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Generative Artificial Intelligence Use and Adoption in African Higher Education among Students and Lecturers: A Systematic Review and Meta-Analysis

Andrew Silungwe[1*], Webrod Mufwambi[2,3], Shafiq Mohamed[4], Martha Mwaba[5,6], Victor Daka[7], Steward Mudenda[2,3]

[1]Independent Researcher, Lusaka, Zambia
[2]Department of Pharmacy, School of Health Sciences, University of Zambia, Lusaka, Zambia
[3]Education and Continuous Professional Development Committee, Pharmaceutical Society of Zambia, Lusaka, Zambia
[4]York and Scarborough Teaching Hospitals NHS Foundation Trust, York, UK
[5]Resident Doctors Association of Zambia, Lusaka, Zambia
[6]Department of Clinical and Radiation Oncology, Cancer Diseases Hospital, Ministry of Health, Lusaka, Zambia
[7]Department of Public Health, School of Medicine, Copperbelt University, Ndola, Zambia
Email: *andrewsilungwe02@gmail.com

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Abstract

Background: Artificial intelligence (AI) tools are becoming increasingly common in higher education, but their use in African universities has not been quantitatively summarized. This study estimated the prevalence of AI use among students and academic staff in African higher education institutions. **Methods:** A systematic review and meta-analysis of quantitative studies was conducted in line with PRISMA 2020 guidelines. AI use was operationalised primarily as engagement with generative AI tools (e.g., ChatGPT), although some studies assessed broader AI tool use in academic contexts. Seven cross-sectional studies from five African countries, involving 1877 participants, were included. Random-effects meta-analysis with logit transformation and restricted maximum likelihood estimation was used, alongside subgroup and sensitivity analyses. **Results:** The pooled prevalence of self-reported generative AI (including ChatGPT and related tools) use was 79.7% (95% CI: 56.6% - 92.2%), with substantial heterogeneity ($I^2 = 97.4\%$). In subgroup analysis, the pooled prevalence was 87.1% (95% CI: 43.1% - 98.4%) among students and 64.2% (95% CI: 3.2% - 99.0%) among lecturers, although no statistically significant difference was observed ($p = 0.2509$). Sensitivity analyses showed that the overall findings were broadly stable. **Conclusion:** AI use appears to be widespread in the sampled African higher education settings, although estimates vary considerably across contexts.

The pooled estimate should be interpreted as reflecting predominantly generative AI use, given the emphasis of most included studies on tools such as ChatGPT. These findings highlight the need for context-specific governance, capacity-building, and more consistent research to support responsible AI integration in African universities.

Keywords

Artificial Intelligence, Higher Education, AI Use, Systematic Review and Meta-Analysis, Africa

1. Introduction

Artificial intelligence (AI) is increasingly reshaping higher education globally, influencing teaching, learning, assessment, and administrative practices (AlBlooshi, 2026; Mudenda, 2025; Katalinic, Slavuj, & Jaksic, 2026). Recent advances in generative AI tools, particularly large language models such as ChatGPT, have accelerated this transformation by enabling students to access on-demand academic support and allowing lecturers to automate or augment instructional tasks (Zheng, Yuan, & Xu, 2025; Kasneci et al., 2023; Abdaljaleel et al., 2024; Zhou & Peng, 2025). Universities worldwide are integrating AI-enabled systems into learning management platforms, assessment workflows, and student support services as part of broader digital transformation strategies (Alotaibi, 2024; Alshammari et al., 2025; Oncioiu & Bularca, 2025; Jin et al., 2025).

Alongside these opportunities, the rapid diffusion of AI in higher education has raised important concerns related to academic integrity, data privacy, algorithmic bias, and institutional governance (Reyes et al., 2025; Ajani, Akintolu & Afolabi, 2024; Muringa, 2025). Peer-reviewed studies highlight tensions between efficiency gains and risks of plagiarism, overreliance on AI-generated outputs, and unequal access to digital tools (de la Fuente & Farhadian, 2025; Taneja, Prabagaren & Thomas, 2025). These challenges have prompted calls for context-sensitive, ethically grounded approaches to AI integration rather than unregulated or purely reactive adoptions (Khatri & Karki, 2023).

In Africa, interest in AI within higher education has grown markedly in recent years, driven by expanding student enrolment, constrained instructional capacity, and ambitions to strengthen digital and research skills for socioeconomic development (Ajani, Akintolu, & Afolabi, 2024). The African Union's Continental AI Strategy emphasizes the importance of building AI capacity among educators and students, improving digital infrastructure, and supporting locally relevant AI innovation (Njoroge, 2024; Addo et al., 2026). Similarly, UNESCO has highlighted AI's potential to support teaching and learning in African universities while cautioning that adoption often occurs in contexts characterized by infrastructural limitations and uneven institutional preparedness (UNESCO, 2025; Ahmed et al., 2025).

Despite this policy momentum, AI adoption across African higher education institutions remains uneven (Guadu, Dibekulu, & Menberu, 2025; Mudenda et al., 2026). Empirical studies consistently report challenges related to unreliable internet connectivity, limited access to computing resources, insufficient staff training, and a lack of institutional guidelines governing AI use (de la Fuente & Farhadian, 2025; Maimela & Mbonde, 2025; Ahmed et al., 2025). Concerns about academic dishonesty and uncertainty regarding acceptable use further complicate institutional responses, particularly in the absence of clear governance frameworks (Guadu, Dibekulu, & Menberu, 2025; Tarisayi, 2024; Maluleke, 2025; Mudenda et al., 2026; Wainaina & Sun, 2025).

Empirical research on AI use in African universities has expanded rapidly since 2023 but remains fragmented. Studies from Southern, West, and East Africa report substantial engagement with generative AI tools among students, often driven by perceived usefulness for academic writing, summarization, and concept clarification (Mudenda et al., 2026; Smit, Bond-Barnard, & Wagner, 2025; Mudenda et al., 2025b, 2024, 2025a). Lecturer-focused studies suggest more cautious but increasing adoption, with many academics expressing willingness to use AI for instructional preparation and assessment support if adequate training and policy guidance are provided (Jin et al., 2025; Schiff, 2022). Consequently, reported prevalence estimates vary widely across studies, reflecting differences in sampling strategies, measurement instruments, and operational definitions of AI use.

In high-income countries, studies report accelerated AI uptake driven by robust infrastructure and institutional investment (Aishwarya et al., 2025; Hara, 2025; Lin, Huang, & Lu, 2023). In contrast, African higher education is characterized by uneven adoption. International agencies emphasize both opportunity and caution: the African Union's Continental AI Strategy and UNESCO highlight AI's potential to advance education while warning that infrastructure, language, and resource gaps can impede effective integration (UNESCO, 2025). Persistent challenges in Africa include limited internet connectivity, unreliable electricity, scarcity of computing devices, and a shortage of locally relevant AI tools (Ade-Ibijola & Okonkwo, 2023; UNESCO, 2025). These issues, along with concerns about plagiarism and staff preparedness, complicate implementation (UNESCO, 2025; Bulathwela et al., 2024). Nonetheless, interest in AI is growing on the continent, spurred by large student populations and ambitions to develop digital skills for economic development (Ahmed et al., 2025; Mwaanga, Wamulume, & Moyo, 2026).

Most existing studies are small-scale, institution-specific, and methodologically heterogeneous. Many rely on convenience sampling and self-reported measures, and few provide comparable prevalence estimates across populations or regions. As a result, it remains unclear whether reported increases in AI use reflect broadly consistent adoption across African higher education or are driven by localized, context-specific factors. The absence of aggregated evidence limits the ability of policymakers, institutional leaders, and curriculum planners to make informed decisions regarding investment, regulation, and capacity building.

To date, no meta-analysis has systematically synthesized quantitative evidence on the prevalence of AI use among students and lecturers in African higher education institutions. Without such synthesis, the rapidly expanding body of empirical research remains difficult to interpret at a continental level. This study, therefore, aimed to conduct a systematic review and meta-analysis of quantitative studies reporting AI use prevalence in African universities. Specifically, the objectives were to estimate the pooled prevalence of AI use among students and lecturers, examine differences by population type and region, and assess the robustness and heterogeneity of existing evidence. By consolidating fragmented findings, this study seeks to provide a clearer empirical basis for evidence-informed policy development and responsible AI integration in African higher education.

This study extends existing literature by providing the first quantitative synthesis of AI use prevalence in African higher education, enabling comparison across settings and identification of overarching patterns that are not apparent in individual studies. By pooling data across countries, this review offers new insights into the scale, variability, and drivers of AI adoption in the region.

2. Materials and Methods

2.1. Study Design and Reporting Framework

We conducted a systematic review and meta-analysis following the PRISMA 2020 reporting guidelines (Page et al., 2021). The review aimed to identify quantitative studies reporting the use of artificial intelligence among students and academic staff in African higher education institutions.

2.2. Search Strategy and Eligibility Criteria

A structured search was performed across six major academic databases, including Scopus, Web of Science, ERIC, ScienceDirect, DOAJ, and AJOL. The full Boolean search strategy for PubMed was: (“artificial intelligence” OR “AI” OR “generative AI” OR “ChatGPT”) AND (“higher education” OR “university” OR “tertiary education”) AND (“Africa” OR names of individual African countries). Searches were conducted between January 2026 and March 2026, and results were limited to studies published in English. Reference lists of included studies were manually screened to identify additional relevant studies. Searches were limited to studies published between 2019 and 2026. Studies were eligible if they: 1) reported quantitative or mixed-methods empirical data, 2) involved university students or academic staff, 3) were conducted in African higher education settings, and 4) provided sufficient data to estimate prevalence. Qualitative-only studies, editorials, commentaries, and studies conducted outside higher education were excluded.

2.3. Study Screening and Data Extraction

Two reviewers (AS and SM) independently screened titles, abstracts, and full texts for eligibility. Data extraction and quality appraisal were also conducted independently by two reviewers using a standardized form that captured study characteristics, including publication details, country, participant group, sample size, AI tools assessed, and the numerical data required for meta-analysis. Disagreements were resolved through discussion and, where necessary, consultation with a third reviewer. Methodological quality was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Prevalence Studies.

2.4. Statistical Analysis

The analysis focused on pooled prevalence estimates of self-reported AI use. AI use was defined as self-reported engagement with AI tools for academic purposes, including generative AI systems such as ChatGPT. Where studies differed in measurement (e.g., ever use, current use, or general exposure), these were harmonized as binary prevalence outcomes (use vs non-use) to enable pooled analysis. These differences were considered a potential source of heterogeneity. Meta-analysis was performed in R (version 4.5.1) using random-effects models to account for expected variation across countries, institutional settings, study populations, and definitions of AI use. Proportions were analyzed using logit transformation, and the between-study variance was estimated using restricted maximum likelihood (REML). Subgroup analyses were conducted by population type and region, where data permitted. Sensitivity analysis was performed using a leave-one-out approach, and influence diagnostics were explored to examine the contribution of individual studies to the pooled model.

Although only seven studies met the inclusion criteria, quantitative synthesis was undertaken to provide a structured summary of the emerging evidence rather than a precise continental estimate. Because the included studies varied in population, setting, and how AI use was defined, the pooled estimates were interpreted cautiously as summary measures across heterogeneous contexts.

2.5. Assessment of Heterogeneity and Bias

Statistical heterogeneity was assessed using Cochran's Q and the I^2 statistic, with higher I^2 values indicating greater inconsistency across studies. Because fewer than ten studies were included, formal statistical testing for publication bias or small-study effects was not considered reliable. Funnel plot assessment was therefore treated as exploratory only (Murphy & Hall, 2024).

2.6. Ethical Considerations

This study involved secondary analysis of published data and did not require ethical approval.

3. Results

3.1. Study Selection

The database search yielded 60 records. After the removal of 20 ineligible records, 40 titles and abstracts were screened. Of these records, 20 records were excluded, leaving 20 full-text articles assessed for eligibility. Thirteen full-text articles were excluded due to the absence of quantitative prevalence data (n = 7), non-African study settings (n = 4), or ineligible study populations (n = 2). Seven studies met all inclusion criteria and were included in the meta-analysis. The study selection process is illustrated in Figure 1.

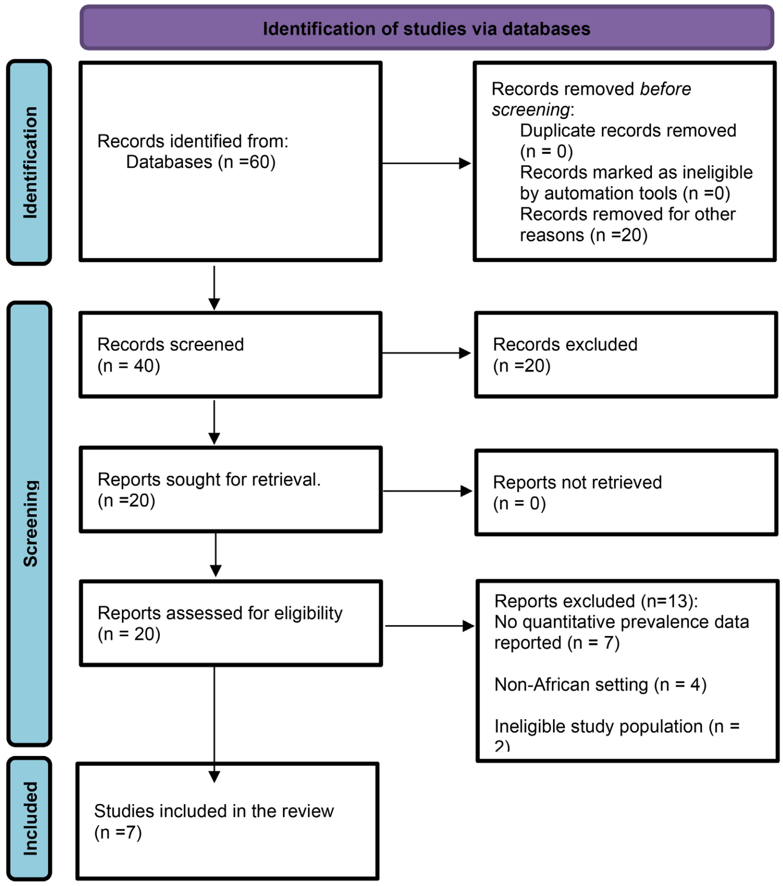

Figure 1. PRISMA 2020 flow diagram of study selection.

3.2. Study Characteristics

A total of seven cross-sectional studies published between 2024 and 2025 were included in the review. These studies were conducted in five African countries, Zambia, Nigeria, Tanzania, South Africa, and Uganda, and together involved 1877 participants. Of these, 1373 reported using artificial intelligence tools, giving a crude prevalence of 73.1% across the combined sample. This crude prevalence represents the unweighted proportion across all included participants and differs from the pooled estimate derived from the random-effects meta-analysis, which accounts for between-study variability. At the individual study level, the reported prevalence varied widely, ranging from 27.1% in a Nigerian academic staff study to 99.0% in a South African student study.

The majority of the studies included focused on students. Four studies involved student populations, with a total of 1289 participants, while three studies examined lecturers, faculty members, or academic staff, comprising a combined total of 588 participants. The studies were distributed across three African regions: two from Southern Africa, two from West Africa, and three from East Africa. East Africa accounted for the highest proportion of participants, with Southern Africa and West Africa contributing smaller shares respectively. All studies employed cross-sectional survey designs and utilized self-administered questionnaires for data collection. In most cases, surveys were conducted online, although a few studies used institution-based data collection methods. The research primarily assessed the use of generative AI tools, especially ChatGPT, with some also exploring broader categories of AI tools used for teaching, learning, research, or academic writing.

Reporting of participant characteristics was inconsistent across studies. Some studies provided age categories rather than summary measures such as mean or median age, while sex distribution was reported in only some papers. Where these details were available, male participants tended to be more represented in certain groups, especially in studies involving engineering, health, or technical education settings. Overall, the included studies reflected a diverse but still limited evidence base on AI use in African higher education. A summary of the study characteristics is presented in **Table 1** and **Table 2**.

Table 1. Characteristics and findings of included studies on AI use prevalence in African higher education institutions.

Study ID	Country	Population	Region	Sample (n)	AI Users	Prevalence % (95% CI)
ZMB1	Zambia	Students	Southern Africa	385	303	78.7 (74.3 - 82.7)
NGA1	Nigeria	Lecturers	West Africa	154	139	90.3 (84.4 - 94.5)
TZA1	Tanzania	Students	East Africa	238	204	85.7 (80.6 - 89.9)
ZAF1	South Africa	Students	Southern Africa	102	101	99.0 (94.7 - 100.0)
UGA1	Uganda	Students	East Africa	564	427	75.7 (72.0 - 79.2)
UGA2	Uganda	Lecturers	East Africa	224	142	63.4 (56.7 - 69.7)
NGA2	Nigeria	Academic Staff	West Africa	210	57	27.1 (21.3 - 33.7)

Total N = 1877 from 5 countries; Overall crude prevalence = 73.1% (1373/1877); Population: students (n = 1289, 4 studies), lecturers/academic staff (n = 588, 3 studies); Regions: Southern Africa (n = 487, 2 studies), West Africa (n = 364, 2 studies), East Africa (n = 1026, 3 studies).

Table 2. Included studies and their bibliographic details.

Study ID	Country	Population	Region	Reference/Citation
ZMB1	Zambia	Students	Southern Africa	Mudenda et al., 2025a
NGA1	Nigeria	Lecturers	West Africa	Fasola, 2024
TZA1	Tanzania	Students	East Africa	Mollel, 2025
ZAF1	South Africa	Students	Southern Africa	Smit et al., 2025

Continued

UGA1	Uganda	Students	East Africa	Ajalo et al., 2025
UGA2	Uganda	Lecturers/ Medical Faculty	East Africa	Mukunya et al., 2025
NGA2	Nigeria	Academic Staff	West Africa	Oyefeso and Abdulazeez, 2024

3.3. Risk of Bias Assessment

Methodological quality was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Prevalence Studies (Table 3). Overall, the risk of bias across the included studies was judged to be moderate. The overall "moderate" risk of bias rating reflects consistent limitations across studies, including non-probability sampling, unclear response rates, and reliance on self-reported data. While these limitations reduce confidence in the precision of prevalence estimates, the consistency of findings across studies supports cautious interpretation of the overall pattern of AI use. Only one study employed a probability-based sampling strategy.

None of the included studies reported formal sample size calculations or response-rate analyses. Assessment of AI use relied solely on self-reported data, which may introduce recall and social desirability bias. Nevertheless, all studies adequately described their settings, participant characteristics, and data collection tools. No study was excluded based on methodological quality. The predominance of non-probability sampling likely contributed to the high between-study heterogeneity observed.

Table 3. Risk of bias assessment of included studies using the Joanna Briggs Institute Critical Appraisal Checklist for prevalence studies.

JBI Criteria	ZMB1	NGA1	TZA1	ZAF1	UGA1	UGA2	NGA2
1. Was the sample frame appropriate to address the target population?	No	No	No	No	No	No	No
2. Were study participants recruited appropriately?	No	No	No	No	No	No	No
3. Was the sample size adequate?	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear
4. Were the study subjects and setting described in detail?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5. Was data analysis conducted with sufficient coverage of the identified sample?	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear
6. Were valid methods used for the identification of the condition?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7. Was the condition measured in a standard, reliable way for all participants?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8. Was there an appropriate statistical analysis?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9. Was the response rate adequate, and if not, was the low response rate managed appropriately?	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear
Overall Risk of Bias	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**

Interpretation: Yes: criterion met (low risk of bias); No: criterion not met (high risk of bias); Unclear: insufficient information to judge; Overall: based on consensus across criteria.

3.4. Overall Pooled Prevalence

Using a random-effects model with REML estimation and logit-transformed proportions, the pooled prevalence of AI tool use across the seven included studies was 79.7% (95% CI: 56.6% - 92.2%). The common-effect model gave a lower estimate of 71.2% (95% CI: 68.9% - 73.5%). Heterogeneity was very high ($I^2 = 97.4\%$, $\tau^2 = 2.0925$, $p < 0.001$), suggesting marked differences in the reported prevalence of AI use across studies. The study-specific estimates and the pooled random-effects estimate are shown in **Figure 2**.

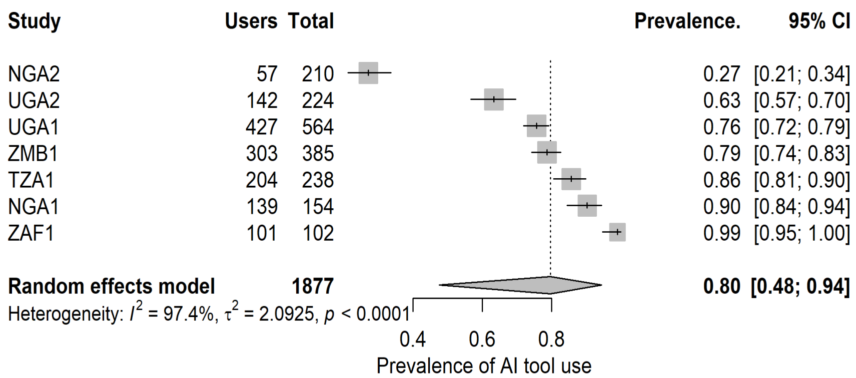

Figure 2. Forest plot showing individual study prevalence estimates and the pooled prevalence of AI use under the random-effects model.

3.5. Heterogeneity

Considerable heterogeneity was observed across the included studies. The I^2 statistic was 97.4% (95% CI: 96.2% - 98.3%), while the estimated between-study variance under REML was $\tau^2 = 2.0925$ ($\tau = 1.4466$). Cochran's Q-test confirmed that this heterogeneity was statistically significant ($Q = 231.49$, $df = 6$, $p < 0.0001$). This level of variation is likely to reflect real differences between studies, including differences in participant groups, institutional settings, countries, and the specific way AI use was assessed. As such, the pooled prevalence should be interpreted cautiously as an average across heterogeneous contexts rather than a precise continental estimate.

3.6. Subgroup Analyses

3.6.1. Population Type

When the studies were grouped by population, students showed a higher pooled prevalence of AI tool use than lecturers. Under the random-effects model, the pooled estimate was 87.1% (95% CI: 43.1% - 98.4%) for students and 64.2% (95% CI: 3.2% - 99.0%) for lecturers. However, this difference was not statistically significant ($p = 0.2509$). There was still substantial heterogeneity within both groups, especially among lecturers, which means these subgroup estimates should be interpreted with caution. A forest plot stratified by population type, illustrating pooled estimates for students and lecturers, is shown in **Figure 3**.

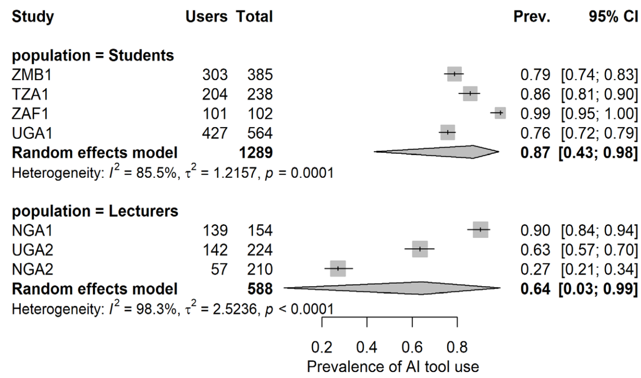

Figure 3. Forest plot of pooled prevalence of AI use stratified by population type (students vs lecturers).

3.6.2. Region

When grouped by region, the pooled prevalence was highest in Southern Africa (94.3%), followed by East Africa (76.0%) and West Africa (64.8%) under the random-effects model. However, the regional differences were not statistically significant ($p = 0.5743$), and the confidence intervals were very wide, especially for Southern and West Africa. This suggests that the regional subgroup findings are unstable and should be interpreted as exploratory rather than conclusive. Regional subgroup estimates and their associated confidence intervals are displayed in **Figure 4**.

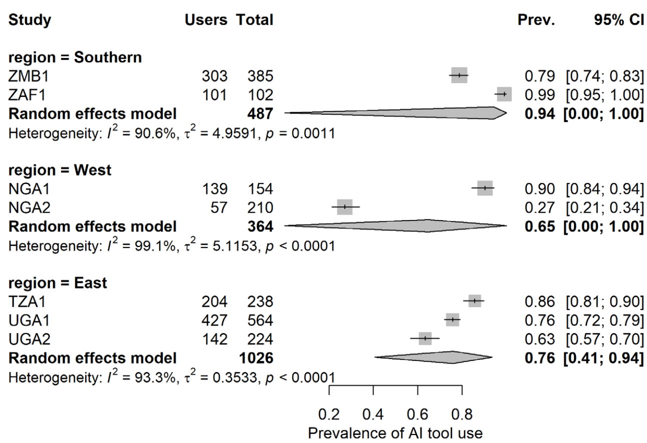

Figure 4. Forest plot of pooled prevalence of AI use stratified by African region.

3.7. Sensitivity Analyses and Influence Diagnostics

3.7.1. Leave-One-Out Analysis

Leave-one-out sensitivity analysis showed that the pooled prevalence remained broadly stable, ranging from 73.0% to 84.1% after sequential omission of individual studies. Heterogeneity remained high across most iterations, although omission of the Nigerian academic staff study (NGA2) produced the largest change, increasing the pooled prevalence to 84.1% and reducing heterogeneity to 91.6%. Overall, no single study substantially altered the direction of the findings as shown in **Figure 5**.

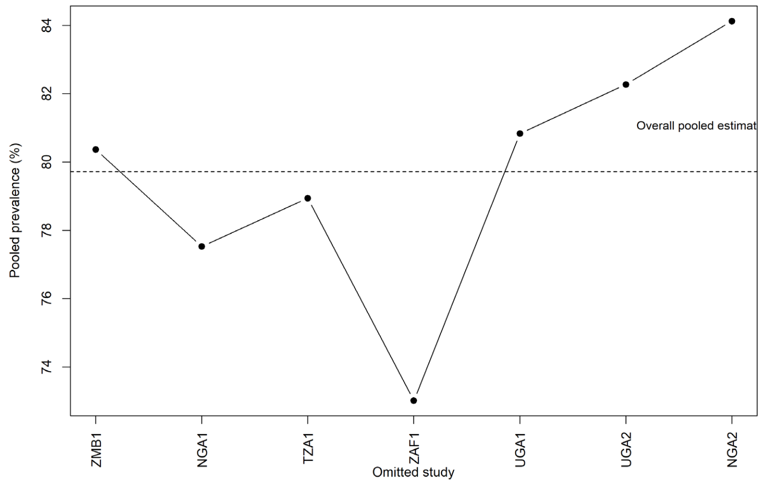

Figure 5. Leave-one-out sensitivity analysis of pooled prevalence estimates.

3.7.2. Influence Diagnostics

Influence diagnostics based on a random-effects logit-transformed prevalence model detected variation in how individual studies contributed to the pooled estimate and heterogeneity. The South African student study (ZAF1) and the Nigerian academic staff study (NGA2) were the most influential, with Cook's distances of 0.439 and 0.281, respectively. The Ugandan faculty study (UGA2) showed a more moderate influence, while the other studies had comparatively small Cook's distances. Consistent with this, leave-one-out sensitivity analysis indicated that excluding NGA2 led to the greatest reduction in heterogeneity and an increase in the pooled prevalence estimate; excluding ZAF1 also reduced heterogeneity but did not significantly alter the overall interpretation. Overall, no single study changed the conclusion that AI tool use in African higher education was widespread. The influence diagnostics plot of the included studies is shown in **Figure 6**.

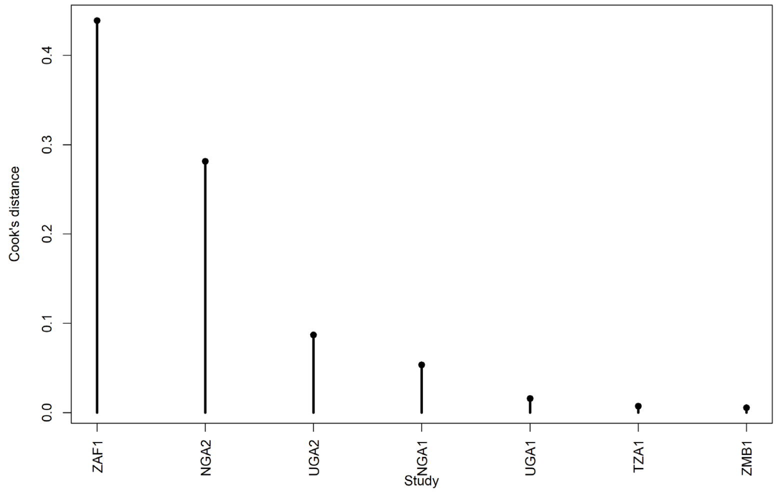

Figure 6. Cook's distance influence diagnostics for the included studies. Higher values indicate greater influence of individual studies on the pooled random-effects model.

3.8. Publication Bias

Publication bias could not be assessed with confidence because the meta-analysis included only seven studies. Although a funnel plot was explored, its interpretation was limited by the small number of studies and the use of transformed prevalence estimates; therefore, any assessment of asymmetry was considered exploratory rather than conclusive.

4. Discussion

This systematic review and meta-analysis present the first quantitative synthesis of evidence on artificial intelligence (AI) use in African higher education, revealing high levels of engagement with AI tools across the diverse institutional and national contexts represented in the included studies. The pooled prevalence of self-reported AI use was 79.7%, indicating that AI technologies have already achieved widespread uptake within the academic environment. This high use of AI in higher education has been reported in other studies globally (Rajki, Dringó-Horváth, & Nagy, 2025; Bamasoud, Mohammad, & Bilal, 2025; Sallam et al., 2024; Delello et al., 2023; Orok et al., 2024).

Subgroup analysis showed a higher pooled prevalence among students (87.1%) compared to lecturers (64.2%); however, this difference was not statistically significant, suggesting broadly comparable levels of adoption between the two groups. The numerically higher uptake among students may reflect greater digital fluency, openness to emerging technologies, and more frequent use of AI for learning support, assessment preparation, and academic tasks. In contrast, relatively lower, but still substantial use among lecturers may be influenced by concerns related to academic integrity, limited institutional guidance, or variability in digital competencies.

Overall, these findings highlight that AI is rapidly becoming embedded in teaching and learning practices across African higher education, similar to findings from other studies (Al-Zahrani & Alasmari, 2025; Echedom & Okuonghae, 2021; Mulaudzi & Hamilton, 2025). The high prevalence across both groups underscores the urgency for institutions to develop clear policies, provide targeted training, and integrate AI literacy into curricula to ensure responsible, ethical, and effective use (Long et al., 2026; Kovari, 2025). Moreover, the absence of a statistically significant difference between students and lecturers suggests a converging trend in AI adoption, pointing to an opportunity for collaborative, institution-wide strategies to harness AI for educational transformation.

Taken together, the findings suggest that generative AI technologies, most notably tools such as ChatGPT, have transitioned rapidly from novelty to frequent academic use among both students and academic staff in several African university settings (Ahmad Malik, Ahmyaw Adem, & Rasool, 2025; Alotaibi, 2024; Maluleke, 2025; Mudenda et al., 2026; Mutelo, 2025; Megbowon, 2025; Mwaanga, Wamulume, & Moyo, 2026). However, the considerable statistical heterogeneity across studies limits the interpretation of the pooled prevalence as a single representative figure for all African higher education. Instead, the overall estimate represents an average across diverse institutional contexts with differences in digital infrastructure, governance capacity, and academic disciplines, suggesting broad engagement in the sampled settings rather than consistent adoption across the continent.

Rather than reflecting coordinated institutional strategies, the observed patterns of AI use point to predominantly bottom-up adoption. Students and lecturers appear to be integrating AI tools into teaching, learning, and research independently, often without clear institutional guidance or formal pedagogical frameworks. This interpretation aligns with recent empirical studies documenting extensive student-driven use of generative AI for academic writing, conceptual clarification, and assessment preparation, alongside relatively underdeveloped institutional policies governing such use (Ahmed et al., 2025; Zhan & Wang, 2024).

Substantial contextual variability across studies further reinforces the importance of institutional conditions in shaping AI engagement. Differences in infrastructure, governance capacity, and institutional support are likely to play a central role in determining how AI tools are accessed and used within higher education settings (Anomah, 2025; Erdmann & Toro-Dupouy, 2025; Jeilani & Abubakar, 2025). Methodological diversity across studies, including variation in study populations, disciplinary focus, and the timing of data collection following the public release of large language models, also contributes to this variability. In addition, inconsistencies in how AI use was defined and operationalized, ranging from any prior exposure to regular pedagogical or assessment-related use, complicate direct comparisons across contexts.

Analyses comparing students and lecturers suggest that AI adoption is not confined to learners alone but is diffusing across academic roles. In the subgroup analysis, the pooled prevalence was higher among students than among lecturers, although this difference was not statistically significant after accounting for between-study heterogeneity. Lecturer engagement also appeared more heterogeneous and less precisely estimated, likely reflecting structural constraints rather than simple resistance to technological innovation. Factors such as access to training, clarity of institutional policy, workload pressures, and accountability concerns may influence lecturers' willingness and capacity to engage with AI tools (Ahmed et al., 2025; Maluleke, 2025). Taken together, these findings suggest that AI use is becoming established across both student and academic staff populations, even though the evidence base of lecturers remains smaller and more variable. This challenges assumptions that African academics are uniformly resistant to AI adoption and instead highlights institutional conditions as key determinants of engagement (Al-Zahrani & Alasmari, 2025; Lubinga, Maramura, & Masiya, 2023).

Similarly, regional comparisons did not reveal clear or statistically significant differences in AI use across Southern, West, and East Africa. Although point estimates varied across regions, the subgroup estimates for Southern and West Africa were highly imprecise, with very wide confidence intervals, indicating limited stability in those pooled estimates. Geographic location alone, therefore, does not appear sufficient to explain variation in AI adoption patterns. Instead, prior research suggests that disparities in digital infrastructure, institutional policy development, and governance arrangements are likely to be more influential than region alone (Sangwa et al., 2025). These findings underscore the need for caution when interpreting regional differences and point to the importance of institution-level factors in shaping AI engagement.

The overall interpretations of the review are strengthened by the stability of findings across sensitivity analyses and influence diagnostics. Leave-one-out analyses showed that the pooled prevalence remained broadly stable despite sequential omission of individual studies, while influence diagnostics identified the South African student study and one Nigerian academic staff study as the most influential contributors to the fitted model. Even so, no single study materially altered the overall conclusion that AI tool use is common in African higher education. This pattern increases confidence that the observed uptake reflects a genuine and emerging phenomenon rather than a result driven entirely by one study or analytical choice.

When situated within the broader international literature, the findings are consistent with global evidence documenting rapid growth in the adoption and study of generative AI in higher education following the public release of large language models (McGrath, Farazouli, & Cerratto-Pargman, 2024). Reports of widespread awareness and use of generative AI tools among university students in non-African contexts further reinforce the interpretation that African higher education institutions are participating actively in this global transformation, rather than lagging behind it (Jin et al., 2025; Ning et al., 2025; Ravšelj et al., 2025; Vieriu & Petrea, 2025; Wang et al., 2024). At the same time, persistent differences in access, governance, and pedagogical integration suggest that the implications of AI adoption may vary substantially across settings.

4.1. Strengths and Limitations of the Study

This study has several strengths. It represents, to our knowledge, the first meta-analysis to quantitatively synthesize evidence on AI use prevalence within African higher education. The use of appropriate transformation methods, random-effects modelling, and extensive sensitivity analyses enhances the methodological rigor and transparency of the findings.

Several limitations should nonetheless be acknowledged. The relatively small number of available studies limits the precision of subgroup analyses and constrains formal assessment of publication bias. Reliance on self-reported measures of AI use may overestimate actual engagement, and the predominance of single-institution, non-probability samples limits generalizability. High contextual and measurement variability across studies further complicates interpretation. Definitions of "AI use" were not standardized: some studies assessed broad AI tool use, others measured practical or current academic use, and several focused specifically on generative systems such as ChatGPT. These operational differences mean that the pooled prevalence combines related but not fully identical constructs, likely contributing to the very high between-study heterogeneity observed. This limitation reflects the early and rapidly evolving nature of empirical research in this field rather than a weakness specific to the present review.

4.2. Implications for Policy, Practice, and Research

The widespread and often weakly governed adoption of AI tools in African higher education carries important implications for policy and institutional practice. Evidence from recent governance-focused studies indicates that institutional preparedness has not kept pace with the rapid diffusion of AI technologies (Sangwa et al., 2025). In this context, reactive approaches, such as blanket prohibitions or fragmented guidance, are unlikely to be effective. Instead, universities must shift toward structured, proactive governance approaches that recognize AI as an already normalized component of academic practice.

The policy implications and strategic responses emerging from this review are synthesized in **Table 4**, which highlights a clear disconnect between the rapid, organic uptake of AI tools and the current state of institutional readiness within African higher education. The recommendations outlined emphasize the need for comprehensive governance frameworks that move beyond enforcement toward integration, focusing on ethical use, assessment design, and academic integrity. Importantly, the table underscores that high prevalence of use, in the absence of formal policy, poses risks not only to academic standards but also to equity and consistency across institutions.

Capacity-building emerges as a central priority. Although AI use is evident among both students and lecturers, existing evidence suggests that staff engagement is more variable and constrained by limited training opportunities, unclear institutional expectations, and uncertainty around appropriate academic use. Embedding AI literacy within curricula and professional development programs is therefore essential to support responsible and pedagogically meaningful use. Without parallel investments in staff capacity and digital infrastructure, regulatory efforts alone are unlikely to succeed.

Table 4 highlights that while generative AI adoption in African higher education is widespread, its integration remains largely unregulated and driven by informal practices. This underscores the urgent need for structured institutional governance frameworks to guide ethical and effective use. Variability in AI competencies among lecturers and students points to gaps in capacity building, necessitating targeted training and curriculum integration. Additionally, persistent infrastructural limitations and digital inequalities continue to hinder equitable access to AI technologies. The fragmented nature of existing research further limits evidence-based policymaking, emphasizing the need for more robust and standardized studies. Importantly, the growing use of AI raises critical concerns around academic integrity, requiring policy reform and assessment redesign. Overall, a coordinated, systems-level approach is essential to ensure responsible, equitable, and sustainable AI integration in African higher education. Future research should prioritize standardized measurement of AI use, multi-institutional sampling, and longitudinal designs to better capture adoption trajectories and policy effects across African higher education systems (Owusu, Debrah, & Oladapo, 2025; Echedom & Okuonghae, 2021; Sangwa et al., 2025; Mudenda et al., 2026).

The implications of these findings extend beyond Africa. As AI adoption accelerates globally, the challenges observed in African higher education, particularly around governance, equity, and infrastructure, offer important lessons for other resource-constrained settings undergoing digital transformation.

Importantly, the very high heterogeneity ($I^2 = 97.4\%$) indicates that AI adoption is highly context-dependent, reinforcing the need to interpret pooled estimates as descriptive summaries rather than precise continental metrics.

Table 4. Policy implications and strategic recommendations for AI integration in African higher education.

Area	Policy Implications	Strategic Recommendations
Institutional Governance	The high pooled prevalence of AI use (79.7%) indicates that AI is already embedded in academic practice, largely through unregulated, bottom-up adoption. The absence of formal governance frameworks poses significant risks to academic integrity, standardization, and institutional accountability.	Develop comprehensive, context-specific institutional policies that move beyond restrictive approaches toward structured integration. Frameworks should address ethical use, assessment redesign, data governance, and clear institutional guidelines on acceptable AI use.
Capacity Building	Although AI use is widespread among both students and lecturers, staff engagement remains inconsistent due to limited training, unclear expectations, and insufficient institutional support.	Implement continuous professional development programmes to strengthen AI literacy among lecturers. Integrate AI competencies into curricula and promote pedagogical innovation, including the design of authentic and AI-resilient assessments.
Infrastructure and Equity	Uneven AI adoption reflects persistent structural inequalities, including unreliable electricity, limited internet access, and a lack of locally relevant AI tools. These disparities risk exacerbating educational inequities across institutions and regions.	Invest in digital infrastructure and equitable access to technological resources. Promote the development and adoption of AI tools tailored to African contexts, including local languages and low-resource environments.
Research and Monitoring	The current evidence base is fragmented, dominated by small-scale, cross-sectional studies with methodological heterogeneity, limiting generalizability and evidence-based decision-making.	Promote large-scale, multi-institutional, and longitudinal research to generate robust evidence. Standardize definitions and measurement of AI use to improve comparability and inform policy and practice.
Academic Integrity	The rapid diffusion of generative AI tools (e.g., ChatGPT) is transforming how students engage with academic tasks, raising concerns about plagiarism, authorship, and over-reliance on AI-generated content.	Revise academic integrity policies to explicitly define acceptable and unacceptable AI use. Emphasize transparency, attribution, and responsible use while redesigning assessments to reduce misuse and encourage critical thinking.

5. Conclusion

This systematic review and meta-analysis indicate that AI use appears to be widespread in the sampled African higher education settings, although estimates vary considerably across contexts. Therefore, these findings reflect the included study settings rather than all African higher education institutions, given the limited country coverage and high heterogeneity. The evidence points to rapid, largely bottom-up adoption that appears to have outpaced the development of institutional governance, pedagogical guidance, and capacity-building mechanisms, creating both risks and opportunities for higher education systems. Without deliberate, context-sensitive responses, this disconnect may undermine academic integrity and exacerbate existing inequalities. However, coordinated policies, educator training, and investments in digital infrastructure offer a pathway toward the ethical, equitable, and pedagogically meaningful integration of AI. Future research should move beyond documenting uptake to examine how AI is used in teaching and learning, how institutional policies shape practice, and how long-term impacts can be evaluated to inform evidence-based decision-making in African higher education.

Ethics Approval and Consent to Participate

Ethical approval was not required for this study as it is a meta-analysis based exclusively on data from previously published studies. No new data were collected, and all included studies had obtained appropriate ethical approval and informed consent as reported by their respective authors.

Availability of Data and Materials

All data used in this study were extracted from published articles and supplementary materials. The datasets generated and analyzed during the current study, as well as the analytic code, are available from the corresponding author upon reasonable request.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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