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Article

The Impact of the Free Senior High School Education Policy and Double-Track System on Quality Education Outcomes: A Quasi-Experimental Policy Evaluation Study in Ghana

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Abstract

In the 2017/2018 academic year, the government of Ghana, through the Ministry of Education, began an educational reform policy codenamed the "Free Senior High School" (FSHS) policy to fully absorb the cost, increase enrolment, and improve the quality of education for all public senior high schools in Ghana. To accommodate more students and reduce overcrowding in schools, the government, as part of the FSHS policy, introduced the double-track system, which divides the total student population and staff into two tracks; as one of the tracks attends school, the other is on vacation and vice versa. No study has assessed this policy on education outcomes. This study assessed the impact of the FSHS policy and the double-track system on quality education outcomes and explored the challenges associated with the implementation of the policies.

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The study further identified strategies needed to address these challenges. The study employed a quasi-experimental study design using a pre-post data collection instrument designed to assess quality education metrics. We also used a comparative cross-sectional study design and qualitative design methodologies to evaluate the FSHS policy and the double-track system. We quantified the impact of the policies using quantile and ordinary least square regression models with cluster robust standard errors. Our evaluation of the policy showed a significant decline in quality of education outcomes and academic performance. Students who attended the double-track schools performed poorly in all the core subjects compared with non-double-track schools. The challenges associated with the implementation of the policy were financial constraints, infrastructure deficit, inadequate and delayed release of food items, lack of teaching and learning materials, inadequate contact hours, and poor implementation of the policy and the double-track system. Government must comprehensively review the FSHS policy and consider cost sharing with parents and caregivers to sustain the policy.

Keywords: academic performance; double-track system; education policy evaluation; free senior high school; impact evaluation; ordinary least square regression; quantile regression; quasi-experimental study

Introduction

An improvement in all dimensions of quality of life (poverty alleviation, improvement in health, etc.) is heavily dependent on the quality of education received from the basic to tertiary level (Adu-Ababio and Osei 2018). Formal education has both short- and long-term impacts and is considered a channel through which a country can put its human and material resources into productive use for the benefit of its citizenry. A key tool to improving access to education is to remove financial barriers that hinder access to quality secondary education. However, only 17 Sub-Saharan Africa (SSA) countries (37%) offer some form of free secondary education (Kerr 2020). SSA has the highest number of out-of-school children of any region in the world. The UNESCO Global Monitoring Report in 2015 showed that in many countries in sub-Saharan Africa where there are no school fees, much of the actual cost of education is still covered by the household, rather than the government (UNESCO 2015).

The 1992 constitution of Ghana clearly states that all persons shall have the right to equal educational opportunities and facilities, and to achieve the full realisation of that right, basic education shall be free, compulsory, and available to all (Republic of Ghana 1992). The Sustainable Development Goal 4 (United Nations 2015) states that "by 2030, all boys and girls should complete free equitable and quality primary and secondary education leading to relevant and effective learning outcomes."

The gradual improvement in Ghana's education system can be attributed to major policy initiatives in education by the current and previous governments. Article 25(1)(b) of the

1992 constitution states that "Secondary education in its different forms including technical and vocational education, shall be made generally available and accessible to all by every appropriate means, and in particular, by the progressive introduction of free education." Several government policies have been implemented in the pursuit of improving access to quality education in Ghana. For instance, the Free and Compulsory Universal Basic Education (FCUBE) programme was introduced in 1995 and promised universal education by 2005, and the Progressively Free Senior High School Education Programme (FSHS policy) for day students started between 2014–2016, in which substantial investments were made in educational infrastructure. In the 2017/2018 academic year, the government of Ghana, through the Ministry of Education, began an educational reform policy to fully absorb the cost of senior high school and vocational education for all students in public schools in Ghana (FSHS). The FSHS policy aims to improve quality through the provision of core textbooks and supplementary readers, teacher rationalisation, and deployment (Free SHS Secretariat, n.d.). The beneficiaries of the FSHS policy do not pay tuition and admission fees, textbooks, library fees, science centre fees, fees for ICT, examination fees, utility fees, boarding, and meals.

To accommodate the increasing number of students within the facility and reduce over-crowding associated with the implementation of the policy, the government, as part of the FSHS policy, introduced the double-track system (DTS), which divides the total student population and staff into two tracks; while one track attends school, the other is on vacation and vice versa (Free SHS Secretariat, n.d.). The DTS intervention was adopted because the 2018 projections for the number of prospective students showed that there was a need for the government to create an additional 181 993 extra spaces to accommodate the high number of students projected to enrol in senior high schools in the 2018/19 academic year. Each track was in school for 81 days per session and 41 days of vacation (Mensah 2019). This was in sharp contrast to what existed before the implementation of the policy, where all the students were in school at the same time and were subjected to three months of teaching and learning. The green track represents the first batch of students who go to school for a semester and are followed by the gold track students who continue after students of the green track session have vacated the academic calendar. Available data on senior high school enrolment showed that the number of students admitted to senior high schools almost doubled from 393 995 in 2007/08 to 787 861 in the 2017/18 academic year (Free SHS Secretariat, n.d.). According to the minister of finance, the government has spent a total amount of GH₵7.62 billion (954 million USD equivalent) for the implementation of the FSHS programme during the past five years (2017–2022) (Agyeman 2021).

It is evident that a great deal of taxpayers' money has been spent on the policy, and that there has been an increase in enrolment; other positive outcomes of the intervention include increased educational attainment, knowledge, skills, and preventative health behaviours, while reducing female fertility (Duflo, Dupas, and Kremer 2021). However, we do not know the extent to which the quality of education has been affected after the implementation of the policy. Impact evaluation of the policy on the quality of education

measured in terms of academic performance has become important because of the numerous challenges associated with the implementation of the policy. The timing of implementation of the policy has been the subject of a significant political debate between the two major political parties in Ghana in the last four presidential elections. While the main opposition party believes that the implementation should be gradual and secondary education made progressively free for sustainability, the current government believes otherwise, and thinks that the time to make senior high school education free for all public schools is long overdue. In addition, experts in educational policy evaluation, headmasters of senior high schools, civil society organisations, and other stakeholders are of the view that the introduction of the FSHS policy and the double-track system have affected the quality of education delivery at senior high schools because of the reduced contact hours for student-teacher face-to-face interaction, inadequate teaching and learning materials, and lack of infrastructure to accommodate the expected increase in enrolment and their opinions correlate with similar challenges associated with the introduction of free educational policies elsewhere (Asankha and Takashi 2011; Mate and Wesonga 2013). These challenges, they believe, will have a detrimental effect on the quality of education. However, there is no empirical evidence to support their hypothesis and shape public opinion. To the best of our knowledge, no study has evaluated the impact of the FSHS policy and double-track system on quality education metrics among senior high school students in Ghana.

Three key policy questions are of interest: (1) Has the three-year implementation of the FSHS policy improved academic performance among students? (2) What is the impact of the double-track system on academic performance? (3) What are the major challenges associated with the implementation of the FSHS policy from the perspective of key stakeholders (heads of academic departments, matrons, parents, and civil society organisations) and what are the mitigation strategies to address these challenges to sustain the policy?

Literature Review

Several factors may contribute to quality education, as highlighted by Adu-Agyem and Osei-Poku (2012). These include poor infrastructure and inadequate logistics for teaching and learning, lack of funding for high schools, inadequate number of trained and well-motivated teachers to promote quality education, and ineffective use of contact hours. Policies that are geared towards improving academic performance should ideally address these challenges. The provision of funding similar to the FSHS policy in other jurisdictions has been shown to have a significant impact on students' enrolment and academic performance globally (Blimpo, Gajigo, and Pugatch 2019; Boatman and Long 2016; Branson and Lam 2017; Garlick 2013). For instance, Abdul-Rahaman et al. (2018) assessed the impact of government funding on students' academic performance in Ghana and concluded that the progressive free policy has a greater impact on students' academic performance. Blimpo, Gajigo, and Pugatch (2019) looked at the effects of large-scale fee elimination for secondary school girls in The Gambia on the

quantity, composition, and achievement of students and concluded that the policy had a positive point estimate of the programme on test scores. Tatiana (2016) also showed that learner motivation via financial incentives increased enrolment rates and decreased dropout rates, with significant improvement of academic performance of a significant and sizeable magnitude. The current study situates the FSHS policy within the context of being able to provide these necessities to promote quality education. There are few studies that have assessed the impact of the FSHS policy in Ghana. For instance, Adbul-Rahim, Adom, and Adu-Agyem (2022) evaluated the impact of the FSHS policy on the quality of education in Ghana using the case of Kintampo Senior High School. Their study only looked at one school and is thus not nationally representative of the effect of the policy on performance. None of the studies reviewed comprehensively assessed the current policy and the double-track system.

Methods

This study followed the standard guidelines for reporting quasi-experimental studies using the Transparent Reporting of Evaluations with Nonrandomized Design/Quasi-Experimental Study Design (TREND) and the standard for reporting qualitative research (SRQR).

Overview of Ghana's Education System

According to Ghana's laws and legislation, formal education in Ghana begins with two years of kindergarten, six years of primary school, and three years of junior high school. Students who complete public and private junior high school sit for the Basic Education Certification Examination (BECE), which is the final examination required to gain admission to any of the Second Cycle Institutions (senior high schools). Senior high school education in Ghana is three years, after which the students sit for their final examination organised by the West African Examination Council, which is a constitutionally mandated body required to organise examinations in the West African sub-region. Students that obtain the pass mark from these examinations automatically gain admission to any of the tertiary institutions in Ghana (polytechnic, university, teacher training and nursing training college) and other diploma and higher diploma awarding institutions depending on their results.

Study Design

Two different policy initiatives were evaluated in this study. First, we assessed the impact of the FSHS policy by comparing data before and after the implementation of the policy. The study compared the academic performance of senior high school students in Ghana who wrote the 2016 examination (before the intervention) with senior high school students who benefited from the intervention between 2017 to 2019 and wrote the final examination in 2020. We emphasised that there was no significant violation of the stable unit treatment value assumption, that is, there was no systematic change in the composition of students before the implementation of the intervention and

students that benefitted from the policy. This is primarily because of the educational system in Ghana, where every child must at least complete junior high school (JHS) before they get admission to senior high school. This stipulates that independent of whether a child benefits from the policy or not, the child must at least obtain a certificate at the JHS level before they are admitted to senior high school. The two groups of students (beneficiaries and non-beneficiaries of the free senior high school policy) were subjected to the same system of JHS education before being admitted to senior high school. An increase in enrolment because of the policy implementation in this context, therefore, does not necessarily change the composition of students in terms of the quality of students that were admitted after the policy was implemented.

Although an experimental design would have been the preferred evaluation design to assess the impact of the policy because it ensures that the intervention and the comparison schools are more similar in terms of both the observed and unobserved characteristics via random treatment assignment of the policy, it was not feasible in our case since the policy was implemented nationwide for all public schools at the same time. In addition, it was not prudent to compare the academic performance of public and private senior high schools using the double-difference in differences analysis method because the management and administration of private schools in terms of the availability of teaching and learning materials, teacher motivation and incentives, built environment, academic qualification of teachers at the private schools, monitoring and evaluation, and the type of students admitted are different from public schools. This would have created the problem of selection bias and ultimately bias the impact estimate.

To obtain adjusted causal effect estimates of the policy (high internal validity) and more precise standard errors, we accounted for the covariates that could potentially influence academic performance by including a set of variables such as the school structure (day or boarding), geospatial location of the school, the academic rank of the school, and school type (boys only, girls only, mixed) in the regression model. These variables were included in the model to reduce residual variance in the outcome, resulting in a more precise (i.e., lower standard error) estimation of the policy coefficient.

Second, we assessed the impact of the double-track system, which is a sub-intervention implemented within the FSHS policy to accommodate the increasing number of students attributed to the implementation of the FSHS policy. The double-track system of senior high school education was introduced in the 2018/19 academic year in about 400 senior high schools across the country. The system operates in two sessions, namely the green track and the gold track. Students were allocated either a green or gold track for each form and attended classes in an alternating manner instead of the traditional sit-in section where students continuously have face-to-face interactions with their teachers for at least three months. According to the Ghana Education Service, the unit directly responsible for managing senior high schools in Ghana, the double-track system is an intervention that allows senior high schools to accommodate more students within the

same facility and it is often motivated by its potential to reduce overcrowding. To determine the impact of the double-track system on academic performance, the study used a cross-sectional survey to generate data that compared the final examination results in 2020 for schools that were assigned double-track and non-double-track schools. In addition, the study accounted for some contextual factors that could mask the relationship between the double-track system and academic performance, such as the structure of the school (day or boarding), geospatial location of the school, the academic rank of the school, and school type (boys only, girls only, mixed).

Data Sources

The data used in this study were obtained from 58 randomly sampled schools from a total of 681 public senior high schools. These 58 schools were located in 55 districts within the 16 administrative regions of Ghana.

Sample Size Determination

The sample size for the total number of schools was obtained using the paired *t*-test on the recommendations of Chow et al. (2017) and Rosner (2015).

$$n = \frac{\left(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta}\right)^2}{\left(\frac{MDE}{SD_{\Delta}}\right)^2}$$

where n is the total number of senior high schools required,

$$Z_{1-\frac{\alpha}{2}}$$

is the standard normal deviate for $\alpha = 5\%$, and $Z_{1-\beta} = 0.845$ is the standard normal deviate for β where $1-\beta$ corresponds to 80% power for the study. We assumed a standardised minimum detectable effect

$$\left(\frac{MDE}{SD_{\Delta}}\right)$$

of 0.37 based on the limited financial budget for the study to arrive at a sample size of 58 public schools in Ghana. For each school, we interviewed the heads of academic departments for core mathematics, English language, and integrated science and social studies. In all, a total of 232 heads of academic departments were interviewed. We also interviewed a total of 43 chief matrons who agreed to be part of the study. Some of the day schools did not have matrons.

Sampling Technique

We obtained a list of all public senior high schools from the National School Inspectorate Authority (NaSIA). NaSIA, an agency under the Ministry of Education, is responsible for licensing new and existing pre-tertiary educational institutions, regulating the establishment of new schools and the quality of infrastructure, and conducting monitoring and evaluation to ensure quality education at the senior high school level. The sampling frame of schools obtained from NaSIA was stratified by the 16 administrative regions and a simple random sampling technique with sampling proportionate to size (number of schools in the region) was used to randomly generate representative samples of the schools.

Data Collection Instruments

We used a structured questionnaire to collect pre-baseline data on the school's academic performance for first-year students enrolled in the 2013/2014 academic year who wrote their final examination administered by the West African Examination Council (WAEC) in 2016 (that is, before policy implementation). We used the same data collection instrument to collect endline data for first-year students enrolled in the 2017/2018 academic year who wrote their final examination in 2020 (post-FSHS policy implementation academic performance) organised by the same institution.

Unit of Analysis

The unit of analysis in this study was the schools that took part in the WAEC. That is, we compared a school's academic performance before and after implementing the policy. We also interviewed heads of academic departments and matrons of the boarding schools.

Spatial Data Collection Procedure

We obtained the geographical coordinates of the sampled schools across the country using GPS during the study as part of the data collection. These geographical coordinates were captured as longitudes and latitudes and were stored as shapefiles for mapping. To put the locations of our sampled schools in context, we also downloaded and extracted both regional and district shapefiles for Ghana using geographic information systems (GIS) and geospatial approaches. These were downloaded as shapefiles. The shapefile for the 16 regions and the 260 districts were obtained from the Humanitarian Data Exchange (HDX) website (https://data.humdata.org/dataset/cod-ab-gha).

Primary Outcome Measures

The following primary outcome measures were studied: the general academic performance, which was measured as the percentage of students in the index school that passed a particular course (English, mathematics, integrated science, social studies), and the average scores of the four subjects. Our proposed conceptual framework for the

definition of quality of education was based on an input (human resources, the provision of teaching and learning materials, etc.), process (supervision of teachers, support for teaching and learning, etc.), and output (pass rate, social skills, etc.) approach developed by Garira (2020). However, this study limited the definition of quality education to achievement in academic subjects, ignoring other aspects of quality education such as students' cultural heritage, social preparation, and personal development geared towards overall development of the child.

Secondary Outcome Measures

In addition to the primary outcomes, the study assessed knowledge and understanding of instructions by students, students' extra-curricular activities (e.g., school plays, sporting activities), student feeding, healthcare and general welfare, content, quality and quantity of teaching materials, food quality, staff motivation and remuneration, and staff job satisfaction and security before and after the implementation of the FSHS policy. This was achieved by developing a Likert-based standard quality education metric tool to rate the experiences of heads of academic departments and matrons before and after the implementation of the policy.

Primary Exposures (Interventions)

The FSHS policy and the double-track systems were the primary exposures of interest.

Confounders

The following were assumed to have an effect on academic performance: type of school (boys, girls, or mixed), geospatial location of the school, the structure of the school (only day versus day/boarding), the rank of the school, and number of courses offered in the school.

Statistical Analysis

Descriptive summary measures (mean, standard deviation, median, interquartile range) were used to analyse differences in the outcome measures before and after the policy intervention. The normality of all the outcome measures was assessed using the Kolmogorov-Smirnov goodness of fit test. In the case of non-normally distributed outcome measures, a multivariable quantile regression model with a robust standard error was used to generate a more representative median impact estimate of the FSHS policy and the double-track system on academic performance. The quantile regression model is more robust and does not require any specified error distributions for skewed data with repeated measurements and no transformation for the outcome measure (Chen, Bertke, and Curwin 2021; Lu and Fan 2020). For the normally distributed outcome measures, a multivariable ordinary least square regression model with cluster robust standard error was used to evaluate the effect of the policy and the double-track system on academic performance.

We specified the model as follows. The quantile regression model for the τth quantile is given as follows:

$$Q_\tau(y_{it}) = \beta_0(\tau) + \beta_1(\tau)FSHS\ Policy + \beta_2(\tau)X_{it} + \beta_3(\tau)Z_i + \alpha_i + \varepsilon_{it}(\tau), i = 1, \dots, n$$

where y_{it} represent the academic performance for school i at time t. X_{it} is the time-varying covariates and Z_i is the time-invariant covariates that could influence the outcome measures, α_i and ε_{it} are both error terms. ε_{it} is different for each school at each point in time. α_i only varies across schools but not across time (captures the effect of unmeasured time-invariant/stable variables).

The double-track system was only implemented in the 2020 academic year as a sub-component of the FSHS policy. To evaluate the impact of the double-track system on academic performance, this study compared the distribution of academic scores between students who graduated from public schools where the double-track system was implemented against schools that did not implement the system by employing a similar analytic technique. The assessment of quality education metrics based on the responses from the heads of academic departments and matrons of the school before and after the implementation of the FSHS policy were compared using the paired *t*-test. Data management and analysis were conducted using Stata version 17 (StataCorp, College Station, Texas, USA), and *p*-values less than .05 were considered statistically significant.

Geospatial mapping approaches were employed to show the distribution of the sampled schools selected for the study. Regional and district-level shapefiles for Ghana were downloaded, extracted, processed, and prepared for the mapping. The rgdal, leaflet, maptools, spdep and tmap packages in R software version 4.1.1 and RStudio were used for the geospatial data preparation and mapping.

Assessing the Challenges Associated with the Implementation of the FSHS Policy

A semi-structured questionnaire and qualitative study design approach were used to better understand from the perspective of key stakeholders (parents, teachers, headmasters, heads of department, CSOs) the key challenges associated with the implementation of the policy. Content analysis of the in-depth interview with these key stakeholders was conducted to understand the challenges of the policy. We developed themes that emerged and looked for them in the data we collected. We used a colour-coding or numbering system to identify text about the different themes, grouped together ideas, and gathered evidence about views on each theme. This content analysis was carried out using NVivo software. We summarised and tabulated the findings from the content analysis. During the process of coding, data analysis was carried out using sub-thematic areas on the interview guide as a predetermined concept. The coded data were refined to represent participants' perspectives on challenges associated with the implementation of the policy. The key informant interview guide can be found in the supplementary material.

Ethics Approval and Consent to Participate

This study secured ethical approval from the Ghana Education Service Ethical Review Committee with approval number GES/DD-G/Q&A/21/54. All participants completed informed consent forms indicating their understanding of the study objectives and their willingness to participate.

Results

Distribution of the Schools

A total of 58 public senior high schools were randomly sampled across the 16 administrative regions of Ghana and included in the study. Fifty per cent (n = 29) of the schools were classified as double-tracked schools. Twenty schools were in the coastal zone, 21 in the middle zone, and 17 in the Northern Zone. Of the 58 schools, 12 were boys only schools, 18 were girls only, and 28 were mixed (both boys and girls). Approximately 62 per cent (n = 36) of the schools were "day/boarding" and the remaining 22 (38%) were classified as "day" schools. Table 1 and Figure 1 show the distribution of the 58 sampled schools across the 216 districts within the 16 administrative regions of Ghana.

Table 1: Distribution of senior high schools across the 16 administrative regions

Region	Number (n) (%) of schools
Ahafo	3 (5.17)
Ashanti	5 (8.62)
Bono	5 (8.62)
Bono East	4 (6.90)
Central	3 (5.17)
Eastern	4 (6.90)
Greater Accra	5 (8.62)
North East	3 (5.17)
Northern	4 (6.90)
Oti	3 (5.17)
Savanah	2 (3.45)
Upper East	4 (6.90)
Upper West	4 (6.90)
Volta	4 (6.90)
Western	4 (6.90)
Western North	1 (1.72)
Total	58

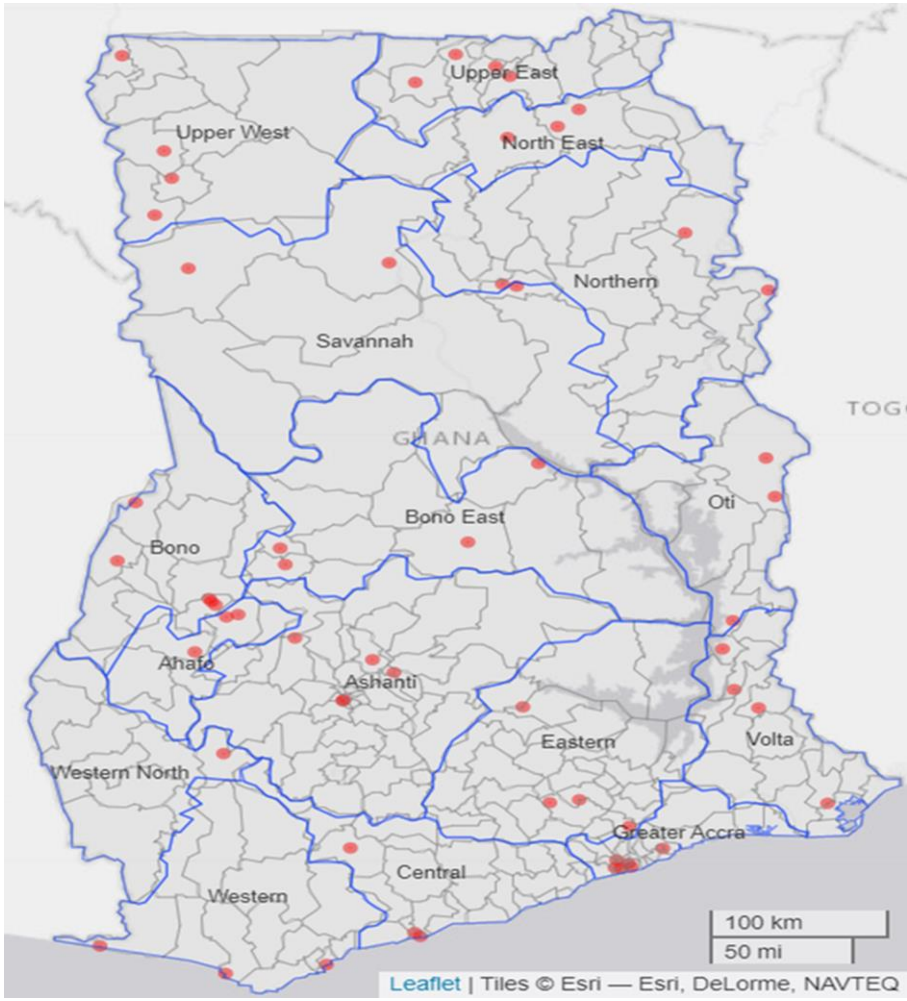

Figure 1: Distribution of location of sampled schools (red circles) by regions (blue polygons) and districts (grey polygons)

Impact of the Free Senior High School Policy on Academic Performance

The average academic performance measured via the percentage of students that passed subject-specific WAEC examinations before and after the policy implementation was studied among the 58 randomly sampled schools. Table 2 compares the academic performance of students before the implementation of the policy (that is, students who were enrolled in 2014 but wrote their final examination in 2016) and after the policy implementation (that is, the first beneficiaries of the policy who were enrolled in 2017 but wrote their final examination in 2020). Among the four subject areas that were assessed, the average academic performance in integrated science reduced significantly after the FSHS policy by 14.5 per cent (95% CI: [-26.6, -2.4]; $p < .05$) compared with the performance in 2016. The average performance in social studies also reduced by 3.8

per cent (95% CI: [-14.8, 11.0]; $p > .05$) after the implementation compared with 2016, albeit statistically insignificant. Although the academic performance in core mathematics and English language increased after the policy implementation compared with 2016, the difference in academic performance was not statistically significant.

Table 2: Average academic performance before and after the implementation of the policy

Subjects	**Total**	**Before (2016)**	**After (2020)**	
	Median [LQ, UQ]	Median [LQ, UQ]	Median [LQ, UQ]	Impact of policy on academic performance: adjusted estimate from quantile regression with robust standard errors [95% CI]
Core				
English language	82.31 [52.58, 98.26]	82.18 [56.52, 98.86]	82.44 [42.00, 98.00]	4.54 [-9.95, 19.04]
Core mathematics	85.00 [51.95, 98.00]	81.04 [39.00, 96.00]	88.71 [60.00, 98.78]	12.00 [-2.98, 26.98]
Integrated science	79.89 [46.00, 98.00]	86.04 [63.08, 99.00]	72.00 [32.00, 97.80]	-14.48 [-26.58, -2.37]*
Social studies	83.52 [50.56, 96.00]	85.20 [64.00, 99.38]	81.83 [38.00, 95.91]	-3.80 [-11.32, 3.72]
Overall scores	78.95 [49.66, 97.50]	81.00 [49.66, 98.06]	76.51 [45.75, 97.50]	-1.04 [-12.97, 10.88]

Note. LQ: Lower quartile, UQ: Upper quartile: CI: Confidence interval; p-value notation: ***$p < .001$, ** $p < .01$, *$p < .05$. The model adjusts for the type of school (boys, girls, or mixed), geospatial effect (latitude and longitude), the structure of the school (only day versus day/boarding), the rank of the school, and number of courses offered in the school.

Evaluating Student Enrolment and Completion Rate Before and After Policy Implementation

Table 3 shows the results of senior high school student enrolment and completion among the 58 randomly sampled schools. The policy increased the average enrolment of students and those that completed SHS1, SHS2, and SHS3 compared with the situation before the policy.

Table 3: Evaluating student enrolment and completion

Subjects	**Total**	**Before (2016)**	**After (2020)**		
	Mean (SD)	Mean (SD)	Mean (SD)	Impact of policy on enrolment and completion: adjusted estimate: OLS with cluster robust standard errors [95% CI]	Impact of policy on enrolment and completion: adjusted estimate from quantile regression with robust standard errors [95% CI]
Enrolment as a percentage of school size					
SHS 1¥	33.73 (15.37)	27.92 (18.69)	37.80 (11.07)	9.05 [0.46, 17.63]*	8.44 [2.29, 14.59]**
SHS 2¥	30.47 (11.84)	23.39 (12.89)	34.90 (8.69)	11.55 [5.40, 17.70]***	11.52 [5.41, 17.62]***
SHS 3	26.43 (12.22)	21.86 (12.81)	29.52 (10.91)	7.28 [0.88, 13.68]*	4.13 [-3.59, 11.85]

Subjects	Total	Before (2016)	After (2020)		
	Mean (SD)	Mean (SD)	Mean (SD)	Impact of policy on enrolment and completion: adjusted estimate: OLS with cluster robust standard errors [95% CI]	Impact of policy on enrolment and completion: adjusted estimate from quantile regression with robust standard errors [95% CI]
Completion as a percentage of school size					
SHS 1¥	31.29 (16.23)	27.32 (21.84)	34.45 (9.03)	7.39 [-3.20, 17.99]	4.45 [-6.83, 15.73]
SHS 2	27.04 (12.99)	21.34 (14.96)	30.84 (10.08)	9.29 [1.16, 17.43]*	8.42 [0.84, 16.01]*
SHS 3¥	28.08 (20.11)	21.04 (13.03)	32.83 (22.68)	11.85 [2.45, 21.24]*	4.63 [-2.07, 11.31]

Note. OLS: Ordinary least square; LQ: Lower quartile; UQ: Upper quartile; CI: Confidence interval; *p*-value notation: *** $p < .001$, ** $p < .01$, * $p < .05$. The model adjusts for the type of school (boys, girls, or mixed), geospatial effect (latitude and longitude), the rank of the school, the structure of the school (only day versus day/boarding), and the number of courses offered in the school. ¥ not normally distributed.

Policy Evaluation by Heads of Academic Departments

Subject-Specific Assessment

The heads of academic departments indicated that the teachers have had a poor teaching experience after the implementation of the policy compared with experiences before the policy implementation. There was a statistically significant decline in teaching experience in the following subject areas: English language, core mathematics, integrated science, social studies, agricultural science, business accounting and secretariat, general arts, general science, and home economics (Table 4).

Table 4: Ratings of teaching experiences before and after the Free Senior High School policy implementation

Subjects	Before Mean (SD)	After Mean (SD)	Difference Mean (SD)	Paired *t*-test
Core				
English language	4.09 (0.77)	3.67 (1.16)	0.42 (1.39)	2.22***
Core mathematics	4.25 (0.66)	3.78 (1.03)	0.47 (1.19)	3.05**
Integrated science	4.09 (0.69)	3.59 (1.11)	0.50 (1.22)	2.77***
Social studies	4.15 (0.60)	3.69 (0.99)	0.46 (1.06)	2.96**
Electives				
Agricultural	4.26 (0.54)	3.35 (1.07)	0.91 (1.12)	3.89***
Business Accounting	4.17 (0.85)	3.67 (1.06)	0.50 (1.31)	2.43***
Business (Secretariat)	4.37 (0.74)	4.12 (0.35)	0.25 (0.71)	1.00
General art	4.22 (0.62)	3.66 (1.00)	0.56 (1.01)	4.29***
General Science	4.21 (0.64)	3.73 (1.02)	0.48 (1.02)	2.68*
Technical	4.17 (0.58)	3.83 (0.58)	0.34 (0.65)	1.77
Vocational (Home Economics)	4.00 (0.73)	3.48 (1.07)	0.52 (1.15)	2.65*
Vocational (Visual arts)	4.21 (0.66)	3.75 (1.18)	0.46 (1.18)	1.90

Note. SD: Standard deviation; *p*-value notation: *$p < .05$, **$p < .01$, ***$p < .001$

Assessment of the Built Environment, Infrastructure, Learning, and Teaching Materials

This study assessed the built environment, infrastructure, availability of teaching and learning materials, staff motivation, and remuneration after the implementation of the policy. Of the 22 core indicators that were assessed, 16 indicators were found to have significantly decreased in quality and standard after the implementation of the policy ($p < .05$, Table 5).

Table 5: Assessment of the built environment, infrastructure, staff motivation, learning, and teaching materials

Variable	Before Mean (SD)	After Mean (SD)	Difference Mean (SD)	Paired *t*-test
Student admissions and enrolment	3.68 (1.02)	3.94 (1.08)	-0.26 (1.52)	-2.61***
The school's general finances	3.75 (1.04)	3.05 (1.22)	0.70 (1.78)	5.76***
Student fees and fee payment	3.27 (1.17)	4.02 (1.24)	-0.75 (1.98)	-4.29***
Acquisition and availability of learning materials	3.44 (1.06)	3.34 (1.19)	0.10 (1.53)	1.06
Content, quality, and quantity of teaching materials	3.71 (0.92)	3.53 (1.06)	0.18 (1.06)	2.21*
Knowledge and understanding of instructions by students	3.99 (0.81)	3.41 (1.14)	0.58 (1.29)	7.01***
Performance outcomes and standards of students	3.88 (0.79)	3.37 (1.12)	0.51 (1.28)	6.18***
Student assessment and examination management	4.04 (0.67)	3.63 (3.50)	0.41 (1.14)	5.63***
Students' extra-curricular activities (e.g. school plays, sporting activities)	4.03 (0.82)	2.97 (1.17)	1.06 (1.36)	11.85***
Classrooms and general academic facilities	3.66 (0.95)	3.29 (1.23)	0.37 (1.26)	4.49***
Student boarding management (for boarding schools)	3.82 (0.92)	3.19 (1.19)	0.63 (1.32)	6.49***

Variable	Before Mean (SD)	After Mean (SD)	Difference Mean (SD)	Paired *t*-test
Student feeding, healthcare, and general welfare	3.67 (0.96)	3.45 (3.45)	0.22 (1.43)	2.29*
ICT and science resources (e.g., labs) and skills of teachers in using them	3.49 (1.06)	3.59 (1.11)	-0.10 (1.15)	-1.29
School infrastructure development and maintenance	3.48 (1.02)	3.26 (1.19)	0.22 (1.27)	2.76**
General student discipline and behaviour	3.98 (0.84)	2.97 (1.34)	1.01 (1.48)	10.55***
General school management and administration	3.99 (0.70)	3.73 (1.03)	0.26 (1.02)	3.83***
Relationships with parents/guardians	4.17 (0.64)	3.36 (1.22)	0.81 (1.27)	9.85***
Students with special learning needs (if applicable)	3.52 (0.83)	3.28 (0.96)	0.24 (0.93)	2.16*
Provision of utilities (e.g. water, electricity, internet connection)	3.59 (1.03)	3.89 (1.07)	-0.30 (1.17)	-3.91***
Continuous professional development of school staff	3.65 (0.90)	3.72 (1.03)	-0.07 (1.18)	-0.88
Staff motivation and remuneration	3.48 (1.11)	2.65 (1.21)	0.83 (1.42)	9.06***
Staff job satisfaction and security	3.41 (1.11)	3.02 (1.28)	0.39 (1.17)	5.13***

Note. SD: Standard deviation; *p*-value notation: *$p < .05$, **$p < .01$, ***$p < .001$

Policy Evaluation by Matrons

According to the matrons of the schools that were sampled, the acquisition and availability of food, quality of foodstuff acquired, and the amount of money allocated to their department has significantly reduced after the implementation of the policy compared to the situation before the policy (Table 6).

Table 6: Matrons' experiences before and after the implementation of the Free Senior High School policy

Variable	Before Mean (SD)	After Mean (SD)	Difference Mean (SD)	Paired *t*-test
Student numbers and their management	3.94 (0.79)	3.81 (0.92)	0.13 (1.22)	0.68
Infrastructure development and maintenance	3.29 (1.20)	3.17 (1.20)	0.12 (1.16)	0.58
The school's finances regarding your unit	3.68 (1.11)	3.17 (1.25)	0.51 (1.25)	2.14*
Acquisition and availability of equipment	3.74 (0.98)	3.51 (1.09)	0.23 (1.19)	0.23
Acquisition and availability of foodstuff	3.94 (1.09)	3.25 (1.27)	0.69 (1.49)	2.80**
Quality of foodstuff acquired	4.11 (0.85)	3.53 (1.11)	0.58 (1.38)	2.53*
Quality of cooked food	4.28 (0.78)	4.22 (0.83)	0.06 (1.04)	0.32
Number of student feeding	4.14 (0.77)	4.28 (0.71)	-0.14 (0.97)	-0.87
General student discipline and behaviour towards your unit	4.06 (0.91)	3.68 (1.23)	0.38 (1.31)	1.67
Management and administration of your unit	4.20 (0.79)	4.20 (1.01)	0.00 (1.06)	0.01
Students with special learning needs (if applicable)	4.54 (0.52)	4.36 (0.67)	0.18 (0.60)	1.00
Provision of utilities (water and electricity)	4.11 (1.02)	4.37 (0.88)	-0.26 (1.01)	-1.51

Variable	Before Mean (SD)	After Mean (SD)	Difference Mean (SD)	Paired *t*-test
Continuous professional development of your unit's staff	3.65 (1.12)	3.53 (1.16)	0.12 (0.84)	0.81
Staff motivation and remuneration	3.74 (1.09)	3.37 (1.19)	0.37 (1.38)	1.60
Staff job satisfaction and security	3.68 (1.08)	3.43 (1.27)	0.25 (1.36)	1.14

Note. SD: Standard deviation; *p*-value notation: *$p < .05$, **$p < .01$, ***$p < .001$

Impact of Double-Track System on Academic Performance: A Multivariable Analysis

Table 7 indicates that the general academic performance decreased in all four core subject-specific areas among the double-track schools compared with the non-double-track schools. The results from the quantile regression with robust standard error showed that the average academic performance in English language significantly decreased by approximately 26.1 per cent (95% CI: [-41.99, -10.21]; $p < .01$) among the double-track schools compared with the non-double track schools. The performance in integrated science decreased by approximately 30.4 per cent (95% CI: [-45.6, -15.24]; $p < .001$) in the double-track schools compared with the non-double-track schools. Overall academic performance decreased by 36.1 per cent (95% CI: [-50.4, -21.9]; $p < .001$) among the double-track schools compared with the non-double-track schools.

Table 7: Impact of double-track system on academic performance

Subjects	Non-Double Track (2020)	Double Track (2020)	Impact of double track system on academic performance: adjusted estimate from quantile regression with robust standard errors
	Median [LQ, UQ]	Median [LQ, UQ]	
Core			
English language	91.58 [77.74, 98.50]	64.50 [32.17, 95.00]	-26.10 [-41.99, -10.21]**
Core mathematics	96.00 [74.00, 100.00]	81.39 [42.33, 97.50]	-16.65 [-32.31, -0.98]*
Integrated science	90.00 [61.34, 98.09]	42.70 [21.50, 81.01]	-30.44 [-45.63, -15.24]***
Social studies	90.91 [63.09, 98.89]	59.14 [32.98, 90.23]	-27.75 [-51.58, -3.92]*
Overall scores	91.69 [70.00, 98.33]	60.58 [38.54, 89.13]	-36.12 [-50.36, -21.89]***

Note. LQ: Lower quartile; UQ: Upper quartile; CI: Confidence interval; *p*-value notation: ***$p < .001$, **$p < .01$, *$p < .05$. The model adjusts for the type of school (boys, girls or mixed), geospatial effect (latitude and longitude), the structure of the school (only day versus day/boarding), the rank of school, and the number of courses offered in the school.

Synthesis of the Qualitative Interviews

This study analysed the in-depth interviews with key informants to identify challenges associated with the implementation of the policy. The main thematic areas explored were challenges experienced during the roll-out of the policy, measures to sustain the FSHS programme, and opinions that the FSHS policy should continue for all students regardless of their ability to pay.

In terms of the challenges, the study identified a common theme among all the study participants (headmasters, parents, CSOs, policymakers, media, and faith-based

organisations). The major challenges indicated by these categories of stakeholders concerning the implementation of the policy were financial constraints, inadequate teaching and learning materials, delay in the release of food items, inadequate contact hours, and poor implementation of the policy and the double-track system.

Financial Challenges

> Funds were not released on time and even affected the initial take-off of FSHS; funds is the main issue for us, since we are a day school. (Headmaster)

> It is very expensive indirectly because as at the time they were paying fees they paid about 700 cedis per term, and when the free SHS started, it was free the things we bought, the extra class. They run three extra classes, they have extra classes, extra classes, extra classes and you have to pay all, and a subject was 50 cedis. So, if she did all the subjects, how much was that. I don't know if it was a means for the teachers to extort money or not. I think they are the first or second who started the Free SHS. My sister-in-law was there, and they were paying fees and it wasn't like that. But when these people started every week, you have to pay an amount, you have to buy books. The materials to be provided for them to learn it's not there. You have to pay a lot for lab practicals. It didn't help both directly and indirectly. It will only help someone who doesn't have physical cash for the child to go that one if you just have your lorry fare, she can go. But if you look at the expenses, we pay more than we even paying the fees. So, to me, it was very expensive and the little you get you must be pumping on her every week I have to send 100 cedis to her. I know students extort money from parents but my girl I can stand in for her that she is not like that. She is currently at UDS studying Doctor of Pharmacy. Everything affected the food because it was free. (Parent)

Inadequate and Delayed Release of Food Items

> When FSHS started, everything was flowing, money and food were coming, but after the election, things have changed; money, you have to wait for a long time before it comes. Food supply you can't beat them, it is rationed when you get this you don't get that, so it has become very difficult. (Headmaster)

> Challenges are on feeding, which has been the biggest challenge, food from buffer stock hasn't been regular. In fact, we have thrown away a menu that we were supposed to use in the schools and that's the biggest challenge. (Headmaster)

> The quality of the food was affected, and she complains she can't eat the food. So, they have to be buying from outside. (Parent)

Poor Implementation of the Policy

> We consistently made it clear that we were not against the provision of schools or education for our children, but we were worried about the State's ability to provide quality education and still make it free and so, much as we were not against the policy per se, we consistently questioned how it could be successfully implemented and rolled out. We thought that free SHS was trying to solve a problem, which was not well identified and well defined, we always challenge the notion that the biggest problem in

> our education was financing. We felt that money per say was not the problem, it was management and so we can throw a lot of money at it, but if we don't get the management right, we will not end up with positive results. (CSO)

> The feedback has been mixed, in the sense that, people like the policy generally, but people feel that the Government rushed the implementation and it's not being patient enough to deal with the challenges that emerge when people give negative feedback about the policy. So, that's my general feeling. So, most people say they like the policy, a lot of people can go to school, but they think that because of the way it was rushed, there is overcrowding, teachers are overwhelmed, discipline is an issue and some of those issues have made it difficult for the policy to be successful. (Media)

> So, in short, free SHS should not be conducted in a way it is presently being conducted. We've had enough experience and we think we should learn the lessons. Um, I think we are wasting the money and we are not getting the value out of that programme. (CSO)

Double-Track System

> Parents are generally happy with the idea that they are not paying school fees but they are not too happy with the shift system. They feel the children are not able to have enough time to study and have to organize extra classes for their wards at home so it is more or less like they are back to paying school fees. Therefore, there is a problem with teaching and learning with the free senior high school policy which needs to be addressed. (Media)

> The free SHS to me didn't help the children at all because of their break in school that they will stay in the house for three months before they go back to school and there was no challenge in the school because it became like everybody can go to school, once you complete JHS, you can go back to school whether your grades are high or low unlike our time there were a lot of challenges that you have to struggle before you. (Parent)

We further synthesised the results to understand how the policy could be sustained. Most of the key informants believed that there is a need to review the policy and government may consider a cost-sharing approach to sustain the policy. Government should only target poor people in society and offer them scholarships at the senior high schools. The following are some of the specific quotes from key stakeholders.

> We need to take a second look at the financing. Government solely financing everything to me is something else, there are some basic things that should be taken off for instance to me I may be wrong I don't see why government should be buying something like church cloth or school cloth for them, this church cloth sometimes delays, they may even get it at the end of second year and at the end of the day they have taken it out and government will still buy another. (Headmaster)

> There should be a cut-off point and also they should allow us to repeat the student who are not good or who don't perform in the exams so that it will serve as a deterrent to the others to be more serious. And then nowadays too you cannot withdraw any student so the person can be in the house for so many months then the person will just pump in to

> come register then you are not supposed to disallow the person so you have to allow the person to register. So it could happen that yes you may see the person for about a few weeks and that could be the end you may not see the person again. You don't have the right to withdraw any student. (Headmaster)

> So, I feel the government has to find a way to review the policy. It is five years now since its implementation and needs to be reviewed. Some parents are ready to pay, so those who are ready to pay should be allowed to pay and those who genuinely do not have and needs support, the government should make the free senior high school policy open to such persons. This will help in funding the policy. (Media)

> No. I think it is not a smart approach to solving the problem. Nobody, who can afford to pay the fees of their child, should go to school free, especially because there are many people who cannot afford and the money must go to those people. So, our position has remained the same. (CSO)

> Yeah. Yes. Uh, as an institution, because I discussed with some of my colleagues and some of my senior men, um, as an institution, number one, we think it's good program. It should continue, but then, because of the current challenges we think it should be prioritized in terms of um, government doing more work to identify those who are actually in need, because it is not everyone who are at the same level, some can pay for. (Faith-based organisation)

Discussion

The study assessed the impact of the FSHS policy and double-track system on academic performance and other dimensions of quality education evaluation metrics. The study further identified challenges associated with the implementation of the policy to guide decision-making geared towards improving the design and implementation of the policy. Although the admission rate increased similar to what has been reported in previous studies (Abdul-Rahaman et al. 2018; Blimpo, Gajigo, and Pugatch 2019; Boatman and Long 2016; Branson and Lam 2017), the policy did not generally improve academic performance; this finding is consistent with a previous assessment of the impact of financial aid on students' academic performance (Mashala 2019). The synthesis of the findings from the qualitative interviews showed that the poor performance of students after the implementation of the policy may be attributed to delays in the release of funds, lack of teaching and learning materials, inadequate and delayed release of food items, inadequate contact hours for the students, poor implementation and management of the policy. Some key informants were of the view that the government rushed in the implementation of the policy without necessarily conducting process evaluation to anticipate potential challenges and how they could be addressed these challenges. The aforementioned factors and other contextual factors might have contributed significantly to the low academic performance scores after the implementation of the policy.

Our findings showed that academic performance has generally declined and schools that were classified as double-track performed poorly in the WAEC examinations compared with the non-double-tracked schools. Challenges associated with the double-track system have recently been documented. Adjei (2021) used the Job Demand Resources Model and Robert Merton's theory on adaptation to assess the challenges of the double-track system. The study indicated that double-track schools faced challenges with infrastructure, inadequate human resources, the untimely release of funds to support teaching and learning, inadequate stakeholder consultation, inadequate provision of logistics, inadequate contact hours to complete the syllabus owing to the double-track system, increased number of holidays, and the poor maintenance of school facilities, including the unwholesome and undersupply of food items which ultimately had some effect on academic performance. The author indicated that if the challenges are not timely met, they will affect the effective delivery of education at the senior high school level.

The double-track system has been criticised by some civil society organisations because in some cases, students spend a shorter time staying in contact with teachers in school and return home and this they believe could have an adverse effect on their academic performance and that may have contributed to the poor academic performance observed in the double-track compared with the non-double-track schools.

Policy Implications

This study provides empirical evidence of the urgent need for government and other relevant stakeholders (Ministry of Education and Ghana Education Service) to comprehensively review the policy and address the challenges associated with its implementation of the policy. Government should consider alternative sources of generating revenue to support the main policy funding stream. Government must provide teaching and learning materials, improve the standard of infrastructure, timely release of funds for food suppliers, increase student-teacher contact hours, completely abolish the double-track system, and provide additional incentives to teachers to motivate quality delivery. The government may consider cost-sharing with parents and caregivers to mitigate the effect of financial challenges experienced in the second-cycle institutions.

Strengths and Limitations

This study used a rigorous statistical analysis of data that originated from a random sample of 58 senior high schools across the 16 administrative regions of Ghana. To the best of our knowledge, it is the first post-FSHS policy era study that combines qualitative and quantitative study designs to evaluate the effect of the policy on different performance indicators and quality education metrics. It is the first study to assess the policy by interviewing all relevant key stakeholders (headmasters, heads of academic departments, matrons, parents, CSOs, and media). That notwithstanding, the current study may suffer from bias associated with a smaller sample size relative to the total

number of public senior high schools. In addition, poor records keeping at the senior high schools resulted in missing relevant information and data within the study period. The use of a quasi-experimental study design may not be the most rigorous evaluation approach compared with an experimental design but the circumstances leading to the implementation of the policy nationwide did not allow the use of an experimental study design. Several unknown factors may have contributed to academic performance and the outcome measures apart from the policy implementation; however, this study could not account for these factors because of the unavailability of data. The impact of COVID-19 on the outcome measures, especially during the peak phase of the pandemic in 2020, cannot be underestimated.

Conclusion

The findings showed that the policy has not improved the quality of education and general academic performance. We emphasise that the knowledge and understanding of instructions by students, students' extra-curricular activities, student feeding, healthcare, general welfare, content, quality and quantity of teaching materials, food quality, staff motivation and remuneration, staff job satisfaction, and security have been negatively affected. Students who attended the double-track schools performed poorly in all the core subjects compared with non-double-track schools. The policy has, however, increased both enrolment and graduation rates at the senior high schools. There is a need for the government and all relevant stakeholders to comprehensively review the FSHS policy implementation and address the challenges associated with the policy.

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