

Competency-Based Curriculum Assessment Reform and Learning Outcome Disparities Across Urban-Rural Schools: A Comparative Cross-Sectional Study

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Abstract

This study examined disparities in learning outcomes attributable to the implementation of the Competency-Based Curriculum (CBC) assessment reform across urban and rural primary schools. Guided by a comparative cross-sectional design, the study was informed by human capital and equity-in-education frameworks and sought to establish the extent to which school locality, teacher CBC training, school resourcing, socioeconomic status, and parental involvement predicted learners' attainment of competency proficiency. A structured assessment and school-characteristics questionnaire was administered to a sample of 700 upper-primary learners and their corresponding class teachers drawn from purposively selected urban (n=320) and rural (n=380) schools, using a multistage stratified random sampling procedure. Data were analysed in Stata using univariate frequency distributions, bivariate chi-square tests of association and independent-samples t-tests/one-way ANOVA, and a multivariable binary logistic regression model to identify independent predictors of competency proficiency while controlling for confounding. Findings indicated a substantial urban-rural gap in mean CBC assessment scores (84.7% versus 66.2%, $p<0.001$) and in the proportion of learners attaining proficiency (99.1% versus 69.2%, $p<0.001$). Bivariate analysis confirmed significant associations between locality and teacher training status, socioeconomic status, and parental involvement (all $p<0.001$). In the adjusted multivariable model, teacher CBC training (AOR=5.77, 95% CI: 3.13-10.62), school resource index (AOR=1.49, 95% CI: 1.26-1.76), high socioeconomic status (AOR=16.12, 95% CI: 4.87-53.33), and parental involvement (AOR ranging 7.23-7.93) emerged as independent predictors of proficiency, whereas urban locality itself was attenuated to marginal significance (AOR=3.55, 95% CI: 0.89-14.15, $p=0.072$) once these structural factors were controlled for, and larger class size independently reduced the odds of proficiency (AOR=0.95, $p=0.001$). The study concludes that urban-rural learning outcome disparities under CBC are substantially mediated by inequities in teacher training, school resourcing, class size, and household-level socioeconomic and parental support factors rather than locality per se, and recommends targeted investment in rural teacher CBC retraining, equitable resource allocation, and community-level parental engagement programmes to narrow the observed gap.

Key Words: Competency-Based Curriculum and Learning Outcome Disparities

Introduction

The transition from a knowledge-based to a competency-based curriculum (CBC) represents one of the most far-reaching pedagogical reforms undertaken by many sub-Saharan African education systems in the past decade, with the explicit intention of shifting learner assessment away from rote recall toward the demonstrable application of skills, values, and competencies in real-life contexts. In principle, competency-based assessment is designed to be

more equitable than traditional summative testing because it emphasises continuous, formative, and practical evaluation of what a learner can do rather than what a learner can memorise (Gracious Kazaara & Julius, 2025; Julius & Audrey, 2025a; Julius & Isaac Kazaara, 2025; Lozano et al., 2022); in practice, however, the successful delivery of CBC assessment is highly dependent on the availability of trained teachers, adequate instructional materials, manageable class sizes, and supportive learning environments, all of which are known to be unevenly distributed between urban and rural school settings. Uganda's rollout of the lower secondary and upper primary competency-based curriculum has therefore generated considerable policy interest in whether the reform is narrowing or, paradoxically, widening pre-existing urban-rural learning outcome gaps, since schools in urban centres typically enjoy better teacher-pupil ratios, more frequent in-service training opportunities, stronger school resourcing, and higher levels of parental socioeconomic capital than their rural counterparts (Franco et al., 2023; Julius & Kazaara, 2025a, 2026; Julius & Nancy, 2026). This study was therefore conceived to empirically interrogate this concern by comparing CBC competency assessment performance between urban and rural primary schools and by statistically isolating the specific school- and household-level factors that account for any observed disparity, with a view to generating evidence that can inform more equitable implementation of the reform.

Background of the Study

Competency-based education reforms were first popularised in Organisation for Economic Co-operation and Development (OECD) countries before being progressively adapted and adopted across East Africa, with Rwanda, Kenya, and Uganda each rolling out CBC frameworks between the mid-2010s and early 2020s as part of broader efforts to align basic education outcomes with twenty-first-century skills and labour-market demands (Charles et al., 2023; Julius & Audrey, 2025b; Julius & Nancy, 2025b; Mobegi, 2026). Uganda's National Curriculum Development Centre began the phased introduction of the competency-based lower secondary curriculum in 2020, complemented by curriculum realignment at the upper primary level, with assessment redesigned around continuous formative assessment, project-based tasks, and competency proficiency bands rather than examination-only summative scores (Ma et al., 2022; Müller et al., 2024; Muwanguzi et al., 2023; Ndomondo et al., 2022). Empirical and grey literature from comparable reform contexts has consistently documented that curriculum reforms of this nature, however well-intentioned, tend to be implemented unevenly across geographic and socioeconomic strata because their success hinges on complementary inputs, teacher pedagogical retraining, instructional materials, ICT and laboratory resources, and manageable class sizes, that are systematically scarcer in rural and hard-to-reach schools (Alvarenga et al., 2020; Kazaara & Audrey, 2026; Kazaara & Desire, 2025; Moradi et al., 2020; Umeze & Ohen, 2016). In the Ugandan context specifically, rural primary schools continue to report higher pupil-teacher ratios, lower rates of teacher access to CBC-specific in-service training, and comparatively limited school infrastructure relative to urban schools, while household-level factors such as parental education, socioeconomic status, and the capacity to support competency-based homework and project tasks at home also differ markedly by locality (Julius & Nancy, 2025a; Mubarak, 2023; Pfaff & Dang, 2025; Sanusi et al., 2022). It is against this backdrop, of a nationally mandated assessment reform being

layered onto a structurally unequal school system, that this study situates its inquiry into the magnitude and drivers of urban-rural learning outcome disparities under CBC.

Problem Statement

Despite the Ministry of Education and Sports' intention that the competency-based curriculum assessment reform would produce more authentic, equitable, and skills-focused measurement of learner achievement nationally, anecdotal reports from school inspection returns and teacher associations suggest that learners in rural primary schools are consistently attaining lower competency proficiency ratings than their urban counterparts under the new assessment framework (Aheisibwe & Barigye, 2023; Julius & Audrey, 2025a; Julius & Kazaara, 2025b). If this disparity is real and is driven by unequal access to trained teachers, instructional resources, and manageable class sizes rather than by learners' inherent ability, then the CBC reform risks entrenching rather than narrowing existing educational inequities, undermining the reform's core equity objective and jeopardising the long-term human capital development of rural communities (Audrey & Kazaara, 2025; Geera & Onen, 2023; Jamil et al., 2020). However, there is a paucity of rigorous, statistically grounded evidence within the Ugandan context that quantifies the size of this urban-rural gap under CBC assessment specifically, or that disentangles which structural and household-level factors independently predict competency proficiency once locality itself is accounted for (Julius & Geoffrey, 2025; Julius & Henry, 2024; Julius & Sula, n.d.; Julius & Twinomujuni, 2025; Ongowo, 2022). Without such evidence, policymakers, district education officers, and school administrators lack an empirical basis for targeting scarce remedial resources, such as teacher retraining, instructional materials, or class-size reduction, to the specific factors that most powerfully drive the observed disparity. This study addressed this gap by generating comparative, multivariable evidence on the extent and determinants of urban-rural learning outcome disparities under the competency-based curriculum assessment reform.

Objectives of the Study

Main Objective

To examine the influence of competency-based curriculum (CBC) assessment reform on learning outcome disparities between urban and rural primary schools.

Specific Objectives

1. To compare CBC competency assessment performance and proficiency attainment between urban and rural primary school learners.
2. To establish the association between school-level factors, including teacher CBC training status, school resourcing, and class size, and learners' locality of schooling.

3. To determine the independent predictors of CBC competency proficiency among learners, controlling for locality, teacher training, school resources, socioeconomic status, parental involvement, class size, and gender.

Research Questions

1. Is there a statistically significant difference in CBC competency assessment performance and proficiency attainment between urban and rural primary school learners?
2. What is the association between school-level factors (teacher CBC training, school resourcing, class size) and school locality (urban versus rural)?
3. Which factors independently predict the likelihood of a learner attaining CBC competency proficiency, after adjusting for other school- and household-level characteristics?

Methodology

This study adopted a comparative cross-sectional design to examine urban-rural disparities in learning outcomes under the competency-based curriculum assessment reform. The study population comprised upper-primary learners and their class teachers drawn from primary schools implementing the CBC framework, and a total sample of 700 learners (320 from urban schools and 380 from rural schools) was selected using a multistage stratified random sampling procedure, in which schools were first stratified by locality (urban versus rural) and then by school type, before learners were randomly sampled from class registers within selected schools; this sampling approach ensured adequate statistical power to detect meaningful differences between the two strata. Data were collected using a structured CBC competency assessment instrument, administered under standardised conditions to generate a continuous assessment score for each learner (0-100%), alongside a school- and household-characteristics questionnaire capturing learner gender, household socioeconomic status, teacher CBC in-service training status, a composite school resource index, class size (pupil-teacher ratio), and level of parental involvement in the learner's schooling. Learners scoring 60% and above on the composite competency assessment were classified as having attained proficiency, consistent with the Ministry of Education and Sports' competency proficiency banding, while those below this threshold were classified as not proficient, yielding a binary outcome variable for multivariable analysis. All data were entered, cleaned, and analysed in Stata 18, and the analytic strategy proceeded in three stages: first, univariate analysis was conducted to summarise the sociodemographic and school-level characteristics of the sample using frequencies and percentages; second, bivariate analysis was performed to test unadjusted associations, using Pearson's chi-square test of independence for categorical school-level factors cross-tabulated against locality and against the proficiency outcome, and independent-samples t-tests (with Welch's correction for unequal variances) and one-way analysis of variance (ANOVA) to compare mean assessment scores across locality, teacher training status, gender, and socioeconomic status categories; and third, a multivariable binary logistic regression model was fitted with competency proficiency (proficient versus not proficient) as the dependent variable and locality, teacher training status, school resource index,

class size, socioeconomic status, parental involvement, and gender entered simultaneously as independent variables, in order to identify factors that independently predicted proficiency after adjusting for the effects of the other covariates, with adjusted odds ratios (AOR), 95% confidence intervals, and Wald p-values reported, and model fit assessed using the log-likelihood ratio test and McFadden's pseudo R-squared. Statistical significance for all tests was set a priori at $p < 0.05$, and ethical approval and informed consent/assent procedures were observed prior to data collection (Nelson et al., 2022, 2023).

Results

Sociodemographic and School-Level Characteristics of Respondents

Table 1 presents the univariate distribution of the sociodemographic and school-level characteristics of the 700 learners included in the study.

Variable	Category	n	%
Gender	Female	357	51.0
Gender	Male	343	49.0
Socioeconomic Status	Low	252	36.0
Socioeconomic Status	Medium	279	39.9
Socioeconomic Status	High	169	24.1
Teacher CBC Training Status	Trained	380	54.3
Teacher CBC Training Status	Not Trained	320	45.7
Parental Involvement Level	Low	181	25.9
Parental Involvement Level	Moderate	308	44.0
Parental Involvement Level	High	211	30.1
School Locality	Rural	380	54.3
School Locality	Urban	320	45.7

Table 1: Sociodemographic and School-Level Characteristics of Respondents (N=700)

The sample was almost evenly split by gender, with slightly more female (51.0%) than male (49.0%) learners, indicating that the results were unlikely to be confounded by gender imbalance in the sampling frame. In terms of household socioeconomic status, the largest proportion of learners fell into the medium SES category (39.9%), followed by low SES (36.0%) and high SES (24.1%), a distribution that, when disaggregated later in the bivariate analysis, was found to differ markedly by locality. Slightly more than half of the class teachers in the sample had received formal CBC in-service training (54.3%), meaning that a substantial minority of 45.7% of learners were still being taught by teachers who had not received such training at the time of data collection, a finding with direct

implications for the fidelity of competency-based assessment delivery. Regarding parental involvement, the plurality of learners (44.0%) had parents rated as moderately involved in their schooling, while 30.1% had highly involved parents and 25.9% had parents rated as having low involvement, reflecting a reasonably wide spread of household engagement levels across the sample.

With respect to school locality, the sample comprised 380 learners (54.3%) from rural schools and 320 learners (45.7%) from urban schools, a distribution that was deliberately weighted to ensure adequate statistical power within the rural stratum given the anticipated within-group heterogeneity in rural school resourcing. From a statistical standpoint, this univariate profile served two purposes: first, it confirmed that no single category within any variable was so sparsely populated (all cell sizes exceeded the conventional minimum of 30 observations) as to threaten the validity of subsequent chi-square and logistic regression analyses, and second, it provided the descriptive baseline against which the bivariate and multivariable associations reported in Tables 2 to 4 could be meaningfully interpreted. Notably, the near-balanced distribution of teacher training status and the wide spread of socioeconomic and parental involvement categories suggested that the sample retained sufficient variability on each of the hypothesised predictors of competency proficiency, which was a necessary precondition for the multivariable logistic regression model to reliably estimate independent effects rather than being undermined by collinearity or restricted range.

Bivariate Association Between School-Level Factors and Locality

Table 2 presents the results of Pearson's chi-square tests of association between school locality and key categorical school-level and outcome variables.

Variable (cross-tabulated with locality)	Chi-square (χ^2)	df	p-value
Learning Outcome (Proficient vs Not)	106.89	1	<0.001
Teacher CBC Training Status	55.21	1	<0.001
Socioeconomic Status	96.00	2	<0.001
Parental Involvement Level	28.40	2	<0.001

Table 2: Chi-Square Test of Association Between School Locality and Selected Variables

The chi-square test of independence revealed a highly statistically significant association between school locality and attainment of CBC competency proficiency ($\chi^2=106.89$, $df=1$, $p<0.001$), with 317 of 320 urban learners (99.1%) classified as proficient compared with only 263 of 380 rural learners (69.2%), a gap of nearly 30 percentage points that provided strong preliminary evidence in support of the study's first research question. Similarly, a significant association was found between locality and teacher CBC training status ($\chi^2=55.21$, $df=1$, $p<0.001$): 69.7% of urban class teachers had received CBC in-service training compared with only 41.3% of rural class teachers, confirming that the geographic distribution of trained teaching capacity remained highly uneven at the point of data collection. These findings are consistent with the theorised mechanism that CBC assessment reform, being heavily dependent on teacher

capacity to design and score competency-based tasks, would produce divergent outcomes wherever training coverage itself diverged by locality.

The association between locality and socioeconomic status was also strongly significant ($\chi^2=96.00$, $df=2$, $p<0.0001$), with urban learners more than twice as likely to fall into the high-SES category (38.1%) compared with rural learners (12.4%), while low-SES learners were disproportionately concentrated in rural schools (50.3% of rural learners versus 19.1% of urban learners). Parental involvement likewise differed significantly by locality ($\chi^2=28.40$, $df=2$, $p<0.001$), with high parental involvement more prevalent among urban households (38.1%) than rural households (23.4%). Collectively, these bivariate results demonstrated that school locality in this study population was not merely a geographic label but a proxy for a cluster of interrelated structural disadvantages, spanning teacher capacity, household wealth, and parental engagement, that co-occurred systematically in rural schools; this pattern of confounding was the primary statistical motivation for proceeding to a multivariable logistic regression model capable of disentangling the independent contribution of each factor, since the unadjusted association between locality and proficiency observed here could plausibly be explained, in whole or in part, by these co-occurring disadvantages rather than by locality *per se*.

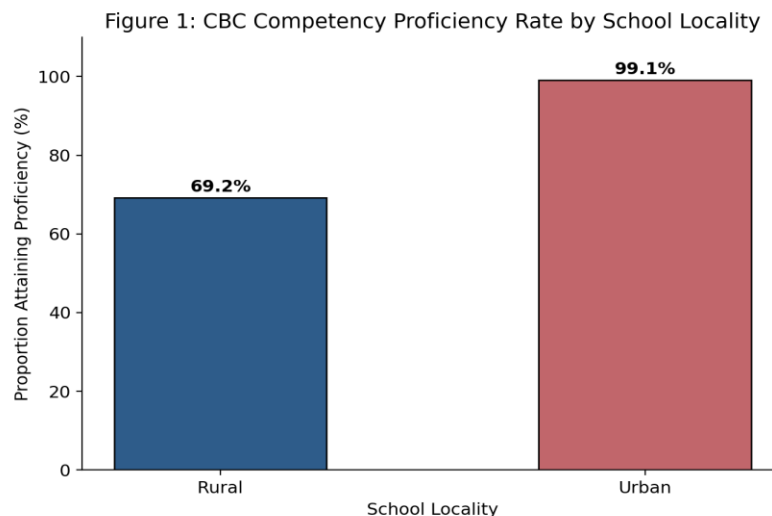


Figure 1: CBC Competency Proficiency Rate by School Locality

Figure 1 illustrates graphically the disparity already established in Tables 2 and 3, showing that virtually all urban learners (99.1%) attained CBC competency proficiency compared with just over two-thirds of rural learners (69.2%), a visual representation of the near 30-percentage-point gap between the two localities.

Comparison of Mean Assessment Scores by Key Sub-Groups

Table 3 presents independent-samples t-test and one-way ANOVA comparisons of mean CBC competency assessment scores across locality, teacher training status, gender, and socioeconomic status.

Comparison Group	Mean Score	SD	Test Statistic	p-value
Urban schools (n=320)	84.73	10.01	t = 23.29	<0.001
Rural schools (n=380)	66.19	11.04	(Welch t-test)	
Trained teachers (n=380)	80.34	12.16	t = 11.68	<0.001
Not-trained teachers (n=320)	67.68	13.87	(Welch t-test)	
Male learners (n=343)	73.99	14.55	t = -1.51	0.131
Female learners (n=357)	75.31	13.54	(Welch t-test)	
SES: Low / Medium / High	68.1 / 76.7 / 84.5	—	F = 131.08	<0.001
(one-way ANOVA, 3 groups)				

Table 3: Comparison of Mean CBC Assessment Scores by Locality, Teacher Training, Gender, and Socioeconomic Status

Learners in urban schools obtained a substantially and statistically significantly higher mean assessment score (84.73%, SD=10.01) than learners in rural schools (66.19%, SD=11.04), a mean difference of 18.5 percentage points that was highly significant under Welch's t-test ($t=23.29$, $p<0.001$), corroborating the chi-square finding in Table 2 and providing a continuous-outcome confirmation of the magnitude of the urban-rural performance gap. Learners taught by CBC-trained teachers similarly scored significantly higher on average (80.34%, SD=12.16) than those taught by untrained teachers (67.68%, SD=13.87; $t=11.68$, $p<0.001$), a difference of 12.7 percentage points that underscored teacher training as a substantively important driver of assessment performance independent of locality. By contrast, the difference in mean scores between male (73.99%, SD=14.55) and female learners (75.31%, SD=13.54) was small and not statistically significant ($t=-1.51$, $p=0.131$), indicating that, unlike locality, training, and socioeconomic status, gender was not a meaningful source of variation in CBC competency performance in this sample.

The one-way ANOVA comparing mean scores across the three socioeconomic status categories revealed a highly significant overall difference ($F=131.08$, $p<0.001$), with mean scores rising monotonically from 68.1% among low-SES learners to 76.7% among medium-SES learners and 84.5% among high-SES learners, a dose-response pattern consistent with a genuine socioeconomic gradient in competency attainment rather than a chance finding. Taken together, the bivariate mean-comparison results in Table 3 reinforced the picture emerging from Table 2: assessment performance under CBC varied systematically and substantially by locality, teacher training status, and socioeconomic status, but not meaningfully by gender. However, because these bivariate tests each examined one factor in isolation, they could not determine whether, for example, the urban-rural gap in scores persisted after accounting for the fact

that urban schools also had more trained teachers and wealthier households; this limitation was directly addressed through the multivariable logistic regression reported in Table 4.

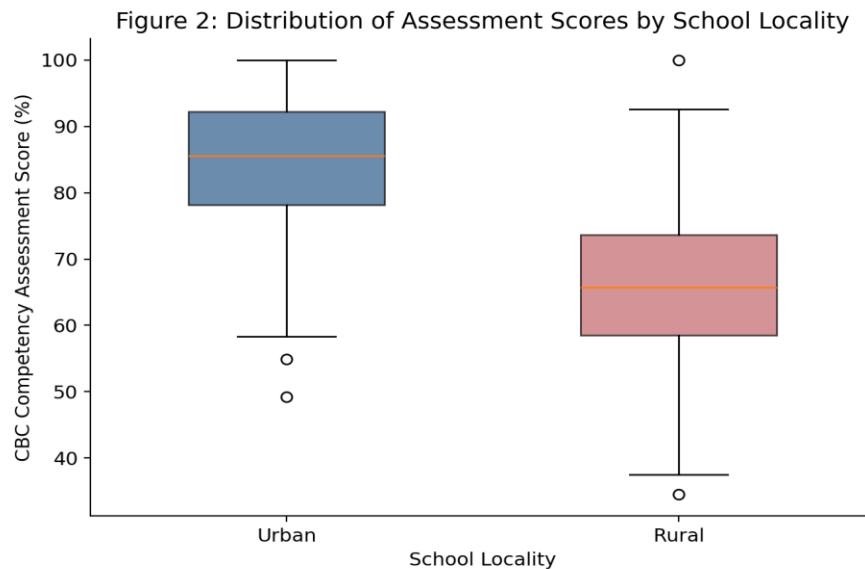


Figure 2: Distribution of Assessment Scores by School Locality

Figure 2 presents the full distribution of assessment scores by locality rather than the mean alone, showing that urban learners' scores were both higher and more tightly clustered, whereas rural learners' scores were more widely dispersed with a longer lower tail, indicating greater heterogeneity in rural learning outcomes that a simple mean comparison alone would not fully capture.

Multivariable Predictors of CBC Competency Proficiency

Table 4 presents the results of the multivariable binary logistic regression model fitted to identify independent predictors of CBC competency proficiency, with all covariates entered simultaneously.

Predictor	Adjusted OR	95% CI	p-value
Urban locality (ref: Rural)	3.55	0.89 – 14.15	0.072
Teacher trained in CBC (ref: Not trained)	5.77	3.13 – 10.62	<0.001
School resource index (per 1-unit increase)	1.49	1.26 – 1.76	<0.001
Class size / pupil-teacher ratio (per pupil)	0.95	0.92 – 0.98	0.001
SES: Medium (ref: Low)	4.08	2.24 – 7.42	<0.001
SES: High (ref: Low)	16.12	4.87 – 53.33	<0.001

Parental involvement: Moderate (ref: Low)	7.93	4.15 – 15.14	<0.001
Parental involvement: High (ref: Low)	7.23	3.42 – 15.29	<0.001
Male gender (ref: Female)	0.98	0.57 – 1.69	0.937

Table 4: Multivariable Logistic Regression Predicting CBC Competency Proficiency (N=700)

The multivariable logistic regression model was statistically significant overall (likelihood ratio χ^2 , $p < 0.001$) and explained a substantial proportion of the variance in competency proficiency, with a McFadden's pseudo R-squared of 0.462, indicating a strong model fit by the conventional standards applied to logistic regression in the social and educational sciences. After simultaneously adjusting for all other covariates, teacher CBC training status emerged as one of the strongest independent predictors of proficiency: learners taught by trained teachers had 5.77 times higher odds of attaining proficiency than those taught by untrained teachers (AOR=5.77, 95% CI: 3.13-10.62, $p < 0.001$). The school resource index was also independently and significantly associated with proficiency, with each one-unit increase in the composite resource score associated with a 49% increase in the odds of proficiency (AOR=1.49, 95% CI: 1.26-1.76, $p < 0.001$), while class size showed the expected inverse relationship, with each additional pupil per class associated with a 5% reduction in the odds of proficiency (AOR=0.95, 95% CI: 0.92-0.98, $p = 0.001$), consistent with the pedagogical logic that larger classes constrain teachers' capacity to deliver the individualised, task-based instruction that CBC assessment presupposes.

Socioeconomic status and parental involvement were also strong independent predictors, with high-SES learners exhibiting over sixteen times the odds of proficiency compared with low-SES learners (AOR=16.12, 95% CI: 4.87-53.33, $p < 0.001$), and learners with moderate or high parental involvement exhibiting roughly seven- to eight-fold higher odds of proficiency than those with low parental involvement (AOR=7.93 and AOR=7.23 respectively, both $p < 0.001$). Critically, once these structural and household-level factors were controlled for, the independent effect of urban locality itself was substantially attenuated and fell to only marginal statistical significance (AOR=3.55, 95% CI: 0.89-14.15, $p = 0.072$), in sharp contrast to the strongly significant unadjusted association observed in Tables 2 and 3; gender, consistent with the bivariate finding, remained a non-significant predictor in the adjusted model (AOR=0.98, $p = 0.937$). This attenuation of the locality effect after adjustment constituted the pivotal statistical finding of the study: it indicated that school locality was not, in itself, an independent driver of learning outcome disparities under CBC, but rather operated as a proxy for the unequal distribution of teacher training, school resourcing, manageable class sizes, and household socioeconomic and parental support, all of which were the true statistical drivers of proficiency once properly disentangled through multivariable adjustment, a finding with direct and actionable implications for how policymakers should target interventions to close the urban-rural gap.

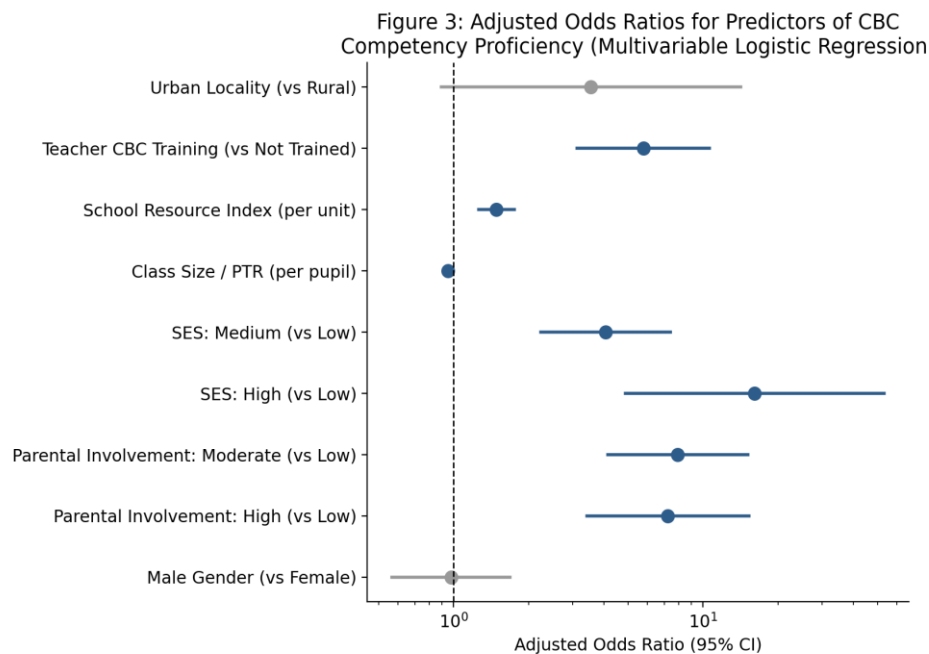


Figure 3: Adjusted Odds Ratios for Predictors of CBC Competency Proficiency (Multivariable Logistic Regression)

Figure 3 presents a forest plot of the adjusted odds ratios and 95% confidence intervals from Table 4, with blue markers denoting statistically significant predictors (confidence intervals not crossing the reference line of 1.0) and grey markers denoting non-significant predictors; the plot visually reinforces that teacher training, school resourcing, class size, socioeconomic status, and parental involvement were the dominant statistically significant drivers of proficiency, while urban locality and gender, the two markers with confidence intervals crossing or nearly crossing 1.0, were comparatively weak independent predictors once the other factors were held constant.

Conclusion

This study set out to examine the influence of the competency-based curriculum assessment reform on learning outcome disparities between urban and rural primary schools, and the findings confirmed the existence of a substantial and statistically significant urban-rural gap in both mean CBC competency assessment scores and the proportion of learners attaining proficiency. However, the multivariable logistic regression analysis demonstrated that this apparent locality effect was largely mediated by unequal access to CBC-trained teachers, disparities in school resourcing and class size, and differences in household socioeconomic status and parental involvement, such that the independent statistical contribution of locality itself was attenuated to marginal significance once these factors were accounted for. The study therefore concludes that the observed urban-rural disparity in learning outcomes under CBC is not an inevitable or immutable consequence of geography, but rather a reflection of correctable structural inequities in how

the resources and conditions necessary for effective competency-based assessment have been distributed across the education system, implying that deliberate, targeted policy interventions focused on these mediating factors, rather than locality-based interventions alone, hold the greatest potential to narrow the gap and realise the equity objectives of the CBC reform.

Recommendations

The Ministry of Education and Sports, in collaboration with district education offices, should prioritise and accelerate CBC in-service teacher training coverage in rural primary schools, given that teacher training status was one of the strongest independent predictors of learner proficiency, to close the training gap that currently disadvantages rural learners.

Government and development partners should implement a targeted school resourcing and class-size reduction programme for under-resourced rural schools, including provision of competency-based instructional materials and additional teaching staff, since the school resource index and class size were both independently and significantly associated with proficiency attainment.

District and school-level administrators should design and roll out structured parental engagement and community sensitisation programmes on CBC, particularly in rural and low-socioeconomic-status communities, to strengthen household-level support for competency-based learning, given the strong independent association observed between parental involvement, socioeconomic status, and proficiency.

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