

Predictive Influence of Pre-Entry Examination Performance on Educational Outcomes among Certificate-Level Trainees in Midwifery, Nursing, and Pharmacy in Uganda

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Title

Predictive Influence of Pre-Entry Examination Performance on Educational Outcomes among Certificate-Level Trainees in Midwifery, Nursing, and Pharmacy in Uganda

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Abstract**Background:**

Admission policy in Uganda's health training institutions is a decisive factor in shaping the quality and safety of the healthcare workforce. Current systems emphasize cut off points

and prerequisite subjects Biology, Chemistry, Physics, Mathematics, and English, yet competence based education reforms demand more nuanced approaches.

Objective:

This study investigated whether pre entry subject performance predicted academic, practical, and progression outcomes among certificate level nursing, midwifery, and pharmacy trainees in Fort Portal, Uganda. The aim was to evaluate the empirical defensibility of strict subject criteria and to explore whether admission reform should emphasize bridging, monitoring, and early support mechanisms.

Methods:

This retrospective cohort study examined admission records and training outcomes from two health training institutions to evaluate the predictive validity of O-Level subject grades. Data were collected using pretested tools from admission records, and academic performance reports. Outcomes assessed were cumulative grade point average (CGPA), practical competence (OSCE/OSPE), and progression indicators such as paper failures and timely completion. Data were entered into SPSS and R for statistical analysis. Descriptive statistics summarized baseline characteristics. Linear regression models were used to determine the association between admission predictors (subject grades, sex, age, program, institution) and training outcomes. Results were reported as beta coefficients with 95% confidence intervals and p-values, with significance set at $p < 0.05$.

Results:

The majority of learners (286/401, 71.3%) were female, with a mean admission age of 19.9 years. No entry subject independently predicted overall CGPA, paper failure, or timely completion. Lower numerical entrance scores suggested better prior performance in the adjusted model ($\beta = -0.645$, 95% CI -1.243 to -0.047 , $p = 0.035$). Mathematics was moderately but significantly correlated with OSCE/OSPE performance ($r = -0.137$, $p = 0.007$). Program and institutional factors were stronger predictors: certificate nursing students had higher odds of finishing on time (AOR = 2.50, 95% CI 1.37–4.56), while

certificate pharmacy students had higher odds of failing compared to midwifery students (AOR = 4.05, 95% CI 1.80–9.10).

Conclusion:

Uganda's reliance on rigid subject prerequisites may not fully capture the competencies required for certificate level health training. Admission reform should integrate bridging programs, structured mentorship, and early support systems to ensure both patient safety and equitable access to training. These findings contribute to ongoing debates on competence based education and socially responsive admissions in low resource settings.

Keywords:

Admission policy, predictive validity, competence-based education, academic outcome, Uganda

Background

Admission policy is a cornerstone of health professions education, determining who gains entry into training and shaping the future healthcare workforce. In Uganda, admission into professional courses such as medicine and pharmacy is governed by cut-off points, while health training institutions require passes in Biology, Chemistry, Physics, Mathematics, and English. This dual emphasis reflects a policy tension: safeguarding patient safety and training quality while avoiding unjust exclusion of potentially competent nurses, midwives, and allied health workers.

The National Education and Training for Health Policy[1]) situate admission within a continuum encompassing identification, admission, training, assessment, certification, internship, professionalization, and lifelong learning, thereby aligning with transparent, meritocratic, and equitable health education responsive to labor market demands[2]. Complementing this, the Uganda Bureau of Statistics Baseline Education Census underscores the need for enhanced data systems to monitor the educational

continuum[3]. Certificate-level health programs remain vital pathways for O-level graduates seeking practical employment in nursing, midwifery, and pharmacy.

The shift toward competence-based education requires admission systems to interpret emerging curricular grades rather than assume equivalence with prior grading schemes. The National Council for Higher Education (NCHE) has established minimum criteria for competence-based education and training, providing a framework for institutions to synchronize curricula and assessment with competence-based learning[4]. This reform foregrounds the theory of validity: admission criteria are defensible only when supported by evidence substantiating their intended interpretation and application[5].

While prerequisite subjects such as Biology, Chemistry, Physics, Mathematics, and English are assumed to forecast academic advancement, practical proficiency, program completion, or readiness for licensure, international research demonstrates that predictive validity varies by context. Prior academic performance may predict certain training outcomes, but its strength differs across settings and outcomes[6, 7]. In low-resource environments, factors such as clinical experience, mentorship, assessment quality, socioeconomic background, and institutional support exert significant influence beyond initial grades [8, 9]

Recent Ugandan scholarship highlights the regulation-practice gap in professional training, underscoring the need for admission systems that are socially responsive and aligned with quality improvement in resource-constrained health systems[10]. Structured mentorship initiatives, such as the MedXMentor program at Mbarara University, further illustrate how bridging and early support mechanisms can enhance competence development [9]

Methods

Study design and Setting:

The study employed a quantitative retrospective cohort design utilizing de-identified institutional records. The research was carried out within certificate-level health training programs in Fort Portal, Uganda. The analytical dataset included students from Fins Medical University and Fort Portal College of Health Sciences enrolled in the 2022 and 2023 cohorts.

Study population:

The study population comprised students enrolled in Certificate Nursing, Certificate Midwifery, and Certificate Pharmacy programs, with accessible entrance, academic, OSCE/OSPE, and progression information. Records devoid of essential predictor or outcome factors were omitted from the pertinent analyses. The final analytic dataset comprised 401 learners, from 866 student records from the two training institutions calculated using Yamane [11]

Eligibility Criteria

Records were eligible for inclusion if they met the following requirements:

- Program enrollment: Students admitted into certificate-level health training programs (Nursing, Midwifery, Pharmacy) at the two participating institutions.
- Admission data: Availability of complete O-Level subject grades in Biology, Chemistry, Physics, Mathematics, and English.
- Outcome data: Presence of at least one training outcome record, including CGPA, OSCE/OSPE scores, , and or progression and completion status.
- Completeness: Records containing both predictor variables (entry grades) and outcome variables (academic, practical, progression indicators).

Records were excluded if they lacked essential admission grades, had missing outcome data, or contained incomplete documentation that prevented reliable analysis. Students who withdrew, transferred, or had interrupted training were excluded from progression analyses but retained in outcome analyses where data were available.

Data Collection Procedure

Data were collected through documentary review of institutional records using a structured data extraction form. Records reviewed included admission files, academic transcripts, examination results, clinical assessment records, OSCE/OSPE results, and student progression or completion lists. The extraction form captured entry subject performance in Biology, Chemistry, Physics, Mathematics, and English, alongside academic outcomes, clinical/practical outcomes, paper failures, repetition, withdrawal, and timely completion.

Data collection was conducted using de-identified records. Student names and personal identifiers were excluded, and each eligible record was assigned a study code to maintain confidentiality. Records were included only when they contained the essential predictor and outcome variables required for analysis.

Training of Data Collectors

Data were collected with the support of trained research assistants. Prior to data collection, they received training on study objectives, eligibility criteria, ethical handling of records, confidentiality, anonymization, and accurate use of the extraction form. Guidance was provided on extracting data consistently from admission, academic, examination, OSCE/OSPE, and progression records. Training emphasized uniform interpretation of variables, consistent coding of grades, proper handling of missing values, and cross-checking extracted information against source documents to reduce errors and improve consistency across institutions.

Pretesting of the Extraction Form

The structured extraction form was pretested on a small sample of records similar to those expected in the main study. The pretest assessed clarity, completeness, and consistency in capturing entry grades, academic performance, OSCE/OSPE outcomes, failure status, repetition, withdrawal, and timely completion. Adjustments were made to improve clarity, harmonize coding categories, and add fields for exceptional circumstances. This ensured the tool was suitable for comparable data extraction across institutions.

Validity Testing

Validity of the extraction form was ensured through face and content validity. The tool was aligned with study objectives and variables of interest, reviewed to confirm coverage of predictor and outcome variables, and refined based on pretest feedback. Content validity was strengthened by mapping each section to a specific objective, while face validity was confirmed by expert review of its appropriateness for extracting institutional data.

Reliability Testing

Reliability was assessed after pretesting. Because this was a retrospective documentary review rather than a psychometric questionnaire, internal consistency testing (e.g., Cronbach's alpha) was not applicable. Reliability was instead ensured through training of data collectors, use of a structured tool, harmonized coding procedures, and cross-checking selected extracted data against source documents. Consistency checks during pretesting further strengthened reliability.

Challenges Encountered

Data collection faced challenges including incomplete documentation, missing entry grades, unavailable academic results, missing OSCE/OSPE scores, and unclear progression outcomes. Records were sometimes fragmented across departments, and some students had withdrawn, transferred, repeated, or interrupted training, complicating classification of progression. These challenges were addressed by cross-checking across multiple record sources, excluding incomplete records from relevant analyses, and guiding data collectors to record missing values consistently without assumptions.

Variables:

The primary predictor factors were initial subject scores in Biology, Chemistry, Physics, Mathematics, and English. In the national O'level scoring system, lower numerical scores indicated superior performance. The outcomes included overall CGPA, total OSCE/OSPE score, failure in at least one examination, and timely completion/progression. Co-curricular activity was regarded as a non-academic experience and a potential effect modifier

Statistical analysis:

Descriptive statistics summarized learner attributes. Pearson correlations evaluated the bivariate associations between initial subject scores and continuous outcomes. Multivariable linear regression models assessed adjusted correlations with CGPA and OSCE/OSPE results. Logistic regression calculated adjusted odds ratios for the failure of at least one paper and timely completion. Models were adjusted for sex, age at entry, program, and institution. Interaction terms examined whether co-curricular involvement influenced the correlation between initial subject performance and CGPA. Statistical significance was evaluated at $p < 0.05$.

Ethical considerations:

The study used retrospective, de-identified institutional records. The protocol was approved by the Fins Medical University Research Ethics Committee (Ref: FMU/REC/FBMS/003/2026), which waived the requirement for individual informed consent because the study involved existing de-identified records and posed minimal risk. All procedures involving human-related data were conducted in accordance with the ethical standards and guidelines of the Fins Medical University Research Ethics Committee, the Uganda National Council for Science and Technology National Guidelines for Research Involving Humans as Research Participants (2025), and the Declaration of Helsinki and its subsequent amendments.

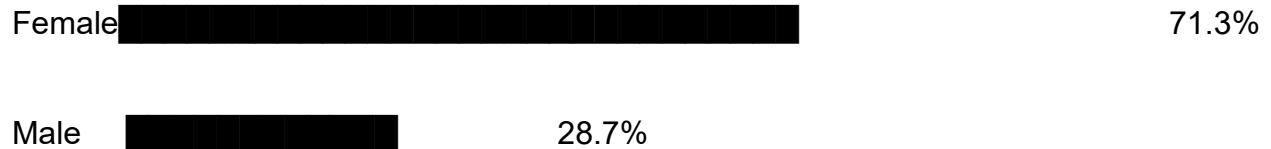
Results**Learner demographic characteristics:**

A total of 401 records of learners were involved. The majority were female (286, 71.3%), with a mean age at admission of 19.9 years (SD 1.8), as indicated in figure 1 below. The 2023 cohort included 55.4% of the learners. Program distribution comprised Certificate in Nursing (36.7%), Certificate in Midwifery (35.4%), and Certificate in Pharmacy (27.9%) indicated in figure 2 below. The average admission qualifying score was 38.7 (SD 7.6), the mean overall CGPA was 3.31 (SD 1.59), and the mean overall OSCE/OSPE score was 63.0% (SD 8.6).

Figure 1. Participant Characteristics (N = 401)

Distribution of sex and program enrollment among certificate-level trainees.

Sex distribution

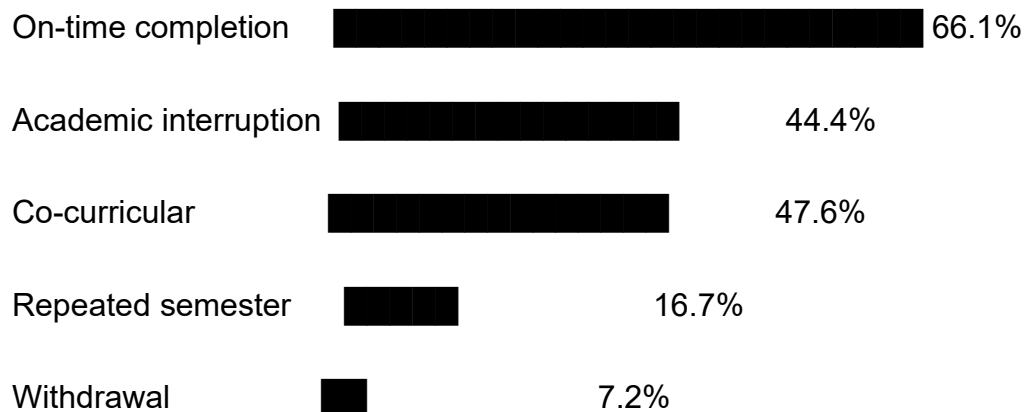


The bar chart shows program composition (Nursing 36.7%, Midwifery 35.4%, Pharmacy 27.9%). Mean age at entry was 19.9 years (SD 1.8). On-time completion was achieved by 66.1% of learners, while 44.4% experienced academic interruption.

Figure 2 below shows the program distribution of student participants



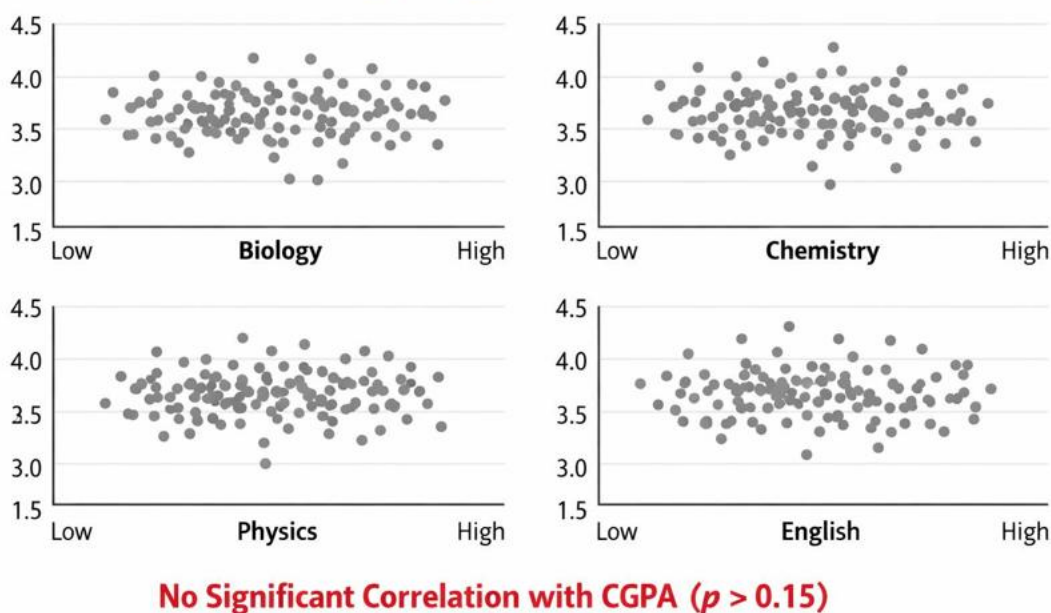
Figure 3 below shows the general academic outcomes of student participants



The Correlation between entry subject scores and cumulative grade point average (CGPA).

The scatter plots below demonstrate weak, non-significant associations between Biology, Chemistry, Physics, Mathematics, and English entry scores and overall CGPA (all $p > 0.15$). No subject independently predicted CGPA after adjustment.

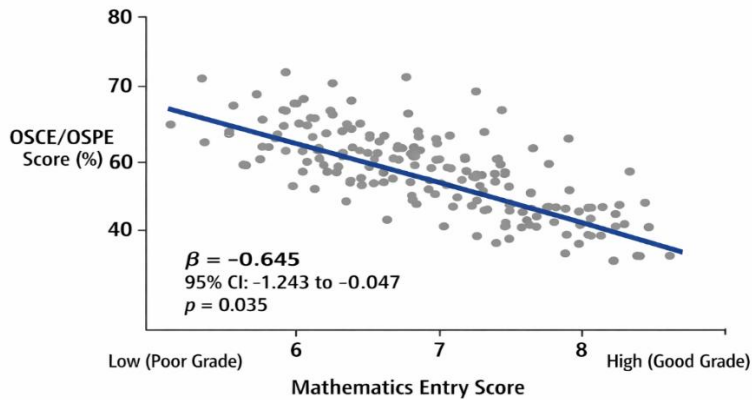
Figure 4 below shows the correlation between entry point and CGPA



Relationship between Mathematics entry scores and OSCE/OSPE performance.

Scatter plot with regression line shows a modest inverse correlation ($\beta = -0.645$, 95% CI -1.243 to -0.047 , $p = 0.035$). Lower numerical Mathematics scores (better performance) were associated with higher OSCE/OSPE scores. Pharmacy students scored lower than midwifery students, and institution 002 scored significantly lower than institution 001.

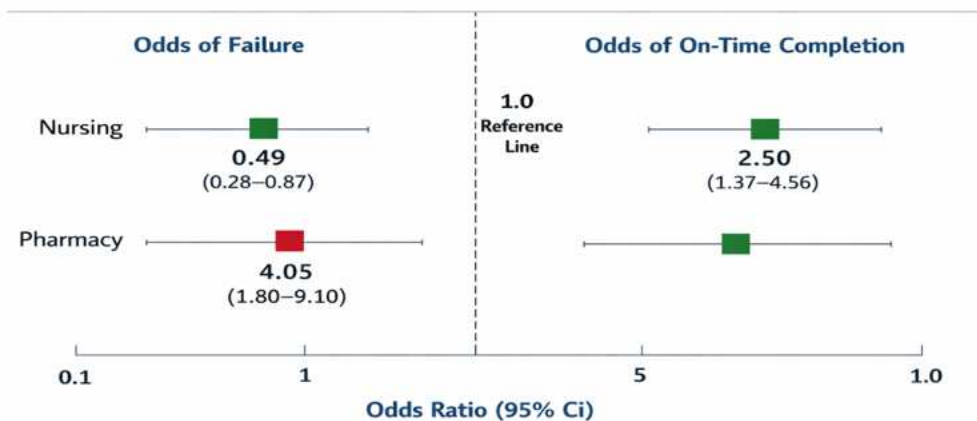
Figure 5 below shows the relationship between math and OSPE performance



Program-Level Odds of Failure and Completion

The Adjusted Odds Ratios (AORs) for program type predicting examination failure and on-time completion is shown in the forest plot. It illustrates that nursing students had reduced odds of failure (AOR = 0.49, 95% CI 0.28–0.87) and increased odds of on-time completion (AOR = 2.50, 95% CI 1.37–4.56). Pharmacy students had increased odds of failure (AOR = 4.05, 95% CI 1.80–9.10). Entry subject scores did not predict either outcome.

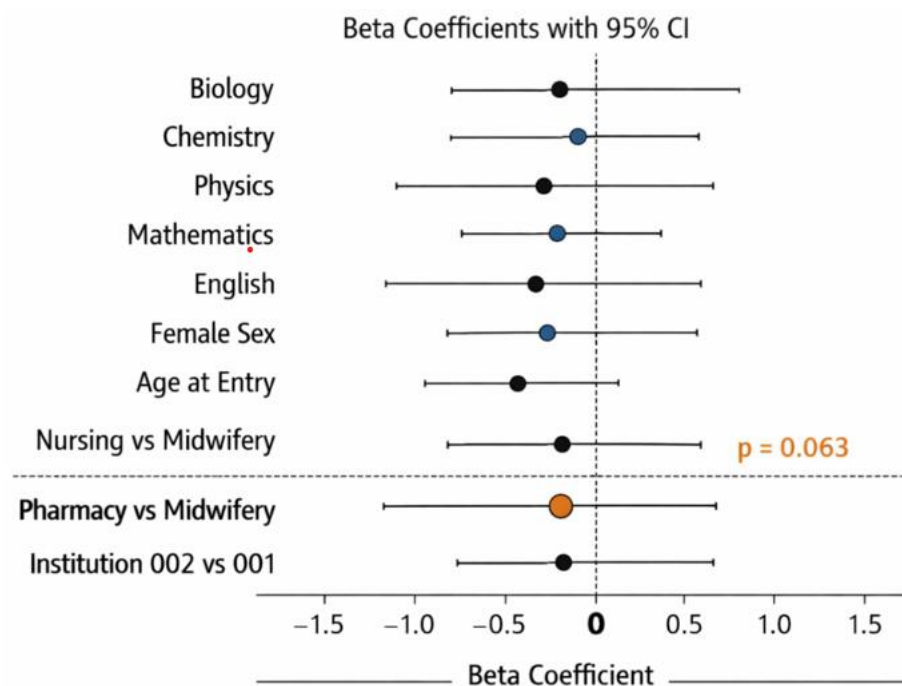
Figure 6 below shows program level of failure



Entry subject performance and CGPA:

None of the individual topic scores exhibited a significant correlation with the overall CGPA. The correlation coefficients were weak and nearly null: Biology ($r = -0.066$, $p = 0.190$), Chemistry ($r = 0.008$, $p = 0.878$), Physics ($r = -0.076$, $p = 0.135$), Mathematics ($r = -0.072$, $p = 0.154$), and English ($r = -0.087$, $p = 0.086$). Upon adjusting for sex, age, program, and institution, no individual variable independently predicted CGPA.

Figure 7 below shows relation between subject performance and CGPA



The forest plot above presents the beta coefficients and 95% confidence intervals for ten predictors analyzed in the regression model. Each horizontal line represents a predictor's confidence interval, with a central dot marking the estimated coefficient. The vertical dashed line at zero indicates the point of no effect.

Academic Subjects (Biology, Chemistry, Physics, Mathematics, English): All coefficients cluster near zero, with confidence intervals crossing the null line showing no significant predictive influence.

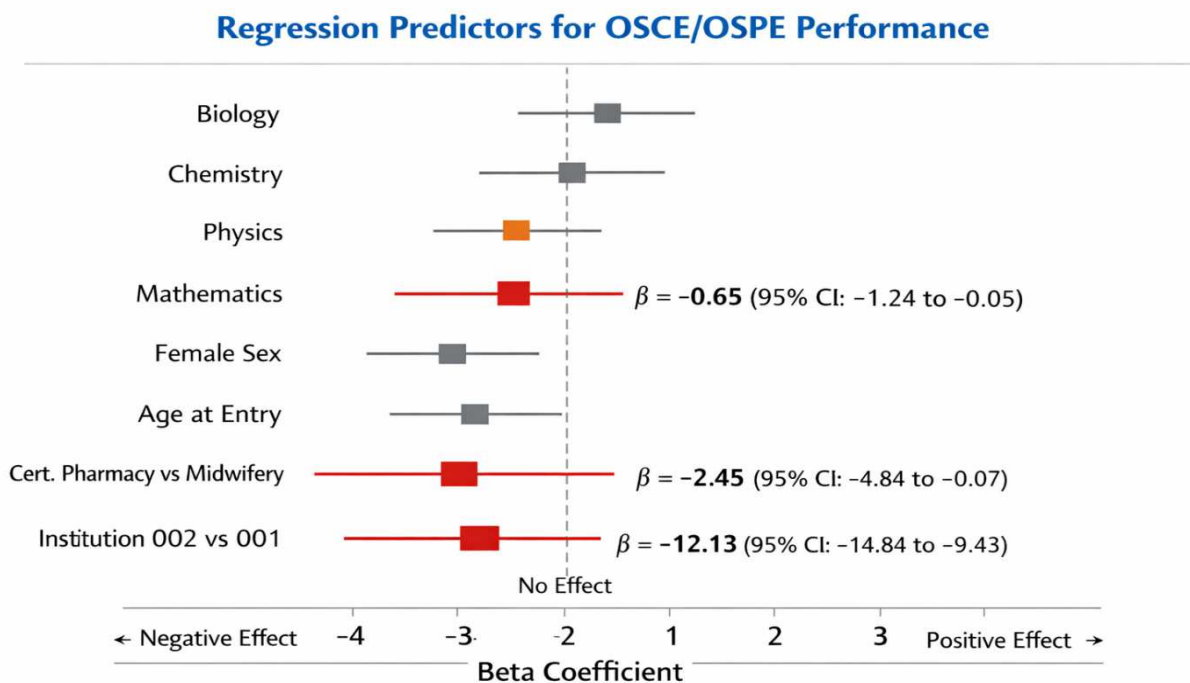
Demographics (Female Sex, Age at Entry): Female sex trends slightly positive, while age at entry trends negative. Both intervals overlap zero, confirming non-significance.

Program & Institution (Nursing vs Midwifery, Pharmacy vs Midwifery, Institution 002 vs 001): Pharmacy vs Midwifery stands out with a negative coefficient ($\beta = -0.515$) and a p -value of 0.063, suggesting a borderline significant effect. Other program and institutional comparisons show non-significant trends.

The forest plot visually emphasizes that most predictors have minimal or statistically insignificant effects. The Pharmacy vs Midwifery variable is the only one approaching significance, hinting at potential program-level differences worth further exploration.

Regression Predictors for OSCE/OSPE Performance

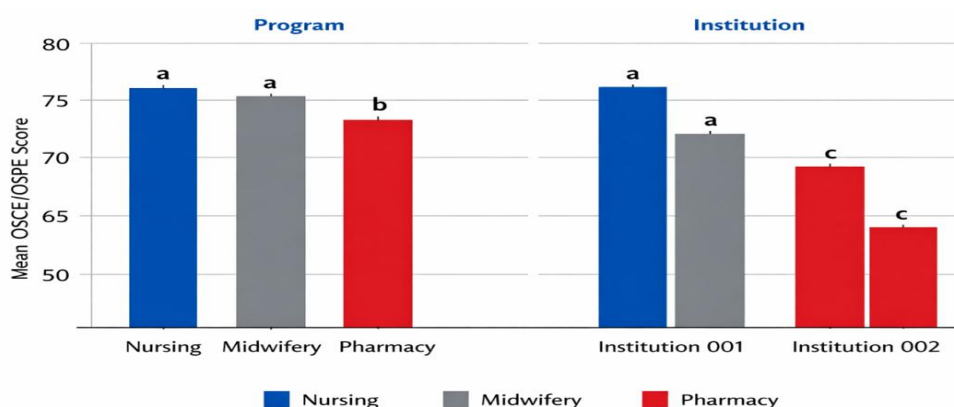
Figure 9. below Forest plot of regression coefficients for entry subjects and demographics. Mathematics was the only significant predictor ($\beta = -0.645$, 95% CI -1.243 to -0.047 , $p = 0.035$). Physics showed a borderline negative trend ($\beta = -0.803$, $p = 0.058$). Other subjects and demographics were non-significant.



OSCE/OSPE Performance by Program and Institution

Grouped bar chart comparing mean OSCE/OSPE scores. Pharmacy students scored lower than Nursing and Midwifery peers. Institution 002 students performed significantly worse than Institution 001, highlighting strong institutional effects.

Figure 10 OSCE/OSPE Performance by Program and Institution

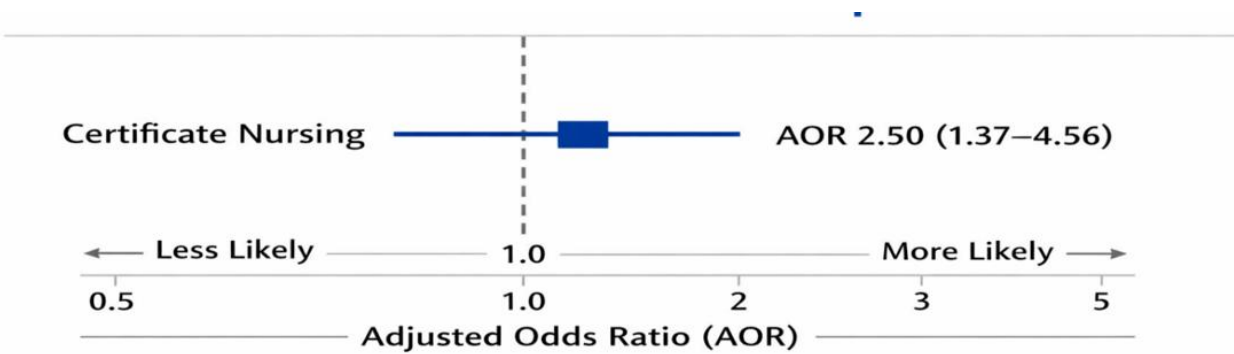


Entry subject performance, failure and on-time completion.

No entry topic score significantly forecasted the failure of at least one examination. The type of program was significantly correlated with failure. In comparison to Certificate Midwifery, Certificate Nursing exhibited reduced odds of failure (AOR = 0.49, 95% CI 0.28 to 0.87, $p = 0.015$), whereas Certificate Pharmacy demonstrated increased odds of failure (AOR = 4.05, 95% CI 1.80 to 9.10, $p = 0.001$). The performance of entry subjects did not indicate timely completion. Nursing certificate learners exhibited greater likelihood of timely completion compared to midwifery certificate learners (AOR = 2.50, 95% CI 1.37 to 4.56, $p = 0.003$).

Forest plot below illustrates the association between program type and timely progression. Certificate Nursing predicted higher likelihood of on-time completion (AOR 2.50, 95% CI 1.37–4.56). This means that completion outcomes were primarily shaped by program-level factors rather than entry subject grades.

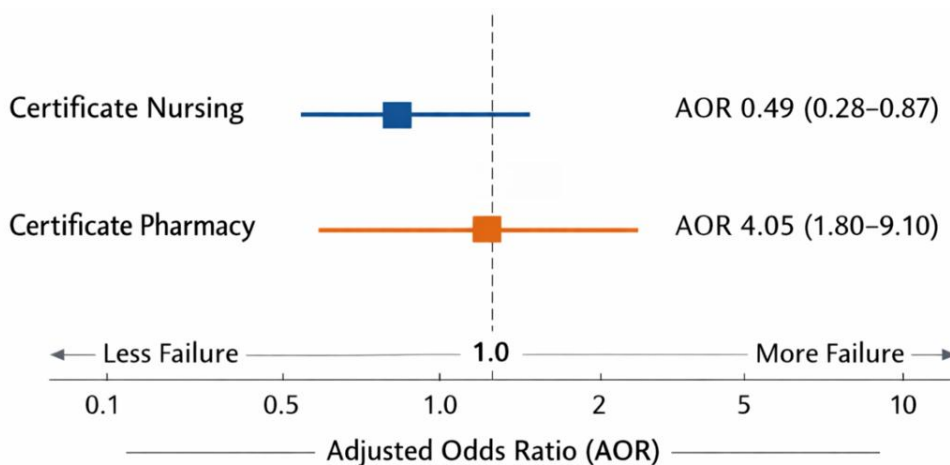
Figure 11. Below Show Timely Completion of training



Failure of at Least One Paper

Figure 12. below, Forest plot showing adjusted odds ratios (AOR) for program-level predictors of paper failure. Certificate Nursing students had significantly lower odds of failure (AOR 0.49, 95% CI 0.28–0.87), while Certificate Pharmacy students had higher odds (AOR 4.05, 95% CI 1.80–9.10). Program context exerted stronger influence on failure risk than entry subject performance.

Figure 12, Failure of at least one paper

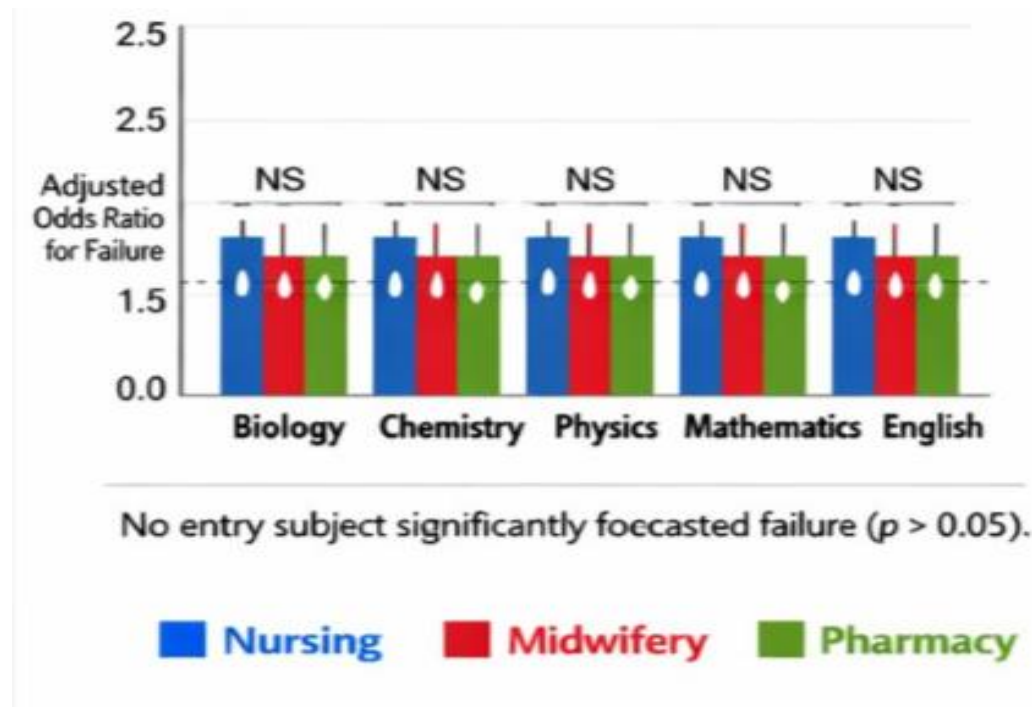


Entry Subjects and Academic Outcomes

Figure 13 below. Show grouped bar chart that compare adjusted odds ratios for failure and completion across entry subjects (Biology, Chemistry, Physics, Mathematics, English). All predictors were non-significant

(NS). Meaning individual subject grades did not significantly predict either failure or progression, underscoring the limited predictive value of subject-specific entry performance.

Figure 13 failure and completion across entry subjects



Discussion

This study examined the predictive validity of O-level subject performance for educational outcomes among certificate-level health trainees and found that most entry subject scores had limited independent predictive value for cumulative grade point average (CGPA), failure rates, and timely progression. Mathematics was the only subject that demonstrated a modest association with OSCE/OSPE performance, while institutional and program-related factors emerged as stronger determinants of educational outcomes. These findings challenge the assumption that superior performance in secondary school science subjects consistently translates into better academic achievement and clinical competence during health professional training.

The limited predictive power of entry subject grades observed in this study is consistent with the broader literature on health professions education. Although prior academic

achievement has traditionally been used as a key criterion for admission into health training programs, evidence regarding its predictive validity remains mixed. [12], in a systematic review of medical education literature, reported that prior academic attainment predicts certain aspects of academic performance but that its predictive strength varies considerably depending on the outcome measured. Similarly, [13] found that secondary school academic performance predicted achievement in knowledge-based assessments more strongly than clinical competence or professional performance. These findings suggest that while academic achievement may reflect cognitive preparedness for training, it does not fully capture the multidimensional competencies required for successful healthcare practice.

The modest association between mathematics and OSCE/OSPE performance observed in this study is theoretically plausible. Mathematics plays an important role in medication dosage calculations, interpretation of laboratory data, fluid management, epidemiological reasoning, and quantitative clinical decision-making. Competence in these areas may contribute to improved performance in practical examinations that assess procedural accuracy and clinical problem-solving. However, the relatively small effect size indicates that mathematics alone explains only a small proportion of variation in practical competence. Similar findings have been reported by [14] who found that mathematical achievement contributes to performance in applied professional tasks but with modest effect sizes. These results suggest that while quantitative skills may facilitate certain aspects of healthcare training, broader competencies are shaped by additional factors beyond academic preparedness.

An important finding of this study was the stronger influence of institutional and program characteristics on educational outcomes. This observation aligns with growing evidence indicating that learner success is heavily influenced by the quality of the educational environment[15]demonstrated that academic achievement among allied health students is determined not only by prior academic performance but also by motivation, teaching quality, institutional support, and learning resources. Similarly, Tinto's Student Integration Theory posits that student persistence and success depend on academic and social integration within educational institutions [16]. The present findings support this

perspective by demonstrating that educational outcomes are shaped by a complex interaction between learner characteristics and institutional factors rather than by entry qualifications alone.

The findings are particularly relevant in the context of health professions education in low-resource settings. [17] reported that clinical competence among healthcare trainees is strongly influenced by mentorship, supervision, availability of clinical learning opportunities, and institutional support systems. [18] found that structured mentorship programs improved student retention, progression, and competence among health sciences students in East Africa. These studies reinforce the conclusion that educational environments play a critical role in transforming academic potential into professional competence. Consequently, institutions with strong mentorship systems, adequate learning resources, and quality clinical placements may be able to support students with varying levels of academic preparedness and achieve comparable educational outcomes.

The findings also contribute to ongoing debates regarding predictive validity in health professions education. Predictive validity theory suggests that admission criteria should be evaluated according to their ability to forecast future performance [19]. However, healthcare competence is a complex construct encompassing knowledge, psychomotor skills, communication abilities, professionalism, ethical reasoning, and clinical judgment [20, 21] argues that no single admission criterion can adequately predict such multidimensional outcomes. The limited predictive value of individual subject grades observed in this study supports this argument and suggests that admission systems based solely on academic performance may overlook important determinants of future success.

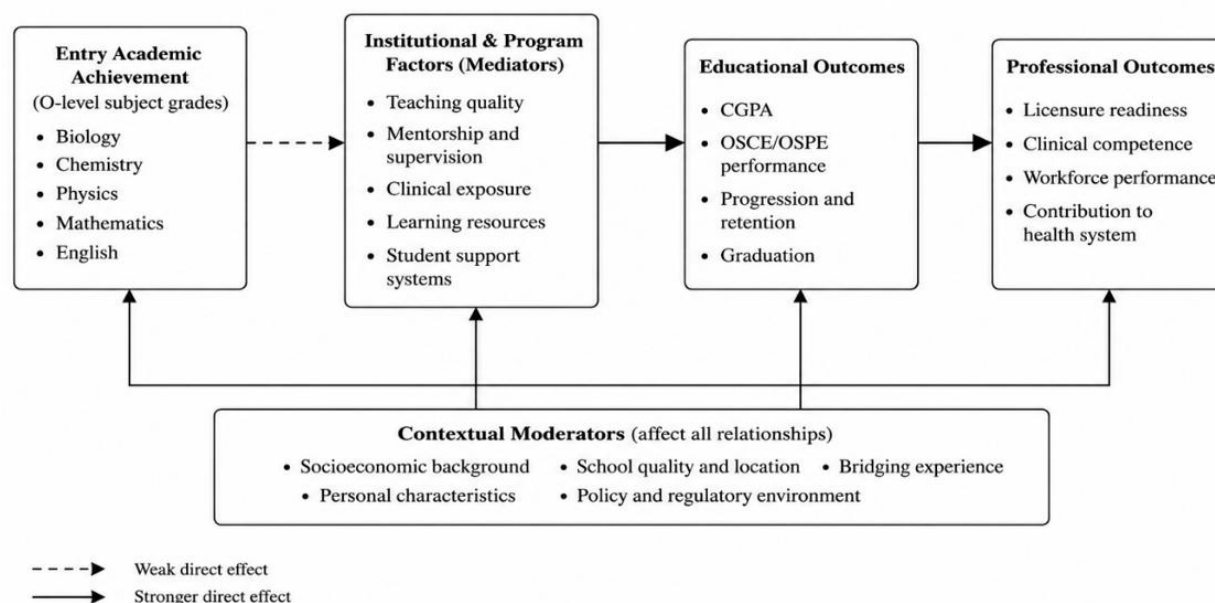
The study findings informed the development of a framework that explains the relationship between entry academic achievement and educational outcomes among certificate-level health trainees. The framework proposes that performance in Biology, Chemistry, Physics, Mathematics, and English provides the foundational knowledge required for health professions education but has only a limited direct influence on educational outcomes. Instead, the relationship between entry qualifications and learner success is mediated by institutional and program factors, including teaching quality, mentorship and

supervision, clinical exposure, learning resources, and student support systems. These mediating factors determine the extent to which academic preparedness is translated into academic achievement and practical competence.

Proposed Conceptual Framework: Entry Academic Achievement and Educational Outcomes among Certificate-Level Health Trainees

This framework below illustrates that performance in Biology, Chemistry, Physics, Mathematics, and English provides the foundational knowledge required for health professions education, but exerts only a limited direct influence on educational outcomes. Instead, progression, competence, and success are shaped more strongly by institutional support, mentorship, contextual factors, and learner resilience.

Figure 13 Proposed Framework of Entry Academic Achievement and Educational Outcomes



The framework further recognizes the influence of contextual moderators such as socioeconomic background, prior school environment, bridging experiences, personal characteristics, and policy or regulatory conditions. These factors may either enhance or diminish the impact of both entry qualifications and institutional support. For example, students from disadvantaged educational backgrounds may initially have lower academic preparedness but can achieve comparable outcomes when provided with adequate

academic support and mentorship. Conversely, academically strong students may underperform in poorly resourced learning environments. This interpretation extends traditional predictive validity models by emphasizing that educational outcomes are produced through interactions between learner characteristics and contextual factors rather than through academic achievement alone.

The policy implications of these findings are significant for health professions education in Uganda. Current admission policies place considerable emphasis on minimum grades in science subjects as indicators of future success. Implicitly, these policies assume a direct relationship between academic performance and professional competence. However, the present findings challenge this assumption by demonstrating that individual subject grades explain only a small proportion of variation in educational outcomes. Similar concerns have been raised by [3] who argued that rigid admission thresholds may create unnecessary barriers to training without guaranteeing improved competence among graduates.

These concerns are particularly important in Uganda, where shortages of health workers persist, especially in rural and underserved communities. Admission systems that exclude applicants solely on the basis of marginal differences in academic grades may inadvertently reduce opportunities for potentially competent individuals to enter the health workforce. Evidence from global health workforce research suggests that students from rural and disadvantaged backgrounds are more likely to return and serve in underserved communities following graduation [22]. Therefore, overly restrictive admission policies may have unintended consequences for health workforce development and equitable access to healthcare services.

The findings support the adoption of more holistic and competency-oriented admission approaches. Rather than using entry grades as strict exclusion criteria, academic performance could be used to identify students who may benefit from targeted support interventions, including bridging programs, mentorship, academic advising, and remedial learning opportunities. Such approaches are consistent with competency-based education frameworks, which emphasize achievement of competencies through structured learning experiences rather than reliance on prior academic performance as a

predictor of future [4, 23]. Strengthening educational environments may therefore be more effective than raising admission thresholds in improving learner outcomes.

This study makes an important contribution to the literature by providing empirical evidence on the predictive validity of O-level subject performance among certificate-level health trainees in Uganda. To our knowledge, few studies have examined the extent to which specific secondary school subjects predict academic progression and practical competence within certificate-level health training programs. The findings suggest that institutional and program factors explain more variation in educational outcomes than individual subject grades, thereby challenging assumptions underlying current admission practices. The study also proposes a contextualized conceptual framework that highlights the mediating role of educational environments and extends existing predictive validity models within low-resource settings.

Despite these contributions, several limitations should be acknowledged. The study relied on retrospective educational records, which may not capture important non-academic determinants of success such as motivation, resilience, socioeconomic status, learning strategies, and psychological wellbeing. In addition, the findings were derived from certificate-level health training institutions and may not be directly generalizable to diploma, undergraduate, or postgraduate health professions programs. The study also focused on educational outcomes and did not assess longer-term professional outcomes such as licensure examination performance, workplace competence, or retention within the health workforce.

Future research should adopt prospective longitudinal designs to evaluate the predictive validity of admission criteria across the continuum of health professions education. National cohort studies following learners from admission through graduation and professional practice would provide stronger evidence regarding the relationships among academic achievement, institutional factors, competence development, and workforce performance. Such studies should incorporate socioeconomic variables, bridging program participation, mentorship exposure, continuous assessment results, licensure outcomes, and measures of workplace performance. This evidence would enable policymakers to determine which admission characteristics genuinely predict success

and to develop admission systems that balance educational quality, equity, and workforce needs.

Conclusion

This study found that most O-level subject grades had limited predictive value for academic achievement, progression, and practical competence among certificate-level health trainees. Mathematics demonstrated a modest association with OSCE/OSPE performance, but institutional and program factors were stronger predictors of educational outcomes. These findings suggest that academic qualifications alone are insufficient predictors of success in health professions education and that learner outcomes are shaped by interactions between academic preparedness, educational environments, and contextual factors. Admission policies should therefore be informed by empirical evidence and complemented by robust institutional support systems that promote competence development and equitable access to health professions training.

Declarations

Ethical approval

The study protocol was approved by the Fins Medical University Research Ethics Committee (Ref: FMU/REC/FBMS/003/2026). All procedures involving human-related data were conducted in accordance with the ethical standards and guidelines of the Fins Medical University Research Ethics Committee, the Uganda National Council for Science and Technology National Guidelines for Research Involving Humans as Research Participants (2025), and the Declaration of Helsinki and its subsequent amendments. Formal permission to access de-identified student records was obtained from both participating institutions.

Consent to participate

The Fins Medical University Research Ethics Committee waived the requirement for individual informed consent because this retrospective study used existing de-identified institutional records, involved no direct participant contact, and posed minimal risk.

Consent to publish

Not applicable. The manuscript contains no identifiable individual participant data, images, or case details.

Competing interests

The authors declare that they have no competing interests.

Funding

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Author contributions

RM and VK devised the study, spearheaded protocol formulation, analysed the results, and composed the report. NH facilitated data organisation, DA analysed institutional training outcomes, and PAB conducted the literature review. JNO supported data analysis and revised the manuscript. All authors reviewed and endorsed the final manuscript.

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Table 1. Socio-demographic and training characteristics of learners (n = 401)

Characteristic	Frequency (%) or mean +/- SD
Female sex	286 (71.3)
Male sex	115 (28.7)
2022 cohort	179 (44.6)
2023 cohort	222 (55.4)
Certificate Nursing	147 (36.7)
Certificate Midwifery	142 (35.4)
Certificate Pharmacy	112 (27.9)
Fins Medical University	336 (83.8)
Fort Portal College of Health Sciences	65 (16.2)
Co-curricular participation	191 (47.6)
Repeated at least one semester	67 (16.7)
Academic interruption	178 (44.4)
Withdrawal	29 (7.2)
On-time progression/completion	259 (66.1)
Age at entry	19.9 +/- 1.8 years
Entry qualification score	38.7 +/- 7.6
Overall CGPA	3.31 +/- 1.59

Overall OSCE/OSPE score	63.0 +/- 8.6%
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Table 2. Multivariable linear regression predicting overall CGPA

Predictor	Beta coefficient	95% CI	p –value
Biology	-0.077	-0.244 to 0.090	0.367
Chemistry	0.078	-0.087 to 0.243	0.352
Physics	-0.095	-0.283 to 0.093	0.321
Mathematics	-0.025	-0.162 to 0.111	0.716
English	-0.087	-0.227 to 0.053	0.222
Female sex	0.200	-0.206 to 0.606	0.334
Age at entry	-0.047	-0.138 to 0.044	0.312
Certificate Nursing vs Midwifery	0.198	-0.207 to 0.603	0.337
Certificate Pharmacy vs Midwifery	-0.515	-1.059 to 0.028	0.063
Institution 002 vs 001	-0.482	-1.087 to 0.124	0.118

Table 3. Multivariable linear regression predicting overall OSCE/OSPE score

Predictor	Beta coefficient	95% CI	p value
Biology	0.159	-0.575 to 0.893	0.670
Chemistry	0.270	-0.453 to 0.994	0.463

Physics	-0.803	-1.633 to 0.027	0.058
Mathematics	-0.645	-1.243 to -0.047	0.035
English	-0.206	-0.827 to 0.415	0.515
Female sex	1.308	-0.487 to 3.104	0.153
Age at entry	-0.027	-0.426 to 0.372	0.894
Certificate Nursing vs Midwifery	0.870	-0.907 to 2.647	0.336
Certificate Pharmacy vs Midwifery	-2.453	-4.836 to -0.070	0.044
Institution 002 vs 001	-12.134	-14.840 to -9.427	<0.001

Table 4. Adjusted logistic regression for failure and on-time completion

Outcome	Significant predictors	Interpretation
Failure of at least one paper	Certificate Nursing: AOR 0.49 (95% CI 0.28 to 0.87); Certificate Pharmacy: AOR 4.05 (95% CI 1.80 to 9.10)	Program-level risk was stronger than subject-specific entry performance.
On-time completion/progression	Certificate Nursing: AOR 2.50 (95% CI 1.37 to 4.56)	Program context predicted completion more strongly than entry subject grades.
Entry subjects	None significant for either binary outcome	Rigid reliance on individual subjects for progression prediction was not supported in this cohort.

