

Admission path, family structure and outcomes in Ghana's public universities: evidence from KNUST students enrolled in the social sciences

Hadrat Yusif¹ · Grace Ofori-Abebrese¹

© Springer Science+Business Media Dordrecht 2017

Abstract At the Kwame Nkrumah University of Science and Technology (KNUST) in Ghana, first year enrolment increased by 1466.81% from 708 in 1961/1962 to 11,093 in 2011. In the 2013/2014 academic year, the total student population was 45,897. There are now five main admission paths, comprising regular, mature, fee paying, less endowed, and protocol/staff admissions. The number of dropouts and fails has risen steeply, for example, at the end of the 2013/2014 academic year, roughly 22.11% of the 1239 students were either withdrawn or repeated at the Faculty of Social Sciences due to non-performance. This paper examined the impact of the admission path and family structure on university students' academic outcomes. A logistic model was applied to individual-level data obtained from 1000 students enrolled at the Faculty of Social Sciences in the university. The results indicated that the regular and mature admission paths have a positive impact on performance whilst the fee-paying admission path has a significant negative influence on academic performance. It was also found that the family structure (living with the father and mother and the mother only) has a significant positive influence on performance. The study recommended that lecturers should be motivated to conduct additional classes for academically weak students. Counselling units should also identify students who experienced disruption in home life and raise their aspirations.

Keywords Admission path · Family structure · Cumulative weighted average · Academic performance · University · Ghana

✉ Hadrat Yusif
hadraty@yahoo.co.uk

¹ Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Introduction

Ghana's old educational system had the 6-4-7-3 format, i.e. 6 years of primary school, 4 years of middle school, 7 years of secondary schooling (5 years for Ordinary Level Certificate and 2 years for Advanced Level Certificate) and 3 years of university education. In 1987, the 6-4-7-3 educational system was replaced by the new educational structure 6-3-3-4 format, i.e. 6 years of primary education, 3 years of junior high school (JHS), 3 years of senior high school (SHS) and 4 years of university education. This policy change was due to the high cost to government having a 10-year pre-secondary education and the relatively higher age (minimum 26 years) at which middle school graduates completed the undergraduate degree (McWilliam & Kwamena-Po 1975; Addae-Mensah 2000). Two things are clear: First, the new educational system reduced the number of years spent at the pre-university level whilst extending the years spent in the university. Second, with the implementation of the new educational system, the number of SHSs increased significantly. Officially recognized SHSs increased by about 57% from 482 (462 public and 20 private) in 1997 to 757 (515 public and 242 private) in 2012 (EMIS files 2012).

Demand for university education increased radically, and to address this growing demand, public university authorities were encouraged to create more spaces and admit higher numbers of qualified students. Total enrolment in public universities increased by about 64.6%, from 125,969 in the 2009/2010 academic year to 207,360 in the 2013/2014 academic year. At the Kwame Nkrumah University of Science and Technology (KNUST), total enrolment increased from 2855 in the 1987/1988 academic year to 45,897 in the 2013/2014 academic year (KNUST, Basic Statistics 2014). Unfortunately, the increase in enrolment has resulted in a greater-than-ever number of dropouts and fails. At the end of the 2013/2014 academic year, for example, 19.4% of the 1119 year three students were withdrawn or failed at least one course. Also, of the 1239 final year social sciences students, roughly 274 constituting 22.11% were withdrawn or repeated due to non-performance (second semester examination records, Faculty of Social Sciences, 2013/2014).

According to Johns (1997), students with years of study extended due to poor academic performance and those withdrawn on academic grounds have incurred financial cost on the taxpayer, the institution attended and themselves. Again, poor educational outcomes simply reflect a misallocation of educational resources (Blankenau & Camera 2009). Non-performance has implication on efficiency of the taxpayers money allocated to tertiary education as well as private resources.

Subsequently, in Europe, North America and Australia; considerable attention has been given to factors that influence academic outcomes of university students. Some studies have investigated personal characteristics (Win & Miller 2005; Van den Berg & Hofman 2005; Wintre et al. 2011). Others are on family characteristics (Thiele et al. 2014; McIntosh & Munk 2007; Aakvik et al. 2005). Others have also studied school characteristics (Mora & Escardíbul 2008; Shulruf et al. 2008; Win and Miller 2005). Yet still others have examined religious background and educational attainment (Sander 2010; Lehrer 2004). McIntosh and Munk (2007) argued that much research has been conducted to explain the determinants of educational attainment. From these studies, our knowledge of factors influencing the performance of university students in the developed economies has improved. Again, the studies have had some significant and positive influence on policies targeted at improving the performance of university students, especially in the economies these studies were conducted. But, according to McIntosh

and Munk (2007), this research is far from being complete, and there are many unresolved issues.

McIntosh and Munk (2007)'s claim is true not only for the developed economies but more especially for Ghana and the rest of sub-Saharan Africa, where demand for higher education has increased significantly since the 1990s. Yet, few studies have explored factors influencing academic achievement in sub-Saharan African universities (see Eeden et al. 2001; Fraser and Killen 2003; Van der Walt and Pickworth 2007; Karimi 2009; Salahdeen and Murtala 2005; Yusif and Ali 2013). It appears this paucity of research on the academic performance of students in higher institutions is due to the limited number of researchers in Africa who are interested in economics of education and also the non-existence of an individual national dataset on university students in many countries in the region.

University authorities, policy makers and the government need to know more about the determinants of performance in public universities in order to address issues of efficiency. However, to our knowledge, no enquiry has been conducted on factors that influence the academic outcomes of the diverse groups of students in Ghana's public universities. Yusif and Ali (2013) investigated the performance of less-endowed students in KNUST. But, much more research on university students' performance in Ghana is critical.

The goal of this paper is to address the following primary research questions: (1) Does the admission path have an effect on outcomes in university? Does family structure predict outcomes in university? The present paper is expected to shape the debate regarding the quality, effectiveness and efficiency of public universities in Ghana. It will aid in the formulation of higher education policies that will improve performance and also reduce dropout and failure rates. It will influence the design of measures such as financial aid and career counselling, all of which could minimize withdrawals and failures in universities in Africa.

The structure of the paper is as follows: Introduction; literature review; method, data and variable description; results and discussion; concluding remarks.

Types of admission and distribution of students—Faculty of Social Sciences

Table 1 shows the types of admission and their meaning in KNUST. Currently, there are five admission paths and by this measure the student population in all faculties and colleges consists of five cohorts (international students are excluded for consistency). These are the regular, matured, fee-paying, less-endowed and staff/protocol students. These admission paths have relations with the type of SHS a student attended—well endowed, moderately endowed and less endowed. Only regular and mature students, mostly from well-endowed SHSs, had been admitted into the two top public universities, in terms of students admitted and international rankings, in Ghana. These are University of Ghana and KNUST. In the 1998/1999 and 1999/2000 academic years, between 60% and 92% of students admitted for the various degrees in the University of Ghana were from the top 50 schools constituting about 10% of the 504 SHSs. Equally, at the KNUST, the top 50 schools formed about 75% of admissions (Addae-Mensah 2000; Yusif and Ali 2013).

Regarding non-traditional admissions, there are two dimensions. First, of SHSs in Ghana, not less than half are in the less-endowed category, mostly attended by children from low-

Table 1 Types of admission and their meaning

SN	Type of admission	Meaning of admission
2	Regular	Applicants with the basic university entry requirement, i.e. at least credit passes (grade C ₆) in three SHS core subjects (English language, mathematics, integrated science) plus credit passes in three elective courses. Again, they must meet the departmental grade cut-off point ^a .
3	Matured	Applicants who are 25 years or more and have the basic entry requirement. They must have at least 2 years working experience
4	Fee paying	Applicants who achieved the basic entry requirement but do not meet the cut-off point and are able to pay full tuition fees.
5	Less endowed	Applicants who attended less-endowed SHSs and obtained the basic entry requirement. However, they do not meet the departmental cut-off point.
6	Protocol/Staff	Applicants who are children of staff or traditional authorities and have the basic requirement but do not meet the departmental grade cut-off point.

Note: The West African Examinations Council's exam grading system is as follows: A₁ = excellent, B₂ = very good, B₃ = good, C₄ = credit, C₅ = credit, C₆ = credit, D₇ = pass, E₈ = pass and F₉ = fail. For university entry, A₁ = 1, B₂ = 2, B₃ = 3, C₄ = 4, C₅ = 4, C₆ = 4, D₇ = pass, E₈ = pass and F₉ = fail

^aThe basic university entry requirement in KNUST is aggregate 6–24 for 6 subjects. The subjects comprise English language, mathematics, integrated science plus any 3 elective subjects. University authorities are unable to admit all applicants with aggregate 6–24. The cut-off point thus refers to the aggregate at which each department stops admitting regular students. It is always less than or equal to aggregate 24

income families and also in rural communities. To ensure that public university education becomes accessible to this group of Ghanaian children, KNUST introduced the less-endowed admission policy in the late 1990s.

Second, due to budgetary constraints, government could only provide 73.7% of the total amount needed to fund higher education in 1996 and this decreased to 61.5% in 1997 (Report of National Forum on Funding Tertiary Education, Akosombo, January 27–28, 1997). This funding gap had a negative effect on quality and even access. To generate more income for public universities, the National Council for Tertiary Education (NCTE) permitted public universities to admit Ghanaian fee-paying students in 1997. The introduction of the fee-paying path has yielded results. In the 2015/2016 academic year, fee-paying undergraduate students were 3530 (12% of undergraduate population) in KNUST and income generated was GH¢19,892,304 compared with government subvention of GH¢153,941,605 (files in the Finance Office, KNUST 2009, 2012, 2013). This corroborated Oketch (2016), that fees have become increasingly accepted as necessary to redress underfunding in the face of greater demand.

Table 2 shows the distribution of students in the Faculty of Social Sciences. The yearly admission figures for each of the five admission paths do not appear to follow a particular trend. For example, in 2005, all admissions increased in absolute terms except mature students' admission that declined by roughly 14% from 114 in 2004 to 98 in 2005.

The irregular nature of the yearly admission figures might be explained by the fact that admissions into KNUST are determined predominantly by the yearly quotas that the Academic Board approves to guide general admissions. Based on the approved quotas, regular admissions are made on the basis of cut-off points by the Admissions Office. Fee-paying and mature students' admissions are done by the departments. Less-endowed and staff/protocol admissions are done at the Admissions Office.

Table 2 Classification and distribution of social sciences students, KNUST

Year	Regular <i>N</i> (%)	Mature <i>N</i> (%)	Fee paying <i>N</i> (%)	Less endowed <i>N</i> (%)	Protocol/staff <i>N</i> (%)	Total
2004	563 (64.49)	114 (13.06)	60 (6.87)	69 (7.90)	67 (7.68)	873
2005	938 (59.52)	98 (6.22)	172 (10.91)	228 (14.47)	140 (8.88)	1576
2006	673 (58.37)	109 (9.45)	103 (8.93)	164 (14.22)	104 (9.02)	1153
2007	681 (59.32)	186 (16.20)	97 (8.45)	65 (5.66)	119 (10.37)	1114
2008	428 (56.17)	152 (19.95)	45 (5.90)	58 (7.61)	79 (10.37)	762
2009	984 (76.75)	128 (9.98)	–	91 (7.10)	79 (6.16)	1282
2010	548 (48.80)	148 (13.18)	221 (19.68)	87 (7.75)	119 (10.60)	1123
2011	883 (69.09)	151 (11.82)	160 (12.52)	–	84 (6.58)	1278
2012	1033 (45.57)	161 (7.10)	663 (29.25)	243 (10.72)	167 (7.37)	2267
2013	1165 (37.33)	99 (3.17)	765 (24.51)	893 (28.61)	199 (6.38)	3121

Data were extracted from files at Planning Unit, KNUST, Kumasi

The significant increase in the number of less-endowed students (87 in 2010 to 893 in 2013) could be explained by improvement in the performance of applicants who completed less-endowed SHSs. In 2007, roughly 10.5% of candidates who sat for the West African Senior School Certificate Examination (WASSCE) qualified for university entry compared with 31.0% in 2012 and 19.0% in 2013 (WAEC files). One significant thing that Table 2 tells is that the proportion of regular and mature students (traditional admission paths) to total admissions has declined from 64.49% and 13.06% in 2004 to 37.33% and 3.17% in 2013 respectively. In contrast, fee-paying and less-endowed admissions have increased from 6.87% and 7.90% in 2004 to 24.51% and 28.61% in 2013 respectively.

Literature review

This section comprises the conceptual framework and review of relevant literature.

Conceptual framework

Smithers and Griffin (1986) found that students admitted through the mature students entry scheme by the Joint Matriculation Board in the UK obtained slightly more first class on BA, BSc and LLB courses; however, the difference from the normal entry was not statistically significant. Barrow et al. (2009) reported that mature students marginally achieve better degree outcomes. The age of an individual at entry is positively associated with the probability of securing a good degree (First Class or Second Class Upper) at Sussex University. Woodley (1984) studied the relative performance of matured (21 or more years) and younger (less than 21 years) students in the UK between 1972 and 1974. The findings of Woodley (1984) suggest that mature students were slightly more likely to leave without a degree and were just as likely to gain a first or upper second degree. However, in the science subjects, mature students were more likely to fail and less likely to gain a good degree. Houston and Rimmer (2005) have examined the performance of traditional and non-traditional first year university students studying business, management and accountancy. They found that the older the male student, the better his performance on average. To them, advancing age is associated with the development or refinement of meta-cognitive abilities such as strategic thinking and improved

social skills. But, there does not seem to be a straightforward relationship between age and academic attainment as measured by first-degree classifications (Richardson & Woodley, 2003). On the contrary, Van den Berg and Hofman (2005) reported that age is negatively correlated with performance explaining that older students study less slowly and also have broken education career.

On family structure, Shim et al. (2000) argued that disruption in home life that accompanies death, separation or divorce is associated with poorer school performance, lower academic expectations and emotional stability. Thiessen (1997) found that children from single-parent families are three times more likely to drop out of high school than children from two-parent families. Garasky (1995) concluded that for ages 7 through to 14, the effect of living with both biological parents is not significantly different from that of other family structures (mother only, father only, mother and stepfather, father and stepmother). Again, in a more recent study in Canada, Wu et al. (2015) have argued that family structure does not have a direct effect on post-secondary education outcomes. They reported that a child's academic characteristics (academic achievement, academic participation, educational aspiration) have the most direct effect on postsecondary education outcomes.

Review of previous works on Africa

Unlike the OECD countries, few studies have investigated factors influencing the academic outcomes of university students in Africa (Yusif & Ali 2013; Karimi 2009; Van der Walt & Pickworth 2007; Salahdeen & Murtala 2005; Eeden et al. 2001; Nyikahadzoi et al. 2013) and, of these studies, none has included the admission path (e.g. regular, mature, fee paying, less endowed) and family structure (e.g. father and mother, father only, mother only). Past studies on Africa have predominantly focused on high school factors, personality make-up and learning strategies.

In 2001, Eeden et al. studied the academic performance of first year engineering, science and technology students in South Africa using a sample of 224 first year students. They reported that high school marks in science, English and mathematics have a positive influence on the academic performance in university. Similarly, Van der Walt and Pickworth (2007) evaluated the relationship between personality and academic success in South Africa. They applied a meta-analytic technique to data for three entry cohorts of the 6-year BVSc. programme at the University of Pretoria. They found that previous academic performance and a sound personality make-up have an effect on academic performance.

In Kenya, Karimi (2009) evaluated the factors contributing to the academic performance of undergraduate students in private universities. Karimi (2009) found that final high school grade, English language proficiency, self-regulatory learning strategies and extrinsic goal orientation have direct effects on students' academic performance. But, intrinsic goal orientation and personality traits were found to impact on academic performance of students indirectly. Salahdeen and Murtala (2005) studied a sample of 54 students in the Lagos State University Medical School in Nigeria and concluded that admission grades have an effect on the performance of students in the first professional examination in the medical school. Similarly, Nyikahadzoi et al. (2013) studied students' performance at the University of Zimbabwe and they found that students who are younger perform significantly better than older students (mature students).

Based on literature regarding Africa, it appears that no empirical study has included the admission path and/or family structure in the dataset and this has created a natural experiment

to be exploited. Regarding family structure, Table 3 indicates that roughly 43.4% of respondents do not live with both parents. This figure is frightening in sub-Saharan Africa. A child living with a single parent is likely to have less financial resources and inadequate social capital than the child living with both parents (Wu et al. 2015; Garasky 1995). On the admission path, quality challenges at the secondary levels in sub-Saharan Africa tend to lead to a high proportion of under-prepared students entering university (Schendel and McCowan, 2016). Therefore, university authorities need to know more about the correlation between admission path, family structure and outcomes.

Method, data and variable description

The idea of this analysis is to find out whether the admission path and family structure have an effect on the academic performance of students in Ghanaian public universities using data from KNUST. KNUST is the second public university established in Ghana through an Act of Parliament (Act 80) in 1961. Total enrolment increased from 708 in the 1961/1962 academic year to 42,561 (64.1% males and 35.9% females) in 2015/2016 (June 2016 Basic Statistics). As stated earlier, the top 50 SHSs (of 504) in the 1998/1999 and 1999/2000 academic years formed about 75% of admissions in KNUST (Addae-Mensah 2000). With the introduction of less-endowed, fee-paying and staff/protocol admissions, this has changed (see Table 2). Children from families of all income levels and types of SHSs have the opportunity to gain admission to KNUST. This section presents the method, data and description of the variables.

Method

Economists, psychologists and sociologists have, in many studies, linked educational outcomes to personal, high school and family characteristics, as well as geographical location (Win & Miller 2005; Ishitani, 2006; McIntosh & Munk 2007; Mora & Escardibul 2008; Barrow et al. 2009; Van Bragt et al. 2011; Siahaan et al. 2014). Some of the studies have also included the opportunity cost of students' time in their models (Ellis et al. 1998; Nonis and Hudson 2006). The present paper was influenced by these studies, and our dependent variable is the individual's undergraduate degree classification.

In KNUST, the bachelor's degree has five designations—First Class, Second Upper, Second Lower, Pass and Fail. Some studies (Smith & Naylor 2001; Naylor & Smith 2004; Barrow et al. 2009) have coded these degree categories as 0 for 'Fail', 1 for 'Pass', 2 for 'Second Lower', 3 for 'Second Upper' and 4 for 'First Class' and have applied an ordered probit model. The linear regression model implicitly treats the difference between any pair of integer values the same, but the ordered probit model overcomes this limitation (Greene 2000; Barrow et al. 2009).

Other studies (Ellis et al. 1998) have also classified the bachelor's degree, i.e. dependent variable, into two—(1) 'high achiever' comprising the Second Upper and First Class and (2) low achiever which consists of the Second Lower, Pass and Fail. Shulruf et al. (2008) classified students' achievement (GPA) into three (high, medium and low achievers) and used two categories at a time. With these classification frameworks, the logistic regression approach has been applied.

The main goal of this present paper is to find out the extent to which the admission path and family structure contribute to make a university student a 'high achiever' or a 'low achiever'. It

Table 3 Description of variables

Variable name	Description	Category	F	M	Total
Dependent					
CWA	CWA of respondent in percentage	1 = 60–100 (First Class and Second Upper) 0 = 0–59.99 (Second Lower, Pass and Fail)	239 198	249 218	488 416
Explanatory: personal characteristics					
Gender	Gender of respondent	1 = female 0 = male	437	467	437 467
Age	Age at admission in years	1 = <20 0 = ≥20	343 94	231 236	574 330
Relat	Relation respondent lives with	1 = father and mother 2 = father only 3 = mother only 4 = other relation	258 15 99 65	254 17 102 94	512 32 201 159
English	Respondent grade in English language	1 = ≥B ₃ 0 = ≤C ₄	219 218	159 308	378 526
Math	Respondent grade in core mathematics	1 = ≥B ₃ 0 = ≤C ₄	264 173	267 200	531 373
Science	Respondent grade in integrated science	1 = ≥B ₃ 0 = ≤C ₄	217 220	225 242	442 462
Type	Type of SHS respondent attended	1 = girls 2 = boys 3 = mixed	255	204	255 204
AdmP	Admission path of respondent	1 = regular 2 = Ghanaian fee 3 = mature 4 = protocol/staff 5 = less endowed	183 351 59 7 15	262 376 35 29 17	445 727 94 36 32
Resid	Where student lived in year 1	1 = hall on campus 2 = hostel off campus 3 = share single room 4 = with parents	355 62 5 15	383 53 13 18	738 115 18 33

Source: authors' computation, field data, 2014

is assumed that the factors affecting student performance might be different for each group (Shulruf et al. 2008). Consistent with Ellis et al. (1998) and Shulruf et al. (2008), we employed a logistic model specified as:

$$\log\left(\frac{P_i}{1-P_i}\right) = \alpha + \beta_i X_i + \dots + \beta_n X_n + \varepsilon_i \quad (1)$$

From Eq. 1, the dependent variable is the logarithm of the odds that a particular outcome will occur. We operationalize Eq. 1 to measure the factors influencing the academic performance of public university students as follows:

$$\log\left(\frac{P_i}{1-P_i}\right) = \alpha + \beta_1 \text{Relat} + \beta_2 \text{AdmP} + \beta_3 \text{Gend} + \beta_4 \text{Engl} + \beta_5 \text{Math} + \beta_6 \text{Sci} + \beta_7 \text{Type} + \beta_8 \text{Resid} + \beta_9 \text{Age} + \beta_{10} \text{Fest} + \beta_{11} \text{Mest} + \beta_{12} \text{Fedu} + \beta_{13} \text{Medu} + \beta_{14} \text{Focc} + \beta_{15} \text{Mocc} + \varepsilon_i \quad (2)$$

To ensure consistency of the results, we estimated two versions of Eq. 2 following Ellis et al. (1998). The dependent variable is a binary variable, and in the first version (model 1), we estimated the likelihood of a student making a cumulative weighted average (CWA) of 60.00–100.00 (First Class or Second Class Upper) with $P_i = 1$ versus making a CWA of 0.00–59.99 (Second Class lower, Pass or Fail) with $P_i = 0$. The second version (model 2) estimated the odds of a student making a CWA between 0.00–59.99; $P_i = 1$ versus CWA between 60.00–100.00, $P_i = 0$, when that outcome is affected by the same set of explanatory variables in Eq. 2. This estimation approach allows further insight into the nature of the influence of certain variables on student performance (Ellis et al. 1998).

To check the robustness of the result, we applied the ordinary least square (OLS) estimation technique to the same set of explanatory variables but the depended variable was the raw values of the individual CWA that ranges from 0.00 to 100.

Data

Following previous research (Mora & Escardíbul 2008; Shulruf et al. 2008; Barrow et al. 2009; Katsikas and Panagiotidis 2010; Rienties et al. 2012), we exploited individual-level data that is restricted to students who had pre-university education in Ghana. The dependent variable (academic performance of a student) is measured by the student's cumulative weighted average (CWA). Shulruf et al. (2008) and Jamelske (2009) have also used the GPA to measure students' academic performance. The CWA used in this study is a continuous variable, ranging from 0.00 to 100.00. It has five designations which are First Class (70.00–100.00), Second Class Upper (60.00–69.99), Second Class Lower (50.00–59.99), Pass (40.00–49.99) and Fail (0.00–39.99). Higher CWAs show better school success and predict stronger future educational outcomes (Rud et al. 2014; Anderson et al. 1994). For this study, the CWA is classified into two major categories: The first is 60–100% representing a higher achiever (First Class and Second Class Upper) and the second is 0.00–59.99 (Second Class lower, Pass and Fail). We obtained the CWAs of all respondents from the Examinations Office of the Faculty of Social Sciences, KNUST.

The explanatory variables were generated by conducting a survey, and the sample comprises 1000 social sciences students who entered KNUST in the 2011/2012 and 2012/2013 academic years and had at least completed the first year. Questionnaires were distributed to roughly 500 students at examination centres during the first semester examinations in April/May 2013 and to another 500 students in April/May 2014. For each period, this exercise was conducted in 5 days at all examination centres and roughly 90.4% of the respondents completed the form.

The Faculty of Social Sciences has seven departments offering the following Bachelor of Arts degree programmes: Economics, English Language, Geography, French, History, Political Studies, Religious Studies, Sociology and Social Work. All candidates pursuing these programmes offered the Arts Option at the SHS (the other two options are Science and Business). Thus, the population is homogenous and, unlike the other five colleges in KNUST where males dominate, there is no significant gender variation. To ensure that our sample is representative of all the programmes, stratified sampling techniques were applied.

The dataset included personal characteristics, school characteristics and parental characteristics. The questionnaires were in three parts. Part 1 was personal characteristics which consisted of gender (Gend), age (Age), marital status, family structure, admission path and number of times candidates sat for the entrance examination. The grades candidates obtained in English language (Engl), core mathematics (Math), integrated science (Science) and the WASSCE aggregate (national SHS examination score the candidate entered university with). The variables of interest are the admission path (AdmP) and family structure (Relat). The choice of the admission path as the major variable is due to the increasing number of non-traditional students (less endowed and protocol/staff) in public universities in Ghana (see Table 2). Regular, mature and staff admission paths are expected to be positively correlated with good performance. About family structure, we considered family member that respondent had been living with for most of the time to avoid serious measurement bias. This variable was added because the number of single parents (separated, divorced and widowed) in Ghana increased by 84% from 2000 to 1,713,743 in 2010 (Population and Housing Census of Ghana 2000 & 2010). Living with both father and mother is expected to be positively associated with good performance.

The grades in English language (Engl), core mathematics (Math) and integrated science (Science) are often emphasized by all universities in order to gain admission, and therefore, following Katsikas and Panagiotidis (2010) and Eeden et al. (2001), our data captured these variables. The idea is to find out whether they have an effect on university academic performance. The English language (Engl), core mathematics (Math) and integrated science (Science) variables were highly correlated with the ability variable (WASSCE), and to avoid issues of multicollinearity, the WASSCE variable was dropped. We expect high grades, A₁, B₂ or B₃ in English, mathematics and science to be positively correlated with good performance. The second part was SHS characteristics, and this captured the SHS a candidate attended—single-sex school (boys or girls) or mixed school—as well as the type of accommodation in university, i.e. on campus or off campus.

For the third part, respondents answered questions on father and mother socio-economic status. The variables are father employment status (Fest), father occupation (Focc), father educational attainment (Fedu), mother employment status (Mest), mother occupation (Mocc) and mother educational attainment (Medu). Employment, occupation and educational attainment of both father and mother are expected to predict academic performance. Aakvik et al. (2005) and Richardson and Woodley (2003) have measured father and mother socio-

economic status using parental income and education. The education variable has five categorizations—no schooling, primary school, junior high school, senior high school and tertiary education. The other parental background information is job status, whether employed, unemployed, retired or deceased. Roughly 90.4% of the respondents completed and returned the questionnaire. Those repeating the year and those re-sitting were dropped.

Variable description

Table 3 shows the description of the dependent variable and personal characteristics of the respondents.

What is striking is that for the family structure roughly 22.2% of respondents live with only their mother compared with 3.5% who live with only their father.

Table 4 presents father and mother characteristics. With regard to the father's employment status, 10.6% of respondents' fathers have retired compared with 2.3% of mothers. Also, 10.5% of fathers are deceased against 3.7% of mothers. This might be due to the fact that men marry at an older age than women in Ghana. Also, 8.7% of female respondents have mothers

Table 4 Description of variables

Variable	Description	Category	F	M	Total
Father characteristics					
Fest	Father's employment status	1 = employed	338	285	623
		2 = unemployed	26	64	90
		3 = retired	40	56	96
		4 = deceased	33	62	95
Focc	Father's current occupation	1 = snr. executive/professional	91	91	182
		2 = businessman	104	72	176
		3 = jnr. executive	30	34	64
		4 = farmer/fisherman	29	75	104
		5 = trader	40	43	83
		6 = religious worker	23	18	41
		7 = other	120	134	254
Fedu	Last school completed by father	1 = no schooling	18	43	61
		2 = middle school/JHS	62	108	170
		3 = SHS/GCE O-level	106	94	200
		4 = poly/NTC/TTC/A-level	75	85	160
		5 = university	143	100	243
		6 = other	33	37	70
Mother characteristics					
Mest	Mother's employment status	1 = employed	334	306	640
		2 = unemployed	78	132	210
		3 = retired	11	10	21
		4 = deceased	14	19	33
Mocc	Mother's current occupation	1 = snr. executive/professional	49	45	94
		2 = businesswoman	67	44	111
		3 = jnr. executive	11	24	35
		4 = farmer/fisherman	15	50	65
		5 = trader	200	200	400
		6 = religious worker	7	3	10
		7 = other	88	101	189
Medu	Last school attended by mother	1 = no schooling	38	83	121
		2 = middle school/JHS	138	168	306
		3 = SHS/GCE O-level	126	93	219
		4 = poly/NTC/TTC/A-level	60	56	116
		5 = university	56	43	99
		6 = other	19	24	43

Source: authors' computation, field data, 2014

Poly polytechnic, *NTC* nurse training college, *TTC* teacher training college

without schooling compared with 17.8% of males, thus implying that the boy child of an illiterate mother is more likely to enter public university than the girl child. This finding is plausible in traditional African society where the girl child, from about age ten, is trained for motherhood and she spends much of her time with the mother in the house.

Results and discussion

Logit regression results

We estimated two logistic models; model 1 estimated the likelihood of a student making a CWA of 60.00–100.00 (First Class or Second Class Upper) with $P_i = 1$ versus making a CWA of 0.00–59.99 (Second Class lower, Pass or Fail) with $P_i = 0$. Model 2 estimated the odds of a student making a CWA between 0.00 and 59.99, $P_i = 1$, versus CWA between 60.00 and 100.00, $P_i = 0$. The outcome in model 2 is affected by the same set of explanatory variables as in model 1.

Table 5 presents the regression results, and as regards the admission path variable (reference category is non-traditional students which consist of less endowed and protocol/staff), the coefficient for the regular student is positive and significant at the 5% level. Similarly, the mature student variable is positive and significant at the 5% level. Thus, the regular and mature students' variables increase the probability of achieving good performance by 16.8% and 25.8% respectively. Smithers and Griffin (1986), Barrow et al. (2009) and Woodley (1984) have also reported similar findings in the developed economies, especially for social science courses. However, our finding contradicts Van den Berg and Hofman (2005) who found that age is negatively correlated with performance.

Regarding the Ghanaian fee-paying admission path, the coefficient is negative and significant at the 5% level. This suggests that the fee-paying admission path decreases the likelihood of good performance compared with the staff/protocol admission path. This finding appears puzzling since both fee-paying and staff/protocol admissions did not meet the cut-off point. Yet, differences in outcomes between the two admission paths are plausible and might be due to father education. The result in Table 5 which is consistent with that of previous studies (Mora and Escardibul 2008; Shim et al. 2000) reveals that father education is positively correlated with output. A large fraction of staff/protocol applicants are children of academic and non-academic staff and also of people in influential positions in the country. The parents are well educated and are likely to influence the child's performance through high aspirations, high expectations and also good academic orientation. In contrast, fee-paying applicants may come from three main families—(1) wealthier homes but not well educated, (2) parents working abroad (Australia, Britain, Canada, Germany, UK, USA, etc) whilst child lacks parental guidance, and (3) low-income families who would sell assets or go for loans to support the child. In all these, the child's aspiration, academic orientation and expectations of parents are likely to be comparatively low.

With regard to family structure, the coefficients indicate that living with both father and mother and mother only (reference category is other relations which comprises uncles, aunts, grandparents, stepfather, stepmother, friends, etc.) have a significant and positive impact on performance. Living with both father and mother and mother only increase the likelihood of achieving good performance by 22.7% and 20.7% respectively. The coefficient of the father-only variable is positive but statistically insignificant. Our finding appears to buttress Garasky (1995) who reported that from ages 7 through to 14 the effect of living with both parents is not

Table 5 Estimated Logit regression results

Variable	(1) CWA \geq 60; (0) CWA < 60		(1) CWA < 60; (0) CWA \geq 60	
	Coefficient	Marginal effect	Coefficient	Marginal effect
Relat (other relation)				
Father and mother	0.928* (0.499)	0.227	-0.928* (0.499)	-0.227
Father only	0.775 (0.618)	0.180	-0.775 (0.618)	-0.180
Mother only	0.873* (0.501)	0.207	-0.873* (0.501)	-0.207
AdmP (non-traditional)				
Regular	0.679** (0.341)	0.168	-0.679** (0.341)	-0.168
Ghanaian fee paying	-0.963** (0.435)	-0.233	0.963** (0.435)	0.233
Mature	1.187** (0.561)	0.258	-1.187** (0.561)	-0.258
Gend (male)				
Female	0.236 (0.153)	0.059	-0.236 (0.153)	-0.059
Engl (grade \leq C ₄)				
\geq B ₃	0.313** (0.151)	0.078	-0.313** (0.151)	-0.078
Math (grade \leq C ₄)				
\geq B ₃	0.734*** (0.155)	0.181	-0.734*** (0.155)	-0.181
Science (grade \leq C ₄)				
\geq B ₃	0.358** (0.153)	0.089	-0.358** (0.153)	-0.089
Type (single-sex school)				
Mixed school	0.059 (0.150)	0.015	-0.059 (0.150)	-0.015
Resid (off campus)				
Hall on campus	0.028 (0.193)	0.007	-0.028 (0.193)	-0.007
Age (<20 years)				
\geq 20 years	0.003 (0.172)	0.001	-0.003 (0.172)	-0.001
Fedu (no education)				
Formal education	0.480** (0.200)	0.117	-0.480** (0.200)	-0.117
Medu (no education)				
Formal education	0.074 (0.161)	0.018	-0.074 (0.161)	-0.018
Fest (unemployed)				
Employed	-0.266 (0.174)	-0.066	0.266 (0.174)	0.066
Mest (unemployed)				
Employed	0.158 (0.174)	0.039	-0.158 (0.174)	-0.039
Focc (low-income workers)				
High-income workers	-0.142 (0.197)	-0.035	0.142 (0.197)	0.035
Mocc (low-income workers)				
High-income workers	0.054 (0.262)	0.013	-0.054 (0.262)	-0.013
Constant	-2.232***	-	2.232***	-

Table 5 (continued)

Variable	(1) CWA \geq 60; (0) CWA $<$ 60		(1) CWA $<$ 60; (0) CWA \geq 60	
	Coefficient	Marginal effect	Coefficient	Marginal effect
	(0.616)		(0.616)	
<i>N</i>	904		904	
Wald chi square	93.28		93.28	
Prob > chi square	0.000		0.000	
Pseudo R-squared	0.094		0.094	

Note: Reference categories and robust standard errors are in parenthesis. Formal education includes middle school/JHS, SHS/GCE O level, poly/NTC/TTC/A-level, university and other. Unemployed comprises unemployed workers, retired and deceased. Low-income workers include jnr executives, farmers/fishermen/traders/religious workers/other. High-income workers consist of snr. executive/professional/businessman/businesswoman. Off campus includes hostel, single room, staying with parents

***1%; **5%; *10% significance levels

significantly different from other family structures (mother only, father only, mother and step father, father and stepmother).

The present paper also considered the entry scores in three core SHS subjects, and the reference category is a weak pass (grades C₄, C₅ and C₆). Table 5 shows that having a good pass (A₁, B₂ or B₃) in English language, mathematics and integrated science increases the likelihood of good performance in university. Our finding is consistent with that of Eeden et al. (2001) in South Africa. They indicated that high school marks in science, English and mathematics have a positive effect on performance in university. The coefficients of other control variables, i.e. gender (male or female), age and residence of student (on campus, outside campus), are not statistically significant. For gender, being female (reference category is male) has a positive coefficient but is statistically insignificant. Shulruf et al. (2008) have also indicated that gender does not affect achievement within the higher achievers group but for lower achievers, males are likely to achieve lower GPA scores.

Regarding parental characteristics, the coefficients reveal that mother employment status, mother occupation, father employment status and occupation do not have any significant effect on university students' academic performance. However, the coefficient for father education (reference category is no formal education) is positive and statistically significant at the 5% level. As indicated earlier, the finding confirms Mora and Escardibul (2008) who reported that the father's level of education has an impact on undergraduate results whereas the mother's level of education is not a determinant of a student's university final grade. In 2000, Shim et al. also found that the mother's education does not explain differences in students' academic achievement.

Robustness

For robustness, we applied the OLS estimation technique and the results are presented in Table 6. The dependent variable is the individual CWA, which is a continuous variable and ranges from 0.00 to 100. The explanatory variables are the same as in the logit regression. The OLS results are not significantly different from the logit results in Table 5. For example, being a regular student has a positive and significant influence on performance at the 1% level whilst the mature admission path has a positive and significant effect on performance but at a relatively weaker level (10%). The fee-paying coefficient is negative and statistically

Table 6 Estimated results for OLS regression

Variable	Dependent variable: cumulated weighted average	
	Coefficient	<i>t</i> value
Relat		
Father and mother	0.836 (1.401)	0.60
Father only	-0.167 (1.941)	-0.09
Mother only	0.763 (1.425)	0.54
Other relation	1.948 (1.448)	1.35
AdmP		
Regular	3.106*** (1.026)	3.03
Ghanaian fee paying	-3.261*** (1.160)	-2.81
Mature	2.735* (1.568)	1.74
Gend		
Female	0.666 (0.447)	1.49
Engl		
≥B ₃	1.172** (0.464)	2.52
Math		
≥B ₃	1.904*** (0.483)	3.94
Science		
≥B ₃	1.553*** (0.465)	3.34
Type		
Mixed school	0.925** (0.458)	2.02
Resid		
Hall on campus	0.075 (0.562)	0.13
Age: ≥20 years	0.086 (0.546)	0.16
Fedu		
Formal education	1.342** (0.633)	2.12
Medu		
Formal education	-0.157 (0.510)	-0.31
Fest		
Employed	-0.998* (0.537)	-1.86
Mest		
Employed	0.515 (0.538)	0.96
Focc		
Snr. executive/profess.	0.232 (0.562)	0.41
Moec		
Snr. executive/profess.	0.032 (0.724)	0.04
Constant	52.883*** (1.719)	30.76
<i>N</i>	904	
<i>F</i> (20, 883)	10.02	
Prob > <i>F</i>	0.000	
<i>R</i> -squared	0.164	

Source: authors' computation, field data, 2014. In parentheses are the robust standard errors

MSLC Middle School Leaving Certificate

***1%, **5%, *10% significance levels

significant at 1% level. A father's education has a positive influence on undergraduate academic performance whilst a mother's education has a negative coefficient but is statistically insignificant. Table 6 also shows that university entrance grades in English language, mathematics and science are positively correlated with undergraduate performance.

Concluding remarks

The conservative belief in Ghana has been that university outcomes are influenced by pre-university preparation, measured by performance in the SHS national examination. This is the sole criterion which has always been used to determine performance in Ghanaian universities. But, not all students who met this entry requirement and admitted into the various programmes in public universities completed successfully. This suggests that there are other important factors that influence performance in university. Thus, investigating these factors has become progressively more important in Ghana, given the increasing diversity of university students.

This paper has examined the impact of the admission path, family structure and other relevant variables on the performance of two cohorts of students admitted into KNUST in the 2011/2012 and 2012/2013 academic years respectively. The logistic regression model was fitted to individual data obtained from 904 students and OLS also applied for robustness. The main finding as regards the admission path is that regular and mature admission have a significant and positive influence on good performance in Ghanaian public universities. We also found that the fee-paying admission path is negatively correlated with good performance. Regarding family structure, the results show that living with both father and mother and mother only has a significant positive impact on good performance though the significance level looks weak. Another interesting finding is that obtaining a good grade (A_1 , B_2 or B_3) in English, mathematics and science at the WASSCE has a positive and significant influence on good performance in Ghanaian public universities. For the gender variable, we found that the female variable has a positive coefficient but is statistically insignificant.

But, one should be cautious in the interpretation of our results since the study is specific to social science students. This limitation notwithstanding, the present paper has important policy implications for university authorities and policy makers not only in Ghana but also the whole of Africa. Income from fee-paying admission has become an important source of internally generated funds (IGF) to many public universities in Ghana. In KNUST, total income generated from fee-paying students increased from USD3,780,950 (GHC7, 108,186.00) in 2012 to USD18,318,961.54 (GHC35, 721,975.00) in 2013. Yet, the findings suggest that fee-paying admission is negatively correlated with good outcome. For reliability and sustainability of income from the fee-paying path, the implication is that additional effort to improve performance of fee-paying students should be encouraged by public university administrators. For example, lecturers should be motivated to conduct additional classes for academically weak students, especially fee-paying students. University authorities should be permitted to employ more well-trained and qualified academic staff. This will reduce the work load of academic staff and enable them to have more time to attend to individual student's needs. Departments should deepen tutorials and ensure well-qualified teaching assistants are assigned these responsibilities. This way, efficiency and effectiveness of public university education will improve and thus impact positively on quality.

Our results regarding family structure indicated that living with both father and mother and living with mother only have a significant positive association with academic outcomes. The

implication of this finding is that the extended family comprising parents, brothers, sisters, uncles, aunts, cousins and grandparents should be strengthened to address the financial resources and social capital needs of the child from a broken family. Need-based scholarships should be set up in public universities to address the financial challenges of students from disrupted homes. Also, counselling units under the Dean of Students in public universities should identify students who have experienced disruption in home life and raise their aspirations. Raising the aspirations and associated academic orientation of children from alternative families is an important strategy for reducing their disadvantage in educational attainment (Wu et al. 2015).

Again, our study implies that teaching of the English language, mathematics and integrated science at the SHS should be well resourced and deepened since performance in these three core subjects has a significant positive influence on student university outcomes. At the national level, SHS students have not been doing well in these three courses. For example, of the 268,771 candidates who sat for the 2015 WASSCE, 50.29%, 25.29% and 23.63% had a credit pass in the English language, mathematics and integrated science subjects respectively (West African Examinations Council files).

We recommend more research, both quantitative and qualitative, that uses data from public universities in other African countries, so that the results could be compared. We believe, if Africa and her development partners can expand and improve the efficiency of university education on the continent, the universities can produce and impart advanced knowledge. Application of the knowledge will stimulate sustainable economic growth, reduce inequality, improve democracy and reduce environmental damage in Africa.

Appendix

Table 7 Descriptive statistics

Variable	Obs.	Mean	Median	Std. dev.	Min. value	Max. value
CWA	904	59.42	59.83	6.93	30.95	76.83
Gender	904	1.52	2.00	0.50	1.00	2.00
Marital status	904	1.04	1.00	0.20	1.00	3.00
Relation	904	2.01	1.00	1.22	1.00	4.00
Admission path	904	1.36	1.00	0.85	1.00	5.00
Sitting times	904	1.13	1.00	0.38	1.00	3.00
English grade	904	2.65	3.00	0.85	1.00	6.00
Mathematics grade	904	2.29	2.00	1.05	1.00	6.00
Int. science grade	904	2.47	3.00	0.99	1.00	6.00
School type	904	2.21	2.00	0.85	1.00	3.00
WASSCE score	904	11.70	11.00	3.31	6.00	24.00
Residence	904	1.32	1.00	0.84	1.00	5.00
Age	904	1.43	1.00	0.62	1.00	3.00
Father emp. status	904	1.63	1.00	1.04	1.00	4.00
Mother emp. status	904	1.39	1.00	0.71	1.00	4.00
Father education	904	3.62	4.00	1.42	1.00	6.00
Father occupation	904	3.96	4.00	2.34	1.00	7.00
Mother education	904	2.88	3.00	1.36	1.00	6.00
Mother occupation	904	4.50	5.00	1.90	1.00	7.00

Source: authors' computation, field data, 2014

Table 8 Correlation matrix

	Gend	Mstat	Relat	AdmP	Sitt	Engl	Math	Science	Type	WASSCE	Resid	Age	Fest	Mest	Fedu	Focc	Medu	Moce
Gend	1.000																	
Mstat	.088	1.000																
Relat	.055	.258	1.000															
AdmP	.048	.216	.072	1.000														
Sitt	.120	.287	.176	.125	1.000													
Engl	.150	.211	.193	.217	.129	1.000												
Math	.013	.138	.099	.336	.215	.191	1.000											
Science	.004	.148	.111	.299	.206	.265	.347	1.000										
Type	.409	.154	.150	.177	.202	.214	.088	.194	1.000									
WASSCE	.063	.270	.144	.454	.250	.361	.568	.520	.176	1.000								
Resid	.011	.072	.083	.242	.073	.086	.131	.145	.106	.222	1.000							
Age	.300	.438	.236	.209	.421	.308	.224	.254	.280	.368	.131	1.000						
Fest	.147	.258	.298	.100	.135	.101	.060	.053	.149	.051	.057	.274	1.000					
Mest	.086	.215	.242	.056	.119	.151	.062	.136	.121	.146	.063	.308	.285	1.000				
Fedu	-.139	-.199	-.198	-.123	-.097	-.227	-.123	-.167	-.172	-.197	-.094	-.281	-.169	-.229	1.000			
Focc	.046	.025	.079	.038	.038	.088	.007	.026	.051	-.003	.061	.093	.076	.089	.176	1.000		
Medu	-.107	-.204	-.156	-.103	-.126	-.234	-.107	-.163	-.142	-.158	-.035	-.290	-.155	-.217	.533	.117	1.000	
Moce	.036	.046	.101	.056	.060	.093	.018	.059	.030	.024	.008	.125	.029	.144	-.104	.417	-.192	1.000

Source: authors' computation, field data, 2014

Table 9 Admission path and grade distribution

Admission path	Grades					Total
	A	B	C	D	F	
Regular	76	359	256	35	1	727
Fee paying	–	20	50	24	–	94
Matured	–	20	15	1	–	36
Protocol	1	12	16	3	–	32
Less endowed	–	3	12	–	–	15
Total	77	414	349	63	1	904

Source: extracted from files of the Examinations Office, Faculty of Social Sciences, KNUST. Grades A and B are classified high performance whilst C, D and F are low performance

Table 10 Population and sample distribution

Department	Population 2011/2012	Population 2012/2013	Total	Sample (35%)
Economics	198	307	505	177
English Language	118	90	208	73
Geography and Rural Development	181	354	535	187
Modern Languages (French & Akan)	90	102	192	67
History and Political Studies	220	429	649	227
Religious studies	30	35	65	23
Sociology and Social Work	309	498	807	282
Total	1146	1815	2961	1036

Note: Questionnaires were administered when students were in year 4. Thus, 2011/2012 and 2012/2013 figures in this table are less than the figures in Table 2 due to withdrawal and repetition

References

- Aakvik, A., Salvanes, K. G., & Vaage, K. (2005). Educational attainment and family background. *Ger Econ Rev*, 6(3), 377–394.
- Addae-Mensah, Ivan (2000). Education in Ghana: a tool for social mobility or social stratification. J. B. Dankwah Memorial Lectures. Ghana Academy of Arts and Sciences (April). Institute for Scientific and Technological Information, Accra.
- Anderson, G., Benjamin, D., & Fuss, M. A. (1994). The determinants of success in university introductory economics classes. *Journal of Economic Education*, 25(2), 99–119.
- Barrow, M., Reilly, B., & Woodfield, R. (2009). The determinants of undergraduate degree performance: how important is gender? *Br Educ Res J*, 35(4), 575–597.
- Blankenau, W., & Camera, G. (2009). Public spending on education and the incentives for student achievement. *Economica*, 76, 505–527.
- Eeden, R., Beer, M., & Coetzee, C. A. (2001). Cognitive ability, learning potential and personality traits as predictors of academic achievement by engineering and other science and technology students. *South African Journal of Higher Education*, 15(1), 171–179.
- Ellis, L. V., Durden, G. C., & Gaynor, P. E. (1998). Evidence on factors that influence the probability of a good performance in the principles of economics course. *Business Quest*, 4.
- Fraser, W. J., & Killen, R. (2003). Factors influencing academic success or failure of first-year and senior university students: do education students and lecturers perceive things differently? *South African Journal of Education*, 23(4), 254–260.

- Garasky, S. (1995). The effects of family structure on educational attainment: do the effects vary by the age of the child? *American Journal of Economics and Sociology*, 54(1), 89–105. doi:10.1111/j.1536-7150.1995.tb02633.x.
- Ghana Education Service, EMIS files (2012), Accra.
- Greene, W. H. (2000). *Econometric analysis* (4th ed.). New York: Macmillan.
- Houston, M., & Rimmer, R. (2005). A comparison of academic outcomes for business and other students. *The International Journal of Management Education*, 4(3), 11–19.
- Ishitani, T. (2006). Studying attrition and degree completion behavior among first-generation college students in the United States. *The Journal of Higher Education*, 77(5), 861–885.
- Jamelske, E. (2009). Measuring the impact of a university first year experience program on student GPA and retention. *High Educ*, 57(3), 373–391.
- Johnes, J. (1997). Inter-university variations in undergraduate non-completion rates: a statistical analysis by subject of study. *J Appl Stat*, 24(3), 343.
- Karimi, F. K. (2009). Factors contributing to the academic performance of students in a private university in Kenya: a case of Daystar University. *The International Journal of Learning*, 17(8), 63–76.
- Katsikas, E and Panagiotidis, T. (2010). Student status and academic performance: an approach of the quality determinants of university studies in Greece. Hellenic Observatory Papers on Greece and Southeast Europe. Gree SE Paper No 40.
- KNUST. (2009). *Basic statistics, 43rd Congregation (June)*. Kumasi: University Press, KNUST.
- KNUST. (2012). *Basic statistics, Congregation (August)*. Kumasi: University Press, KNUST.
- KNUST. (2013). *Basic statistics, Congregation (June)*. Kumasi: University Press, KNUST.
- KNUST. (2014). *Basic statistics, Congregation (June)*. Kumasi: University Press, KNUST.
- Lehrer, E. (2004). Religiosity as a determinant of educational attainment: the case of conservative protestant women in the United States. *Rev Econ Househ*, 2, 203–219.
- McIntosh, J., & Munk, M. D. (2007). Scholastic ability vs family background in educational success: evidence from Danish sample survey data. *J Popul Econ*, 20, 101–120.
- McWilliam, H.O.A. and Kwamena-Po, M.A. (1975). *The development of education in Ghana: an outline*. Third Edition, Longman Group Ltd.
- Mora, T., & Escardibul, J.-O. (2008). Schooling effects on undergraduate performance: evidence from the University of Barcelona. *High Educ*, 56(5), 519–532.
- Naylor, R., & Smith, J. (2004). Degree performance of economics students in UK universities: absolute and relative performance in prior qualifications. *Scottish Journal of Political Economy*, 51, 250–265.
- Nonis S. A and Hudson, G. (2006). Academic performance of college students: influence of time spent studying and working. *Journal of Education for Business*, 151–158.
- Nyikahadzoi, L., Matamande, W., Taderera, E., & Mandimika, E. (2013). Determinants of students' academic performance in four selected accounting courses at University of Zimbabwe. *Research in Higher Education Journal*, 21, 1.
- Oketch, M. (2016). Financing higher education in sub-Saharan Africa: some reflections and implications for sustainable development. *High Educ*, 72(4), 525–539. doi:10.1007/s10734-016-0044-6.
- Richardson, J. T. E., & Woodley, A. (2003). Another look at the role of age, gender and subject as predictors of academic attainment in higher education. *Stud High Educ*, 28(4), 475–493.
- Rienties, B., Beausaert, S., Grohert, T., Niemantsverdriet, S., & Kommers, P. (2012). Understanding academic performance of international students: the role of ethnicity, academic and social intergartion. *High Educ*, 63(6), 685–700.
- Rud, I., Van Klaveren, C., Groot, W., & Maassen van den Brink, H. (2014). The externalities of crime: the effect of criminal involvement of parents on the educational attainment of their children. *Econ Educ Rev*, 38, 89–103.
- Salahdeen, H. M., & Murtala, B. A. (2005). Relationship between admission grades and performances of students in the first professional examination in a new medical school. *Afr J Biomed Res*, 8, 51–57.
- Sander, W. (2010). Religious background and educational attainment: the effects of Buddhism, Islam, and Judaism. *Econ Educ Rev*, 29, 489–493.
- Schendel, R., & McCowan, T. (2016). Expanding higher education systems in low- and middle-income countries: the challenges of equity and quality. *Higher Education*, 72(4), 407–411. doi:10.1007/s10734-016-0028-6.
- Shim, M.K., Felner, R.D. and Shim, E. (2000). The effects of family structures on academic achievement. Paper presented at the Annual Meeting of the American Educational Research Association, (New Orleans, LA, April 24–28, 2000).
- Shulruf, B., Hattie, J., & Tumen, S. (2008). Individual and school factors affecting students' participation and success in higher education. *High Educ*, 56, 613–632.
- Siahaan, F., Lee, D. Y., & Kalist, D. E. (2014). Eduactional attainment of children of immigrants: evidence from the national longitudinal survey of youth. *Econ Educ Rev*, 38, 1–8.
- Smith, J., & Naylor, R. (2001). Determinants of degree performance in UK universities: a statistical analysis of the 1993 student cohort. *Oxf Bull Econ Stat*, 63(1), 29–60.

- Smithers, A., & Griffin, A. (1986). Mature students at university: entry, experience and outcomes. *Stud High Educ*, 11(3), 257–268.
- Thiele, T., Singleton, A., Pope, D., & Stanistreet, D. (2014). Predicting students' academic performance based on school and socio-demographic characteristics. *Stud High Educ*. doi:10.1080/03075079.2014.974528.
- Thiessen, S. (1997). Effects of single parenting on adolescent academic achievement: establishing a risk and protective framework. <http://www.eric.ed.gov/PDFS/ED412479.pdf>
- Van der Walt, H. S., & Pickworth, G. (2007). Personality and academic performance of three cohorts of veterinary students in South Africa. *Journal of Veterinary Medical Education (Summer)*, 34(3), 356–365.
- Van Bragt, C. A. C., Bakx, A. W. E. A., Bergen, T. C. M., & Croon, M. A. (2011). Looking for students' personal characteristics predicting study outcome. *High Educ*, 61, 59–75.
- Van den Berg, M. N., & Hofman, W. H. A. (2005). Student success in university education: a multi-measurement study of the impact of student and faculty factors on study progress. *High Educ*, 50(3), 413–446.
- Win, R., & Miller, P. W. (2005). The effects of individual and school factors on university students' academic performance. *Aust Econ Rev*, 38(1), 1–18.
- Wintre, M. G., Dilouya, B., Pancer, S. M., Pratt, M. W., Birnie-Lefcovitch, S., Polivy, J., & Adams, G. (2011). Academic achievement in first-year university: who maintains their high school average? *High Educ*, 62(4), 467–481.
- Woodley, A. (1984). The older the better? A study of mature student performance in British universities. *Res Educ*, 32, 35–50.
- Yusif, H. M., & Ali, B. (2013). Academic performance of less endowed high schools' students in Ghanaian public universities. *J Sci Technol*, 33(2), 104–117.
- Wu, Z., Schimmele, M. C., & Hou, F. (2015). Family structure, academic characteristics, and postsecondary education. *Fam Relat*, 64(2), 205–220. doi:10.1111/fare.12112.