significantly by the region where the boys were schooled.

For the girls-only sample, the North-South divide was a significant predictor of the initial status (β = 21.49, p < .001) but not the linear (β = -4.69, p = .19) or the quadratic changes (β = .25, p = .67) in the completion rate. That means the girls in the Southern Belt had a significantly higher completion rate in 2009 compared to girls in the Northern Belt. However, the rate of changes in the girls' completion rate was not significantly different between girls in the Northern and Southern belts.

Moderation effects of Rural-Urban divide

In the full sample, the rural-urban divide was a negative predictor of the initial status (β = -17.62, p < 0.01) and the quadratic change (β = -1.46, p < .05) but a positive predictor of the quadratic changes (β = 8.09, p < .05) in the completion rate of the full sample. That means the rural districts had a significantly lower completion rate in 2009. Regarding the linear slope of the completion rate, the rural districts showed a faster rate of change compared with the urban districts. In terms of quadratic growth, the rural district had a slower rate of change in the completion rate when compared with the urban districts.

Similar to the full sample, results from the boys-only sample show that the rural-urban divide was a negative predictor of the initial status (β = -19.15, p < 0.01) and the quadratic change (β = -1.67, p < .05) but a positive predictor of the quadratic changes (β = 9.49, p < .05). That means the rural

districts had a significantly lower completion rate in 2009. Regarding the linear slope of the completion rate, the rural districts showed a faster rate of change compared with the urban district. In terms of quadratic growth, the rural district had a slower rate of change in the completion rate compared with the urban districts.

Within the girls' sample, the rural-urban divide was a negative predictor of the initial status (β = -16.50, $p < 0.01$) and the quadratic change (β = -1.22, $p < .05$) but not the linear changes (β = 6.47, $p = .09$). That means girls in the rural districts had a significantly lower completion rate in 2009 than those in the urban districts. In terms of quadratic growth, the rural district had a slower rate of change in the completion rate compared with the urban districts. Regarding the linear slope of the completion rate, the rural districts did not experience a faster rate of growth than their urban counterparts did.

Moderation role of gender

Overall, the gender comparison reveals that males have consistently had a higher completion rate compared to females. Overall, the magnitude of the gender gap has fluctuated over time. The gender gap was wider in 2013 (i.e., 10.97) compared to the four earlier observation periods in 2012 (i.e., 8.48); 2011 (i.e., 9.55); 2010 (i.e., 8.41); and in 2009 (i.e., 10.44). Neither boys nor girls have fully "recovered" from the huge decline in the completion rate from 2009 to 2010 (boys: -11.43; girls: -9.55). However, between the lowest completion rate in 2010 and the most recent observation period in 2013, boys have regained slightly more (+9.65) compared to girls (+7.09). Overall, boys had the steepest decline and that fastest recovery.

For the full sample, the correlation between the intercept and the linear growth parameter is negative (β = -1.97, $p < .001$), which means that districts with a high completion rate had a slower linear decrease, whereas districts with a low completion rate have a faster decrease in linear growth over time. However, this trend does not vary by gender (boys: β = 4.80, $p = .64$; girls: (β = -10.29, $p = .30$).

Table 1. *Multilevel growth curve results of JHS completion rate*

	Full sample		Boys sample		Girls sample	
	Model 1a Unconditional mean model	**Model 1b** Conditional growth model	**Model 2a** Unconditional mean model	**Model 2b** Conditional growth model	**Model 3a** Unconditional mean model	**Model 3b** Conditional growth model
Fixed effects						
Intercept (γ_{00})	68.59***	76.74***	73.08***	83.84***	63.60***	71.20***
Year (γ_{10})		-13.53**		-17.11**		-10.59*
Year^2 (γ_{20})		2.77***		3.37***		2.2**
South (γ_{01})		23.08***		23.43**		21.49***
Rural (γ_{02})		-17.62**		-17.78**		-16.50**
Years * south (γ_{11})		-3.74		-2.44		-4.69
Year^2 * south (γ_{21})		.02		-0.21		0.25
Year * rural (γ_{12})		8.09*		8.53*		6.47+
Year^2 * rural (γ_{22})		-1.46*		-1.54*		-1.22*

Random effects

Residual (r_{ij})	156.94***	136.22***	181.36***	159.93***	147.72***	124.58***
Intercept (u_{0j})	308.61***	259.69***	317.67***	265.82***	315.95***	301.74***
Year (u_{1j})	-	-1.97	-	.18	-	-10.17
Model Fit						
-2LL	6520.80	6428.53	6591.03	6488.03	6477.43	6403.75
AIC	6526.80	6454.52	6597.03	6514.03	6483.43	6429.75
BIC	6540.77	6515.04	6610.99	6574.49	6494.39	6490.27

Evidence of spatial clustering results

Results of the Getis-Ord spatial analysis presented in Table 2 reveals statistically significant patterns of high clustering of the completion rate, particular since 2011 and through 2013. Results show the pattern of clustering is largely progressive from 2009 to 2013. The larger the absolute value of the z-score, the stronger the intensity of the spatial clustering.

Table 2. *Results of cluster analysis with the full, boys-only, and girls-only samples*

	Full sample			Boys-only sample			Girls-only sample		
Year	Observed G	Expected G	Z-score	Observed G	Expected G	Z-score	Observed G	Expected G	Z-score
2009	.087	.079	1.891	.086	.079	1.725	.087	.079	1.92
2010	.089	.079	2.433*	.088	.079	1.997*	.089	.078	2.323*
2011	.094	.079	6.006***	.093	.079	5.747***	.095	.079	6.139***
2012	.092	.079	5.281***	.092	.078	5.258***	.093	.079	5.173***
2013	.091	.079	5.444***	$.02^{e-4}$	$.07^{e-3}$	-2.106*	.093	.079	5.834***

*p < .05, **p < .01, ***p <. 001

Figures 3 – 5 graphically illustrate areas with statistically significant clusters of high completion rate (hot spots) and areas with low completion rate (cold spots) in the full, boys-only, and girls-only samples. All 5 panels in Figure 3 show a clear trend of clustering, with the hot spots in the South and the cold spots in the North. This means there is a higher than usual concentration of districts with a low school completion rate in the Northern regions of Ghana compared to other areas of the country. It is also important to note that the contrast between the North and South was more evident, particularly in 2009 and 2013. In other words, the sharp contrast between the North and the South nearly disappeared in 2010 but reemerged increasingly through the rest of the observation.

Figure 3. *Statistically significant clusters of high (hot spots) and low (cold spot) JHS completion rate (full sample).*

Overall, the general trend of North-South divide in the full sample (Figure 3) is similar to the evidence of spatial inequality trends in boys-only (Figure 4) and girls-only samples (Figure 5). However, there is a small exception. The comparison of Figures 4 and 5 reveal an interaction between gender and geographical location. Unlike Figure 4, we begin to see in Figure 5 a limited but statistically significant concentration of districts with high completion rates for girls in the Northern regions from 2011 through 2013.

Figure 4. *Statistically significant clusters of high (hot spots) and low (cold spot) JHS completion rate (boys-only sample).*

2013

Figure 5. *Statistically significant clusters of high (hot spots) and low (cold spot) JHS completion rate (girls-only sample).*

Discussion

Completion of basic school is an important milestone in every Ghanaian child's educational trajectory and a critical step toward transition to SHS and beyond. Nonetheless, many young Ghanaians do not reach this feat because they are unable to complete JHS successfully. This study offers longitudinal insights into (a) the scale and trajectories of JHS completion and (b) the gender and spatial nuances in the trends. The study findings suggest that the completion rate is steadily on track to reach the historic level achieved in 2009, although the upward trajectory is sluggish. The findings further reveal unequivocal gender and spatial disparities in the completion rate and its trajectory, although the spatial inequalities are worse compared to the gender inequalities.

As previously mentioned, one major objective of Ghana's school system, as designed by the Education Reform Program of 1987, is to make education more relevant to the socioeconomic realities of the country. Furthermore, the goal of the education sector as indicated in the Growth and Poverty Reduction Strategy (GPRS II) document is to provide the relevant education for all Ghanaians to enable them to acquire relevant skills to ensure they are functionally literate and productive to help reduce poverty and stimulate wealth creation. Ideally, that means all Ghanaian children need to pursue education beyond the basic school level so that they can acquire specialized skills and competencies that will enhance their chances of living productive and meaningful lives. Results from the current study suggest that the country is slowly headed in the right direction of "universal" JHS completion.

Notwithstanding this commendable trend and the finding that the growth rate of JHS completion may very likely increase over the long term, there are caveats of potential wide fluctuation, which should concern government officials, policymakers, and researchers. Ghana

recorded its highest completion rate in 2009. Interestingly, the country also recorded its lowest completion rate in recent history, barely a year after recording the highest rate. Although the completion rate has since improved steadily, it has yet to catch up to the level attained in 2009. Indeed, it is not surprising for educational indicators to fluctuate, but it is worrisome if the downward swing is so steep that it may take years and a significant amount of resources to recover.

As evident in Ghana's education history reviewed earlier, basic education has always been closely dependent on the political milieu, and so the inception of a new government in 2009 meant changes in policies and leadership of the education sector. This change might have had implications on management, supervision, and morale within the sector. Perhaps more important, this period of wide fluctuation in the completion rate immediately followed the introduction of two initiatives by the new government: free exercise books and uniforms in 2009. Either these interventions generally have no correlation with the JHS completion rate or the initiatives may have been too nascent or preliminary to see short-term positive impacts on JHS completion.

Regardless, the slow recovery of the completion rate suggests that government officials and stakeholders may need to do more to accelerate recent gains in the dropout rate. The longer the rate takes to catch up or surpass the level reached in 2009, the more young people who will be socially excluded and deprived of viable pathways to acquire post-basic education and to become more productive citizens. The government will have to invest additional resources to drastically boost the growth in basic school completion so that children are not only enrolled in school at the basic level but are given support to successfully complete basic education to progress to the senior high level. Fortunately, the Ghana government, policymakers, and the country's development partners have demonstrated the capacity and the will to address arguably more daunting educational challenges. A typical case in point is the success story of remarkable primary school enrollment. The JHS completion challenges can be addressed with similar commitment from the government and from stakeholders.

This study also found that gender and spatial inequalities continue in Ghana's educational system, despite interventions by the government. For instance, the grand mean completion rate in 2009 was 71.20 for girls and 83.84 for boys. As the trend lines in Figure 1 revealed, girls' average completion rates have consistently remained below the boys' average as well as the national average. Over the 5-year observation period of this study, the gender gap in 2009 (i.e., 10.44%) remained relatively unchanged five years later in 2013 (i.e., 10.97%). An encouraging trend in the finding is that the girls' completion rates have shown a robust sign of long-term improvement.

Conversely, one of the worrisome findings of the study is that spatial inequalities of JHS completion, particularly between Northern and Southern Ghana, remains entrenched. The hot spots analysis revealed that although the sharp contrast between the North and the South nearly disappeared in 2010, as shown in Figure 3, the contrast reemerged and grew at an increasing pace through the rest of the observation period. The initial forceful response from the government and stakeholders to bridge the North-South divide may have waned possibly due to complacency, dwindling funding, or a shift in priorities away from spatial disparities.

Given what we know about education as a way out of poverty and a viable path for societal well-being (Eryaman, 2006, 2007; Gradtein, Justman & Meier, 2004; Harper et al., 2003), education in Northern Ghana is imperative for the reduction of poverty in that part of the country. Furthermore, the country must take education of children, particularly in Northern Ghana, seriously. If significant proportions of children in Northern Ghana are unable to complete their education at the basic level, they are shut out of any opportunity to pursue education at the secondary and tertiary level, which will affect their future survival and eventually perpetuate the spatial disparities in the country. To that end, government efforts, such as the establishment of the Savannah Accelerated Development Authority (SADA), to quicken the pace of development in the Northern Savannah ecological zone of Ghana could be instrumental in addressing the unacceptable spatial disparities. However, the educational agenda of SADA has a 90% target for primary school enrollment, but there are no targets for school

completion. Perhaps, there is an erroneous assumption that universal enrollment would necessarily translate into a remarkable completion rate. Thus far, all education data consistently point to wide gaps between gross enrollment rate and completion rate (World Bank, 2011). Moreover, data from UNICEF's Education For All Global Monitoring Report suggest that Ghana is one of the worst performing sub-Saharan African countries in terms of transitioning to upper secondary school. For Ghana to reverse this unenviable record, the government and policymakers must set realistic school completion targets and work toward such targets. Conscious efforts on the part of education development planners is critical for setting school completion and transition targets and for committing to achieving such targets as was done with primary school enrollment.

Lastly, findings from this study show that not only do gender and spatial inequalities of school completion persist, but they also interact. This finding is consistent with what other studies have found about educational indicators, such as school attendance, enrollment, and academic progression (Akyeampong, 2007; Camfed, 2012). Moreover, this finding somewhat favors girls and is more illuminating in the Northern regions. Results from the hot spot analysis reveal a limited but growing cluster of districts with high completion rates for girls (hot spots) in the Northern sector of Ghana, as shown in Figure 4. Thus, although gender inequalities in JHS completion have continued, the risk of girls in some Northern districts dropping out of JHS may have improved slightly. The fact that we do not see identical trends in the boys-only sample in Figure 5 may suggest that programs targeting girls in education in the Northern regions are showing modest improvement. These relatively modest gains may be a reflection of many interventions aimed at supporting education for girls.

Limitations and strengths

Given the exploratory nature of the study, its scope and focus did not permit assessment of factors that may predict school completion trends. Thus, the study offers limited insights into concrete reasons for the nature of school completion. Moreover, because data was unavailable on recently created districts in Ghana, the study does not fully reflect JHS completion trends in the new districts.

Despite these limitations, the study has the potential to advance the existing body of work on JHS completion and its gender and spatial dimensions. The analytical tools and strategies used in the study have a number of benefits. The study's use of multilevel growth curve modeling is more powerful than other analytical approaches used for investigating trajectories of educational indicators, particularly when sample sizes vary by measurement occasion. In addition, mapping hot spots of JHS completion facilitated effective communication of school completion patterns, which could be useful for district education officers and decision makers at the district level in developing and planning JHS dropout prevention strategies. Lastly, the ability to examine 5 years of school completion data is an improvement over existing studies that have mostly relied on cross-sectional data to make inferences about educational trends in Ghana.

Conclusion

The government's expectation that universal access to education will lead to improvement in the socioeconomic lives of the Ghanaian people will not be realized if inequalities and disparities exist in the education sector based on geographical location and access to resources. The state's dominant role in financing, regulating, and providing a basic education (Gradtein, Justman & Meier, 2004) should always reflect the understanding that education is necessary for the well-being of society and all individuals, regardless of gender or geographical location. As the current study found, gender and spatial disparities in JHS completion rate continue to exist. Without targeted interventions to address challenges of educational inequality, many children, particularly young girls and children in Ghana's Northern regions, will continue to fail to complete basic school, become socially excluded and become economic liabilities to their families and the country. Our expectation is that the evidence from this study and other bodies of work about the inequalities in the JHS completion rate will help Ghana's government, the country's development partners, and education stakeholders to make better

decisions about allocating education resources to areas where they are needed the most to address school completion challenges.

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