



Does institutional quality matter for primary school retention? Lessons from Uganda

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ABSTRACT

Our study examines school institutional drivers of pupil retention schools in Uganda over the period 2008–2014. We use longitudinal data from a sample of 7824 government and privately owned primary schools. Using the fixed effects regression model, we estimate the association between institutional factors and retention. Our study finds that only three in every ten (32%) pupils who enrolled in primary one complete primary seven. Regression results further suggest that school retention is associated with moderate and not necessarily small class sizes which promote a conducive learning environment as well as group interactions among the learners. Additionally, retention is associated with boarding schools, and government-owned schools compared to their private counterparts. These findings suggest the need for government to strengthen the school inspection function especially in rural based government schools promote surveillance critical in addressing pupil dropouts. Furthermore, recruiting more and better trained teachers while regulating high school fee policy is critical to provide a support system for pupils to complete the primary school cycle.

1. Introduction

Ensuring school retention in primary schools remains one of the major global concerns today. The United Nations Scientific and Cultural Organization (UNESCO) estimates that three in ten pupils (30%) that register in primary fail to graduate from the primary school level (UNESCO, 2019). The situation is worse for Sub-Saharan Africa, where the dropout rate increased to 42% over the last decade (*ibid*). UNICEF (2016) and UWEZO (2018) reveal that Uganda has the highest dropout rates in East Africa at 59% when compared with counterparts Tanzania (20%) and Kenya (21%). As school retention rates remain low, finding the right policy mix to retain children in school remains a necessary development imperative. Moreover, the recent gains in enrollment in Sub-Saharan African countries, following universal education measures, are associated with a deterioration in the quality of school standards by straining school resources.

This study focuses on the Ugandan context and makes several observations about the school-related factors that may contribute to school retention in rural and urban schools. We zoom on in two key associations: the association between school retention rates and school ownership status and the relationship between teacher and physical

facility factors and school retention. This study uses the annual Ugandan school Census cohort data from 2008 to 2014 to examine the nexus between school institutional factors and school retention. Just like many developing countries, administrative data on pupil retention is not captured and unavailable. To circumvent this data limitation challenge, we track enrollments of learners over a seven year period (as per Ugandan primary school cycle) to obtain school level retention rates.

We track a cohort of pupils registered in 7824 private and public schools between two years in 2008 and 2014. Ideally, children enrolled in primary one in 2008 are expected to complete primary seven in 2014. We then estimate school-level retention rates as a percentage of pupils in the cohort that complete the primary cycle over the two periods. The study also defines institutional factors along three dimensions; school physical factors (facilities) and academic factors (evaluation, pedagogy, and teaching) and social factors (student social networks) (Fraser, 2012; Fonllem et al., 2020). Consequently, we adopt all three dimensional factors; physical factors (classrooms, offices, stances, teacher housing) and academic factors (teacher related factors such as pupil teacher ratio, female teacher ratios and school inspections) and social factors (rural versus urban as well as regional location) which are captured in the Census data.

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The key to understanding school retention drivers is longitudinal data on schools, but such panel data have rarely been available or even used in past studies. Our study leverages the unique panel structure of the cohort data on pupils to account for unobserved variations across schools and regions to provide more efficient estimates regarding school retention. Additionally, the study further provides some insight into the automatic promotion policy relates to school retention which took effect in 2007. Past evidence suggests that school retention is higher in schools where institutions successfully integrate students socially and academically into their prevailing cultures (Zepke & Leach, 2005).

It is important to note that school retention was the main goal of the Universal primary education (UPE), a programme which Uganda was one of pioneers in Africa in 1997. Specifically, the main goal of the initiative was to ensure that every child enters and completes primary school, thereby reducing inequities in education and eventually reducing poverty (Nishimura et al., 2008; Kan and Klasen, 2021). Evidence suggests that whereas UPE boosted enrollment rates, just like in other sub-Saharan African countries, the persistently low rates of pupil retention have continually rolled back gains in school enrollment (Grogan, 2009; Evans and Mendez Acosta, 2021). For instance, while the gross enrollment rates exponentially grew from 3.1 million in 1996–7.6 million in 2006, two-thirds of pupils enrolled in first grade were unlikely to complete seventh grade (Bategeka and Okurut, 2006; UNDP, 2007). Educationists increasingly argue that growth in school enrollment aided by the UPE programme was not matched by improvements in school quality and learning environment. More succinctly, increased enrolments contracted the public expenditure percapita which affected the quality of education in UPE schools. Limited access to school inputs (infrastructure, teachers) resulted in overcrowding, learner, and teacher absenteeism leading to higher rates of school dropout (Ssewamala et al., 2011; NPA, 2015). Indeed, Ugandan schools often lack resources but also fail to efficiently utilize the available fund resources allocated by the government (Muvawala and Hisali, 2012; Gilligan et al., 2021). Specifically, primary schools are technically inefficient in translating school resources into educational outcomes such as test scores and primary school completion (Yawe, 2014; Muvawala and Hisali, 2012).

Our findings suggest that school retention is associated with an optimal moderate pupil teacher ratios and not necessarily very small class sizes. More specifically, moderate class sizes promote a conducive learning environment and group interactions among the learners while ensuring efficiency of the funds allocated to schools. We also find that inspection visits as well as teacher facilitation are critical for school retention in rural compared to urban schools. The results seem to suggest that teacher housing and school inspection are more critical for teacher and learner attendance and addressing absenteeism, prevalent in remote and rural areas. Existing evidence on school retention in sub-Saharan Africa has mainly focused on the regional disparities in pupil retention (Muwanika, 2009; Mpyangu et al., 2014) as well as the individual and household factors associated with pupil dropouts (Okumu et al., 2008; Tamusuza, 2011; Makorani, 2017). However, these studies primarily focused on demand side factors relating to individual and household level effects on retention. Therefore, little is known about the association of institutional quality with pupil retention in primary schools. Even the few studies that have examined school-related factors and retention, such as Kushiya (2011) and Mikisa (2019), are descriptive in scope, based on small surveys and hardly use quantitative methods to analyze data. Our study contributes to the existing literature on school in these ways. First the analysis explores the association between school institutional factors and retention, a topic that research has not conclusively explored in the Ugandan context. Additionally, our estimation strategy employs a panel data structure over large sample of schools to account for with-in school heterogeneity. This therefore allows for context specific policy implications that promote school retention in developing countries, Uganda inclusive.

2. Background of Uganda's primary education system

The Ugandan education system operates a four-tier education model comprising of pre-primary, primary, secondary, and tertiary levels. However, the provision of pre-primary education (early childhood development) is not compulsory and is predominantly provided by private schools (Ejuu, 2012). Primary school education comprises seven (7) years of education, secondary six (6) years divided into two levels; the first level consists of secondary 1–4 (ordinary level) and senior 5–6 (advanced level). Primary and secondary schools follow a calendar comprising three terms, with each term covering three to four months. The tertiary level consists of university or technical colleges and business schools.

Progression from one level of education, for instance, from primary to secondary, is based on centrally administered national examinations by Uganda National Examinations Board (UNEB). Initially, progression within a certain level, say from one grade to another, was based on the performance of children in internal exams administered by the school. However, in 2007, the Ministry of Education and Sports (MoES) introduced an automatic policy as a modality of progression.

Uganda's education entails some uniqueness that has strong implications for this study. First, MoES introduced the automatic promotion policy in 2007 as a way of progressing from one grade to another at the end of a school year for learners in primary level rather than the performance-based progression. The advocates of automatic promotion argue that the policy is a better alternative than repetition as it enhances education quality, improves internal efficiency of the education expenditure, and fosters personal learner development (Ndugutse, 2008; Okurut, 2015). However, this policy is not observed in some schools, as children are forced to repeat classes to improve their academic performance (Kasirye, 2009; Gilligan et al., 2021). Secondly, contrary to developed countries with school districts, parents and guardians in Uganda are not required to enroll their children within a particular geographical proximity (Kasirye, 2009). This, therefore, implies a high likelihood of pupil mobility as pupils move from one school to another in search of better and affordable education or with the migration of the guardian (Machin et al., 2006; Kyoko, 2017).

The government introduced UPE in 1997 to enable universal access to education and eliminate gender disparities in primary school enrolment (Kasirye, 2009). Specifically, the government committed to paying tuition fees at the rate of 5000 Ugandan shillings per pupil per annum in the first three years of primary schooling, and 8100 Ugandan shillings for primary four to primary seven (Ministry of Education and Sports, 1999). Owing to the abolition of school fees, gross enrolment rates increased from 63% in 1992/93–85% by 2005/06. Two groups of learners benefited from the UPE program, notably the girls and learners from households in the poorest quintiles (Deninger, 2003).

Additionally, the government prioritized recruiting teachers and the construction of classrooms to accommodate the growing numbers of learners in primary schools. For instance, the number of teachers recruited on the government payroll also increased substantially from 81,564 in 1996–145,587 in 2003, registering a 78% increase compared to only 12% in the decade preceding the introduction of the UPE programme (Bategeka and Okurut, 2006). Similarly, the government constructed classrooms translating the Pupil Classroom Ratio (PCR) from 96:1 in 2000–72:1 by 2006. Notwithstanding, the ratio falls short of the recommended class size (50:1) (Ministry of Education and sports, 2007). Whereas UPE improved some quality indicators such as increases in the numbers of teachers, classrooms and textbooks, this increase was exceeded by the growth in pupil enrollments. Consequently, the deficit in school inputs compromised the quality of education characterized by overcrowding in classes, teacher and pupil absenteeism and high dropout. For instance, in some schools, pupils still received their training in open and improvised facilities such as mosques and churches (Kasirye, 2009). Although data on completion rates are scanty, cohort statistics show that of the pioneer cohort of pupils that enrolled in

primary one in 1997, only 485,703 (23%) reached primary seven in 2003 (Bategeka and Okurut, 2006). The decline in school quality resulted in some parents (especially the well-off and urban areas) shifting their children from government-aided to private schools. Notably, the share of private schools in Uganda increased to 19% in 2006 from 5% in 1996 (Ministry of Education and Sports, 2006). Indeed, growth in the demand for primary education in many developing countries including Uganda, led to the rapid mushrooming of low-cost private schools that provide an alternative to public schools (Tooley & Dixon, 2005).

The proponents of private schools argue that these schools deploy teachers and other school inputs more effectively but are also held to a higher level of accountability by parents because of direct financial transactions than government-aided schools (Andrabi & Khwaja, 2008; Patrinos et al., 2009). On the other hand, there are concerns that private schools operate on a low-cost model to generate profit while charging lower fees, which raises concerns about the ability of these schools to offer quality education (Heyneman & Stern, 2014). For instance, it was noted in a recent newspaper article¹ that 60 primary private schools in Wakiso district were closed due to a lack of qualified teachers but also operated in sub-standard structures, which put the pupils' lives at risk.

Overall, there have been large public and private investments geared at improved school infrastructure and school access in Uganda's primary education. However, it is critical to understand how these school quality factors have facilitated learners to complete the primary school cycle in public and private schools.

2.1. Conceptual framework

This study is based on the conceptual framework (Fig. 1) which draws from the school environment theory (Kutsyuruba et al., 2015). The theory posits that a safe and supportive environment where learners thrive emotionally, socially and academically is based on three key dimensional factors. The dimensions are; (i) physical factors — the condition of school facilities, the environmental quality of schools, and their relationship with student outcomes; (ii) academic/teacher factors, which entail personal skills and characteristics of teachers and how they are used to foster student achievements and outcomes. And lastly (iii) social factors which relates to the social interactions and networks among different members of the school community. The theory further suggests that these dimensions don't operate in but interact together to influence the quality of school environment and learning outcomes such as school retention.

The poor state of physical factors such as school facilities leads to discomfort and reduced learning but also shapes negative attitude, and behavior such as absenteeism and vandalism leading to eventual school dropout. In our study, we conceptualize physical factors to include the quality of facilities such as classrooms, stances, offices, water sources among others. The academic/teachers covers aspects of teacher's skills and personal characteristics and how these influence student outcomes such as retention and academic performance. For instance, it is assumed that when teachers expect learners to perform poorly, they are likely to perform poorly and vice versa (Sabarwal et al., 2022; Carr and Symonds, 2023). In this study, we relate this dimension to teacher related variables such as female teacher ratio, pupil teacher ratio as these factors influence the way teachers' capacity to manage students in class but also the pedagogical methods used in delivering lessons in class. Lastly, the social dimension relates to the differences in the social interactions between pupils (peer group interactions) and teachers (faculty interactions) in rural and urban settings. These differences point to the variations in cultural, social norms, family and peer expectations across

the geographical divide which shape the behaviors and decision of learners to remain or drop out of school (Wu et al., 2010; Mu & Wu, 2019; Bailey et al., 2020). For instance, there is a popular ideology in rural areas that "education is useless" in rural society (Li and Wu, 2015; Wondimu, 2022). As such, this shapes the peer students on their decision to remain in school or not. The lower low expectations for education of young people in rural area may have long-term consequences for their individual development.

Fig. 1 shows how the different dimensions of the school environment interact to influence school retention in Uganda's context.

3. School quality and pupil retention

Several studies explain the relationship between primary school retention and other related school-related factors using different empirical approaches. Past studies show that the decision to remain in school include school distance, school quality and cost (fees and related costs), the quantity of educational facilities (classrooms and latrines), class size, pupil-teacher ratio, teacher absenteeism, school location and quality of teachers (Wils, 2004; Hanushek et al., 2008; Ruff, 2016; Blatchford and Russell, 2020; Hirakawa and Taniguchi, 2021). Blatchford and Russell (2020) argue that class size matters for education attainment because it affects the interactions in the classroom and their quality, and the time teachers have for marking, assessments and understanding the strengths and weaknesses of individual pupils.

Previous studies show that overcrowded classrooms, poor quality teaching, the lack of role models in schools, insufficient learning materials, under-qualified teachers, teacher absenteeism, and insufficient school buildings also increase the risk of dropping out of school as students find learning less attractive (Chimombo, 2005; Alexander, 2008; Hunt, 2008; Sabates and Fernandez, 2010; Gondwe, 2016). In Uganda, whereas the introduction of UPE through the abolition of school fees promoted pupil enrolment rates, this program registered low effects on school retention due to the shortage of teachers, schools and school materials (Bategeka and Okurut, 2006; Kan & Klasen, 2020).

Whereas access to quality education is critical for school completion, irregular government monitoring, and inspection of schools due to meagre budgetary resources result in lower school retention levels (Guloba et al., 2010; Kagoda, 2012). Notably, improving the quality of education requires complementary efforts between different interventions, as emphasised by Mbiti et al. (2019) in Tanzania. Also, providing some input, such as school uniforms and sanitary pads, could increase the retention of girls (Duflo et al., 2015; Evans and Mendez Acosta, 2021).

Mpyangu et al. (2014) also find that an unfavorable school environment (with unapproachable, reluctant, and tough teachers) is associated with low school retention rates as children prefer working for pay than going to school. Wils (2004) also notes that the long distance to school is associated with low school retention levels, especially for the girls, due to their parent's concern for their safety. Community factors such as school location (rural or urban location), level of urban development and availability of economic activities also explain school retention. Mulkeen and Chen (2008) find that school retention is lower in rural areas because of the difficulty in attracting and retaining teachers, predominantly female teachers. Also, communities with booming economic activities are likely to lure students out of school to concentrate on making money.

Abuya et al. (2013) examine the risk factors associated with dropout among primary school children in the low-income areas of Nairobi. Using qualitative data from the Education Research Program, they find that dumpsites in the two slum sites of Korogocho and Viwandani lure children out of school. Further, Musimenta (2018) finds that attending a privately owned school is associated with a higher probability of remaining in school because private schools are often of higher quality than government owned schools. In contrast, Abuya et al. (2013) find that retention rates are likely lower in private schools than government

¹ Daily Monitor (2021) "60 schools face closure over standards" <https://www.monitor.co.ug/uganda/news/national/60-schools-face-closure-over-standards-1689782>

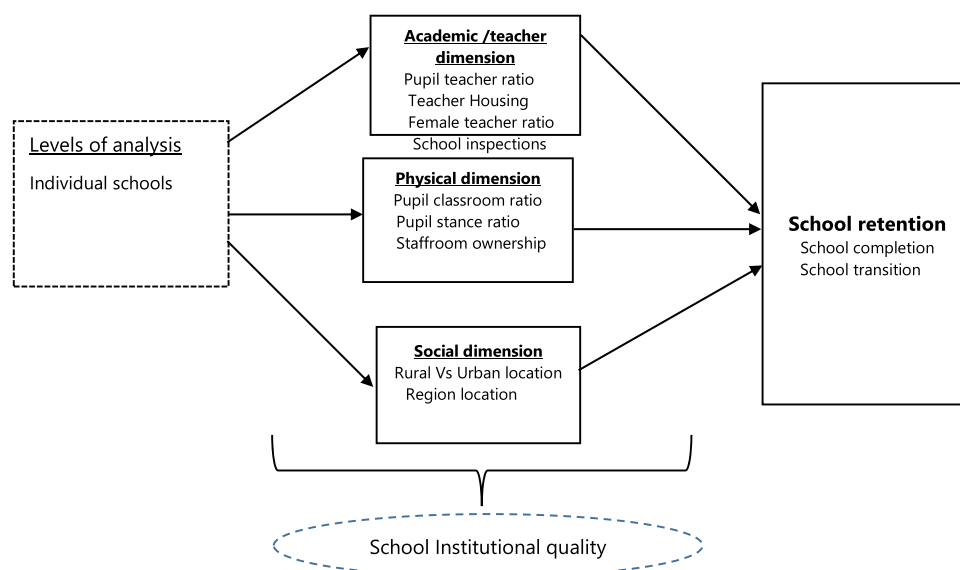


Fig. 1. Conceptual framework linking school institutional factors and pupil retention. Authors' construct based on Kutsyuruba et al. (2015).

schools because of high school fees.

4. Data and methodology

4.1. Data

Our study uses administrative data from the Annual School Census (ASC) conducted in government and private primary schools. These data are collected by the Ministry of Education and sports. For this study, our analysis tracks a cohort of primary one pupils in 7824 schools from 2008 until they completed their primary school cycle (primary seven) in 2014. The census data also capture several school factors including the number of classrooms, teachers (both male and females), teacher houses, type of the primary school, school inspection visits, school location, average distance walked by pupils, and school ownership status, among others. For sample representativeness, we selected schools across Uganda's four (4) regions – East, Central, West, and North.

The ASC data collection entirely relies on the feedback of various educational stakeholders at the local government level and the statistics department division at the MoES. The census commences annually at the beginning of the first term (January), with the MoES sending a detailed questionnaire to all primary schools across the country. At school, the questionnaire is administered to all head teachers who provide information on schools based on various sources; school registers, daily attendance rosters, admission books; library record books; and inventory books, among others. Precisely, the questionnaire captures data on the school environment, pupil, and teacher characteristics. The filled questionnaires are then submitted by the head teachers to the district and ministry authorities for quality control to eliminate any inconsistencies. Consequently, the data are processed and stored in the Education Management Information System (EMIS) database (MoES, 2016). Due to financial constraints, the last annual school census was undertaken in 2016.

From the EMIS data, we draw on two key assumptions for the analysis in this study. First, most primary schools observe the automatic promotion policy (2007), which minimizes the prevalence of grade repetition among learners (MoES, 2008). Although, evidence shows grade repetition among lower classes (grade 1, 2 and 3) due to underage pupils (Jones & Schipper, 2015) and grade 6 children were deemed academically unfit (MoES, 2014; Gilligan et al., 2021). Nonetheless, the incidence of grade repetition is substantially low, ranging between 5% and 7% of the class enrollment (Kabay, 2016). Put differently, we

purposely use the 2008 enrollment cohort as this provides the context for a period after the automatic promotion policy had taken effect in 2007. Secondly, we assume that pupils in certain schools transferred to other primary schools during the analysis period, however, evidence suggests that this is a rare. Considering these assumptions, we hypothesize that any variations between the cohort enrollment in 2008 and 2014 is primarily explained by cohort dropout (Camilla et al., 2004).

4.2. Variables

The study adopts school retention as the outcome variable. The variable is measured as the proportion of the pupils who started primary one in 2008 and completed the primary school cycle in 2014. We adopt a school as the unit of analysis. We also adopt various school-specific control variables as presented in Table 1. We measure the pupil-teacher Ratio (PTR) – the average number of pupils per teacher in primary school. This ratio is estimated as the proportion (percent) of the

Table 1
Description of variables used in the study.

Variable name	Variable definition /Measurement	Hypothesis
School retention	The proportion of pupils who enrolled in primary one that completed primary seven.	N/A
Pupil Teacher Ratio	The ratio of teachers to total pupil enrollment in the primary school.	-
Pupil Class Ratio	The average number of pupils per classroom in school	-
Female teacher Ratio	The proportion of female teachers in the primary school.	+
Pupil Stance Ratio	The average number of pupils per stance (latrines) in school.	-
Rural	The dummy takes on 1 if the school is in a rural area and 0 otherwise.	-
Government	The dummy takes on 1 if the school is government owned and 0 otherwise.	-
Staffroom	The dummy takes on 1 if the school owns a staffroom and 0 otherwise.	+
Inspection visits	The dummy takes on 1 if the school was visited by the school inspector in a year	-
Teacher houses	The number of teacher houses in a primary school.	-
Distance to school	The dummy takes on 1 if learners on average walk less than 2kms to school	-
Region	The dummies represent the regional location of the primary school.	+

Source: Authors' construct

total enrollment to the number of teachers in school. The Female Teacher Ratio (FTR) expresses the proportion of female teachers in a school. The Pupil Classroom Ratio (PCR) is the average of pupils that sit in a classroom in primary school. It is derived as the proportion of the total enrollment to the number of classrooms in each primary school. The school ownership variable captures the ownership status, that is, government or privately owned. The school office variable indicates whether the school has an office or not. Relatedly, staffroom ownership looked at whether the school has a staffroom structure. The variable on school inspection visits captured the number of inspection visits by the inspector of schools to the primary school annually, while the teacher houses variable looks at the number of teacher houses in the primary school in the period of analysis.

4.3. Estimation Strategy

The relationship between institutional quality factors and school retention can be expressed in form of an educational production function (Hanushek, 1996). Specifically, school retention (output) can be viewed as a function of several factors (inputs) at individual, family and school levels.

$$Y_{ij} = f(X_{it} \quad H_{it} \quad W_{it} \quad \varepsilon_{it}) \quad (1)$$

Where Y_{ij} the school retention rates of school i , X_{it} are the school inputs at time t , W_{it} are the individual pupil factors and H_{it} are household level factors. To establish the school related drivers of school retention, we hold constant the individual and household factors to derive an econometric model presented in Eq. (2). First, we employ the pooled Ordinary Least squares technique (OLS) to estimate this equation that takes the following form.

$$Y_{it} = \delta_i + \beta_i X_{it} + \varepsilon_{it} \quad (2)$$

Where Y_{it} is the retention of school i for the year, δ is the intercept and β , is the time varying effect of the school characteristics X_{it} while ε_{it} is the error term that is specific to a school. However the pooled OLS estimates don't account for unobserved heterogeneity arising from omitted variables and their correlation as well as their effect on school retention (Allison 2009; Des Jardins, 2003). To address this challenge, we estimate Eq. (3) as panel data series using random-effects (RE) model.

$$Y_{it} = \delta_i + \beta X_{it} + \gamma Z_i + \alpha_i + \varepsilon_{it} \quad (3)$$

Where β , is the time varying effect of the school characteristics X_{it} and γ is the effect of invariant school observed characteristics. Additionally, α_i and ε_{it} are the error terms of the random effects model. Specifically, α_i denotes the cross-sectional error component and does not change over time while ε_{it} which is the idiosyncratic error term specific to the primary school.

Noteworthy, we consider the RE model estimates based on the the properties of its two error term components. First, if the individual school component α_i is uncorrelated to the regressors X_{it} , then pooled OLS estimators β are consistent and the error terms are known to be random and hence adoption of the random effects would be appropriate (Tipayalai, 2020). However if α_i is correlated to the regressors (school characteristics), OLS estimator would be inconsistent with RE model estimates hence we adopt the third model, the fixed effects model that takes the form in Eq. (4).

$$Y_{it} = \delta_i + \beta X_{it} + \gamma Z_i + \theta_i d_{it} + \varepsilon_{it} \quad (4)$$

Where d_{it} a dummy variable is takes the value of one for school i and zero otherwise and θ_i is the coefficient for the school i . This implies that the term i allows for variations across schools as they have unique characteristics. In other words, it allows each school to have its own intercept value that does not vary overtime. As such, the fixed effects model accounts for unobserved heterogeneity across schools in scenarios

where individual-specific effects are correlated with the regressors (Green, 2003). The choice between the fixed and random effect models is based on the Hausman test evaluation (Hausman, 1978). The Hausman test investigates whether the individual school errors α_i in Eq. (3) are correlated with regressors based on Eq. (5).

$$H = (\hat{\beta}_{RE} - \hat{\beta}_{FE})' [Var(\hat{\beta}_{RE}) - Var(\hat{\beta}_{FE})] (\hat{\beta}_{RE} - \hat{\beta}_{FE}) \quad (5)$$

Where $\hat{\beta}_{RE}$ and $\hat{\beta}_{FE}$ are the vectors of random and fixed model estimates. The Hausman tests follows a Chi-squared distribution with the number of degrees of freedom equal to the number of regressors in the model. When the Hausman-statistic is greater than critical values at 5% level of significance, then we conclude that there is a significant difference between random and fixed effects models. As such we reject the null hypothesis in favour of the alternative which implies that fixed effects model is the appropriate model.

Additionally, we include squared variables for PCR and PTR in all the model estimations to test for a possible non-linear relationship between the behavior of these characteristic ratios and school retention (Urquiola, 2006; Chingos, 2013). This is because previous studies such as Rafiq (1996) and Ngarwe (2007) find a possible non-linear link between pupil progress and school input characteristics. More specifically, the number of teachers, classrooms, and stances should be optimal, that is, not too high to avoid overutilization and not too low to prevent underutilization.

5. Results and discussion

5.1. Summary statistics

Table 2 presents the summary statistics of 7824 sampled schools from all the regions of Uganda. The results show that 31.9% of the pupils enrolled in primary one in 2008 completed primary seven in 2014. This retention rate is consistent with the primary seven survival rate estimated at 32% (UWEZO, 2019). Furthermore, most of the selected schools (94%) are government owned compared to privately owned schools (8%). This confirms the fact that Ugandan learners mostly join government schools at the primary school level but join private schools at the secondary level (Steiner, 2010). Additionally, the sample mainly comprises day schools (92%) compared to boarding schools (8%).

Regarding the location, most schools are situated in the rural areas (92%), although this reduced to 87% as more schools were classified as urban due to urbanization during the analysis period. On average, the schools had a pupil teacher ratio of 69.9 in 2008 and later reduced to 58.8 in 2014. This is partly because of the government's provision of more classrooms to government schools between the two periods. Similarly, building more latrines explains the drop in the average pupil stance ratio from 264.9 in 2008–68.6 in 2014. The average pupil teacher ratio reduced by 7.9% from 55.6 in 2008–51.2 in 2014 because schools recruited more teachers. Relatedly, the average female to male teacher ratio increased from 0.86 in 2008–0.98 in 2014. This implies that ratio of female to male teachers moved closer to parity over the 7 years of analysis.

Regarding the average distance walked by the pupils to school, 52% of the schools reported that their pupils walked below 1 km to school, however, the share increased by 56% in 2014. Additionally, 62% of the schools reported that they were inspected in 2008 compared to 78% in 2014. This points to the heightened effort of the district inspection officers in school monitoring and supervision of schools more recently.

5.2. Institutional drivers of school retention

Table 3 presents the regression results on the school factors that explain school retention in Uganda. We estimate the relationship using three models pooled OLS (1); random and fixed effects models in models (2) and (3) respectively. Evaluating the models using the Hausman test

Table 2

The summary statistics of the variables used in the study.

2008					2014			
Variable	Mean	S.D	Min	Max	Mean	S.D	Min	Max
Enrollment	139.8	80.1	0	938	44.7	28.5	1	414
Pupil classroom Ratio	69.9	45.53	4.48	732	74.69	58.78	2.05	1175
Pupil Teacher Ratio	55.6	27.88	0.48	728	51.24	32.22	0.07	1878
Female Teacher Ratio	0.86	0.95	0	10	0.98	1.08	0	13
Teacher houses	0.59	0.49	0	1	0.57	0.50	0	1
Rural (1 =Yes)	0.92	0.39	0	1	0.87	0.33	0	1
Day school (1 =Yes)	0.91	0.29	0	1	0.92	0.27	0	1
Staffroom ownership	0.44	0.49	0	1	0.41	0.49	0	1
Office ownership	0.867	0.339	0	1	0.89	0.401	0	1
Boarding (1 =Yes)	0.08	0.26	0	1	0.08	0.26	0	1
Government (1 =Yes)	0.92	0.27	0	1	0.94	0.27	0	1
Private (1 =Yes)	0.08	0.27	0	1	0.08	0.27	0	1
Distance to school	0.52	0.50	0	1	0.56	0.50	0	1
Inspection (1 =Yes)	0.62	0.48	0	1	0.78	0.41	0	1
Region	2.76	1.23	1	4	2.76	1.23	1	4

Source: Authors' computations based on the Uganda Schools Census data (2016)

Table 3

Regression results from the OLS, fixed and random effects models.

Dependent variable: School retention			
Variables	(1)	(2)	(3)
Log PCR	1.2037 * ** (0.0742)	1.1894 * ** (0.0745)	1.4384 * ** (0.0709)
Log PCR ²	-0.1251 * ** (0.0089)	-0.1234 * ** (0.0089)	-0.1450 * ** (0.0085)
Log PSR	0.3317 * ** (0.0428)	0.3188 * ** (0.0429)	-0.1392 * ** (0.0436)
Log PSR ²	-0.0128 * ** (0.0044)	-0.0115 * ** (0.0044)	0.0240 * ** (0.0044)
Log PTR	0.2511 * ** (0.0671)	0.1997 * ** (0.0665)	0.3338 * ** (0.0638)
Log PTR ²	0.0067 (0.0089)	0.0138 (0.0089)	0.0005 (0.0085)
Female Teacher Ratio	-0.0175 (0.0264)	-0.0168 (0.0265)	0.0026 (0.0251)
Teacher houses	0.0188 * ** (0.0035)	0.0187 * ** (0.0035)	0.0203 * ** (0.0033)
Rural	-0.2534 * ** (0.0293)	-0.2558 * ** (0.0294)	-0.1582 * ** (0.0281)
Boarding	0.0729 * ** (0.0181)	0.0733 * ** (0.0181)	0.0303 * (0.0173)
Frequency of inspection (<i>The reference category is "More than two visits"</i>)			
No Inspection	-0.1610 * ** (0.0189)	-0.1614 * ** (0.0189)	-0.0285 (0.0185)
One Inspection visit	-0.1769 * ** (0.0139)	-0.1755 * ** (0.0140)	-0.0362 * (0.0141)
Two Inspection visits	-0.0203 (0.0127)	-0.0201 (0.0128)	-0.0359 * ** (0.0121)
Distance to the school	0.0096 (0.0101)	0.0095 (0.0101)	0.0140 (0.0096)
Government	0.2453 * ** (0.0332)	0.2425 * ** (0.0333)	0.1642 * ** (0.0317)
Staffroom ownership	0.0508 * **	0.0508 * **	0.0479 * **
Region (<i>The reference category is "North"</i>)			
	(0.0099)	(0.0099)	
West	-0.0144 (0.0169)	-0.0134 (0.0170)	
East	0.0468 * ** (0.0159)	0.0466 * ** (0.0159)	
Central	-0.1089 * ** (0.0169)	-0.1082 * ** (0.0169)	
Rural*Government	0.4221 * ** (0.0357)	0.4277 * ** (0.0358)	0.2293 * ** (0.0346)
Constant	-0.9797 * ** (0.1715)	-0.8283 * ** (0.1691)	-0.3497 * (0.1642)
Observations	7820	7820	7820
R-squared	0.6716	0.4601	0.4915

Note: (i) Standard errors are reported in the parentheses. (ii) *, **, *** indicate significance at the 90%, 95% and 99% level, respectively.

shows that fixed effects is more efficient estimator as evidenced in the Hausman chi-square statistic (P-value=0.000). Therefore, we choose the fixed effects model over the random effects model. Consequently, we discuss the drivers of school retention based on the fixed effects model results (3).

Overall, the results suggest that Pupil Classroom Ratio, Pupil Teacher Ratio and Pupil Stance Ratio and their corresponding squared variables exhibit a non-linear relationship on school retention. This confirms the presence of a non-linear relationship between these variables and school retention, as earlier established in the past studies (Urquiola, 2006; Chingos, 2013). The reasoning behind this finding is underscored by Blatstchfor and Rusell (2020), who argue that very large classrooms are often problematic for the teachers to provide necessary differentiation and individual support to pupils.

Contrariwise, classrooms that are too small limit adequate group interactions and peer support among pupils but are also expensive (less cost-effective) for educational systems (Ngerwa et al., 2013; Blatstchfor and Russell, 2020). As such, desirable class sizes and pupil teacher ratios in schools need not be neither too low nor too high, but just optimal to achieve a conducive learning environment in school. For instance, UNESCO recommends a Pupil Teacher Ratio standard of about 40:1 and further advises against reducing or expanding this standard to maintain the education quality (UNESCO, 2015).

Noteworthy, our results suggest that private schools are less likely to retain pupils than government schools. Particularly, the government schools are 35% more likely to retain pupils than their private school counterparts. This finding alludes to two reasons; the high school fees and stringent progression requirements in private schools, which force children from private schools, compared to public schools (Oketch & Musyoka, 2013). Due to these reasons, the dropped learners in private schools end up joining government schools where there is an automatic promotion and no (or little) tuition fees is paid. This therefore explains the relatively larger enrolments in government schools (Rumberger and Lim, 2008).

Furthermore, results suggest that teacher housing is associated with higher rates of school retention. More precisely, a percentage increase in housing is associated with 2% increase in school retention. Evidence shows that provision of teacher accommodation enables teachers to dedicate enough time to vulnerable students without worries of travelling long distances to go home after school days (Taylor & Mulhall, 2001). Indeed, Mulkeen and Chen (2008) argue that teachers in remote rural areas are likely to start class late and leave for home, which reduces their interaction with pupils compared to their urban counterparts. Further, improved housing facilities attract and retain more competent teachers in urban schools, contrary to the poor housing conditions in rural areas (Podolsky et al., 2016).

The results suggest that children in rural schools are less likely to remain in school than their urban counterparts due to a combination of risk factors. For instance, many households depend on children during the busy seasons of the agricultural year, such as during the harvest and planting periods (Taylor & Mulhall, 2001; [Mulkeen and Chen, 2008](#)). These barriers range from teenage pregnancies among girls (Morara & Chemwei, 2013) to high levels of poverty among rural households (UNICEF, 2014; [Smink and Reimer, 2017](#)) and less educated rural parents who attach low value to education (Jeynes, 2005; [Blondal and Adalbjarnardottir, 2014](#)). Relatedly, our results show that schools with boarding sections are 0.6% more likely to retain pupils than day schools. More specifically, providing accommodation to pupils reduces the external environment that learners face as they commute to and from school such as defilement and exhaustion from walking, among others ([Sang et al., 2013](#); Ncube, 2004).

Additionally, our analysis shows that school retention is associated with the frequency of the school inspection visits. More specifically, more inspection visits in schools is related to a higher likelihood to retain pupils through the primary school cycle. Inspection visits act as accountability checks in schools and, therefore, can promote quality standards and student performance which positively impacts school retention (MoES, 2016; Matete, 2021). Evidence shows inspections improve the commitment of teachers but also help to implement the rules of conduct of students, and develop strategies for school management and performance ([Ehren and Visscher, 2006](#); [Hossain, 2017](#)).

To examine the heterogeneity of school retention across the urban-rural and private-public school divides, we estimate the fixed effects

regression models across these contexts as presented in [Table 4](#). The results confirm the previous results in [Table 3](#) that government schools have higher school retention rates than privates regardless of their location. The analysis also show that teacher housing regardless of their location and ownership status increase the odds of retaining pupils in school. This emphasizes the critical role of teacher housing as a motivating factors for teachers to remain in school and give attention to pupils in school.

Consistent with findings by [Mutabaruka et al. \(2018\)](#), our results show that inspection visits have a significant positive effect on the school retention in public schools, whereas the effect is not substantial for private schools. Noteworthy, government schools rely on inspection visits as their main external quality check in promoting teaching quality, learning standards, and pupil performance. Conversely, inspection visits in private schools play a smaller role since these schools are already strictly monitored by their proprietors to ensure high teacher and pupil attendance and performance (Aslam & Kingdon, 2011). Relatedly, [Laura et al. \(2014\)](#) find that inefficiencies such as teacher absenteeism and poor performance in private schools are minimized by serious disciplinary action or even dismissal from the school proprietors. Relatedly our analysis suggests that inspection visits among rural schools are associated with higher school retention. In contrast, the results suggest that inspection visits have no significant effect on retention among urban primary schools. This is explained by the fact that urban schools are located closer to government offices and hence are under the constant surveillance of education officers compared to remote rural schools which are out of sight of government officials ([Kagoda, 2012](#)).

The results also reveal that boarding schools located in urban centres are likely retain pupils more than their rural counterparts. This could be explained by the fact that most boarding schools in urban centres provide a conducive environment for learners away from home to focus and remain in school (Vilsa & Fryer, 2014). Moreover, the day scholars in the urban centres are likely to be lured into businesses to make money and hence dropout of school as a result of loss of interest in further studies ([Mugume et al., 2021](#); [Holmes and Lowe, 2023](#)). Conversely, the rural boarding schools may still suffer challenges in attracting competent quality teachers and infrastructure gaps such as modern classrooms, toilets, and road networks.

6. Conclusions

Uganda has made substantial strides towards realizing universal primary education envisioned in Sustainable Development Goal 4. The goal aims at achieving inclusive and equitable quality education to promote lifelong learning opportunities for all. More specifically, the country has registered exponential gains in pupil enrolment owing to the introduction of free education policy by the UPE programme in 1997. However, low pupil retention in schools characterized by the high dropouts and low completion rates continue to undermine progress towards the universal education for all goal. The study therefore explores the nexus between school institutional factors and retention rates in primary schools in Uganda. More precisely, we examine the impact of teacher and infrastructure availability factors on the primary cohort completion in 7824 schools in Uganda. Our study finds that only three in every ten (32%) pupils enrolled in primary one complete primary seven grade. The analysis further suggests that school retention is associated with moderate and not necessarily “small” class sizes, which promote a conducive learning environment for peer and group interactions among the learners in class.

Regarding school location and ownership, our results show that providing accommodation for teachers and increasing school inspection visits in rural areas promote school retention. For the urban schools, our results show that upgrading schools to the boarding section is an effective approach to curb high dropout rates. Surprisingly, government schools are likely to retain more pupils than private schools. This finding could be attributed to the likely transfer of pupils from private schools to

Table 4
Determinants of school retention by school ownership and by location.

Variables	(1) Rural	(2) Urban	(3) Government	(4) Private
Log PCR	1.4454 *** (0.0753)	0.9964 *** (0.2579)	1.4374 *** (0.0833)	1.2766 *** (0.1400)
Log PCR ²	-0.1454 *** (0.0089)	-0.0897 *** (0.0338)	-0.1417 *** (0.0100)	-0.1310 *** (0.0166)
Log PSR	-0.1523 *** (0.0455)	-0.2122 (0.1528)	0.0204 (0.0572)	-0.3050 *** (0.1017)
Log PSR ²	0.0249 *** (0.0045)	0.0364 * (0.0158)	0.0086 (0.0055)	0.0450 *** (0.0115)
Log PTR	0.2361 *** (0.0649)	0.6592 *** (0.3174)	0.1765 *** (0.0658)	0.5691 *** (0.1695)
Log PTR ²	0.0116 (0.0086)	-0.0282 (0.0459)	0.0187 * (0.0086)	-0.0215 (0.0236)
FTR	-0.0049 (0.0259)	-0.0258 (0.1040)	-0.1073 *** (0.0256)	0.4446 *** (0.0655)
Teacher houses	0.0154 *** (0.0013)	0.0190 *** (0.0038)	0.0144 *** (0.0013)	0.0186 *** (0.0026)
Boarding	0.0121 (0.0193)	0.0780 * (0.0410)	0.0381 * (0.0205)	0.0005 (0.0366)
<i>Frequency of inspections (*Base category is more than 2 visits)</i>				
No Inspection	-0.0398 ** (0.0193)	0.0492 (0.0632)	-0.0117 (0.0214)	-0.0611 (0.0429)
One Inspection visit	-0.0442 *** (0.0146)	0.0419 (0.0514)	-0.0489 *** (0.0148)	-0.0500 (0.0371)
Two Inspection visits	-0.0421 *** (0.0124)	0.0303 (0.0511)	-0.0396 *** (0.0114)	-0.0023 (0.0497)
Government	0.3451 *** (0.0182)	0.1678 *** (0.0369)		
Distance to school	0.0160 * (0.0096)	-0.0404 (0.0533)	-0.0118 (0.0097)	0.1178 *** (0.0246)
Staffroom	0.0539 *** (0.0097)	-0.0154 (0.0358)	0.0402 *** (0.0097)	0.0769 *** (0.0236)
Constant	-0.2299 (0.1720)	-0.1774 (0.5742)	-0.0475 (0.1936)	-0.9596 *** (0.3812)
Observations	7146	678	5798	2026
R-squared	0.4656	0.6104	0.4542	0.3609

Note: (i) Standard errors are reported in the parentheses. (ii) *, **, *** indicate significance at the 90%, 95%, and 99% level, respectively.

government schools due to high school fees charged in private schools in the period of analysis. Alternatively, these results also relate to the effect automatic promotion policy widely implemented in government schools as opposed to their private counterparts. This promotes higher and timely school completion of pupils in government primary schools. The study also finds that inspection visits boost higher completion rates in public schools than in private schools. This could be attributed to strong monitoring and accountability structures established by school owners and directors in private schools which keep teachers and school management in check.

6.1. Policy implications

Our study suggests the dire need for government and education stakeholders strengthen the monitoring and inspection visits in public schools especially in rural areas, to increase the quality of school management. Particularly, these visits are critical in addressing teacher and student absenteeism and overseeing the general effective operations of the school. As such, there should be more funding and facilitation of district inspectors and Centre coordinating tutors in terms of transport means to ensure more frequent visits to schools rather than the current two visits in a year. Furthermore, there is a need to recruit more trained and qualified teachers in accordance with the school enrollment to reduce the pupil teacher ratio from the current 51:1. This will create more space for teachers to handle a few pupils but also provide more teacher-pupil interactions and provide a conducive environment for learners to guarantee that they remain in school.

To increase quality assurance and management in public schools, the government should strengthen the role of school management committees to conduct quality assurance and the general running of the school to check the challenges of high dropouts and teacher absenteeism. Lastly, the government and other stakeholders need to address infrastructure deficits in primary schools. More specifically, efforts to increase number of classrooms and stance blocks based on school population will promote good sanitation and overcrowding and address school dropout.

Declaration of Competing Interest

None.

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