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Editorial

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Editorial

Journal of Advocacy, Research and Education – 2014 to 2026: An Overview

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Abstract

The *Journal of Advocacy, Research and Education* was founded in October 2014 in Ghana, Africa, to promote open access scholarship and facilitate the dissemination of multidisciplinary research in advocacy, education, and related fields. Since its establishment, the journal has experienced steady growth in both international authorship and academic recognition. Between 2014 and 2025, the journal has published contributions from scholars representing 33 countries across Africa, Asia, Europe, North America, and South America. In addition to its growing international reach, the journal has been indexed in several reputable academic databases and repositories, including Scopus and other major indexing services, enhancing global accessibility and scholarly visibility. As we reflect on 11 years of continuous publication, we celebrate the journal's achievements and acknowledge the contributions of our authors, reviewers, editors, and institutional partners. We remain committed to strengthening the journal's reputation as a trusted platform for disseminating high-quality, open-access research that informs policy, education, and practice worldwide.

Keywords: Editors' Note, Ghana, Journal of Advocacy, Research and Education, Open Access Publishing, Scholarly Communication.

1. Historical Reflection (2014–2025)

The *Journal of Advocacy, Research and Education (JARE)* was founded in October 2014 by the Centre for Behaviour and Wellness Advocacy (formerly KAD International) in Ghana, with technical and funding support from Cherkas Global University Press (Washington, District of Columbia, USA). The primary aim of the JARE was to promote open access publishing globally (Sarfo, 2023). The inaugural issue featured seven articles authored by scholars from Ghana and the Russian Federation (KAD International, 2014). Since its establishment, the JARE has maintained a consistent publishing record and gradually expanded its global reach.

Following its first issue, the JARE adopted a publication schedule of once every four months. For the past 11 years, the JARE has consistently published three issues annually in April, August,

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and December, with steady growth in its international visibility and scholarly contributions (Sarfo, 2024, 2025).

Between 2014 and 2025, the journal has published research contributions from over 3o countries across Africa, Asia, Europe, North America, and South America. Among these contributors, Ghana remains the leading contributor with 147 authors, reflecting the journal's strong foundation within the Ghanaian academic community. Other notable contributors include Ukraine (38 authors), South Africa (35 authors), Mexico (19 authors), Nigeria (18 authors), Russia (14 authors), and the United States of America (14 authors). Contributions from several other countries across Asia, Europe, and the Americas demonstrate the journal's increasing international engagement and academic collaboration (Centre for Behaviour..., 2026a).

In addition to its growing international authorship, JARE has achieved recognition through inclusion in several reputable indexing and abstracting services. So far, the JARE is indexed in major scholarly databases, including Scopus, African Journals Online, EBSCO Information Services, Google Scholar, Crossref, ERIH PLUS, and Research4Life (Centre for Behaviour..., 2026b). Inclusion in these widely recognised platforms has significantly enhanced the robustness, visibility, accessibility, and global dissemination of the journal's research. Additionally, such notable indexes enable students, researchers, institutions, practitioners, and policymakers worldwide to access and engage with our publications.

2. Future Aspirations

Over the past eleven years, the *Journal of Advocacy, Research and Education* has built a reputation for publishing high-quality, evidence-based research addressing important issues in education, advocacy, and interdisciplinary scholarship (Sarfo, 2024, 2025).

As the global research environment continues to evolve, the journal remains committed to strengthening its role as a platform for accessible and impactful academic communication. Our goal is to continue improving the quality, visibility, and international diversity of open access research.

Looking ahead, the Editorial Board seeks to expand international collaboration among scholars, reviewers, and institutions while maintaining rigorous peer-review standards. We also aim to enhance the journal's presence in major academic databases and to promote the wider dissemination of research outputs. We also hope to expand our funding scope to support our open-access agenda, especially for countries in the Research4Life community.

On behalf of the JARE Editorial Board, I express our sincere appreciation to our authors, reviewers, readers, indexing partners, and supporting institutions for their continued contributions to the journal's growth. Together, we look forward to strengthening the *Journal of Advocacy, Research and Education* as a trusted home for multidisciplinary research and open knowledge sharing.

7. Declarations

Ethics approval and consent to participate

Not applicable.

Consent to publish

Not applicable.

Availability of data and materials

All cited sources are publicly available online.

Conflict of interest statement

The author reports no conflicts of interest.

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Authors' contributions

JOS: Conceptualisation, Writing-original draft, Writing-review and editing. The author contributed to and has approved the final manuscript.

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Articles

Determinants of Financial Literacy among Mexican University Students

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Abstract

Financial literacy enables effective decision-making across contexts and improves individuals' and society's financial well-being, facilitating their participation in economic life. This research aims to analyze the relationship between financial literacy and socio-economic, demographic, educational and family determinants among university students in Mexico. Data were collected from 1,355 students at three universities in different Mexican states, using non-probabilistic, self-determined sampling. The analysis method is based on constructing multiple linear regression models to estimate financial literacy and its three dimensions: knowledge, behavior and attitude. The results show that gender, type of institution, field of knowledge, work experience, and the mother's educational level are significantly related to university students' financial literacy level. This research contributes to the regional comparative literature by analyzing university students from different socio-economic regions in Mexico, generating evidence that can inform the design and implementation of public policies to strengthen financial literacy at the local level.

Keywords: Determinants, Financial Literacy, Financial Well-Being, Mexico, University Students.

1. Introduction

Financial literacy can be defined as a process, tool, or strategy aimed at developing knowledge, attitudes, skills, abilities, and behaviors to facilitate intelligent and informed decision-making regarding financial products and services (Avendaño et al., 2021). Financial literacy enables effective decision-making across various contexts and improves individuals' and society's

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financial well-being (Escalera-Chávez et al., 2025; Culebro-Martínez et al., 2025), thereby facilitating their participation in economic life (OECD, 2017).

Mexico has been measuring financial literacy since 2018 by using data collected through the National Financial Inclusion Survey (ENIF, by its acronym in Spanish), whose goal is to generate statistical information and official indicators at national level to allow financial authorities to conduct diagnostics, design public policies, and establish financial inclusion and education goals (INEGI, 2024). The financial literacy index is constructed using data from the ENIF by summing the scores obtained from the following sub-indices: knowledge (basic understanding of financial concepts); behaviors (financial actions to experience minimal financial stress); and attitudes (attitude statements towards money and planning for the future) (CNBV, 2022).

Based on the 2021 ENIF, the financial literacy index for Mexico, which is 57, with a normalized score at 100, places it with a greater performance compared to countries such as Colombia, Romania, and Italy, but a lesser one than that obtained by Peru, Germany, and Hong Kong, and the average for OECD countries (CNBV, 2021; OECD/INFE, 2020). The sociodemographic characteristics of the population influence the financial literacy level, according to the results obtained from the ENIF, 2021. However, they do so in a non-uniform manner. On account of the previously stated, this work is of great relevance to the Mexican context, where significant differences are observed among the different regions (Maceda-Méndez, Espinosa-Espíndola, 2024).

The aim of this research is to analyze the relationship between economic, demographic, educational, and family determinants and university students' financial literacy in Mexico. One of the major contributions of this work focuses on students' analysis from three different universities belonging to contrasting geographical areas, according to the ENIF classification (CNBV, 2021): Northeast (San Luis Potosí and Tamaulipas) and South-Central and Eastern (Veracruz). There are significant differences in financial literacy levels in these regions, particularly in the financial knowledge and behavior dimensions.

Regional differences in financial literacy could be explained by differences in human development levels across regions. Although Mexico remains among the countries with a high Human Development Index (HDI), ranking 77 out of 193 countries measured, it does show significant regional differences (Briano-Turrent, 2025). According to data published by the National Population Council and based on the United Nations Development Program (UNDP) methodology, in 2020, San Luis Potosí recorded an HDI of 0.77, indicating a medium-high human development level. Veracruz had an HDI of 0.74, corresponding to a medium-high human development level, while Tamaulipas surpassed both states, with an HDI of 0.80 and a high human development level (UNDP Mexico, 2024).

In this context, this research contributes to the regional comparative literature by analyzing university students from different sociodemographic regions in Mexico, generating evidence that can contribute to the design and implementation of public policies and actions to strengthen financial literacy at the regional and local levels. It also expands the international literature by addressing new sociodemographic variables that may affect university students' financial literacy, such as their parents' educational level.

Literature Review

Studies from different parts of the world show that, even though young people with university education have a higher financial literacy level than those who did not attend university (Samuelsson et al., 2023), university students, both in developed and developing countries, have low financial literacy levels (Kharel et al., 2024; Lantara, Kartini, 2015). In Ecuador, Peñarreta-Quezada et al. (2024) found that university students have a high level of financial knowledge (68 % answered more than 70 % of the questions). However, they presented average financial behavior and attitude scores. In Mexico, Merino's (2023) results show that, in terms of financial knowledge, approximately 60 % of the young people who participated in the study do not understand the concepts of inflation, interest, and financial risk. Approximately 3 out of 4 have good financial behavior, and regarding their attitude, around 70 % think about their financial future.

Gender, age, and university students' financial literacy

University students' financial literacy level has been found to be associated with gender. According to Liaqat et al. (2021) and Philippas and Avdoulas (2019), university students with

higher financial literacy levels are men. In contrast, Peñarreta-Quezada et al. (2024), Valencia-Márquez et al. (2023), and Novák et al. (2021) found no association between students' gender and their financial literacy level. Student age has also been identified as a variable that significantly influences their financial literacy level (Ruiz-Palomo et al., 2023). Peñarreta-Quezada et al. (2024) found that students aged 26 or older had higher scores on the financial knowledge and behavior dimension and, therefore, higher financial literacy levels. Based on this evidence, the first research hypothesis is presented:

H1. University students' financial literacy is significantly related to their gender and age.

Economic determinants and university students' financial literacy

There is evidence that students' financial literacy levels are strongly associated with their socio-economic status. Those from high-income families have higher levels of financial literacy (Lusardi, Messy, 2023; Ergün, 2017). Lantara and Kartini (2015) show that, in Indonesia, university students with higher financial literacy levels are those with higher incomes and work experience. This result is consistent with that found by Böhm et al. (2023) among university students in Slovakia and by Peñarreta-Quezada et al. (2024) in Ecuador. Based on these results, the second research hypothesis is established:

H2. Students' financial literacy has a positive and significant relationship with their income level and work experience.

Educational determinants and university students' financial literacy

Human capital theory posits that knowledge and education are perceived as a type of investment (Becker, 1964). According to Lusardi and Mitchell (2014), people who acquire financial knowledge have the potential to obtain above-average expected returns on their investments. From this perspective, this study addresses the relationship between financial literacy and university students' education. Educated individuals tend to be more competent in financial services and natural resources use than illiterate and unskilled individuals (Ahmad et al., 2022).

Antonio-Anderson et al. (2020) and Boisclair et al. (2017) found that higher educational levels are associated with higher financial literacy. Sarigül (2014) agrees with this result, finding that financial literacy among university students is higher among seniors than among first-year students. Preston and Wright (2024) reached the same conclusion, although they also found that the increase in financial literacy levels decreases with each additional year of study. In contrast, Novák et al.'s (2021) findings show that there was no association between students' financial literacy and their education level. It has also been shown that the area of specialization affects students' financial literacy level. In this sense, Lantara and Kartini (2015), Tavares et al. (2022), and Ergün's results (2017) show that economics and business students have a higher financial literacy level than students from other areas. However, the results by Gavurova et al. (2017) show that economics and business students' financial literacy levels are no different from those students belonging to other specialties.

The type of institution where they are enrolled is another identified variable as a determinant of students' financial literacy. Liaqat et al. (2021) and Villagómez and Hidalgo (2017) found that students at private institutions have higher levels of financial literacy. However, the results of Valencia-Márquez et al. (2023) indicate that university students' financial literacy levels do not differ by university funding source (public or private). Based on the above, the third research hypothesis is presented.

H3. University students' financial literacy is significantly related to their degree, field of study, and type of educational institution.

Family determinants and university students' financial literacy

According to Lusardi and Mitchell (2014), parents' educational level is a determining factor in young people's financial literacy levels. In this sense, the results of Merino (2023) and Amagir et al. (2020) show that, among young Mexicans, the mother's educational level is the only variable that significantly influences their financial literacy. Ansong and Gyensare (2012) reported the same finding, although they also noted that the father's educational level is not a determining factor in this relationship. In contrast, Böhm et al. (2023) and Philippas and Avdoulas (2019) found that the mother's educational level is not related to students' financial literacy. However, the father's educational level and having a father with a master's or doctoral degree are significantly associated with the student's financial literacy. From the above, the fourth and final hypothesis of this research is presented.

H4. Students' financial literacy has a positive and significant relationship with their parents' educational level.

2. Methods and Materials

Research Design

The analytic cross-sectional design was adopted for this study.

Population and Sample

The units of analysis are undergraduate students from three Mexican universities in three states in the Gulf-Northeast region of the country: Universidad Autónoma de San Luis Potosí (UASLP), which in the 2023-2024 academic year reported an enrollment of 23,301 at the state's capital campus; Universidad Autónoma de Tamaulipas (UAT), which registered an enrollment of 9,273 in the Ciudad Victoria campus; and Universidad Cristóbal Colón (UCC), which enrolled 1,869 students in the Veracruz campus (ANUIES, 2024). The first two operate with public funding, and the third with private funding.

Data Collection

An electronic survey was administered from January to March 2024 to collect data using a non-probabilistic, self-selected sample of students across the three university campuses. Students gave their informed consent to participate in the study. Originally, 1,469 responses were received; however, after discarding incomplete and inconsistent records, a database of 1,355 students was created, equivalent to 4 % of the total population: 807 women, 525 men, and 23 students who preferred not to answer this question. Of the total, 27.1 % were enrolled at the UASLP, 38.6 % at the UAT, and 34.3 % at the UCC; 94.0 % of respondents at UASLP are enrolled in business and administration programs, while at UAT this figure is 28.9 % and at UCC 27.7 % (Table 1).

Table 1. Population and sample size

Institution	On-site registration				Sample				
	Women	Men	Total	%	Women	Men	Not declared	Total (%)	Adm. (%)
UASLP, *San Luis Potosí Campus*	12,197	11,104	23,301	65.4	234	131	2	367 (27.1)	94.0
UAT, *Ciudad Victoria*	5,426	3,847	9,273	29.1	284	226	13	523 (38.6)	28.9
UCC, *Veracruz*	1,035	834	1,869	5.5	289	168	8	465 (34.3)	27.7
Total	**18,658**	**15,785**	**34,443**	**100.0**	**807**	**525**	**23**	**1,355**	**46.1**

Source: own, based on ANUIES (2024) data.

Variables and Constructs

The survey was structured into four sections. The first includes demographic variables (gender, age), economic variables (household income level, whether the respondent works in addition to studying), educational variables (institution, field of knowledge, academic year), and family variables (parents' educational level). The three remaining sections address questions on financial behavior, attitudes, and knowledge, consistent with the OECD-recommended questions for measuring financial literacy (Atkinson, Messy, 2012).

In order to evaluate financial knowledge (FK), seven questions are posed that assess the student's knowledge of inflation effects, simple interest, compound interest, the relationship between risk and return, and diversification and risk. If the respondent answers correctly, one point is assigned, and zero otherwise. To rule out multi-collinearity problems among items, tetra-choric coefficients are estimated, suitable for determining correlations between binary variables, with an acceptance criterion for correlations less than 0.6. The number of correct answers is then arithmetically summed to obtain a financial well-being indicator that ranges from 0 to 7. This indicator is subsequently transformed into a scale of 0 to 100.

To assess financial attitude (FA), four items were included with statements related to the preference of living in the present and not worrying about the future. For financial behavior (FB), five items were posed that describe positive financial behaviors such as budgeting, setting financial goals, making informed purchases, and paying bills on time. Both sections were coded on a five-point Likert scale according to whether the statement described the respondent. Regarding financial behavior, if the respondent agreed with the statement, it means that their behavior contributes to improving their financial literacy level. Conversely, financial attitude was assigned inverse values; that is, if the statement describes the respondent, it means their financial attitude was unfavorable to their financial literacy.

Subsequently, financial attitude and financial behavior indicators were estimated using confirmatory factor analysis. Before this, the internal consistency of the data is tested by calculating Cronbach's alpha coefficient and applying an acceptance criterion for an alpha greater than 0.65. The suitability of the data for factor analysis is also assessed using Bartlett's test of sphericity and estimating the Kaiser-Mayer-Olkin (KMO) coefficient, with acceptance criteria of $p < 0.05$ and $KMO > 0.65$, respectively (Bartlett, 1937; Kaiser, 1974).

Financial attitude and financial behavior indicators are transformed to fit a scale ranging from 0 to 100, with higher scores indicating a greater contribution to the financial literacy level. Skewness and kurtosis measures are also estimated for these indicators and the financial knowledge indicator to identify whether they approximate a normal distribution. Finally, once the indicators for the three components (FK, FA, FB) are estimated and standardized, the overall financial literacy (FL) indicator is estimated by the simple average of the component scores (see Equation 1).

$$FL = \frac{FK + FA + FB}{3} \; ; \; FL, FK, FA, FB \in [0, 100] \tag{1}$$

Econometric Analysis

In this research, the dependent variable is financial literacy, which is analyzed both globally and through its components separately. It should be noted that these components can vary inversely, and therefore, it is important to analyze them independently (Atkinson, Messy, 2012; Cucinelli et al., 2019).

The independent variables are the demographic, economic, educational, and family factors which presumably determine students' financial literacy levels. The demographic variables considered are gender and age. On the one hand, gender includes three mutually exclusive categories (female, male, does not state) which receive a value of one if the respondent identified with one of them. Age, on the other hand, is treated ordinally, ranging from 17 to 25, with 25 including 16 students who declared themselves to be 25 years of age or older.

The economic variables are the household income level and whether the person works in addition to studying. Income level (n_inc) is ordinally coded in eleven intervals of 260 US dollars (which at the time of the survey was equivalent to 5,000 Mexican pesos), starting at 0 and reaching the eleventh level, which corresponds to more than 2,600 US dollars. Whether the respondent works in addition to studying (work) is coded dichotomously, assigning one if affirmative and zero otherwise.

The educational variables are the type of institution, field of knowledge, and academic year. Institution (inst) is used to determine whether it is primarily funded by public or private resources (type_inst); one is assigned if it is funded privately and zero if public. Field of knowledge is a categorical variable indicating whether the respondent is studying: in a business and administration program (adm_bus), in programs such as accounting, economics, business management, or international business; in a social science program (soc_sc), for example, criminology, communication, international relations; or in other areas (other_area) such as nursing, medicine, engineering, veterinary medicine, gastronomy, etc. Finally, the variable academic year (acad_uni), coded ordinally, is used to indicate the respondent's seniority, ranging from one to six.

The family variables considered are the father's educational level (f_educ) and mother's (m_educ), coded ordinally into three levels: no schooling, primary, or secondary school (0); high school (1); and undergraduate or graduate (2). If the parents' educational level is unknown to the student, the record is omitted from the analysis. A description of these variables is presented in Table 2.

Table 2. Variables description

Variable	Description	Source
Dependent variables		
Financial literacy (FL)	Continuous variable estimated by its components arithmetic average: financial knowledge, attitude and behavior. FL ϵ [0, 100]	Atkinson and Messy (2012)
Financial Knowledge (FK)	Continuous variable estimated by multiplying 100 by the percentage of correct answers in seven questions about financial knowledge. FK ϵ [0, 100]	
Financial attitude (FA)	Continuous variable estimated from four items factor analysis on a Likert scale and adjusted to a 100-point scale. FA ϵ [0, 100]	
Financial behavior (FB)	Continuous variable estimated from five-item factor analysis on a Likert scale and adjusted to a 100-point scale. FB ϵ [0, 100]	
Independent variables		
Demographic		
Gender (gender, *female*, *male*, *does not state*)	Set of dichotomous variables that includes three mutually exclusive categories that receive a value of one if the respondent identified with one of them and zero otherwise. *gender= {female, male, does not state}* ϵ {0, 1}	Lantara and Kartini (2015); Liaqat et al. (2021); Peñarreta-Quezada et al. (2024)
Age (*age*)	Ordinal variable that indicates the student's age. *age* ϵ {17, 25}	
Economic		
Income level (*n_inc*)	Ordinal variable in eleven intervals of 260 US dollars, starting at 0 (0–206), continuing with 1 (261–521), 2 (522–782) and so on, consecutively, until reaching the eleventh level (more than 2,600). *n_inc* ϵ {0, 1, ..., 10}	Lantara and Kartini (2015); Lusardi and Messy (2023); Peñarreta-Quezada et al. (2024)
Work status (*work*)	Dichotomous variable indicating whether the respondent works in addition to studying (1) or not (0). *work* ϵ {0, 1}	
Educational		
Institution (*inst*)	Nominal variable that identifies the institution in which the person surveyed is enrolled. *inst* ϵ {UASLP, UAT, UCC}	Chen and Volpe (1998); Lantara and Kartini (2015); Liaqat et al. (2021)
Type of institution (*type_inst)*	Dichotomous variable that receives the value of one if the institution is financed primarily with private resources and zero with public resources. type*_inst* ϵ {0, 1}	
Field of knowledge (*field*)	Categorical variable that indicates whether the person surveyed studies in a program in the business and administration area (*adm_bus*), in thesocial sciences area (*soc_sc*), or in other areas of specialty (*other_field*). *esp* = {*adm_bus, soc_sc, other_field*} ϵ {0, 1}	
Academic year (*acad_year*)	Ordinal variable indicating the seniority the respondent has at their current university. *acad_year* ϵ {1, 2, ..., 6}	
Parents' education		
Parents' educational level	Ordinal variables coded at three levels: no education, primary, or secondary (0); high school (1); and	Lusardi and Messy (2023);

Variable	Description	Source
(m_*educ*, *f_educ*)	undergraduate or graduate (2). If parents' educational level is unknown to the student, the record is omitted from the analysis. $m\_educ, f\_educ \in \{0, 1, 2\}$	Merino (2023)

Using these variables, four multiple linear regression models and a structural equation model were constructed. The analysis was performed using Stata version 14.0. The first four models were used to individually analyze the relationship between the determining factors described and the dependent variables: financial literacy (FL), financial knowledge (FK), financial attitude (FA), and financial behavior (FB), as shown in equation 2:

$$FX = a_{X0} + a_{X1} \cdot gender + a_{X2} \cdot age + a_{X3} \cdot n\_inc + a_{X4} \cdot work + a_{X5} \cdot field + a_{X6} \cdot acad\_year + a_{X7} \cdot m\_educ + a_{X8} \cdot f\_educ + error \quad (2)$$

The structure of equation 2 works for both overall financial literacy and its components, X = {FL, FK, FA, FB}. Additionally, the gender variable includes the categories "female" and "male," with the "does not state" category as the reference (equation 3):

$$a_{X1} \cdot gender = a_{X1m} \cdot woman + a_{X1h} \cdot man \quad (3)$$

Furthermore, the specialty variable (field) includes the categories "business and administration" (adm_bus) and "social sciences" (soc_cs), which are compared with the "other_specialties" category (other_field) as the reference (equation 4):

$$a_{X6} \cdot field = a_{X6a} \cdot adm\_bus + a_{X6h} \cdot soc\_sc \quad (4)$$

3. Results

Financial Literacy Factor Analysis

In this study, indicators were estimated to measure financial knowledge, financial attitude, and financial behavior among university students. Financial knowledge (FK) was calculated by an arithmetic seven binary-coded items sum, with a value of 1 if the question was answered correctly and 0 otherwise.

Similarly, indicators for financial attitude (FA) and financial behavior (FB) were estimated using confirmatory factor analysis with principal components and Varimax rotation. Tests were previously conducted to determine the internal consistency of the items, the adequacy of the sample, and the feasibility of performing a factor analysis on the data.

In order to assess internal consistency, Cronbach's alpha coefficients were estimated for both constructs. On the one hand, with the four items originally proposed for financial attitude (FA), the alpha coefficient did not exceed the acceptance threshold of 0.65. However, by omitting FA3 and retaining FA1, FA2, and FA4, the alpha coefficient registered a value of 0.6823, validating the items' internal consistency. Furthermore, the five items proposed to assess financial behavior (FB) obtained an alpha coefficient of 0.7831, thus accepting their internal consistency.

Bartlett's test of sphericity was applied to the above items, yielding a $p > 0.001$ for each of the constructs, indicating that the sample was adequate for processing. Likewise, the Kaiser-Meyer-Olkin test yielded values of 0.652 for financial attitude and 0.778 for financial behavior, indicating that the constructs are acceptable for factor analysis.

To estimate the financial attitude and behavior indicators, confirmatory factor analyses were conducted using principal component factors with Varimax rotation. As a result, it was found that each construct could be represented by a single factor, thus meeting Kaiser's (1974) criterion, which requires retaining factors with eigenvalues greater than or equal to 1. Furthermore, it was observed that for financial attitude (FA), this factor explains 61.2 % of the variance, while the factor retained for financial behavior (FB) explains 54.4 % of its variance (Table 3).

Table 3. Factor analysis of financial attitude and financial behavior

Variable/Item	Load Factor	Explained Variance
Financial attitude		0.612
FA1	0.727	
FA2	0.814	
FA4	0.804	
Financial behavior		0.541
FB1	0.709	
FB2	0.789	
FB3	0.870	
FB4	0.641	
FB5	0.645	

Thus, indicators were estimated to measure financial attitude (FA) and financial behavior (FB). These, along with the previously calculated financial knowledge (FK) indicator, were transformed to fit a scale of 0 to 100, where 100 represents the highest score in each financial literacy (FL) component. The latter is estimated by taking the simple average of the three components. Finally, it was verified that the four constructs (FA, FB, FK, FL) met the normality tests before proceeding to the regression analysis, as shown in Table 4.

Table 4. Normality tests for financial literacy constructs

Indicator	Observ.	Mean	St. Dev.	Asymmetry	Kurtosis
Financial knowledge (FK)	1,355	66.7	19.9	-0.9	4.1
Financial attitude (FA)	1,355	59.4	23.9	-0.2	2.6
Financial behavior (FB)	1,355	64.3	22.2	-0.4	2.7
Financial literacy (FL)	1,355	63.5	14.1	-0.3	3.2

The 1,355 students who participated in the study recorded an average of 63.5 points on a scale of 0 to 100, with a standard deviation (SD) of 14.1. By component, the highest score was for financial knowledge with 66.7 (SD = 19.9), followed by financial behavior with 64.3 (SD = 22.2), and financial attitude with 59.4 (SD = 23.9).

Financial Literacy Descriptive Statistics

There was a significant difference observed in financial behavior, financial knowledge, and the overall financial literacy indicator, favoring men ($p < 0.001$). Furthermore, the older the students, the greater their financial knowledge ($p < 0.05$). Likewise, the higher the household income, the better their financial behavior and the more accurate their financial knowledge scores were ($p < 0.001$ and $p < 0.01$, respectively). Similarly, when university students work in addition to studying, their financial behavior and knowledge improve significantly compared to their non-working peers ($p < 0.001$ and $p < 0.05$, respectively). These results are shown in Table 5.

By educational institution, students at the UASLP obtained the best results in financial attitude and financial knowledge, while, in financial behavior, the differences in results were not statistically significant. However, no significant difference was found in financial literacy between students at public and private institutions.

By field of knowledge, students in business and administration-related programs performed significantly better on financial attitude, financial knowledge, and overall financial literacy ($p < 0.001$). However, only the financial attitude component showed significant differences related to the academic year in which the students were enrolled ($p < 0.05$).

Table 5. Financial literacy by demographic and economic variables

Variables	Observations		Financial attitude (FA)		Financial behavior (FB)		Financial knowledge (FK)		Financial literacy (FL)	
	Freq.	%	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Demographics										
Gender			F=0.11		F=14.68***		F=13.31***		F=13.05***	
Women	807	59.6	59.6	23.2	61.9	22.2	64.6	19.4	62.1	13.8
Men	525	38.7	59.1	25.0	68.3	21.5	70.1	20.0	65.8	14.2
Does not declare	23	1.7	58.0	25.8	57.5	25.3	60.2	25.1	58.6	16.1
Age			F=1.17		F=0.87		F=2.28*		F=0.65	
17	30	2.2	59.2	24.1	57.2	22.3	61.4	23.5	59.3	17.5
18	243	17.9	61.0	22.3	64.1	22.4	64.5	20.3	63.2	14.0
19	307	22.7	58.0	23.7	63.7	21.9	67.4	20.7	63.1	13.6
20	247	18.2	59.6	23.7	65.8	21.7	65.9	18.5	63.8	13.7
21	270	19.9	60.2	23.1	63.9	21.9	66.8	20.2	63.6	14.1
22	136	10.0	59.0	25.6	64.6	23.2	68.0	18.6	63.8	13.6
23	56	4.1	54.7	28.2	66.5	23.1	70.2	18.1	63.8	15.6
24	30	2.2	67.5	24.7	61.6	24.5	62.9	21.4	64.0	17.6
25	36	2.7	54.9	29.7	68.7	21.4	76.6	17.8	66.7	16.2
Economic										
Income level*			F=1.44		F=4.09***		F=2.42**		F=1.68	
0 - 260	226	16.7	60.2	25.7	63.6	22.8	62.8	21.4	62.2	14.6
261 - 521	262	19.3	61.1	23.1	61.2	23.7	63.8	18.9	62.0	14.1
522 - 782	244	18.0	61.2	23.8	62.1	21.2	68.1	18.0	63.8	14.1
783 – 1,043	150	11.1	57.7	24.0	62.2	20.9	67.8	18.0	62.6	13.0
1,044 – 1,304	104	7.7	60.5	24.1	67.1	22.5	70.1	19.8	65.9	15.8
1,305 – 1,564	111	8.2	60.4	21.5	63.2	22.1	68.0	20.7	63.8	12.7
1,565 – 1,825	65	4.8	58.3	21.9	73.8	18.2	68.8	21.6	67.0	13.4
1,826 – 2,086	49	3.6	55.2	24.9	66.1	19.7	69.4	19.3	63.6	12.5
2,087 – 2,347	33	2.4	51.7	26.9	66.8	23.6	65.8	25.2	61.4	18.2
2,348 – 2,600	29	2.1	58.9	19.9	71.8	17.8	71.4	16.2	67.4	10.8
More than 2,600	82	6.1	53.4	25.0	73.1	21.3	69.3	22.8	65.3	14.7
Work status			F=1.36		F=18.52***		F=5.87*		F=16.46***	
Works and studies	583	43.0	60.3	24.1	67.3	20.8	68.2	19.0	65.2	13.6
Does not work	772	57.0	58.7	23.8	62.1	22.9	65.5	20.5	62.1	14.3
Total	**1,355**	**100.0**	**59.4**	**23.9**	**64.3**	**22.2**	**66.7**	**19.9**	**63.5**	**14.1**

Statistical significance with two-tailed ANOVA, F statistic and p-value:
*p < 0.05; **p < 0.01; ***p < 0.001.
* Income level declared in US dollars. Peso/dollar exchange rate June 5th, 2025 (19.17 Mexican pesos per dollar). Calculated with data from Banco de México exchange market web page. Retrieved from: https://www.banxico.org.mx/tipcamb/main.do?page=tip&idioma=sp

Additionally, it was observed that the higher the mother's educational level, the higher the scores obtained by her children in financial behavior and knowledge ($p < 0.001$) and, in general, in financial literacy ($p < 0.01$). Similarly, the father's educational level is positively related to university students' performance in financial knowledge ($p < 0.01$). However, the higher the father's education, the lower their score in financial attitude ($p < 0.01$). These results can be seen in Table 6.

Table 6. Financial literacy by educational and family variables

Variables	Observations		Financial attitude (FA)		Financial behavior (FB)		Financial knowledge (FK)		Financial literacy (FL)	
	Freq.	%	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Educational										
University			F=6.84**		F=0.08		F=14.71***		F=10.48***	
UASLP	367	27.1	63.0	22.5	64.1	19.6	70.8	17.8	66.0	12.2
UAT	523	38.6	57.0	25.4	64.3	23.6	63.5	21.2	61.6	14.9
UCC	465	34.3	59.3	22.9	64.7	22.5	66.9	19.5	63.6	14.4
Institution			F=0.02		F=0.14		F=0.11		F=0.07	
Public	890	65.7	59.5	24.5	64.2	22.0	66.5	20.2	63.4	14.0
Private	465	34.3	59.3	22.9	64.7	22.5	66.9	19.5	63.6	14.4
Field of knowledge			F=7.43***		F=2.20		F=30.74***		F=23.79***	
Administration	625	46.1	62.0	23.0	65.7	20.1	71.1	18.0	66.2	12.6
Social Sc.	379	28.0	56.4	25.5	63.6	24.2	61.8	19.5	60.6	14.8
Other	351	25.9	58.0	23.4	62.8	23.4	64.1	21.9	61.6	15.0
Academic year			F=2.70*		F=0.73		F=2.18		F=1.63	
1	244	18.0	59.6	23.3	64.5	23.6	63.8	21.4	62.6	15.6
2	524	38.7	60.2	23.5	64.2	21.4	68.2	19.4	64.2	13.2
3	255	18.8	56.2	24.6	64.6	22.7	66.0	19.1	62.3	13.8
4	257	19.0	60.7	23.9	63.0	22.2	66.1	20.4	63.3	14.8
5	67	4.9	56.5	26.1	67.8	21.2	70.1	18.2	64.8	13.9
6	8	0.6	81.2	13.5	72.4	16.7	64.3	22.9	72.6	10.9
Educational level of parents										
Mother's education			F=1.83		F=7.76***		F=7.18***		F=4.13**	
Up to secondary	276	20.4	61.7	25.1	58.7	21.2	65.8	19.4	62.1	14.4
High School	436	32.2	60.0	24.1	65.8	22.4	66.9	18.3	64.2	13.9
Bachelor or postgraduate	572	42.2	58.2	23.4	66.0	22.0	68.1	19.9	64.1	13.9
Does not know	71	5.2	56.3	22.6	63.9	23.0	56.7	27.4	59.0	15.5
Father's education			F=3.80**		F=1.00		F=3.92**		F=1.79	
Up to secondary	246	18.2	62.4	24.1	62.2	22.4	65.4	20.2	63.3	14.2
High School	396	29.2	61.2	23.1	64.8	20.6	66.8	19.6	64.3	12.8
Bachelor or postgraduate	579	42.7	57.5	24.6	65.0	23.0	68.1	19.5	63.5	14.8
Does not know	134	9.9	56.8	22.6	64.4	22.8	61.9	21.2	61.0	14.5
Total	**1,355**	**100.0**	**59.4**	**23.9**	**64.3**	**22.2**	**66.7**	**19.9**	**63.5**	**14.1**

Statistical significance with two-tailed ANOVA, F statistic and p-value: *p < 0.05; **p < 0.01; ***p < 0.001.

Financial Literacy Econometric Analysis

Different demographic, economic, educational, and family factors determine the financial literacy of those university students who participated in this research. It should be noted that these factors vary according to each financial literacy component, even inversely to the other components.

Financial attitude is primarily determined by income level ($p > 0.05$), although students from higher-income families reported being less future-oriented and more inclined to make impulse purchases. Similarly, those enrolled in social science programs ($p < 0.01$) and other majors unrelated to management and business ($p < 0.05$) were less inclined to save. In contrast, students

from private institutions demonstrated a financial attitude compatible with foresight and savings, compared to their peers from public institutions (Table 7).

Table 7. Analysis of the determinants of financial literacy

Variables	Financial attitude (FA)			Financial behavior (FB)			Financial knowledge (FK)			Financial literacy (FL)		
	Coef.	E.E.	p	Coef.	E.E.	p	Coef.	E.E.	p	Coef.	E.E.	p
Gender (ref. man)	-0.144	1.485		-4.902	1.342	***	-4.804	1.157	***	-3.283	0.844	***
Age	-0.583	0.543		0.459	0.491		1.238	0.424	**	0.371	0.309	
Income level	-0.738	0.263	**	0.670	0.238	**	0.344	0.205		0.092	0.150	
Work	2.704	1.505		4.802	1.361	***	1.003	1.173		2.836	0.856	**
Type of institution (ref. public)	3.522	1.705	*	1.562	1.542		3.242	1.329	*	2.775	0.970	**
Field of knowledge (ref. Adm)												
Social Sc.	-6.273	1.756	***	-1.460	1.587		-10.251	1.369	***	-5.995	0.998	***
Other	-4.894	1.825	**	-2.377	1.650		-7.797	1.423	***	-5.023	1.038	***
Academic year	0.745	0.818		-0.257	0.740		-0.016	0.638		0.157	0.465	
Father educ level	-1.913	1.078		-0.469	0.974		0.983	0.840		-0.466	0.613	
Mother educ level	-0.083	1.075		2.688	0.972	**	1.019	0.838		1.208	0.611	*
Constant	75.024	10.147		52.703	9.176		45.190	7.911		57.639	5.771	
Observations		1,174			1,174			1,174			1,174	
P>F		0.001			0.000			0.000			0.000	
R2 Adjusted		0.018			0.047			0.083			0.064	
Significance: *p < 0.05; **p < 0.01; ***p < 0.001.												

In this sense, financial behavior is significantly related to gender, favoring men, and to work status favoring working students ($p < 0.001$). Likewise, prudent and sustainable financial behavior is positively associated with family income and the mother's education level ($p < 0.01$).

Furthermore, financial knowledge shows a significant difference by gender, favoring men, and by field of knowledge, favoring business and administration students ($p < 0.001$). Furthermore, among the students who participated in the research, age is positively associated with financial knowledge ($p < 0.01$), as well as being enrolled in a private institution is ($p < 0.05$).

Finally, in financial literacy comprehensive assessment, the most influential factors were being male and enrolled in a business and administration-related program ($p < 0.001$), working in addition to studying and being enrolled in a private institution ($p < 0.01$), and having a student's mother with a high education level ($p < 0.05$). In contrast, the student's academic year and the father's educational level were not significant for financial literacy or any of its components.

4. Discussion

The results obtained in this study coincide with those of Peñarreta-Quezada et al. (2024), where students' scores in the financial knowledge dimension were higher than those obtained in the financial behavior and financial attitude dimensions. The results obtained on the questions measuring financial knowledge were better than those reported by Merino (2023) in another population of Mexican university students. They also coincide with the results of Hernández-Mejía et al. (2022), who identified that, in general, Mexicans answered the question about inflation better and the question they failed the most was the one on calculating compound interest. The financial behavior of 71.5 % of the university students who participated in the study was short-term, as they did not set any financial goals. In this sense, they coincide with Lara and Ortega (2016), who described young people of this age as living in the present without worrying about the medium and long-term future. Furthermore, the results regarding financial behavior coincide with Merino's

(2023), in that timely debt repayment and prudent consumption are the best practices that a greater percentage of young people follow.

Although the participants are university students, their financial knowledge is low. Only the inflation awareness result is better than that reported by the ENIF 2021 for the general Mexican population. The rest of the knowledge assessed was lower in the student population, highlighting the low result obtained in the compound interest calculation, fifteen percentage points below that reported by the ENIF for the Mexican population with only primary education. Students' financial behavior is also lower than that reported by the ENIF 2021. For example, the number of students who prepare a budget is 27.4 % lower than the number of Mexicans with bachelor's degrees who budget. Regarding timely bill payment, this difference is 28.9 %. As for financial literacy, 9.0 % more students are inclined to save than the percentage of the Mexican population with a bachelor's degree who reported this attitude in the ENIF 2021. Students' scores were lower for the remaining financial literacy indicators.

On financial literacy determinants, the results show a gender difference favoring men, consistent with Liaqat et al. (2021); Philippas and Avdoulas (2019); and Lantara and Kartini's (2015) findings in university student populations. Regarding age, although the present study found no significant difference in the relationship between this variable and financial literacy, the results are consistent with those of Peñarreta-Quezada et al. (2024), who found that young people's financial knowledge increases with age.

The economic determinants analysis results show that students' family income does not influence their financial literacy, which contrasts with the findings by Lusardi and Messy (2023) and Ergün (2017). However, work experience is a significant financial literacy determinant. This result is consistent with those of Ergün (2017), Böhm et al. (2023), and Lantara and Kartini's (2015). The dimension analysis shows that income and work economic determinants do not influence students' financial knowledge, but they do influence their behavior. This contrasts with the findings of Peñarreta-Quezada et al. (2024), who identified that students' work experience influences their financial knowledge level and attitudes towards finance, but not their behavior. As for the educational variables analyzed, the type of university and the field of knowledge have a significant relationship with university students' financial literacy. When analyzing by dimension, it is observed that the relationship between these variables is significant with students' financial knowledge, but not with their behavior. Lantara and Kartini (2015), Tavares et al. (2022), and Ergün (2017), agree that having a higher financial literacy level, increases when studying a business and administration program.

The results on the relationship between financial literacy level and type of university are consistent with those of Liaqat et al. (2021) and Villagómez and Hidalgo (2017), in that the highest financial literacy level is found among students from private institutions. In contrast to the results obtained by Antonio-Anderson et al. (2020), Boisclair et al. (2017), Sarigül (2014) and Preston and Wright (2024), students' financial knowledge is not associated with their degree. Finally, as reported by Ansong and Gyensare (2012), the results show that it is the mother's educational level, and not the father's, that is a significant determinant of university students' financial literacy.

5. Conclusion

This research aimed to analyze the relationship between economic, demographic, educational, and family determinants and university students' financial literacy in Mexico. It was identified that there is a gender gap in financial literacy, and that the type of university, the students' field of knowledge, work experience, and their mother's educational level are the most significant financial literacy determinants.

This study addresses a gap in the literature by analyzing financial literacy level in general and by each of its three dimensions (knowledge, behavior, and attitude) in a population of university students living in different states in Mexico, attending different types of universities, and studying programs in different fields of knowledge. The results can serve as a basis for designing policies aimed at improving university students' financial literacy across Mexico. Although some previous studies have identified some financial literacy determinants among university students, these are limited in the Mexican context; they have not conducted comparative analyses by region or included sociodemographic variables such as parents' educational level.

Future research can analyze the differences in teaching-learning content and strategies, between public and private universities to identify best practices that contribute to increasing their students' financial knowledge, behavior, and attitudes. Furthermore, this type of study can be extended to other Latin American countries with similar financial literacy levels to identify how they have addressed the problem and the actions implemented to strengthen financial literacy.

6. Declarations

Ethics approval and consent to participate

The authors declare that all methods used in this project complied with the 2024 revision of the Declaration of Helsinki. The Institutional Review Boards of the UASLP, UAT, and UCC approved the study's ethical standards. Also, all individuals participating in the study gave their express, written consent.

Consent for publication

The authors affirm that study participants provided informed consent for participation and publication. Participants signed informed consent regarding publishing their data.

Availability of data and materials

Data and materials associated with this study are available upon request.

Conflict of interest statement

The authors report no conflicts of interest.

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Authors' contributions

This document is the work of the authors, as an intellectual contribution to the academic work, and they have approved it for publication. Conceptualization: EMG, OGM and GCBT, methodology, data curation, data analysis: OGM, writing – original draft preparation, writing: EMG, OGM and GCBT; writing – review and editing: EMG; writing – supervision: OGM and GCBT. All authors have read and agreed to the final version of the manuscript for publication.

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Perceived Training Needs of Academic Heads of Department in Higher Education

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Abstract

Due to the complex nature of higher education institutions' activities in achieving institutional strategic goals, there has been a demand to prepare education leaders for their management and leadership roles to ensure effective performance. The literature identifies that academic Heads of Departments (HoDs) who directly deal with students, the direct beneficiaries of higher education, have little or no formal leadership preparation for their roles to deliver their strategic plans. Yet, HoDs have enormous responsibilities to optimise learning, research, and community engagements. This article explored the perceptions of academic HoDs regarding the preparations they deem necessary before assuming duty to ensure success. A case study strategy was used to describe and understand the perceptions of the 16 selected HoDs at a university in Ghana. Semi-structured interviews were used to gather data that was analysed thematically. Findings revealed the kind of preparations, such as preparatory and periodic in-service training and the areas of office and finance management that HoDs wanted to receive to improve their self-efficacy. Recommendations include the need for the case university to structure HoD training programmes based on their needs assessment and to train HoDs on their administrative and leadership roles before they assume office.

Keywords: Academic leaders, Heads of Department, Leadership, Management, Preparation.

1. Introduction

Organisations that want to compete effectively in the 21st-century educational setting require knowledgeable, skilled employees to create and sustain superior performance. Higher educational institutions (HEIs) that function within a marketised space are not exempt. Moreover, intense competition among HEIs to produce graduates who meet the job market's needs, both locally and internationally, calls for effective, committed leaders to remain in the race. Several authors (Avolio, Hannah, 2020; Day et al., 2020; Wang, Howell, 2020; Yukl, Mahsud, 2020) maintained that leadership preparation positively correlates with employee task and creative performance through harmonious passion. Kim and Le (2020) and Smith and Johnson (2021) emphasise the need for employee empowerment through role preparation. They explored how cognitive dimensions such as problem-solving skills, decision-making abilities, and creativity can empower organisational

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employees and also how managers can effectively leverage cognitive characteristics such as emotional intelligence, critical thinking, adaptability, and empowerment to empower their employees (Kim, Lee, 2020; Smith, Johnson, 2021).

According to Spreitzer (2015), trust, commitment, and productivity are enhanced if leaders are empowered with the needed skills and knowledge. As institutions of higher learning try to implement modern practices, concerns have grown regarding the quality of their educational leadership and management. Studies by Hallinger and Heck (1998) and Louis et al. (2010) have shown that influential leaders, including heads of departments (HoDs) [academic], plan and implement policies to attain institutional goals. Therefore, influential educational leaders play a role in ensuring the effective delivery of these leadership and management activities. Leadership preparation for HoDs has been found to equip them with skills in both their leadership and managerial duties, including translating ideas into visions and goals and working with others to pursue those goals (Albrecht, Andreetta, 2019).

The literature indicates that most leadership preparation programs are devoid of participants' actual needs, as their organisations plan and determine training needs (Northouse, 2010). For instance, Antel (2013). maintains that a leadership preparation programme should have purpose, direction, and motivation to make it successful. In this case, leaders such as academic HoDs would gain the exact knowledge, skills, and attitudes needed to perform effectively if their preparatory programmes are based on a needs assessment. Hence, the perceptions of academic HoDs regarding the desired pre-assumption-of-duty preparation programmes to equip them to be effective and successful leaders are essential.

We adopt the developmental leadership theory proposed by Isaac Mostovicz et al. (2009), which holds that leadership is a developmental process grounded in a leader's choices. The choice always presents leaders with two good options to choose from, based on one's worldview: looking for affiliation (i.e., the Theta worldview) or looking for achievement (i.e., the Lambda worldview). Consequently, leaders need to be mindful of the training they received as they align their worldview with planned organisational activities to achieve good performance. Hence, leadership training should be tailored to their needs. Hammond et al. (2007) and Kakabadse and Kakabadse (1999) explain that the developmental framework presents leadership as grounded in an individual's observations and reflections during the process of interpretation. This leadership preparation framework means a deliberate effort should be made to equip leaders with a deeper understanding of their roles and the challenges they entail. Consequently, academic HoDs who receive tailored preparation are better positioned to fulfil their responsibilities effectively (Avolio, Hannah, 2020). This makes the notion that effective leaders can be developed through systematic preparation and that leaders are cultivated rather than inherently born with such qualities. Individuals who exhibit apparent natural leadership abilities acquired them through learning (Avolio, Hannah, 2020). Therefore, conscious efforts should be made to prepare leaders, though some may be naturally influential.

A study by Carroll (2010) suggested that to lead effectively, leaders need significant preparation to develop the necessary knowledge, attitudes, and skills, and that this preparation should address their leadership and management needs, enabling them to acquire the required competencies. In the context of academic HoDs, they play a critical role in managing and leading their respective departments effectively. Authors (Agyekum, Agyekum, 2020; Ansong, Acheampong, 2020). confirmed a similar idea raised by Carroll (2010). This article will address an understudied area in the literature and one that has not been examined in the case study university: the intersection of the desired area of preparation and leadership development. This article seeks to understand the perceptions of academic HoDs at a university in Ghana and identify their preferred areas of preparation to equip them to perform their roles effectively. We address the following questions:

1. What kind of preparations do academic HoDs need to make them effective in discharging their roles?
2. What knowledge, skills, and experiences do HoDs identify as required to perform their duties effectively?

Drawing insights from this article will inspire the university management to ensure that conscious efforts to prepare academic HoDs are based on their needs assessment. Findings would help address Sustainable Development Goal 4, which promotes sustainability, equity, and inclusion in higher education management.

2. Methodology

Research Design and Study Setting

The authors adopted an interpretative phenomenological design, using one case study institution to capture the subjective meanings of the rich experiences of the HoDs (Larkin et al., 2020; Smith, 2020) regarding their perceptions of the training needs for their roles. The authors deemed this design appropriate, as it is the first study in a post-secondary setting to explore HoDs' perceptions of their training needs for their roles in Ghana.

Sample and Sampling Size

We adopted a purposive sampling technique to select participants for the study, considering the following inclusion criteria: (a) HoDs who have been in the position for one month to four years, (b) from various colleges, and (c) from different fields of study. Academic HoDs who did not meet the above exclusion criteria were excluded from the study.

Instrument

A researcher-developed semi-structured interview guide based on the extant literature was used to collect relevant qualitative data for the study (Merriam, Tisdell, 2009). The interview protocol consisted of two sections, A and B. Section A focused on participants' demographics, including years of experience in their current role, rank, and area of study. Section B sought to elicit information related to the following research questions: (1) What kind of preparation would you need to be effective in your role as HoD? (2) What knowledge and skills do you need to perform your duties effectively? In addition to several probes during the interview sessions, the researchers endeavoured to take notes during each interview.

Data Collection

After obtaining ethical clearance from the Institutional Review Board of the University of Cape Coast, the principal investigator contacted the target participants face-to-face to explain the research purpose and the need for their involvement, and then conducted individual interviews with 16 eligible academic HoDs. Data saturation and information power were observed with the 14th participant, but additional interviews were conducted to verify the quality of the data saturation, as recommended by Sarfo et al. (2021). All interviews were conducted face-to-face, mostly in participants' offices, with three opting that they be interviewed in their homes. Also, reflexivity was maintained throughout the study by the researchers (Sarfo, Attigah, 2025). Each interview session was audio-recorded with participants' consent and lasted 1 to 2 hours. The interviews were conducted from February 2023 to June 2023.

Data Analysis

Three of the authors conducted a manual analysis of the interview data using Braun and Clark's (2024) six-step thematic analysis. This approach permitted us to do recursive and iterative analysis. Again, the approach enabled reflexivity in the production of knowledge from participants' narratives. According to Braun and Clarke (2024), the six steps in qualitative data analysis include: familiarising with the data; generating initial codes; generating themes; reviewing potential themes; defining and naming themes; and producing the report. Hence, the recorded interviews were played back several times and transcribed letter-perfect from audio to text. Each researcher was independently familiarised with the data by actively reading it repeatedly whilst listening to the audio concurrently to confirm the transcription's accuracy. We adopted member-checking and debriefing sessions to ensure the credibility of the transcribed data. We generated initial codes by identifying common, relevant words, phrases, and sentences. Subsequently, similar codes were summarised into groups based on frequency of occurrence, which were then sorted and refined to generate participant themes and sub-themes. Upon agreement among three of the authors on what should constitute the themes, we refined the emergent themes to guide the final analysis, based on confirmed congruence and an audit trail to capture important details, facilitating reader understanding and the ease of applying the adopted approach to similar analyses, thereby ensuring transferability.

3. Results

Demographics

Sixteen academic HoDs (pseudonyms represent their names) were interviewed. Table 1 summarises the demographic characteristics of the participants. Two of the HoDs were females, and fourteen were males. Four were from College A, four from College B, two from College C, four from College D and two from College E. Regarding their ranks, two were professors (P), three were associate

professors (AP), seven were senior lecturers (SL), and four were lecturers (L). The minimum and maximum years of being in the position ranged from less than 1 year to nearly 4 years.

Table 1. Demographic profile of the participants (n = 16)

College	Participants	Gender	Rank	Years as an HoD
B	Akwasi	Male	Senior Lecturer	6 months
A	Kwadwo	Male	Associate Professor	1 and half
A	Kwame	Male	Senior Lecturer	1 and half
B	Yaw	Male	Associate Professor	Less than one year
A	Grace	Female	Lecturer	6 months
D	Effa	Male	SeniorLecturer	1 and half
B	Boat	Male	Senior Lecturer	Less than one year
A	Felicia	Female	Senior Lecturer	7 months
E	Opoku	Male	Lecturer	Less than one year
D	Emmanuel	Male	Professor	Less than a year
C	Eric	Male	Senior Lecturer	More than 2 years
D	Turkson	Male	Senior Lecturer	Nearly 4years
B	Ofori	Male	Lecturer	5 months
D	Bando	Male	Lecturer	Less than one
C	Nicholas	Male	Associate Professor	2 years
E	Abeka	Male	Professor	Less than 1 year
Total	16			

Emergent themes and sub-themes

Based on the results, the researchers identified a general theme in the perceptions of the academic HoDs regarding their training needs, organised into three categories and several subcategories. From the data, the three categories include: “type of training needs”, “Succession Planning” and “areas of training needs. Subcategories were generated under each category. These subcategories were 7 in all. A summary of the categories, their corresponding subcategories and respective selected quotes is shown in Table 2.

Table 2. Summary of themes and sub-themes from transcribed data

Categories	Subcategories	Sample quotations
1. Type of training needs	Preparatory training	*Training should be provided to individuals before they assume the HoD role, following their identification for the position* (Yaw) *“...In the three months leading up to the handover, it is essential to invite the incoming individual to all meetings to ensure they are well-informed about ongoing activities* (Akwasi)
	Periodic in-service training	*...then, there should be the same thing in your second year. They must take it seriously because the department will be left behind if the HoD does not behave well* (Ofori) *Employees should undergo continuous training during their time at the office, with training sessions scheduled every six months* (Kwadwo)
2. Succession planning	University-wide grooming	*Practical training sessions should be conducted for individuals likely to assume such roles to*

Categories	Subcategories	Sample quotations
		manage when they reach HoD positions (Felicia) *… The university should provide training for all lecturers rather than limiting the selection process to a few individuals for the HoD role. This approach ensures that when any lecturer is appointed to lead the department, they are well-prepared to begin their responsibilities immediately* (Emmanuel)
	Peer-to-peer and departmental grooming	*…those they have in mind to be appointed HoDs should be identified earlier and learn about the roles so as not to struggle when their time comes* (Boat) *…at least, there should be a succession plan for potential HoDs to be trained by their respective HoDs so that they will be well equipped to stand in for them in their absence….even before their actual appointments come* (Grace)
3. Areas of training needs	Training in office management procedures	*It is essential for HoDs to have a clear grasp of the administrative processes involved in their roles, such as to how do you handle correspondence if there is some so as not to depend on your administrative staff* (Abeka) *"The training program should incorporate essential administrative skills, such as document management, correspondence drafting, arranging letters, and everything else* (Terkson)
	Finance management	… *"Training in university financial administration systems is crucial for effectively carrying out one's duties* (Effa) *Training on the department's monetary issues is what I want* (Boat)
	Leadership training	*I would suggest that leadership training be organised for all academics to give us an understanding of how to optimise the use of both human resources, such as employees, and non-human resources, including equipment, technology, and finance (Kwame)*

4. Discussion

Using the interpretative phenomenological design, we explored the subjective meanings of HoDs' perceived training needs at a selected university in Ghana. Guided by the developmental theoretical framework by Isaac Mostovicz et al. (2009) and Kakabadse and Kakabadse (1999), we conducted a thematic analysis following the framework by Braun and Clarke, (2024) and the research questions, three main themes were discovered following our analysis: "type of training needs", "succession planning and "areas of training needs" The developmental leadership theory holds leadership is a developmental process, which is based on the type of choice a leader makes. The choice always presents leaders with two good options that align with one's worldview regarding affiliation (i.e., the Theta worldview) or achievement (i.e., the Lambda worldview). Consequently, leaders need to align their worldview and planned organisational activities to achieve good performance. Hence, their training should be based on their needs assessment to enable them to make sense of their roles.

Academic HoDs often identify specific training needs, yet their own suggestions may inadvertently reveal gaps in their existing knowledge, potentially hindering their effectiveness in

driving university modernisation initiatives. Survey participants emphasised the importance of providing formal training to academic HoDs before their official appointment. Specifically, they recommended that this preparatory training be conducted several months (e.g., two to three) in advance of assuming their responsibilities. Such pre-appointment training would serve as a vital foundation, familiarising them with the diverse expectations of students, faculty, and university administration. Ultimately, this initial preparation aims to equip HoDs with a clear understanding of their forthcoming duties and to instil the confidence needed to assume their leadership positions effectively.

Again, proper preparation is crucial for individuals taking on new roles, particularly for academic HoDs. The initial training will enable them to avoid mistakes and be well-prepared for their responsibilities. This is because foundational knowledge acquired through formal preparation can significantly impact their performance. The HoDs indicated that comprehensive training before assuming a role contributes substantially to success in that role. For instance, a study (Boyd et al., 2009) found that effective teacher preparation before they begin their duties largely contributes to student achievement. Similarly, identifying and training prospective senior members of the university can lead to sustainable and vibrant departments, with HoDs effectively discharging their duties.

The academic HoDs held varying opinions on the ideal duration for role-specific training. Still, they concurred that regular in-service training was essential for refreshing their skills and enhancing their responsiveness to their responsibilities. This ongoing training would enable them to assess their current knowledge, identify gaps, and acquire the necessary skills to perform their duties effectively. Furthermore, periodic training is vital for keeping HoDs up to date on the latest practices and for addressing emerging challenges. As they navigate their roles, new issues arise, and continuous training provides them with the knowledge needed to tackle these challenges. Several studies underscore the importance of continuous professional development for academic leaders. Effective training programs can significantly enhance their ability to perform their roles.

The study revealed that the HoDs did not have a succession plan, so they asked for one. Through succession planning, some HoDs preferred that the institution groom all lecturers for HoD roles, whereas others opted for peer-to-peer and department-based grooming by their respective HoDs. University-wide grooming is seen as a conscious effort taken by the university management to prepare all the faculty members before they become HoDs. McCall (1998) argues that leadership development is a gradual process that cannot be rushed, so identifying and training potential leaders to take on future roles is essential and proactive. Grooming those likely to be HoDs helps ensure continuity, so there will always be someone to fill the position in times of vacancy. Furthermore, every lecturer groomed would gain insights into the HoDs' roles and play them well whenever appointed as an HoD. The idea of succession planning aligns with what scholars (Wiesman, 2012) suggested: to develop an effective succession plan, leaders must have a deep understanding of their team, the current situation, and the key players involved. This enables them to place the right individuals in the appropriate positions at the optimal time. In a university setting, identifying and grooming potential HoDs is vital to ensuring the long-term sustainability and vitality of departments, as HoDs play a pivotal role in discharging their duties effectively.

The HoDs emphasised that training in areas they deem necessary would help them overcome the challenges of their roles and enhance their effectiveness. Specifically, in terms of management training, the respondents requested training on routine office tasks, including report writing and correspondence management, to improve their daily operations. Additionally, they advocated training for their departments in financial management, particularly procurement processes and fundraising strategies. The HoDs underscored the significance of mastering daily office management procedures as a crucial aspect of their managerial responsibilities. The administrative responsibilities of academic HoDs encompass a range of tasks, including budget preparation and staff supervision. According to Gmelch and Miskin (2010), these duties involve overseeing both teaching and non-teaching staff through assigned tasks, either individually or through committees. The HoDs highlighted the need for training in administrative tasks, with some HoDs calling for training in letter and report writing. Others have suggested the need for training in document completion and correspondence response. Additionally, some HoDs have expressed the need for training in meeting organisation, procurement procedures, and fund generation. The HoDs require comprehensive training to effectively manage their administrative responsibilities, including budget preparation, staff supervision, document management, and financial administration.

In leadership training, the HoDs maintained that effective leadership is important for the success of any organisation, including academic institutions. To accomplish this, they require training in participatory leadership, which involves collaborating with other members to achieve shared objectives. According to Chu (2012), leaders acquire useful values to work well with people in an enabling environment. This enables other workers to become committed to their work and helps HoDs achieve the departmental organisational goals.

As identified in areas of need, HoDs are expected to provide leadership in departmental activities, guiding other members and ensuring the implementation of purposeful programmes. To achieve this, HoDs require training on collaboration and leadership to maintain vital departmental initiatives (Northouse, 2013). Research by Carroll (2010) revealed that to enhance leadership skills, HoDs should undergo training focused on collaboration and leadership within their departments, as developing leadership capabilities requires a systematic approach that addresses the specific needs of leaders. Academic HoDs can develop the necessary knowledge, skills, attitudes, values, and behaviours to lead and manage when they are adequately prepared before and throughout their tenure. Research has shown that inadequate training can lead to ineffectiveness in their roles. Crow (2006) highlighted the importance of ongoing development opportunities for leaders to update their knowledge and refine their leadership skills. Similarly, Bryman (2008) noted that HODs face complex management and leadership circumstances with little or no orientation.

5. Conclusion and Recommendations

This study has contributed to understanding how academic HoDs want to be prepared to be effective in their roles. With the constant shifts in leadership and management practices, coupled with ever evolving higher education landscape and culture in developing countries due to such factors as demands for increased access to higher education, organisational restructuring and provision of a skilled workforce attuned to national development drives, the need to train the academic HoDs to acquire and use evidence-based skills in effectively performing their roles towards improving their departments cannot be underestimated.

This would require that preparation programmes for academic HoDs be well-structured relative to role expectations and performance indicators, prior to their assuming office, to prevent unanticipated surprises associated with initial struggles in role performance. Periodic in-service training is also needed since new developments, including challenges that crop up, would need to be addressed with knowledge and modern approaches from such training. During training sessions, avenues are open for academic HoDs to share their challenges and success stories in their roles. Such opportunities could foster healthy relationships and networks among academic HoDs, which are necessary for improved role performance whenever possible.

Academic HoDs should be trained in their management and leadership roles, including administrative procedures, financial administration, and leadership development. Included in the administrative procedures should be writing and responding to correspondence, as well as attending to day-to-day office activities. For training in financial administration, a focus on income generation, procurement practices, and the management of the department's finances would enhance the effectiveness of academic HoDs. Lastly, leadership training on delegation and on involving others in decision-making could improve the leadership effectiveness and role performance of academic HoDs.

6. Declarations

Ethics approval and consent to participate

The authors declare that all methods used in this project complied with the 2024 revision of the Declaration of Helsinki. Ethical approval was obtained from the Institutional Review Board of the University of Cape Coast. Written and signed consent was obtained from all individual participants included in the study.

Consent for publication

The authors affirm that study participants provided informed consent for participation and publication. Participants signed informed consent regarding publishing their data.

Availability of data and materials

Data and materials associated with this study are available upon request.

Conflict of interest statement

The authors report no conflicts of interest.

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Author contributions

All authors – GKB, AJA, FRCT, and KBA – conceived the study. GKA collected the qualitative data. All authors analysed the data and wrote the manuscript. All authors read and approved the final version of the manuscript.

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Marijuana Use among In-School Adolescents in Saint Vincent and the Grenadines: A Reciprocal Determinism Perspective

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Abstract

Substance use, particularly marijuana among adolescents, remains a public health concern, especially in the Island countries in the Caribbean. There is a paucity of research using current data on the prevalence and potential correlates of marijuana use among in-school adolescents in Saint Vincent and the Grenadines. This study, therefore, aimed at assessing the prevalence and correlates of marijuana use among adolescents in St Vincent and the Grenadines. We analysed data from the 2018 Global School-Based Student Health Survey among in-school adolescents in Saint Vincent and the Grenadines. We conducted descriptive statistics, Chi-square analysis, and binary logistic regression to determine the prevalence of marijuana use and associated factors. The prevalence of marijuana among adolescents in Saint Vincent and the Grenadines was 17.1 %. The odds of marijuana use were higher in males (AOR = 1.36, 95%CI = 1.002-1.851); adolescents engaged in multiple-partner (AOR = 2.94, 95%CI = 2.177-3.959); adolescents who reported using amphetamine or methamphetamine (AOR = 6.60, 95%CI = 4.269-10.201). Similarly, the odds of reporting marijuana use were higher in those who reported using alcohol (AOR = 3.27, 95 %CI = 2.396-4.463); adolescents whose parents used tobacco (AOR=1.44, 95%CI=1.017-2.044) and those with suicidal ideation (AOR = 1.47, 95%CI = 1.060-2.34). Meanwhile, the odds of marijuana usage were lower among adolescents who were bullied (AOR = 0.67, 95%CI = 0.465-0.950) and adolescents whose parents knew what they did during their leisure (AOR = 0.60, 95%CI = 0.438- 0.832). Various factors relating to behavioural, social, alcohol and substance use, aggression and self-harm, including parental factors, predict marijuana usage. Multiple factors should be considered when designing interventions to target marijuana usage.

Keywords: Global School-Based Student Health Survey, In-School Adolescents, Marijuana Use, Saint Vincent and the Grenadines, Substance Use.

1. Introduction

Adolescence is a time of rapid growth, curiosity and increasing independence. For in-school adolescents, this stage is critical, as they begin to form habits and attitudes that may influence their

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health and well-being. Among the many risks they may encounter, marijuana use has become a significant public health concern globally, due to its effects on cognitive development, mental health, academic performance, and social well-being, and vulnerability to psychological disorders (Jacobus, Tapert, 2014; Lorenzetti et al., 2020). The adolescent brain is still developing; hence, the use of marijuana makes it vulnerable.

According to the Global School-Based Student Health Survey (GSHS), approximately 7.02 % of school-going adolescents aged 12-15 years reported cannabis use, with boys (9.20 %) more likely than girls (4.20 %) to have used cannabis (Son et al.,2023). In the Caribbean, regional prevalence varies. For instance, the 2017 GSHS in Jamaica reported that 14.0 % of school-going adolescents aged 12–17 used marijuana in the past 30 days (Dadras, 2024). A multi-country survey conducted between 2011 and 2013 across Caribbean and South American nations, including Trinidad and Tobago and The Bahamas, found an average marijuana use prevalence of 8.3 % among secondary school students (Peltzer, Pengpid, 2018). Additionally, data from Trinidad and Tobago revealed that 12.1 % of students had used marijuana in their lifetime, 6.4 % in the past year, and 2.7 % in the past 30 days (Organization..., 2010; Inter-American Drug Abuse Control Commission, 2010). However, in Saint Vincent and the Grenadines (SVG), nationally representative data on adolescent marijuana use remain limited. Some existing studies have explored some substance use patterns and related behaviours. For instance, Myers et al. (2021) reported how the illicit drug economy contributes to HIV risk. Peltzer and Pengpid (2022) also documented alcohol misuse and behaviour correlates among school- going adolescents, while Sarfo et al. (2022, 2023) examined suicidal behaviours and injury risk indicators often linked to substance use. These findings reveal the need to focus on the prevalence of marijuana use among in-school adolescents in SVG.

Marijuana use in adolescents has been linked to a range of factors. These include demographic factors such as age, sex and grade, with older male students often reporting higher rates (Goncy, Mrug, 2013; Howard, Ali, 2014). Other factors include peer pressure, poor parental supervision, truancy, bullying, emotional distress, and family drug use (Elsaesser et al., 2020; Martin et al., 2020; Sarfo et al., 2022). In SVG, there is a unique context for understanding adolescent marijuana use due to its evolving legal stance on cannabis and long-standing cultural associations. The country's partial decriminalisation of marijuana for religious use and private consumption may influence adolescent perceptions of harm and accessibility (Cottle, 2023). Additionally, gender norms and community attitudes shape behaviours and reinforce risk-taking, particularly among male youth (Bishop et al., 2022).

This study uses Bandura's Social Learning Theory (1977) to explain how adolescents may pick up marijuana use by observing others around them, whether it is their peers, family, or members of the wider community. The theory's concept of Reciprocal Determinism, which describes the dynamic interaction among personal factors, environmental influences, and behaviour, helps us understand how these elements interact. Given the limited data available in SVG, this study aims to assess how common marijuana use is among in-school adolescents and identify the main factors associated with it. The findings are expected to inform the development of targeted, evidence-based interventions and to contribute to broader global goals, such as the Sustainable Development Goals (SDG 3: Good Health and Well-being and SDG 4: Quality Education).

Conceptual framework

For an individual to understand the prevalence and contributing factors of marijuana use among in-school adolescents in a jurisdiction like SVG. There will be a need to develop effective preventive and intervention strategies to better understand the phenomenon. Adolescents' susceptibility to marijuana usage may be explained by a diversity of variables, which can be used as a framework to recognise the prevalence and correlation of marijuana use. Bandura (1977) propounded the Social Learning Theory, which unveiled Reciprocal Determinism, a framework also used to analyse predictors of marijuana use. The variables stated in the framework were categorised into personal, environmental, and behavioural factors. Personal and environmental factors were the explanatory variables, whilst behaviour was the outcome variable. With the personal factors (sex, age, grade, loneliness, multiple sexual partners, amphetamines or methamphetamines use, alcohol use, smoked cigarettes, serious injury, suicidal ideation), for instance, males, the use of amphetamines and suicidal ideation were noted to result from higher use of marijuana (Dadras, 2023). Also, with the environmental factors (truancy, physical fight,

bullying on campus, parents/guardians use tobacco and parents or guardians' knowledge of children's free time activities). A longitudinal study showed that when parents build an attachment with their children, they can protect their adolescents from the risk of violence exposure and substance use, including marijuana (Elsaesser et al., 2020). Studies around behaviour (use of marijuana) found that increased substance use and risky behaviour of adolescents may lead to future crises of adolescents (Manwani et al., 2022; Whitaker et al., 2021). Therefore, understanding the occurrence of marijuana usage among adolescents in SVG who are enrolled in school rests upon the connections and effects between these factors.

2. Materials and Methods

Study design and sample

Data for this study came from the 2018 GSHS in SVG, focusing on physical bullying among adolescents aged 13-17. The World Health Organization (WHO), alongside the CDC and the Ministry of Health, Wellness and Environment in SVG, conducted the GSHS, which uses a self-administered questionnaire to examine health-related behaviours in young people. This cross-sectional study used closed-ended questions to collect information from participants.

Sampling procedure

A two-stage cluster sampling method was used. First, schools were selected based on enrolment size. Then, classes were randomly chosen, with all students in selected classes participating. The study achieved a 100 % school response rate and a 78 % student response rate, with 1,876 students completing the survey.

Measures

Dependent variables

The study examined current marijuana use using a self-report question which examined present use in the past 30 days. Responses were binary, recorded as "yes" (1) or "no" (2).

Independent variables

The analysis used 21 predictor variables, including demographics, substance use, violence, personal and social factors, and suicidal behaviours. These variables are outlined in Table 1, along with their coding details.

Ethical statements

Ethics approvals were obtained from the relevant authorities, and tools were pretested for reliability and validity. Informed consent was obtained from students and their parents. The data is available on the WHO website for further review.

Statistical analysis

We applied sample weights to adjust for nonresponses and ensure representativeness. Missing data (ranging from 1 % to 10 %) were handled using multiple imputations. A bivariate analysis using Pearson's Chi-square identified significant relationships, which were then analysed using logistic regression. The adjusted odds ratios (AORs) were reported with 95 % confidence intervals (CIs).

3. Results

Prevalence of marijuana use among adolescents in SVG

The overall point prevalence of marijuana use was 17.1 %. (see Figure 1).

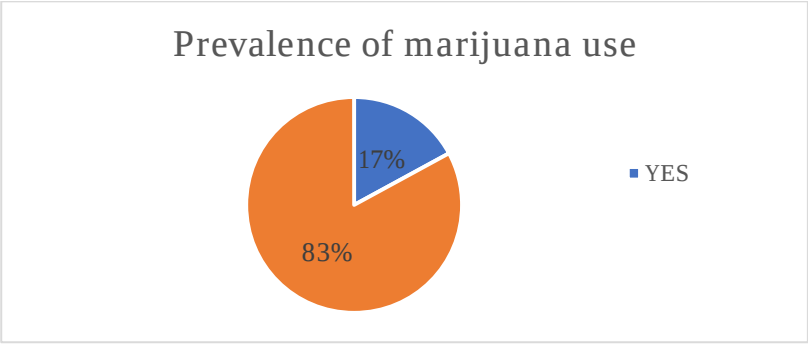

Fig. 1. Prevalence of marijuana use among in-school adolescents in SVG

Bivariate Analysis

Table 1 shows the summary of the bivariate analysis of factors associated with marijuana usage among adolescents in St Vincent and the Grenadines. The results showed that sex ($p < 0.001$), age ($p < 0.001$), missing school without permission ($p < 0.001$), feeling lonely ($p < 0.01$), and being in multiple sexual partnerships ($p < 0.001$) were significantly associated with marijuana usage. Additionally, use of amphetamines or methamphetamines ($p < 0.001$), drinking alcohol ($p < 0.001$), smoking cigarettes ($p < 0.001$) and engaging in a fight ($p < 0.001$) were also significantly associated with marijuana usage. Furthermore, parental tobacco use ($p < 0.001$) and parental supervision ($p < 0.001$) were significantly associated with marijuana usage.

Table 1. Bivariate analysis of personal and environmental factors and reported marijuana use among in-school adolescents in SVG

Variables	Category	Marijuana Use		χ^2	Phi Coefficient
		Yes n (%)	No n (%)		
Demographic					
Sex	Male	193 (21.8)	691 (78.2)	26.942***	0.120
	Female	127 (12.8)	865 (87.2)		
Age (years)	≤15	142 (13.7)	896 (86.3)	18.735***	-0.100
	≥16	178 (21.2)	660 (78.8)		
Grade	1–3	199 (16.3)	1021 (83.7)	1.373	-0.027
	4–5	121 (18.4)	535 (81.6)		
Behavioural and Social					
Missed classes without permission	Yes	150 (26.8)	409 (73.2)	53.789***	0.169
	No	170 (12.9)	1147 (87.1)		
Felt lonely most of the time	Yes	92 (21.8)	330 (78.2)	8.659**	0.068
	No	228 (15.7)	1226 (84.3)		
Had sexual intercourse with ≥2 persons	Yes	199 (30.9)	445 (69.1)	132.824***	0.266
	No	121 (9.8)	1111 (90.2)		
Drug and Substance Use					
Used amphetamines or methamphetamines	Yes	78 (59.5)	53 (40.5)	179.669***	0.309
	No	242 (13.9)	1503 (86.1)		
Currently drank alcohol	Yes	245 (27.9)	633 (72.1)	137.247***	0.270
	No	75 (7.5)	923 (92.5)		
Currently smoked cigarettes	Yes	75 (47.5)	83 (52.5)	112.779***	0.245
	No	245 (14.3)	1473 (85.7)		
Aggression and Self-Harm					
Involved in a physical fight	Yes	154 (25.5)	450 (74.5)	44.842***	0.155
	No	166 (13.1)	1106 (86.9)		
Bullied on school property	Yes	68 (15.2)	380 (84.8)	1.469	-0.028
	No	252 (17.6)	1176 (82.4)		
Seriously injured	Yes	206 (21.8)	741 (78.2)	29.799***	0.126
	No	114 (12.3)	815 (87.7)		
Seriously considered suicide	Yes	118 (22.7)	401 (77.3)	16.353***	0.093
	No	202 (14.9)	1155 (85.1)		
Parental Factors					
Parents/guardians used tobacco	Yes	80 (27.4)	212 (72.6)	26.133***	0.118
	No	240 (15.2)	1344 (84.8)		
Parents knew what they did during free time	Yes	73 (10.6)	616 (89.4)	32.145***	-0.131
	No	247 (20.8)	940 (79.2)		

Notes.
Percentages are row percentages.
χ^2 = Pearson Chi-square statistic.
$p < .05$, ** $p < .01$, *** $p < .001$.

Multivariate analysis of factors associated with marijuana usage among school-going adolescents in SVG

Table 2 presents the results of the logistic regression for predictors of marijuana use. After adjusting for other factors predicting multiple sexual partners, sex was the only demographic factor that predicted marijuana usage. Males had higher odds of being in a multiple-partner relationship than their female counterparts (AOR = 1.36, 95%CI = 1.002-1.851). Under behavioural and social factors, adolescents engaged in multiple-partner relationships had increased odds of reporting marijuana usage compared to their counterparts who did not report engaging in multiple sexual partnerships (AOR = 2.94, 95%CI = 2.177-3.959).

Among the drug and substance use factors, adolescents who reported using amphetamine or methamphetamine had higher odds of marijuana usage than those who reported not using those substances (AOR = 6.60, 95%CI = 4.269-10.201). Similarly, the odds of reporting marijuana use were higher in those who reported using alcohol than those who reported not currently drinking alcohol (AOR = 3.27, 95%CI = 2.396-4.463). Regarding factors relating to aggression and physical harm, adolescents who were bullied had lower odds of reporting marijuana usage compared to those who were not bullied (AOR = 0.67, 95%CI = 0.465-0.950). Meanwhile, higher odds of marijuana usage were reported among those with suicidal ideation compared to those without suicidal ideation who were bullied (AOR = 1.47, 95%CI = 1.060-2.034). Similarly, under the parental category adolescents whose parents used tobacco had higher odds of using marijuana compared to those whose parents did not use tobacco (AOR = 1.44, 95%CI = 1.017-2.044) while the odds of marijuana usage were lower among adolescents whose parents knew what they do during their leisure compared to adolescents whose parents who exercised less supervision (AOR = 0.60 95%CI = 0.438-0.832).

Table 2. Associated factors of marijuana use among in-school adolescents in SVG

Variables	**AOR**	**95 % CI for EXP(B)**	
		Lower	**Upper**
Demographic			
Sex (Ref: Female)	1.362*	1.002	1.851
Age (Ref: ≥16 years)	.978	.693	1.379
Grade (Ref: 4–5)	.954	.670	1.357
Behavioural and Social			
Missed classes without permission (Ref: No)	1.328	.991	1.780
Felt lonely most of the time (Ref: No)	1.292	.928	1.797
Had sexual intercourse with ≥2 persons (Ref: No)	2.936***	2.177	3.959
Drug and Substance Use			
Used amphetamines or methamphetamines (Ref: No)	6.599***	4.269	10.201
Currently drank alcohol (Ref: No)	3.270***	2.396	4.463
Currently smoked cigarettes (Ref: No)	2.877***	1.909	4.336
Aggression and Self-Harm			
Involved in a physical fight (Ref: No)	1.312	.972	1.769
Bullied on school property (Ref: No)	.665*	.465	.950
Seriously injured (Ref: No)	1.143	.850	1.537
Seriously considered suicide (Ref: No)	1.469*	1.060	2.034
Parental			
Parents/guardians used tobacco (Ref: No)	1.442*	1.017	2.044
Parents knew what they did during free time (Ref: No)	.604*	.438	.832

Notes. Hosmer and Lemeshow test (goodness-of-fit), χ^2 (8) = 7.453, p = 0.489.
* p < 0.05, ** p < 0.01, *** p < 0.001.

4. Discussion

The study investigated marijuana use among in-school adolescents in SVG, guided by Reciprocal Determinism. Reciprocal Determinism, in this context, posits that marijuana use behaviour among in-school adolescents results from continuous interactions among personal factors, environmental influences, and the behaviour itself (Tataw, 2024; Woodward, Macmillan, 2021).

The overall point prevalence of marijuana use among adolescents in SVG in this study was 17.1 %, suggesting that nearly one in six students reported current use. This prevalence appears higher than that reported in several global and regional estimates. For example, the GSHS reported that about 7.02 % of school-going adolescents aged 12–15 years used cannabis, with boys (9.20 %) more likely than girls (4.20 %) to report use (Son et al., 2023). In the Caribbean, a 14.0 % prevalence was reported among adolescents aged 12–17 years in Jamaica (Dadras, 2024), while a multi-country survey across Caribbean and South American countries found an average prevalence of 8.3 % among secondary school students (Peltzer, Pengpid, 2018).

The findings of this study also show a clear sex difference, with male adolescents (21.8 %) reporting higher marijuana use than females (12.8 %), which is consistent with previous studies showing that boys tend to report higher cannabis use than girls (Son et al., 2023). However, nationally representative data on adolescent marijuana use in SVG remain limited, as previous research in the country has mostly focused on related issues such as substance use behaviours, mental health, and risk behaviours (Myers et al., 2021; Peltzer, Pengpid, 2022; Sarfo et al., 2022, 2023). These findings, therefore, highlight the need for continued monitoring and prevention efforts targeting adolescent marijuana use in the country with a focus on selected personal and environmental factors.

Personal factors

Personal factors play a significant role in influencing adolescent marijuana use. These factors encompass intrinsic characteristics and psychological states that predispose individuals to engage in risky behaviours. One notable personal factor identified in this study is gender, where adolescent males were found to have a higher likelihood of using marijuana compared to their female counterparts. This finding aligns with research conducted by Dadras (2024), which also identified a positive association between adolescent males and marijuana use. The societal association of masculinity with risk-taking behaviours, coupled with gendered differences in social influences, may contribute to this disparity (Friedl et al., 2020; Greaves, Hemsing, 2020).

Additionally, sexual behaviour emerged as a significant personal factor. Adolescents who had engaged in sexual intercourse with two or more persons exhibited a higher likelihood of marijuana use. This behaviour may reflect an overarching propensity to take risks among adolescents, which aligns with previous findings (Manwani et al., 2022; Sullivan, 2020). Also, mental health status, particularly suicidal ideation, was another critical factor. Adolescents who seriously considered attempting suicide were more likely to use marijuana. Marijuana use in this context may act as a coping mechanism for managing emotional pain or psychological distress, as supported by prior research (Airagnes et al., 2023; Lehmann et al., 2024).

Environmental influences

Environmental influences are external conditions and interactions that shape adolescent behaviour, including family dynamics, peer interactions, and school experiences. Parental behaviours and monitoring emerged as significant environmental factors in this study. Adolescents whose parents or guardians used tobacco were more likely to use marijuana, likely due to a modelling effect where adolescents imitate the substance use behaviours they observe in their parents (English, Whitehill, 2023). Conversely, adolescents whose parents or guardians actively monitored their free-time activities were less likely to use marijuana. This finding underscores the protective role of parental engagement in deterring risky behaviours (Champion et al., 2022; Elsaesser et al., 2020; Mirzaei et al., 2024).

Social interactions at school also influenced marijuana use. Interestingly, adolescents who were bullied on school property were less likely to use it. This finding suggests that social isolation and restricted networks may reduce exposure to peer groups that promote marijuana use. Additionally, these adolescents may consciously avoid substance use to minimise further negative consequences in their lives. However, this result contradicts previous research that identified a positive relationship between bullying and marijuana use (Gao, Han, 2024; Lehmann, Wingert, Jones, 2024).

Behaviour

Marijuana use, the behaviour under study, is both a result of and a contributing factor to other risky behaviours, forming a cycle that perpetuates substance use. This study found strong associations between marijuana use and the use of other substances. Adolescents who used amphetamines or methamphetamines were significantly more likely to use marijuana. Similarly, those who consumed alcohol or smoked cigarettes had higher odds of marijuana use. These findings align with studies that indicate substance use behaviours often cluster together in adolescent populations (Halladay et al 2020; Whitaker et al., 2021; Manwani et al., 2022).

In some cases, marijuana use may serve as a coping mechanism for adolescents facing emotional challenges. For example, adolescents who seriously considered suicide might turn to marijuana as a temporary escape or means to manage psychological distress. This behaviour, while providing short-term relief, often exacerbates underlying issues, creating a feedback loop that reinforces the behaviour.

4. Conclusion

This study provides a comprehensive analysis of marijuana use among in-school adolescents in SVG, revealing significant demographic, behavioural, and social correlates. The associations between substance use and a range of demographic, behavioural, and psychosocial factors point to the need for holistic, multi-layered prevention strategies. Rather than focusing solely on individual behaviours, effective interventions should address the broader social and emotional contexts in which substance use occurs, particularly through gender-responsive programming and support systems that recognise co-occurring risk behaviours and mental health challenges. Furthermore, the protective role of parental involvement emphasises the value of engaging families in prevention efforts. Moving forward, policies and programs that incorporate family-based, school-centred, and community-informed approaches may be more successful in curbing adolescent marijuana use. Future research should explore these strategies longitudinally and qualitatively to deepen our understanding of how to support youth resilience.

5. Strengths and Limitations

The availability of school-based data was accessed on student health and behaviour to examine the prevalence and correlates of marijuana use among in-school adolescents in St. Vincent and Grenadines, which helped to leverage and better understand the scope of the issue. The study's findings can also be used to compare other Caribbean nations, identify regional trends, and inform cross-cultural comparisons. Similarly, the study findings can help identify potential risks and protective factors guiding prevention efforts and also provide crucial data on the extent of marijuana use among in-school adolescents by informing educational and public health policies and interventions.

Notwithstanding, while this theory provides valuable frameworks, it may not fully explain the complex nature of marijuana use among adolescents. Cultural and contextual factors specific to SVG were not considered; thus, marijuana use may be influenced by complex cultural, social, and economic factors that may require a deeper understanding of the local context. The study also lacks a longitudinal investigation to examine the development of marijuana use over time. The study's findings were not representative of the entire adolescent population in SVG because it excluded out-of-school adolescents. Although there are setbacks, the study's results are a foundation for future studies and educational sensitisation for in-school adolescents on the use of marijuana.

6. Implications for Practice, Policy and Research

Practice Implications

Both teachers and school staff should be trained to recognise signs of marijuana use, how to effectively intervene and refer students to appropriate support services. There should be implementation of early intervention and school-based prevention for students struggling with marijuana use (Benningfield et al., 2015), including counselling, support groups, and referrals to rehabilitation services. Schools should engage both parents and families in drug education and prevention to create a cohesive, community-wide approach and also provide the necessary resources and training to help school health professionals deliver evidence-based marijuana education and termination programs.

Policy Implications

Stakeholders could collaborate with organisations in the community to provide recreational, educational, and employment opportunities for youth as alternatives to marijuana use. There should be development and implementation of comprehensive drug education and prevention programs in schools, targeting the specific risk factors for marijuana use identified in research. Again, policies and enforcement around the legal age of marijuana use and purchase to limit adolescent access should be strengthened. Lastly, mental health screening and support services should be integrated within school systems to address underlying issues that may contribute to marijuana use.

Research Implications

A comprehensive epidemiological study should be conducted to help better understand the current prevalence of marijuana use among in-school adolescents in SVG. Multiple levels of influence, including individual, family, peer, and community-level risk, together with protective factors associated with marijuana use in this population, should be investigated. Further studies should evaluate the effectiveness of existing drug education and prevention programs to inform the development of more targeted and impactful interventions. Nonetheless, Government and school managements should collaborate with policymakers and practitioners to ensure research findings are translated into evidence-based policies and practices. Finally, there should be an exploration of the links between marijuana use and other health and social outcomes, such as academic performance, mental health, and risky behaviours, to champion a holistic approach to addressing the issue.

7. Declarations

Ethics approval and consent to participate

The authors declare that all methods used in this project complied with the 2024 revision of the Declaration of Helsinki. The Institutional Review Boards of the WHO, CDC, and the Ministry of Health, Wellness, and Environment of SVG approved the study's ethical standards. Trail Registration: "Global School-Based Student Health Survey 2018 (VCT_2018_GSHS_v01) Registered August 20, 2021, https://extranet.who.int/ncdsmicrodata/index.php/catalog/878." All individuals participating in the study gave their express, written consent.

Consent to publish

Not applicable.

Availability of data and materials

The dataset used in this study is publicly available on the WHO website (https://extranet.who.int/ncdsmicrodata/index.php/catalog/878/study-description#metadata-identification).

Conflict of interest statement

The authors report no conflicts of interest.

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Authors' contributions

JOS: Resources, Conceptualisation, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualisation, Writing-original draft, Writing-review and editing, Supervision. EK: Conceptualisation, Writing-original draft, Writing-review & editing. EDT: Conceptualisation, Writing-original draft, Writing-review & editing. MO: Conceptualisation, Writing-original draft, Writing-review & editing. DKA: Conceptualisation, Formal analysis,

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Student Teaching Evaluations as Tools for Quality Assurance within the Sub-Saharan African Higher Education: A Systematic Review

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Abstract

This study examines the challenges and biases associated with Student Evaluations of Teaching (SET) in sub-Sahara African (SSA) higher education and their implications for quality assurance. Using a systematic review guided by PRISMA 2020, 80 peer-reviewed studies (2014–2024) in English were analysed. The search focused on SET challenges and biases within SSA higher education. SET research fluctuated over the decade, with peaks in 2020 and 2022 (11 studies each). South Africa led in publications with 20 studies (25.0 %), followed by Ghana and Kenya, highlighting notable regional disparities. Methodologically, mixed-method approaches were most common, with 26 studies (32.5 %), followed by qualitative and quantitative approaches. Key challenges were reliability issues (73 studies, 91.2 %), administrative constraints and low response rates (70 studies, 87.5 % each), and cultural misalignment (67 studies, 83.7 %). Significant biases included grading leniency in 67 studies (83.7 %), gender stereotypes in 60 studies (75.0 %), and language bias in 53 studies (66.2 %). The resulting implications were distorted teaching effectiveness (74 studies, 92.5 %), unfair promotions (73 studies, 91.2 %), low morale (70 studies, 87.5 %), and compromised quality assurance (66 studies, 82.5 %). Proposed alternatives featured student learning outcomes in 71 studies (88.7 %), peer evaluations in 70 studies (87.5 %), and self-assessments in 64 studies (80.0 %). Key recommendations were regular tool validation (74 studies, 92.5 %), awareness training (73 studies, 91.2 %), and standardised instruments (70 studies, 87.5 %). These factors undermined teaching quality and morale. Alternatives like learning outcomes, peer and self-evaluations, and multi-source feedback were suggested. Recommendations included training, regular review, anonymised, standardised tools, and mixed methods to enhance fairness, reliability, and policy alignment in SSA's faculty evaluation.

Keywords: Student Evaluations of Teaching, Higher Education, Quality Assurance, Faculty Evaluation, Sub-Saharan African Universities, Systematic Review.

1. Introduction

Student evaluations of teaching (SET) have become a widely used mechanism for assessing instructional effectiveness and informing quality assurance policies in higher education institutions worldwide (Spooren et al., 2013). Within the sub-Saharan African (SSA) higher education concern,

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SET play a crucial role in faculty performance reviews, accreditation processes, and pedagogical improvements (Seldin et al., 2010). However, despite their widespread use, the reliability and validity of SET have been widely debated due to inherent challenges and biases that compromise their objectivity and effectiveness (Uttl et al., 2017).

A growing body of literature highlights multiple biases that influence student evaluations, including gender and racial bias, as well as non-instructional factors such as grading leniency, course difficulty, and instructor popularity (Boring et al., 2016; MacNell et al., 2015). Research suggests that female and minority instructors often receive lower evaluations, irrespective of their actual teaching effectiveness (Valencia, 2020). Similarly, students' perceptions of their instructors are frequently shaped by factors unrelated to pedagogical quality, such as physical appearance, personality traits, and even course scheduling (Esarey, Valdes, 2020). These biases undermine the credibility of SET as an objective tool for evaluating teaching performance and ensuring quality assurance in higher education.

Despite these concerns, SET remain a dominant method for assessing faculty effectiveness, particularly in resource-constrained SSA institutions where alternative evaluation methods, such as peer reviews and classroom observations, are less feasible due to financial and logistical limitations (Machingambi, Wadesango, 2011). Moreover, existing studies on SET have largely focused on Western contexts, with limited research examining how these challenges and biases manifest within SSA higher education settings (Marsh, 2007). This knowledge gap raises important questions about the validity of SET in SSA institutions and their implications for faculty development, institutional reputation, and overall educational quality.

Given the increasing reliance on SET SSA higher education, it is imperative to critically examine their effectiveness and explore potential strategies to mitigate biases. This systematic review aims to synthesise existing literature on the challenges and biases in SET, specifically within the SSA higher education context. By addressing these issues, this study seeks to contribute to the discourse on higher education quality assurance and inform policy recommendations for more equitable and effective faculty assessment practises.

The reliance on SET as a primary tool for evaluating teaching effectiveness has been a subject of intense debate in higher education globally. While these evaluations are intended to provide insights into teaching quality, their validity and reliability have been increasingly questioned due to the presence of various biases and methodological limitations (Hornstein, 2017; Quansah et al., 2024). In the SSA context, where higher education systems are undergoing significant transformation, the use of SET presents unique challenges that warrant closer examination

One of the primary concerns with SET is their susceptibility to biases related to gender, race, and ethnicity. Research has shown that female instructors and instructors of colour often receive lower evaluation scores compared to their male and white counterparts, even when teaching identical courses (Chávez, Mitchell, 2020). This bias can have significant implications for faculty career progression, particularly in contexts where SET are heavily weighted in decisions related to promotion and tenure. Moreover, the lack of student training in providing objective feedback further exacerbates the problem, as students may base their evaluations on factors unrelated to teaching quality, such as personal preferences or grading leniency (Hornstein, 2017).

In addition to biases, the methodological approaches used in studies on SET vary widely, which complicates the interpretation and comparison of findings. While some studies rely on classical measurement theories, others employ more advanced psychometric models, such as Generalisability Theory (GT) and Many-Facet Rasch Modelling (MFRM) (Quansah et al., 2024). These advanced models offer a more nuanced understanding of the sources of variability in SET, but their application in the SSA higher educational context remains limited. This gap in the literature highlights the need for a systematic review that examines the methodological approaches used in studies on SET in SSA and identifies best practices for future research.

Furthermore, the SSA higher education landscape presents unique challenges that may further complicate the use of SET. These challenges include resource constraints, increasing student numbers, and the need for quality assurance in a rapidly evolving educational environment (Kay, 2022). In this context, the reliance on SET as a primary tool for evaluating teaching effectiveness raises significant concerns, particularly given the potential for these evaluations to be influenced by factors unrelated to teaching quality. Therefore, it is imperative to systematically review the existing literature to understand the trends, methodological approaches, and challenges

associated with SET in SSA higher education. The primary objective of this systematic review is to explore the challenges and biases associated with SET in higher education institutions across SSA. Specifically, the review seeks to address the following research questions:

1. What yearly trends and methodological approaches are discussed in studies on SET in SSA higher education?
2. What key challenges are discussed in studies on SET in higher education institutions across SSA?
3. What forms of biases (such as gender, race, age, and grading leniency) are discussed in studies on SET in SSA higher education?
4. What implications of student biases are discussed in studies of students' evaluation of teaching performance within the SSA higher education?
5. What alternative student evaluation methods are discussed in studies on evaluations of teaching performances within the SSA higher education?

2. Methodology

Study inclusion and exclusion criteria

To ensure a comprehensive and relevant review, studies were selected based on specific inclusion and exclusion criteria.

The inclusion criteria were:

– Studies published between 2014 and 2024 to capture the most recent trends and discussions.

– Research focusing on SET within SSA higher education institutions.

– Empirical studies, systematic reviews, and meta-analyses that examine biases, methodological approaches, and quality assurance in SET.

– Studies published in peer-reviewed journals or reputable conference proceedings.

– Studies available in English to ensure accessibility and consistency in analysis.

The exclusion criteria were:

– Studies focusing on primary or secondary education rather than higher education.

– Research conducted outside the SSA region without direct relevance to SSA higher education.

– Opinion notes, Lecture notes, author commentaries, and editorials lacking empirical or systematic analysis.

– Studies with insufficient methodological rigour or unclear findings.

Database search and study selection

Information Sources

To ensure a comprehensive and systematic review of the literature on SET in SSA higher education, multiple academic databases and other sources were consulted. The primary databases searched included Google Scholar, PubMed (for education and social science studies), ERIC (Education Resources Information Centre), Scopus, Web of Science, JSTOR and African Journals Online (AJOL). These databases were chosen to capture a broad range of peer-reviewed studies, policy papers and empirical research on the subject. In addition, the reference lists of relevant articles were manually searched to identify additional studies that met the inclusion criteria. The final search of each database was conducted to ensure the most recent and pertinent literature was included in the review.

Structured Search Strategy

A structured search strategy was employed to maximise the retrieval of relevant studies. Boolean operators (AND, OR, NOT) were used to refine searches and enhance precision. The general search strategy included: ("student evaluations of teaching" OR "teacher ratings") AND ("bias" OR "limitations" OR "challenges") AND ("higher education" OR "university") AND ("quality assurance" OR "teaching effectiveness") AND ("Sub-Saharan Africa").

For bias-focused research outputs, the search string consisted of: ("gender bias" OR "racial bias" OR "age bias" OR "grading bias") AND ("student evaluations of teaching") AND ("higher education" OR "university") AND ("Sub-Saharan Africa"). For studies addressing quality assurance and policy-related implications, the search strategy applied: ("student feedback" OR "faculty evaluation") AND ("quality assurance" OR "higher education policy") AND ("Sub-Saharan Africa").

Filters were applied where relevant, including restrictions to peer-reviewed journal articles, studies published between 2014 and 2024, and English-language publications.

To strengthen the search and ensure adequate representation across the region, this general search was complemented by a country-specific search strategy to capture research outputs focused on individual countries in SSA. Countries included in the search string were: “Angola” OR “Benin” OR “Botswana” OR “Burkina Faso” OR “Burundi” OR “Cabo Verde” OR “Cameroon” OR “Central African Republic” OR “Chad” OR “Comoros” OR “Congo” OR “Democratic Republic of Congo” OR “Côte d’Ivoire” OR “Djibouti” OR “Equatorial Guinea” OR “Eritrea” OR “Eswatini” OR “Ethiopia” OR “Gabon” OR “Gambia” OR “Ghana” OR “Guinea” OR “Guinea-Bissau” OR “Kenya” OR “Lesotho” OR “Liberia” OR “Madagascar” OR “Malawi” OR “Mali” OR “Mauritania” OR “Mauritius” OR “Mozambique” OR “Namibia” OR “Niger” OR “Nigeria” OR “Rwanda” OR “São Tomé and Príncipe” OR “Senegal” OR “Seychelles” OR “Sierra Leone” OR “Somalia” OR “South Africa” OR “South Sudan” OR “Sudan” OR “Tanzania” OR “Togo” OR “Uganda” OR “Zambia” OR “Zimbabwe.”

Selection Process

The selection process followed a two-stage screening approach. In the first stage, two independent reviewers screened the titles and abstracts of retrieved studies against the inclusion criteria. Articles that did not meet the criteria were excluded at this stage. In the second stage, full-text articles were assessed for eligibility. Any disagreements between reviewers were resolved through discussion or by consulting a third reviewer. Automation tools, such as Rayyan QCRI, were used to facilitate the screening process and enhance efficiency. A PRISMA 2020 flow diagram documented the selection process, including the number of records identified, screened, excluded, and included in the final synthesis. The process was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 framework by Page et al. (2021), an update of the PRISMA technique by Moher et al. (2009). The study selection process focused on education-related databases, including ERIC (n = 1,358), ProQuest Education Database (n = 274), and Taylor & Francis Online (n = 506), yielding a total of 2,138 potential studies. Additionally, studies were retrieved from digital libraries and repositories, including Journal Storage (JSTOR) (n = 11), SpringerLink (n = 18), and ScienceDirect (n = 11).

After removing 826 duplicate records, 1,143 studies were excluded for not meeting the inclusion criteria, leaving 169 studies for further screening. These studies were assessed for relevance to the challenges and biases in SET and their implications for quality assurance in African higher education. Following this screening, full-text retrieval was attempted for all 147 studies; however, 52 were studies not in SSA, reducing the total to 116. Further exclusions were made, removing 29 books and 32 non-English studies, bringing the total to 55. From digital libraries and repositories, 40 studies were sought (JSTOR: n = 11; SpringerLink: n = 18; ScienceDirect: n = 11), of which 9 were not retrieved. Additionally, 30 studies from education-focused databases were assessed for eligibility, of which 7 were excluded due to language barriers or insufficient specificity regarding SET challenges and biases. Similarly, 25 studies from digital libraries and repositories were assessed, with 8 books excluded. In total, 55 studies were selected from databases, while 15 were obtained from digital libraries and repositories. Ultimately, 80 studies met the inclusion criteria and were deemed directly relevant to the challenges and biases in SET and their impact on quality assurance in SSA higher education.

Grouping Findings from Selected Articles

A literature matrix was developed to categorise and map the characteristics of the selected studies on student SET in SSA higher education institutions. The matrix consisted of multiple columns representing key study features and rows representing individual studies. Each study was carefully analysed and independently evaluated by the authors based on the following criteria: (1) year of publication and author(s), (2) country and institution of focus, (3) research methodologies used (qualitative, quantitative, or mixed-method approaches and data collection instruments), (4) key challenges and limitations of SET in SSA, (5) influence of biases (gender, race, age, grading leniency) on SET, (6) implications of biased SET on faculty performance, promotion, and quality assurance, (7) alternative or complementary methods for assessing teaching effectiveness, and (8) policies and best practises for mitigating biases and improving SET reliability.

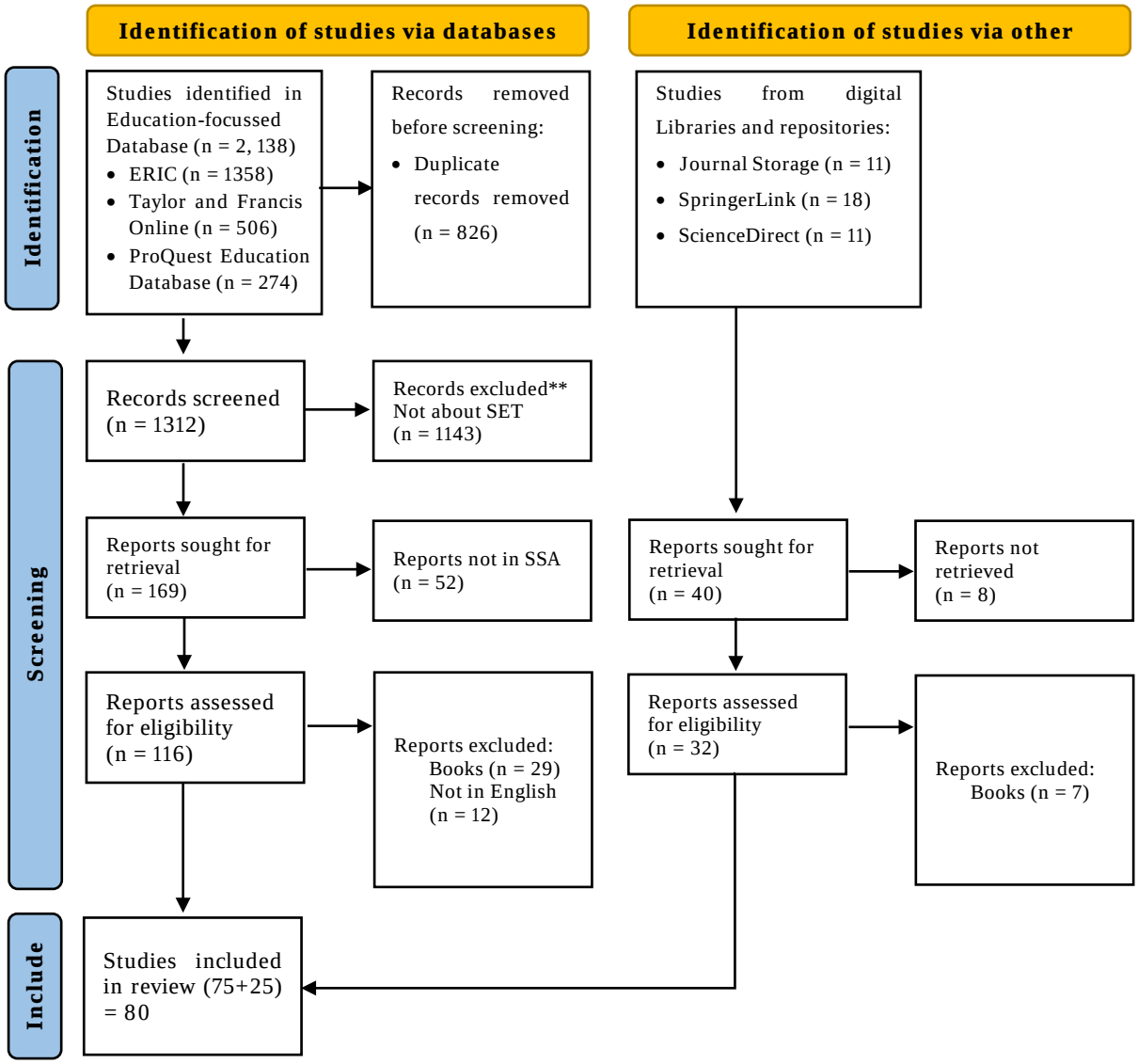

Fig. 1. Flow diagram for the selection process of SET-related studies
Source: Author's Construct, 2025

A colour-coding technique was applied to distinguish different themes, followed by an iterative discussion process to ensure consensus on the naming and categorisation of codes. This analysis resulted in the identification of five thematic areas: (1) key challenges and limitations of SET in SSA, (2) influence of biases (gender, race, age, grading leniency) on SET in SSA universities, (3) implications of biased SET on faculty performance, promotion, and quality assurance, (4) alternative or complementary methods to SET for assessing teaching effectiveness, and (5) policies and best practises to mitigate biases and improve SET reliability. To ensure accuracy and consistency in coding, we refined our categorisation over multiple iterations. The final themes reflect the most significant findings from the reviewed literature and serve as the basis for the analysis and synthesis. The methodological characteristics of studies on Tertiary SET and their Implications for Quality Assurance in African higher education institutions are presented in Table 6.

Quality Criteria and Assessment

To ensure quality in the selection process, a systematic assessment was conducted based on predefined criteria. This assessment enabled us to code key themes and concepts related to SET, as outlined in the study objectives. Following the thematic structure, five key categories were identified: (1) key challenges and limitations of SET in SSA education, (2) influence of biases on SET in SSA universities, (3) implications of biased SET on faculty performance, promotion, and

quality assurance, (4) alternative or complementary methods to SET for assessing teaching effectiveness, and (5) policies and best practises to mitigate biases and improve SET reliability. Intercoder reliability was ensured by calculating the agreement level across the authors involved in the review process. The obtained Krippendorff's alpha coefficient exceeded the recommended threshold of $\alpha = 0.8$, indicating high reliability and credibility in the classification of studies. This rigorous assessment reinforced the validity of the selected themes and ensured that the findings accurately reflected the literature on SET in higher education institutions in SSA.

3. Empirical Results

The results align with the research questions. The first part examines SET research trends within SSA higher education, highlighting yearly publication patterns and country contributions, with Ghana and South Africa leading. The second part explores methodological approaches, including quantitative, qualitative, and mixed methods. The third part identifies challenges such as reliability concerns, low response rates, and cultural biases. The fourth part analyses biases in SET, including grading leniency and gender influences. The fifth part reviews alternative evaluation methods like peer reviews and classroom observations. Finally, the study discusses policies for improving SET reliability, such as structured evaluations and anonymised reviews. These findings provide insights into the role of SET in SSA higher education quality assurance.

Yearly studies on SET in SSA higher education

Figure 2 shows the yearly publication distribution of studies on SET and their implications for quality assurance in SSA higher education, indicating a fluctuating research trend over the years. The data reveals no period of sustained stability, with annual outputs varying considerably. The peak years for research output were 2020 and 2022, each with 11 studies (13.8 % of the total). In contrast, the lowest output was recorded in 2021, with only 3 studies (3.8 %). Other years show moderate activity, such as 2014 with 10 studies (12.5 %) and 2017 with 9 studies (11.3 %). The most recent years, 2023 and 2024, saw a decline to 7 (8.8 %) and 5 (6.3 %) studies, respectively. These findings highlight that while there is consistent scholarly attention to SET's role in quality assurance, the interest has been volatile rather than showing steady growth, with a noticeable downturn in the most recent data.

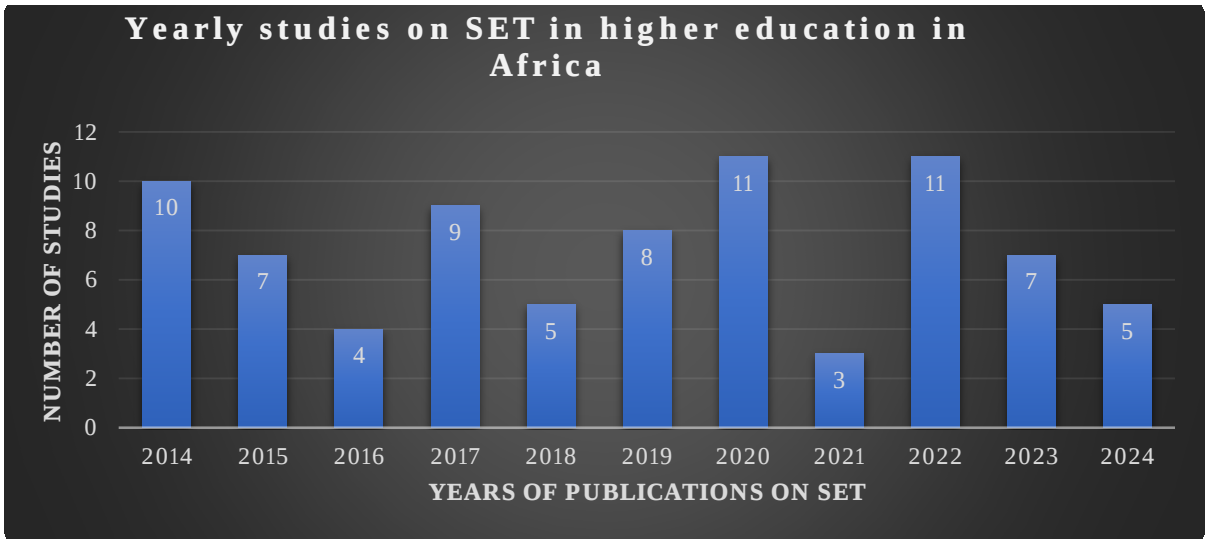

Fig. 2. Trends in selected studies on SET
Source: Author's Construct, 2025

Country contribution of studies on SET in SSA higher education

Figure 3 shows the country-level contribution of studies on SET and their implications for quality assurance in SSA higher education, highlighting significant variations in research output. South Africa recorded the highest number of studies with 20 (25.0 %), demonstrating the strongest academic engagement in SET-related quality assurance discussions. Ghana followed with

12 studies (15.0 %), while Kenya contributed 10 studies (12.5 %). Nigeria was the next largest contributor with 7 studies (8.8 %). Tanzania and Zimbabwe each accounted for 6 studies (7.5 %), while studies focusing on multiple Sub-Saharan countries contributed 5 (6.3 %). Uganda and Namibia each provided 4 studies (5.0 %). Other notable contributors included Malawi and Ethiopia with 2 studies each (2.5 %), and Rwanda and Somalia with 1 study each (1.3 %). These findings indicate that while SET research is present across the continent, scholarly output is concentrated in a few countries, with South Africa, Ghana, and Kenya leading the discourse.

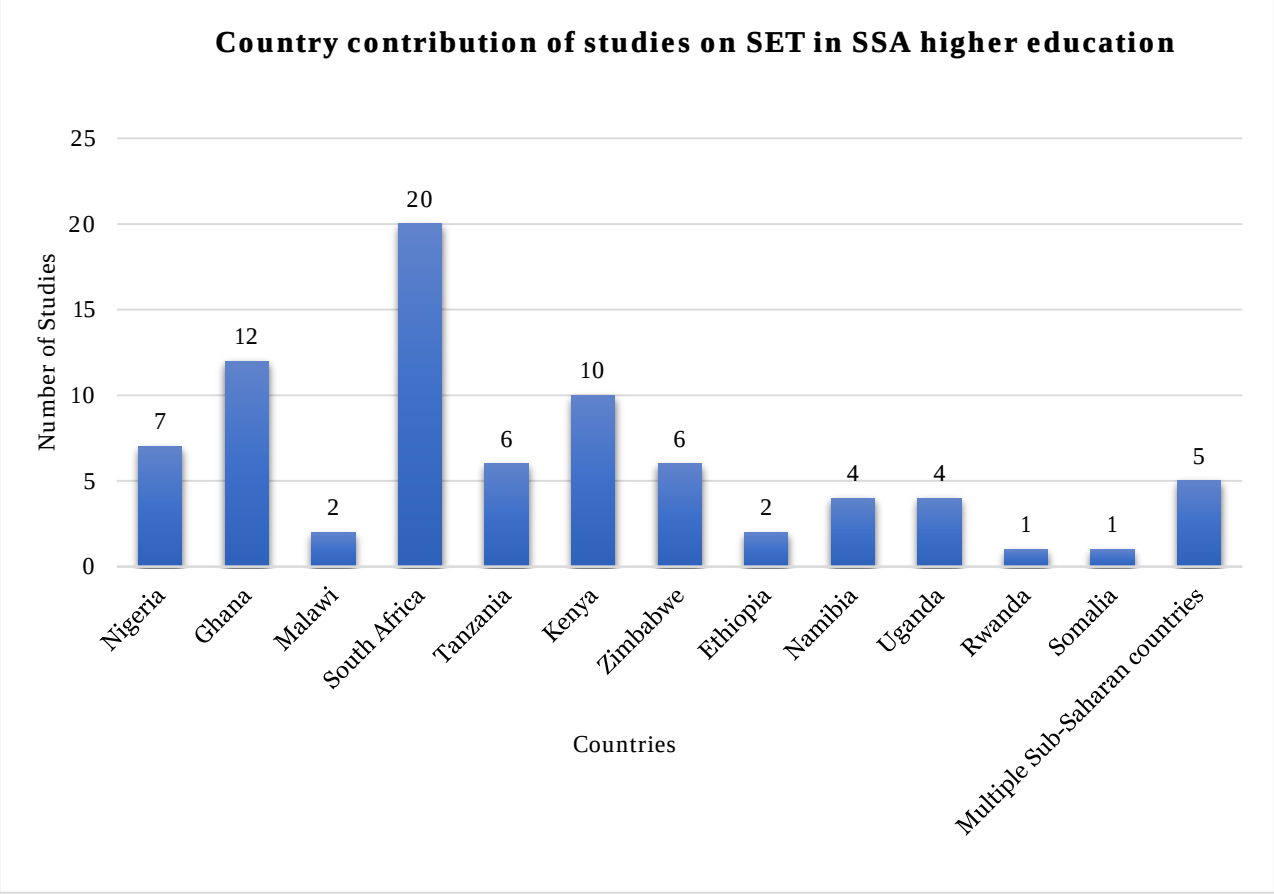

Fig. 3. Country contribution of studies on SET
Source: Author's Construct, 2025.

Methodological approaches of studies on SET in African higher education

SET in SSA higher education show a diverse use of methodological approaches, with mixed-method studies being the most common. As detailed in Table 1, 26 of 80 studies (32.5%) employed a mixed-methods approach, incorporating both questionnaires and interviews to enhance data triangulation.

Qualitative studies accounted for 25 (31.2 %) of the total, while quantitative approaches were used in 20 studies (25.0 %). Additionally, 9 studies (11.2 %) utilised a desktop review approach. These findings indicate a balanced preference for methodologies that provide in-depth and triangulated insights, rather than a dominance of a single approach. A detailed analysis of the data collection instruments reveals a strong emphasis on empirical data collection. Interviews were the most frequently used single instrument, featured in 26.2 % of all studies (either solely or as part of a mixed method). Questionnaires followed closely and were used in 22.5 % of studies. The use of secondary data was also notable, comprising 21.3 % of the methodological instruments, which includes documents for desktop reviews and supplementary data in qualitative and quantitative studies. The subjects or respondents in these studies included various groups: undergraduate and graduate students; faculty members and lecturers; quality assurance officials and administrators; and library and information science professionals.

Table 1. Methodological details of the SET-related studies

Approach	Number of studies	Percentage	Instrument			
			Questionnaire	Interview	Questionnaire & Interview	Secondary Data
Quantitative	20	25.0 %	18(22.5 %)			2(2.5)
Qualitative	25	31.2 %		21(26.2 %)		4(5.0)
Mixed Method	26	32.5 %			26(32.5 %)	
Review	9	11.2 %				11(13.8 %)
TOTAL	**80**	**100 %**	**18(22.5 %)**	**21(26.2 %)**	**26(32.5 %)**	**17(21.3 %)**

Source: Author's Construct, 2025

Other respondent categories included medical and health education professionals; education stakeholders and policymakers; and business and industry professionals. Additionally, tutors and college educators, and specialised groups in fields like engineering, STEM, and economics were also included. The significant use of interviews and mixed methods suggests that rich, contextual insights are highly valued in SET research within the African higher education context.

Challenges associated with SET in higher education institutions across Africa

Figure 5 highlights the key challenges and limitations associated with SET in higher education institutions across Africa, revealing widespread and severe concerns about their effectiveness and implementation. The most frequently cited issue was reliability and subjectivity issues, reported in 73 studies (91.2 %), reflecting predominant concerns over bias and inconsistent evaluation outcomes. This was followed by a three-way tie among significant challenges: low response rates and engagement, administrative and technological constraints, and cultural and contextual misalignment. Both low response rates and administrative constraints were each identified in 70 studies (87.5 %), indicating major problems with student participation and institutional capacity. Cultural misalignment was noted in 67 studies (83.7 %), emphasising the need for more locally adapted evaluation frameworks. Finally, the lack of training on evaluation usage was highlighted in 62 studies (77.5 %), suggesting that faculty and administrators often struggle to interpret and apply SET data effectively. These findings suggest that SET systems in Africa face a complex set of interconnected and severe challenges that are likely to undermine their reliability, fairness, and overall impact on quality assurance.

Table 2. Challenges associated with SET in higher education institutions across Africa

Indicators	No of studies (%)
Low Response Rates & Engagement	70 (87.5 %)
Lack of Training on Evaluation Usage	62 (77.5 %)
Cultural & Contextual Misalignment	67 (83.7 %)
Reliability & Subjectivity Issues	73 (91.2 %)
Administrative & Technological Constraints	70 (87.5 %)

Biases influencing SET performances in African universities

Table 3 highlights the biases influencing SET in African universities, revealing significant concerns about fairness and objectivity. The most frequently reported bias was grading leniency vs.

strictness, cited in 67 studies (83.7 %), indicating that students may rate instructors more favourably based on perceived leniency in grading. Gender stereotypes in perceptions were noted in 60 studies (75.0 %), suggesting that male and female instructors may receive different evaluations due to implicit biases. Language and accent bias were identified in 53 studies (66.2 %), highlighting challenges faced by instructors whose speech patterns differ from students' expectations. Both race and ethnic bias in multicultural institutions and age-related bias were each reported in 52 studies (65.0 %), reflecting disparities in student perceptions based on instructors' backgrounds and potential discrimination against younger or older faculty members. These findings suggest that a wide range of significant biases in SET may compromise their reliability and fairness, raising critical concerns about their use in academic decision-making across African universities.

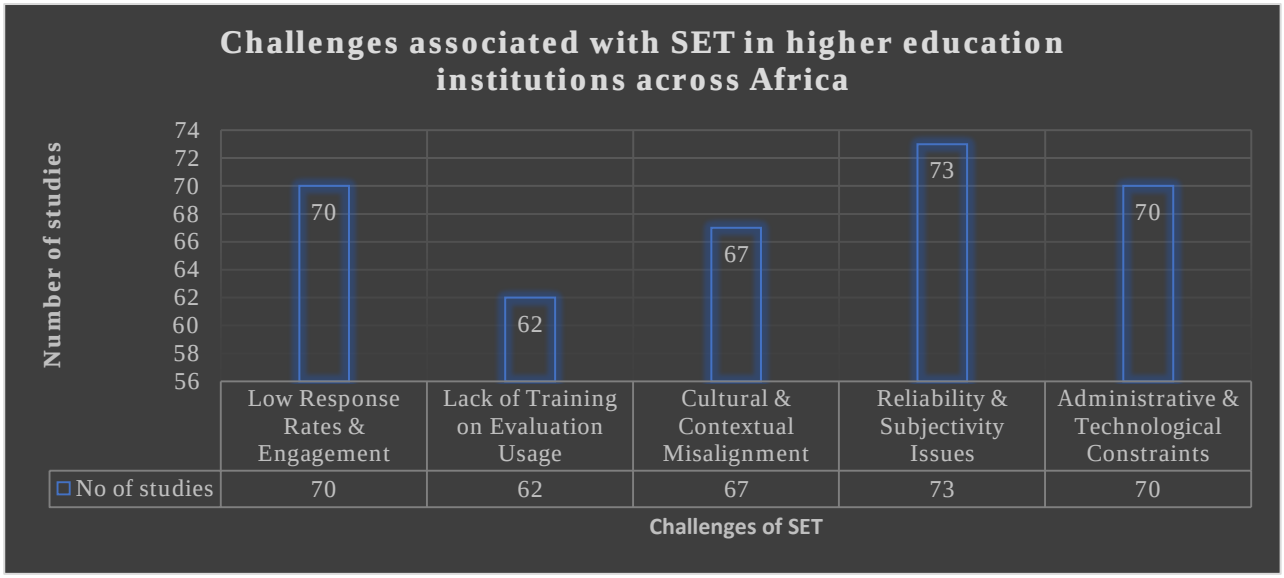

Fig. 5. Challenges associated with SET in higher education institutions across Africa
Source: Author's Construct, 2025

Table 3. Biases influencing SET in African universities

Indicators	No of studies (%)
Gender Stereotypes in Perceptions	60 (75.0 %)
Race & Ethnic Bias in Multicultural Institutions	52 (65.0 %)
Age-Related Bias	52 (65.0 %)
Grading Leniency vs. Strictness	67 (83.7 %)
Language & Accent Bias	53 (66.2 %)

Source: Author's Construct, 2025

Implications of student bias in evaluations of teaching on quality assurance in African higher education

The reported implications of biased SET on faculty performance assessment, promotion, and overall quality assurance in higher education highlight significant concerns for academic fairness and institutional integrity, as presented in Figure 6. The most frequently cited consequence was the limited reflection of true teaching effectiveness, reported in 74 studies (92.5 %), suggesting that SET may not accurately measure instructional quality. This was closely followed by concerns over unfair promotion and tenure decisions, identified in 73 studies (91.2 %), indicating that biases in SET can significantly disadvantage faculty in career progression. The impact on institutional quality assurance measures was noted in 66 studies (82.5 %), raising questions about the reliability of SET in ensuring educational standards. Furthermore, the reinforcement of inequities in academia was highlighted in 65 studies (81.2 %), underscoring how SET biases perpetuate systemic disadvantages. Finally, discouragement and low morale among faculty were reported in 70 studies (87.5 %), pointing to the profound negative psychological impact of biased evaluations. These

findings reveal an overwhelming consensus that biased SET can severely undermine faculty development, distort quality assurance mechanisms, and perpetuate inequities in higher education.

Methods of SET across African higher education institutions

Table 4 presents alternative or complementary evaluation methods compared to traditional SET for assessing teaching effectiveness in African higher education, highlighting diverse approaches aimed at improving assessment reliability. The most frequently cited method was student learning outcomes and performance metrics, identified in 71 studies (88.7 %), emphasising the importance of measuring actual learning achievements. This was closely followed by peer evaluations by faculty, reported in 70 studies (87.5 %), suggesting that colleagues can provide valuable insights into teaching effectiveness. Self-assessment and teaching portfolios were highlighted in 64 studies (80.0 %), allowing instructors to reflect on their teaching practices.

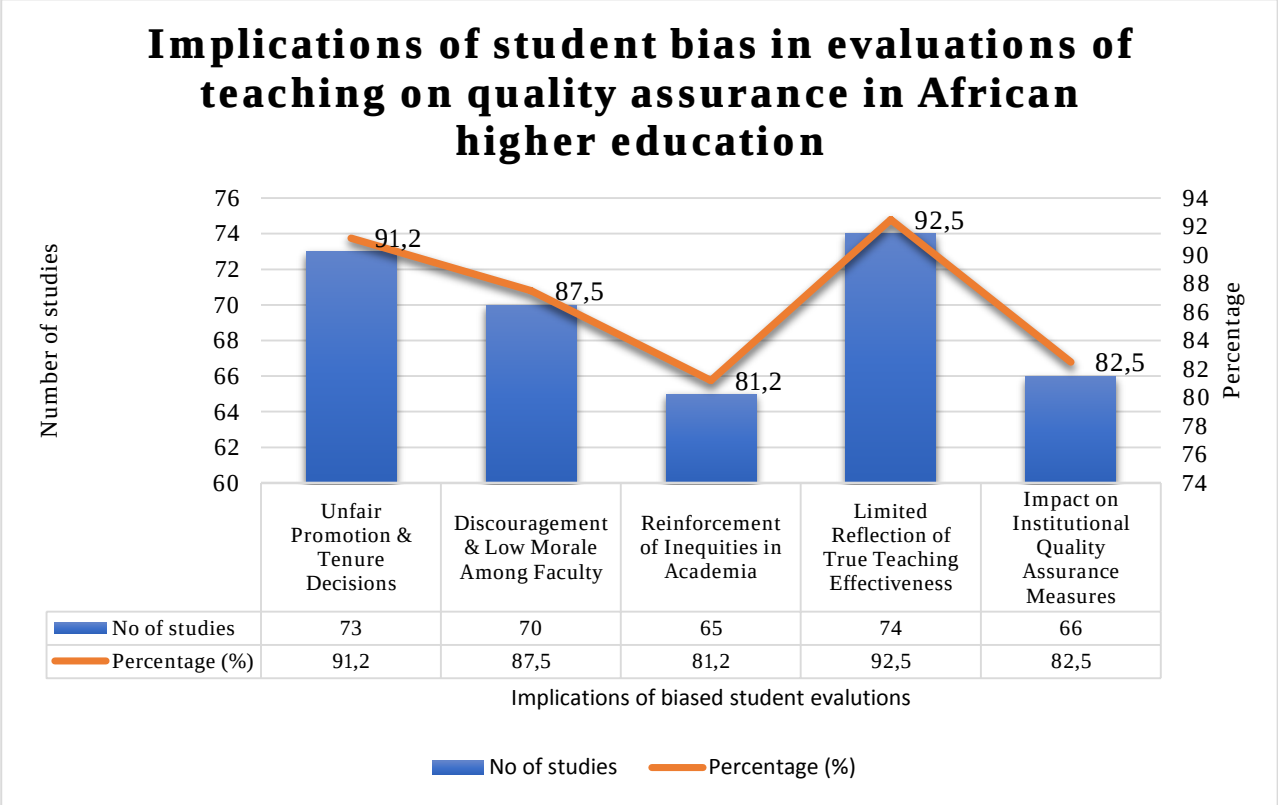

Fig. 6. Implications of biased SET
Source: Author's Construct, 2025

Classroom observations by experts appeared in 63 studies (78.7 %), indicating the usefulness of direct assessment by experienced educators. Finally, multi-source feedback (360-degree evaluation) was noted in 62 studies (77.5 %), promoting a more holistic review incorporating multiple perspectives. These findings suggest a strong consensus on the value of multi-faceted evaluation systems, with all complementary methods being supported by a large majority (over 75 %) of the studies. Integrating these methods can provide a more comprehensive and balanced assessment of teaching effectiveness than SET alone.

Table 4. Alternative SET methods

Methods	No. of studies (%)
Peer Evaluations by Faculty	70 (87.5 %)
Self-Assessment & Teaching Portfolios	64 (80.0 %)
Classroom Observations by Experts	63 (78.7 %)
Student Learning Outcomes & Performance Metrics	71 (88.7 %)
Multi-Source Feedback (360-Degree Evaluation)	62 (77.5 %)

Source: Author's Construct, 2025.

Approaches for mitigating biases of student evaluations to enhance quality assurance in African universities

Table 5 outlines reported approaches that can mitigate biases and enhance the reliability of SET for quality assurance in African universities. The most frequently cited strategy was the regular review and validation of SET tools, reported in 74 studies (92.5 %), highlighting the need for continuous refinement to maintain reliability. This was closely followed by awareness and training for students and faculty, identified in 73 studies (91.2 %), emphasising the critical role of educating stakeholders on the appropriate use of SET. Structured and standardised evaluation instruments were recommended in 70 studies (87.5 %), ensuring consistency in how teaching effectiveness is measured.

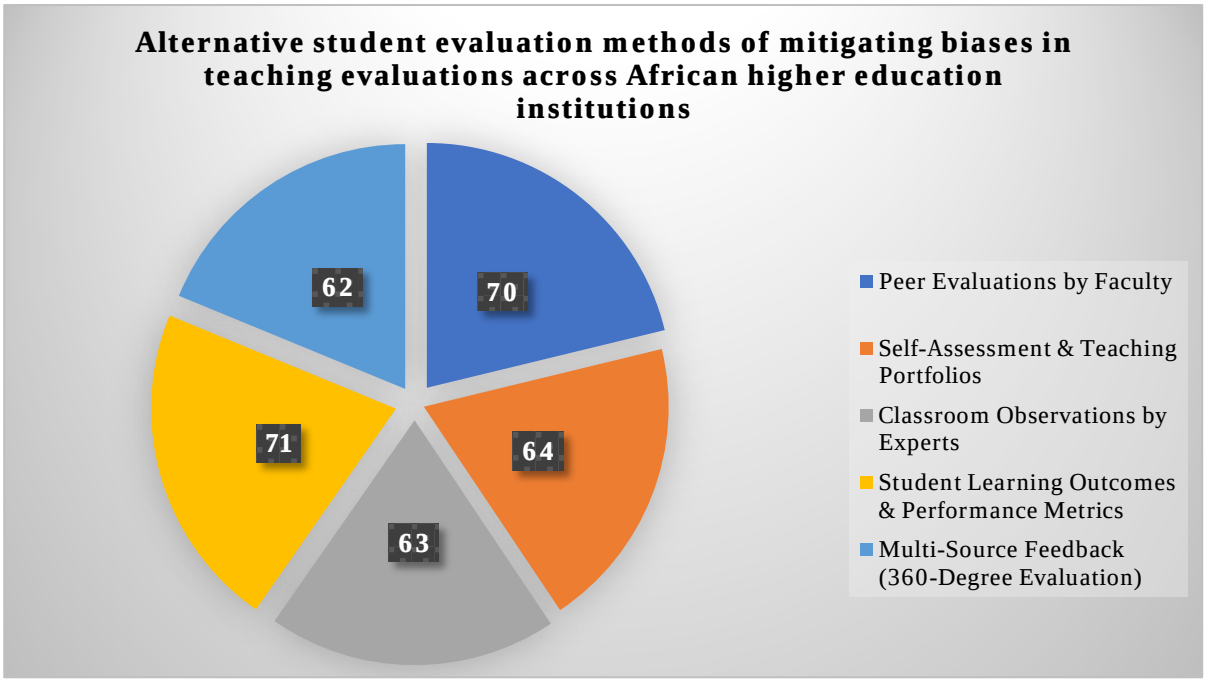

Fig. 7. Alternative SET methods
Source: Author's Construct, 2025.

Weighting SET with multiple assessment methods was supported by 68 studies (85.0 %), suggesting that integrating complementary evaluation approaches can improve fairness. Finally, blind or anonymised review processes were noted in 56 studies (70.0 %), reducing potential bias by concealing instructor identities. These findings indicate a strong consensus on a multi-faceted approach and that implementing well-designed policies can significantly improve the credibility and effectiveness of SET in African higher education.

Table 5. Policies and best practises to mitigate biases in SET

Indicators	No of studies (%)
Structured & Standardised Evaluation Instruments	70 (87.5 %)
Awareness & Training for Students & Faculty	73 (91.2 %)
Weighting SET with Multiple Assessment Methods	68 (85.0 %)
Blind or Anonymised Review Processes	56 (70.0 %)
Regular Review & Validation of SET Tools	74 (92.5 %)

Source: Author's Construct, 2025

Table 6. Methodological characteristics of studies on tertiary SET and implications for quality assurance in African higher education institutions

№	Author(s)	Year	Country of Study	Research Approach	Research Design	Sample Instrument Used	Sample Used or Number of Articles
1.	Akanmu, S.O.	2023	Nigeria	Mixed	Survey and Quasi-experimental	Questionnaire Interview	260 students and 48 lecturers
2.	Amuche, A.C.I., Umar, M.H.	2019	Nigeria	Quantitative	Survey	Questionnaire	2600 students
3.	Anderson, A.B., Boateng, R., Ansong, E.	2017	Ghana	Qualitative	Case Study	Interview	54 participants (40 students, 10 lecturers, 4 administrative staff)
4.	Batizani, D., Mpundu, M.	2024	Malawi	Mixed	Case Study	Questionnaire Interview	240 participants (200 students, 38 university managers, 2 NCHE officers)
5.	Bhuiyan, M.M.Z.U., van As, A.S.	2022	South Africa	Quantitative	Descriptive	Questionnaire	48 students
6.	Chikazinga, W.W.N.	2018	Malawi	Quantitative	Descriptive	Questionnaire	52 lecturers
7.	Choma, I.A., Raymond, B.	2022	Tanzania	Qualitative	Case Study	Interview	34 participants
8.	Coker, W.	2018	Ghana	Qualitative	Case Study	Document Extraction	Not specified
9.	Dattey, K., Westerheijden, D.F., Hofman, W.H.A.	2019	Ghana	Quantitative	Survey	Questionnaire	1,100 students (696 from public, 404 from private universities)
10.	De Klerk, D., Benvenuti, S., MacGregor, A.	2022	South Africa	Qualitative	Phenomenological	Interview	19 questionnaire respondents; 8 focus group participants
11.	Ebert, A., Pistor, P., Sella, S.	2017	Tanzania	Mixed	Case Study	Questionnaire Interview	142 graduates
12.	Effah, A.G.	2020	Ghana	Quantitative	Descriptive Survey	Questionnaire	96 tutors
13.	Elijah, M.S.	2017	Kenya	Quantitative	Descriptive	Document Extraction	Not explicitly specified
14.	Fitchett, J.M., Sheridan, C.M.	2023	South Africa	Qualitative	Not explicitly specified	Interview	Not explicitly specified
15.	Garwe, E.C.	2021	Zimbabwe	Mixed	Case Study	Questionnaire Interview	33 participants (2 ministry officials, 6 ZIMCHE members, 15 university research directors, 10 researchers) and multiple documents over 2010–2020 period
16.	Garwe, E.C., Zunguze, M., Kanda, M.	2024	Zimbabwe	Qualitative	Case Study	Interview	23 participants (6 senior administrators, 7 program coordinators and academics from various departments, and 10 students.)
17.	Gavu, E.K.	2018	Ghana	Mixed	Not	Questionnaire	312 respondents

№	Author(s)	Year	Country of Study	Research Approach	Research Design	Sample Instrument Used	Sample Used or Number of Articles
					explicitly specified	Interview	
18.	Gumbo, J.R.	2017	South Africa	Mixed	Case study	Questionnaire Interview	Not explicitly specified
19.	Haile, V.T., Szendrő, K., Szente, V.	2020	Ethiopia	Quantitative	Cross Sectional	Questionnaire	450 samples
20.	Hassan, S., Wium, W.	2014	South Africa	Mixed	Epistemological	Questionnaire Interview	22 first year students studying a science-based subject
21.	Hinson, C. .	2016	Ghana	Quantitative	Descriptive	Questionnaire	203 respondents
22.	Ibrahim, A.	2020	Nigeria	Desktop Review	Review Study	Document Extraction	Not explicitly specified
23.	Igbojekwe, P.A., Ugo-Okoro, C.P., Agbonye, C.O.	2015	Nigeria	Desktop Review	Review Study	Document Extraction	Not explicitly specified
24.	Kadhila, N., Iipumbu, N.	2019	Namibia	Desktop Review	Review Study	Document Extraction	Not explicitly specified
25.	Kadhila, N., Nyathi, S. F.	2015	Namibia	Mixed	Not explicitly specified	Interview Questionnaire	360 students
26.	Katende, D., Namutebi, E.	2024	Uganda	Quantitative	Case Study	Questionnaire	215 students
27.	Kay, J.	2022	Kenya	Mixed	Cross Sectional	Questionnaire Interview	21 lecturers, 562 students
28.	Shange, J.	2015	Rwanda	Qualitative	Case Study	Interview	Not explicitly specified
29.	Kigozi, E.	2020	Uganda	Qualitative	Not explicitly specified	Interview	80 student teachers (20 from each of 4 PTTCs)
30.	Kofi, K., Addo, P. K., Owusu, F.	2022	Ghana	Mixed	Case Study	Questionnaire Interview	62 faculty members
31.	Dansieh, S.A.	2015	Ghana	Mixed	Case Study	Questionnaire Interview	567 questionnaires administered (502 responses), 17 academic and administrative staff interviewed
32.	Lembuka, M.	2023	Tanzania	Desktop Review	Review Study	Document Extraction	specific number not stated
33.	Lumadi, M.W., Acquah, B.Y.S.	2014	Ghana	Quantitative	Descriptive Survey	Questionnaire	52 trainee Economics teachers (21 females, 31 males) and 2194 Senior High School students (1332 males, 862 females)
34.	Machingambi, S.	2017	South Africa	Qualitative	Case Study	Interview	35 academics who participated in teaching excellence awards
35.	Maiyo, J.K.	2018	Kenya	Mixed	Descriptive Survey	Questionnaire Interview	70
36.	Makondo, L., Ndebele, C.	2014	South Africa	Quantitative	Descriptive Survey	Questionnaire	118 volunteer lecturers
37.	Maiyo, J.K.	2020	Kenya	Mixed	Descriptive Survey	Questionnaire Interview	70 respondents (67 % response rate)
38.	Makondo, L., Ndebele, C.	2014	South Africa	Quantitative	Descriptive Survey	Questionnaire	118 lecturers
39.	Makoni, R.P.	2015	Zimbabwe	Qualitative	Phenomenological	Interview	17 lecturers

№	Author(s)	Year	Country of Study	Research Approach	Research Design	Sample Instrument Used	Sample Used or Number of Articles
40.	Malunda, P.N., Atwebembeire, J., Bazanye, N.K.	2024	Uganda	Desktop Review	Review Study	Document Extraction	Not Explicitly specified
41.	Martin, M.	2018	Multiple countries	Mixed	Case Study	Questionnaire Interview	311 higher education institutions (survey) and 8 university case studies
42.	Mashiri, P.	2014	Zimbabwe	Desktop Review	Review Study	Document Extraction	Not Explicitly specified
43.	Slabbert, R.	2024	South Africa	Qualitative	Survey	Interview	12 experts
44.	Mrema, D., Ndayambaje, I., Ntawiha, P., Ndabaga, E.	2023	Tanzania	Qualitative	Case Study	Interview	46 participants (4 quality assurance directors, 8 senior quality assurance officers, 10 academics, 24 student cabinet members)
45.	Mrema, D., Ndayambaje, I., Ntawiha, P., Ndabaga, E.	2023	Tanzania	Qualitative	Case Study	Interview	46 respondents from 4 universities
46.	Munyae, M.M., Kigwilu, P. C.	2020	Kenya	Mixed	Not Explicitly specified	Questionnaire interview	122 valid questionnaires (105 students and 17 employees)
47.	Muya, S.M.	2019	Kenya	Mixed	Descriptive	Questionnaire interview	119 students (determined sample size), with 178-180 respondents for various quantitative questions
48.	Netshifhefhe, L.P.	2020	South Africa	Qualitative	Descriptive and Explanatory	Interview	24 interviewees
49.	Netshifhefhe, L., Nobongoza, V., Maphosa, C.	2016	South Africa	Desktop Review	Review Study	Document Extraction	Not Explicitly specified
50.	Nsibande, R.	2022	South Africa	Mixed	Case Study	Questionnaire Interview	Not Explicitly specified
51.	Ntim, S.	2014	Ghana	Quantitative	Survey	Questionnaire	120 respondents from 30 private universities
52.	Odera, A.O.	2020	Kenya	Mixed	Sequential Exploratory	Questionnaire Interview	Not Explicitly specified
53.	Odhiambo, G.O.	2014	Kenya	Qualitative	Case Study	Interview	public universities; 1 quality assurance agency; 16 participants (2 VCs, 2 QA directors, 8 deans, 4 QAA heads)
54.	Ojo, F.Y.	2014	Nigeria	Quantitative	Survey	Questionnaire	100 lecturers
55.	Nwokonko, R.N.	2022	Nigeria	Desktop Review	Review Study	Document Extraction	Not Explicitly specified
56.	Omar, A.M., Kisige, A.	2023	Somalia	Quantitative	Non-experimental, descriptive, and cross-sectional	Questionnaire	108 academic staff members

№	Author(s)	Year	Country of Study	Research Approach	Research Design	Sample Instrument Used	Sample Used or Number of Articles
57.	Onditi, E.O., Wechuli, T.W.	2017	Kenya	Qualitative	Review Study	Document Extraction	Not Explicitly specified
58.	Padayachi, R.A.	2015	South Africa	Mixed	Case Study	Questionnaire Interview	Not Explicitly specified
59.	Pawandiwa, P., Ndlovu, M.J., Shava, G., Charumbira, J., Mathonsi, E.	2022	Zimbabwe	Mixed	Exploratory	Questionnaire Interviews	60 respondents (9 Vice Chancellors, 9 Ministry officials, 21 Faculty Deans, 15 ZIMCHE board members, 6 Student Representatives)
60.	Petersen, M.	2016	South Africa	Qualitative	Case Study	Interview	16 individual university teachers from eight different faculties at SU.
61.	Piason, V., Maxwell, C.	2021	Zimbabwe	Mixed	Case Study Descriptive Design	Questionnaire Interview	67 students from the E-Business course, plus an additional group for interviews
62.	Ansah, F., Nudzor, H.P., Swanzy, P.	2017	Ghana	Mixed	Convergent	Questionnaire Interview	450 students (225 from a public university, 225 from a private university college)
63.	Quansah, F.	2020	Ghana	Quantitative	Three-facet partially nested random balanced	Questionnaire	30 lecturers and 600 students (20 students from each of 30 classes
64.	Saidi, A.	2020	South Africa	Qualitative	Review Study	Document Extraction	Multiple conference presentations and referenced literature (exact number not specified)
65.	Santally, M.I.	2016	Multiple African countries	Qualitative	Case Study	Document Extraction	Analysis of programme documentation, feedback from 487 successful participants across multiple cohorts
66.	Sevnarayan, K.	2022	South Africa	Qualitative	Phenomenol ogical	Interview	10 students and 6 lecturers"
67.	Siraj, M.N., Hágen, I.Z.	2020	Ethiopia	Mixed	Cross-Sectional Survey	Questionnaire Interview	295 (74 instructors, 191 students, plus department heads and FGD participants)
68.	Sospeter, M., Amuli, A., Hassanal, I.	2022	Tanzania	Mixed	Sequential Explanatory	Questionnaire Interviews	113 respondents
69.	Steyn, C., Davies, C., Sambo, A.	2019	South Africa	Qualitative	Case Study	Interview	161 students (from 220 registered) participated in the evaluation exercise, generating 481 recommendations
70.	Surujlal, J.	2014	South Africa	Qualitative	Exploratory	Interview	12 academics (purposive sample)
71.	Taylor, N.	2023	Multiple SSA Countries	Mixed	Case Study	Questionnaire Interview	4 detailed country case studies (Rwanda, Uganda,

№	Author(s)	Year	Country of Study	Research Approach	Research Design	Sample Instrument Used	Sample Used or Number of Articles
							Senegal, South Africa) + data from 16 additional countries (33 % of 48 SSA countries)
72.	Tennant, G., Khamis, T.	2017	Multiple African Countries	Mixed	Case Study	Questionnaire Interview	429 students (from 700 enrolled, 61.3 % response rate) across 26 courses
73.	Tomas, N., Aukelo, M., Tomas, T.N.	2022	Namibia	Quantitative	Descriptive cross-sectional survey	Questionnaire	148 respondents
74.	Tomes, T., Coetzee, S., Schmulian, A.	2019	South Africa	Quantitative	Comparative experimental	Questionnaire	334 respondents (167 in opinion-based group, 167 in prediction-based group)
75.	Moodley, V.R.	2019	Multiple African Countries	Qualitative	Phenomenol ogical	Interview	11 academic leaders from 6 countries
76.	Ubong, B., Okpor, M.O.	2019	Nigeria	Desktop Review	Review Study	Document Extraction	Not explicitly specified
77.	Uiseb, I.	2017	Namibia	Qualitative	Case Study	Interview	Not explicitly stated
78.	Van der Bank, C.M., Van der Bank, M.	2014	South Africa	Qualitative	Case Study	Document Extraction	Not explicitly stated
79.	Waweru, S.M.	2021	Kenya	Qualitative	Descriptive	Interview	113 participants for one participants per college 46 respondents
80.	Wilson Kasule, G., Wesselink, R., Noroozi, O., Mulder, M.	2015	Uganda	Quantitative	Exploratory	Questionnaire	570 participants (managers: 130; teaching staff: 200; students: 240)

4. Discussion

The findings of this review highlight key trends in research on SET and their implications for quality assurance in higher education across Africa. The yearly distribution of studies indicates fluctuating research activity, with relatively stable publication rates between 2014 and 2017, followed by a decline in 2018 and 2021. However, the resurgence in 2019, 2020, and a peak in 2022 and 2023 suggest a growing academic interest in SET, likely driven by increased institutional focus on teaching quality and accountability. The variation in research output across the years may reflect shifts in policy priorities, funding availability, and evolving debates on SET effectiveness in African higher education. SET in African higher education are heavily concentrated in Ghana and South Africa, followed closely by Nigeria, Kenya, and Tanzania. These countries have shown strong academic engagement with SET, indicating an active discourse on its implications for quality assurance. In contrast, contributions from countries such as Rwanda, Somalia, and Lebanon are minimal, suggesting potential research gaps or lower institutional emphasis on SET. The dominance of a few countries in SET research highlights the need for broader regional engagement to ensure diverse perspectives on its role in quality assurance across different educational landscapes.

In terms of methodological approaches, SET studies in African higher education are largely quantitative, with most relying on survey-based data collection. While qualitative and mixed-method studies provide additional insights, they remain less utilised, potentially limiting deeper explorations of faculty and student experiences with SET. The relatively low adoption of desktop review approaches further emphasises a preference for primary data collection over secondary document analysis. This trend underscores the importance placed on direct empirical evidence in assessing the effectiveness of SET as a quality assurance tool. Regarding study subjects and sample

sizes, the findings indicate a research focus on undergraduate and graduate students, as well as faculty members, reflecting the primary stakeholders involved in SET processes. Quality assurance officials and administrators also receive notable attention, reinforcing the role of institutional leadership in implementing and interpreting SET results. However, limited studies on specialised groups, business and industry professionals, and policymakers suggest an underexplored dimension of SET research and its broader implications beyond academia.

The SET in Africa face significant challenges and limitations, primarily centred on low response rates, lack of training, cultural misalignment, reliability issues, and administrative constraints. Low response rates and student engagement are critical concerns, as online evaluations often lead to procrastination or neglect, while absenteeism further reduces participation, as noted by Akanmu (2023) and Netshifhefhe (2020). Anonymity, though encouraging honesty, can result in superficial feedback, exacerbated by students' lack of training in constructive evaluation methods, as indicated by Chikazinga (2018) and Choma and Raymond (2022). Additionally, the digital divide in Africa limits access to online evaluations, particularly in regions with poor internet infrastructure (De Klerk et al., 2022; Kadhila, Nyathi, 2015). Cultural and contextual misalignment further complicates SET, since tools developed in other regions may not capture the unique realities of African higher education (Akanmu, 2023; Dattey et al., 2019). Reliability and subjectivity issues persist, with students often rating instructors based on personal biases, such as grading leniency or course difficulty, rather than teaching effectiveness (Amuche, Umar, 2019; Akanmu, 2023). Administrative and technological constraints, including high costs of paper-based evaluations and underutilised digital infrastructure, further hinder effective SET implementation, as pointed out by (Chikazinga, 2018) and (De Klerk et al., 2022; Maiyo, 2020). Addressing these challenges requires improved training, better technological integration, and culturally adapted evaluation frameworks to ensure SET's reliability and impact on teaching quality.

Additionally, SET in African universities are significantly influenced by biases related to gender, race, age, grading leniency, and language, undermining their reliability and fairness. Gender biases are prevalent, with female lecturers often receiving lower evaluations despite comparable or superior teaching performance, reflecting societal stereotypes and institutional prioritisation of research over teaching, as reported by (Chikazinga, 2018) and (De Klerk et al., 2022). Racial and ethnic biases further distort SET outcomes, as students may rate instructors based on their ethnic background rather than teaching quality, thereby perpetuating broader societal prejudices, as emphasised by Batizani and Mpundu (2024) and Coker (2018). Age-related biases also play a role, with younger faculty perceived as inexperienced and older faculty viewed as outdated, regardless of their actual teaching effectiveness (Effah, 2020; Ebert et al., 2017). Grading leniency significantly impacts SET, as students tend to rate instructors more favourably if they perceive grading policies as lenient, creating incentives for faculty to lower academic standards to secure higher evaluations (Akanmu, 2023; Amuche, Umar, 2019). Language and accent biases further complicate SET, as instructors who teach in non-dominant languages or have accents differing from students' preferences often receive lower evaluations, regardless of teaching quality, as pointed out by (Dansieh, 2015) and (Kadhila, Iipumbu, 2019; Kigozi, 2020). These biases highlight the need for systemic reforms, including training students to provide constructive feedback, contextualising evaluation results, and supplementing SET with peer reviews to ensure a fair and comprehensive assessment of teaching effectiveness.

Biased SET significantly impact faculty performance, promotion, and institutional quality assurance in African universities. Unfair promotion and tenure decisions often arise from overreliance on SET, which is influenced by grading leniency, gender, race, and age biases rather than actual teaching effectiveness (Akanmu, 2023; Amuche, Umar, 2019). Faculty members from marginalised groups, particularly women and ethnic minorities, face systemic inequities in career progression due to biased evaluations, reinforcing existing disparities in academia (Batizani, Mpundu, 2024; Effah, 2020). This reliance on SET discourages faculty, lowers morale, and pressures educators to prioritise favourable evaluations over rigorous teaching standards, ultimately compromising educational quality (Coker, 2018; Ebert et al., 2017). Furthermore, SET's limited reflection of true teaching effectiveness undermines institutional quality assurance, as small numerical differences in scores are often overinterpreted, leading to misguided decisions (De Klerk et al., 2022; Makondo, Ndebele, 2014). To address these issues, institutions must adopt holistic evaluation frameworks, integrating peer reviews, classroom observations, and faculty self-

assessments to ensure fair and accurate assessments of teaching quality (Dattey et al., 2019). Strengthening quality assurance processes requires reducing overreliance on SET and implementing diverse evaluation metrics to support equitable faculty development and institutional decision-making (Anderson et al., 2023).

Alternative or complementary approaches to SET are essential for a more comprehensive and accurate assessment of teaching effectiveness. Peer evaluations by faculty offer a holistic perspective, as they provide insights into teaching quality that SET alone cannot capture (Chikazinga, 2018; Dattey et al., 2019). Also, self-assessment and teaching portfolios encourage reflective practises, enabling faculty to document and improve their teaching methods over time, as demonstrated by Batizani and Mpundu (2024) and Effah (2020). Classroom observations by trained experts provide objective, in-depth evaluations of teaching practises, complementing student feedback with professional insights (Coker, 2018; Hinson, 2016). Measuring student learning outcomes and performance metrics, such as pre- and post-course assessments, offers a direct measure of teaching impact, reducing reliance on subjective evaluations (Akanmu, 2023; Bhuiyan, van As, 2022; Makondo, Ndebele, 2014). As suggested by Kadhila and Iipumbu (2019) and Ebert et al. (2017), multi-source feedback, or 360-degree evaluations, integrates input from students, peers, and supervisors, ensuring a balanced and reliable assessment of teaching effectiveness. These methods, when combined, create a robust framework for evaluating teaching quality, addressing the limitations of SET and promoting continuous improvement in higher education.

Policies and best practises to mitigate biases and improve the reliability of SET include the development of structured and standardised evaluation instruments, such as the Lecturer Teaching Effectiveness Scale (LECTAS), which ensures psychometric soundness and reduces subjectivity (Akanmu, 2023; Amuche, Umar, 2019). Institutions should provide awareness and training for both students and faculty to enhance understanding of SET's purpose and reduce biases stemming from personal or contextual factors (Batizani, Mpundu, 2024; Kadhila, Iipumbu, 2019). Weighting SET with multiple assessment methods, such as peer reviews, self-assessments, and teaching portfolios, ensures a more balanced and comprehensive evaluation of teaching effectiveness (Anderson et al., 2023; Coker, 2018). Implementing blind or anonymised review processes can minimise biases related to gender, race, or personal preferences, fostering fairer assessments (Hinson, 2016; Katende, Namutebi, 2024). Regular review and validation of SET tools, including statistical rigour and periodic revisions, are essential to maintain their reliability and relevance over time (Chikazinga, 2018; Dattey et al., 2019). According to Ebert et al. (2017), Bhuiyan and van As (2022), and Makondo and Ndebele (2014), institutions can adopt these practises to enhance the credibility of SET and ensure its meaningful contribution to teaching quality and professional development.

Limitations of this Empirical Review

This study is subject to several noteworthy limitations. Firstly, it included only studies published in English, thereby excluding potentially relevant literature in French, Portuguese, and other African languages. Given the multilingual nature of higher education research across the continent, this linguistic restriction may have inadvertently omitted important perspectives from regions where these languages dominate academic discourse. Secondly, the search strategy, although rigorous, may have been constrained by the exclusion of certain potentially relevant terms, such as "student feedback systems" or "faculty performance appraisal tools," which might be used in some institutional or regional contexts to describe processes similar to SET. The absence of these alternative terminologies in the initial search parameters may have led to the omission of a small number of relevant studies.

Next, the review was limited to publications available through the second quarter of 2025 and excluded studies published before 2015. While the initial aim was to capture research spanning the past two decades, preliminary screening revealed that older studies tended to reiterate themes already addressed in more recent literature, particularly regarding common challenges such as low response rates, bias, and cultural misalignment. As such, their exclusion was intended to maintain thematic currency and relevance; however, this temporal restriction may have reduced the historical depth of the analysis. A further limitation is that most of the included studies relied heavily on descriptive statistics, thematic analysis, or interview-based methods. Consequently, many of the reported challenges, such as administrative constraints, bias in evaluations, or the overreliance on

SET for faculty promotion, are primarily self-reported and were not independently verified in this review, necessitating cautious interpretation to avoid overstatement or overgeneralisation.

In addition, studies that focused on SET in non-tertiary settings or that examined teaching quality without explicit reference to formal evaluation systems were excluded. This approach, while ensuring a clear focus on SET in higher education, may have limited insights into how evaluation practises and attitudes are shaped earlier in the educational pipeline. Furthermore, the deliberate exclusion of opinion pieces, theoretical papers, and non-empirical works narrowed the conceptual range of the dataset, potentially overlooking nuanced theoretical debates and alternative conceptualisations of teaching effectiveness that could have enriched the analysis.

Finally, significant geographical gaps remain, as some African countries were either minimally represented or absent from the dataset due to a lack of published research within the review period. This absence should not be interpreted as evidence of the absence of SET-related challenges or innovations in those contexts; rather, it underscores the need for targeted research to capture a more comprehensive, regionally balanced understanding of SET in SSA higher education.

5. Recommendations

The main findings of this literature review yield several interrelated recommendations that emphasise the need for sustained institutional commitment and scholarly attention to enhancing SET systems in SSA higher education. Persistent challenges such as low student response rates, limited digital literacy, misalignment of evaluation tools with cultural norms, and administrative constraints necessitate that universities adopt a more strategic and context-sensitive approach to SET implementation. Institutions should actively explore mechanisms to increase student participation, including targeted incentives, integrating digital skills training into academic support programmes, and expanding accessible, user-friendly feedback platforms. Such initiatives, if embedded within institutional quality assurance frameworks and supported by adequate resource allocation, would help ensure that SET results are both representative and reliable, even in the face of fluctuating engagement levels.

The review further identified the influence of biases, particularly those related to gender, race, age, grading leniency, and language, which can distort SET findings and undermine the fairness of faculty evaluations. Addressing these concerns will require both structural and cultural reforms. At the structural level, institutions should prioritise the adoption of standardised, context-appropriate evaluation instruments and consider integrating anonymised review processes to reduce subjective bias. At the cultural level, awareness-building programmes for students and faculty could promote more informed, objective participation in evaluation processes, thereby enhancing trust in the system. Such interventions would position SET as a fairer and more equitable component of faculty assessment, contributing to a balanced institutional culture of teaching quality assurance.

Another recurring concern is the overreliance on SET outcomes as the primary metric for faculty promotion, retention, and performance appraisal. While student feedback is an important indicator, sole dependence on this measure risks incentivising superficial teaching practises rather than rigorous and innovative pedagogy. Future policy reforms should promote a more holistic evaluation framework that integrates multiple sources of evidence, including peer reviews, self-assessments, classroom observations, and measures of student learning outcomes. Multi-source feedback systems such as 360-degree evaluations which offer particular promise for producing a more balanced and comprehensive view of teaching effectiveness.

The review also underscored the limitations of applying SET frameworks developed in Western contexts without adapting them to the unique cultural and institutional realities of SSA universities. Locally developed or modified instruments, created in consultation with faculty and students, would better reflect the values, priorities, and pedagogical practises of SSA higher education. Such culturally grounded tools could improve the validity of evaluation data and foster stronger faculty engagement with the process.

Research evidence shows that studies on SET in SSA remains heavily dominated by descriptive statistical analyses and thematic approaches. While these have provided foundational insights, they limit the ability to generalise findings across contexts. There is a compelling case for more sophisticated methodological approaches such as regression modelling, ANOVA, and partial least squares structural equation modelling (PLS-SEM) to test relationships between variables and generate robust, data-

driven insights. Mixed-method and longitudinal studies could further deepen understanding by tracking the long-term impact of SET reforms and identifying persistent structural challenges.

Faculty development emerged as a crucial yet underutilised area for improving teaching quality. Institutions should invest in structured training and mentorship programmes that focus on pedagogical innovation, student engagement techniques, and the interpretation of SET data for continuous improvement. These efforts should be reinforced by independent quality assurance mechanisms, including faculty performance audits and feedback loops, to ensure that evaluation findings translate into tangible teaching enhancements rather than punitive measures.

Finally, the review highlights the critical importance of responsible data interpretation in decision-making processes. Misinterpretation or overemphasis of SET scores risks distorting personnel decisions and damaging faculty morale. Higher education institutions should therefore prioritise targeted training for academic leaders, administrators, and quality assurance officers on how to interpret and apply SET results as one component of a broader, contextually informed faculty evaluation strategy. Such an approach will ensure that teaching quality assurance systems are not only more accurate and equitable but also more responsive to the dynamic realities of SSA higher education.

6. Policy Implications

The findings highlight the need for systemic changes and institutional policies to improve the implementation and fairness of SET. Institutions should adapt SET tools to reflect SSA educational realities by involving faculty and students in the development process and ensuring evaluation criteria align with local teaching and learning environments. Additionally, independent quality assurance mechanisms should be established to supplement SET with faculty performance audits, longitudinal studies, and feedback loops, enabling continuous improvement in evaluation systems. SSA higher educational institutions are encouraged to explore multi-source feedback systems, such as 360-degree evaluations, which combine student feedback with peer and supervisor assessments for a more balanced and fair evaluation of faculty performance. Finally, comprehensive training should be provided to administrators and decision-makers to ensure responsible interpretation of SET data, emphasising its use as one component of a broader faculty assessment strategy rather than the sole determinant of teaching quality.

7. Research Implications

The findings underscore the need for methodological advancements and further research to address gaps in SET studies. Researchers should move beyond descriptive statistics and thematic analysis by incorporating inferential statistical tools such as ANOVA, PLS-SEM, and regression analysis to provide more robust and generalisable insights into the impact of SET on teaching quality. Future research should also focus on underrepresented regions, such as Rwanda and Somalia, to ensure diverse perspectives and address regional gaps in SET literature. Additionally, there is a need for research focused on developing and validating SET tools that are culturally and contextually aligned with SSA higher education systems, ensuring their relevance and effectiveness in local contexts.

8. Practice Implications

At the institutional level, actionable steps are needed to improve SET implementation and outcomes. To address low response rates and ensure reliability, institutions should adopt strategies such as incentivising participation, integrating digital literacy training, and improving accessibility for students. Biases related to gender, race, age, grading leniency, and language can be mitigated through the implementation of structured and standardised evaluation instruments, blind or anonymised review processes, and awareness training for both students and faculty. A more holistic evaluation framework should be adopted, integrating peer reviews, self-assessments, classroom observations, and student learning outcomes assessments to ensure fairer, more comprehensive evaluations of teaching effectiveness. Complementary assessment methods, such as peer evaluations, self-assessment, and expert classroom observations, should be integrated into faculty evaluation processes to enhance validity and reliability. Finally, institutions should establish structured faculty development programmes focused on pedagogical skills, student engagement techniques, and SET interpretation to help faculty improve their teaching practises and ensure the effective use of SET results.

9. Conclusion

This paper has provided a comprehensive review of the challenges, biases, and implications of SET in SSA higher education institutions. The review synthesised relevant literature to examine the validity, reliability, and fairness of SET as a quality assurance tool, particularly in resource-constrained environments. The findings highlight significant concerns related to biases (gender, race, age, grading leniency, and language), low response rates, and institutional overreliance on SET for faculty performance assessments and promotions. These limitations undermine the effectiveness of SET in measuring true teaching effectiveness. Additionally, the review identified alternative and complementary evaluation methods, such as peer evaluations, self-assessment, classroom observations, and student learning outcomes, as essential strategies to enhance the robustness of faculty assessments. It also emphasised the importance of structured evaluation instruments, training programmes, and multi-source feedback mechanisms to mitigate biases and improve the reliability of SET. Overall, while SET remains a widely used tool in SSA universities, its effectiveness is hindered by inherent biases and methodological shortcomings. Institutions must adopt a more holistic approach to faculty evaluation, integrating diverse assessment methods and policy interventions to ensure fair, objective, and meaningful evaluations that contribute to educational quality improvement.

10. Declarations

Ethics Approval and Consent to Participate

Ethical approval was not necessary for this study, as it involved a systematic review of previously published literature. The results are intended for submission to peer-reviewed journals for publication.

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Prosper Dzifa Dzamesi: Conceptualisation, Writing, Review & Editing, Supervision, Writing of the original draft.

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Conflict of interest.

The authors declare no conflict of interest.

Data availability statement

The data presented in this study are available on reasonable request from the corresponding author.

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Sustainability of Artisanal Fishing in Nigeria: Implications for Food Security

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Abstract

The growing demand for artisanal fish as a source of protein is overstretching the fish-catching sector, threatening its sustainability. This study examines the food security implications of the nexus between artisanal fishery catch and sustainable fishing in Osun State, Nigeria. With a structured questionnaire, primary data were collected from 150 artisanal fishers in Osun State and analysed using Seemingly Unrelated and binary logistic regressions. The results reveal that catfish and tilapia are the most harvested fish species by artisanal fishers, who are more food-secure. Fishing experience and gender significantly influence sustainability indicators, while food security is influenced by social, environmental, and catfish harvesting. Artisanal fishers should improve their sustainability efforts to ensure food security. The Federal Ministry of Agriculture, through its Department of Fisheries and Aquaculture, should educate and encourage artisanal fishers to diversify their fishing activities to address the negative environmental impacts of continuous fishing and to improve their economic well-being.

Keywords: Artisanal Fish species catch, Sustainable fishing, food security, Nigeria.

1. Introduction

Sustainability has garnered significant research attention globally, particularly in agriculture (Adomako et al., 2023; Hermundsdottir, Aspelund, 2022). The United Nations Sustainable Development Goals (SDGs) emphasise the need for policy interventions to address socio-economic challenges such as food insecurity, poverty, and hunger (United Nations, 2015). Sustainability, characterised by a balance between environment, equity and economy, aims to foster thriving, resilient communities (UCLA Sustainability Charter, 2016). Implementing sustainable practices enhances energy efficiency and environmental improvement (Liu et al., 2020) and organisational competitiveness (Yao et al., 2011).

Recent FAO assessments and the State of the World Fisheries Report reaffirm that small-scale fisheries are indispensable to local diets and livelihoods (Thanh, 2021). These reports emphasise governance models that conserve fish stocks, while ensuring access for vulnerable populations. The Kunming-Montreal Global Biodiversity Framework (GBF) (Convention on Biological Diversity [CBD], 2022) and IPBES syntheses sharpen this debate, urging a shift from

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"conserve versus feed" to "conserve and feed." The GBF's ambitious 30x30 conservation target shows the scale of environmental commitments, yet scholars warn that spatial protection without social safeguards risks imposing disproportionate burdens on the poorest communities.

Emerging literature on trade-off analytics offers pathways out of these zero-sum dilemmas. Systems and spatial trade-off models demonstrate how ecological, nutritional, and economic objectives can be balanced. For example, aligning seasonal closures with local production cycles, protecting critical habitats while supporting alternative livelihoods, or investing in aquaculture where wild stocks are under stress. Central to these approaches is the integration of local knowledge with spatially explicit conservation and food-system modelling (Von et al., 2024), thereby ensuring that biodiversity targets do not unintentionally undermine dietary security for populations dependent on artisanal fisheries (Nuer et al., 2024).

In Nigeria, fishing is a critical economic activity, contributing 1.09 % to the national Gross Domestic Product (GDP) in 2020 (Odioko, Becer, 2022). The country ranks second in African fish production, with an estimated 1,477,651 individuals employed across the fisheries value chain (Posthumus et al., 2018). Artisanal fishing, characterised by small-scale operations using simple equipment (Martins, Carneiro, 2021), is labour-intensive, capital-limited, and often conducted in remote areas with poor infrastructure (Omorinkoba et al., 2011). Key species harvested include finfish (catfish, tilapia) and shellfish (molluscs, shrimps) (Kareem et al., 2013).

Artisanal fishing significantly influences livelihoods, nutrition, and local economies (Harper et al., 2013). However, the sustainability of this sector faces threats from overfishing (Sumaila, Tai, 2020), destructive methods (Amos, Peter, 2018), climate change (Bryndum-Buchholz et al., 2021), inadequate regulation (Egesi, 2016), and limited community awareness (Amos, Peter, 2018). Preserving fish populations is now an urgent necessity due to global environmental degradation (Munang et al., 2011). While sustainability and food security exhibit a bidirectional relationship (Singh et al., 2024), the sustainability of artisanal fisheries and its impact on food security remains a concern. Understanding the link between sustainable fish catch and food security is crucial for developing effective management strategies.

This study explores the relationship between artisanal fish species catch and sustainable fishing practices in Osun State, Nigeria, recognising their direct and indirect effects on food security. By examining this nexus, the research aims to unravel the human and ecological factors shaping fisheries' dynamics and sustainable practices. This research contributes to SDGs 3, 8, 9, 12, 14, and 17, promoting health, economic growth, innovation, responsible consumption, life below water, and partnerships.

2. Methods and materials

Research Philosophy

The study is rooted in the positivist research philosophy. The study's choice of positivism is based on the assumption that reality is objective, observable, and measurable through systematic inquiry. Positivism emphasises empirical evidence, statistical testing, and causal explanation (Ali, 2024; William, 2024), making it well-suited to investigating the relationships among artisanal fish species catch, sustainability practices, and food security in Osun State, Nigeria. Within this paradigm, knowledge is generated by formulating hypotheses, collecting quantifiable data, and applying rigorous statistical models to validate or refute assumptions (Bibi et al., 2022). The use of structured questionnaires, Seemingly Unrelated Regression (SUR), and binary logistic regression reflects a commitment to objectivity and generalisability. These methods enable the study to identify significant associations among socio-economic characteristics, sustainability practices, and food security outcomes while minimising researcher bias. The positivist stance also underpins the study's cross-sectional design and its reliance on representative sampling techniques. By employing Yamane's formula to determine sample size and stratified random sampling for respondent selection, the research ensures replicability and statistical validity.

Research Design

This study employed a descriptive-analytical cross-sectional survey design to investigate the relationship between artisanal fish species catch, sustainable fishing practices, and food security outcomes among artisanal fishers in Osun State, Nigeria. A cross-sectional design was deemed appropriate as it enables the collection of quantitative data from a defined population at a single point in time, providing a robust snapshot of current practices, demographic characteristics, and

livelihood outcomes. Such a design is widely recognised in sustainability and food systems research for its efficiency in identifying associations and explanatory factors without the time and resource intensiveness of longitudinal studies. Additionally, the cross-sectional design enabled the simultaneous examination of multiple relationships while controlling for demographic and socio-economic variables (Omega et al., 2025).

Study Area

The study was a cross-sectional survey design carried out in three (3) zones in Osun State, Nigeria. Osun State is nestled in the southwestern part of Nigeria and boasts a landscape enriched with freshwater bodies: rivers, lakes, and ponds, which have nurtured artisanal fishing traditions for generations (Adelekan, Fregene, 2015). The State is located at longitude 4.5199593 and latitude 7.5628964. It shares boundaries with Ekiti and Ondo states to the east, Kwara state to the north and Ogun and Oyo states to the south and west, respectively. It experiences tropical savannah climatic conditions, with an average temperature of 64 °F and 596 inches of rainfall (Onyekuru, Marchant, 2014). The abundance of freshwater bodies and the predominance of artisanal fisheries influenced the choice of the State for the study.

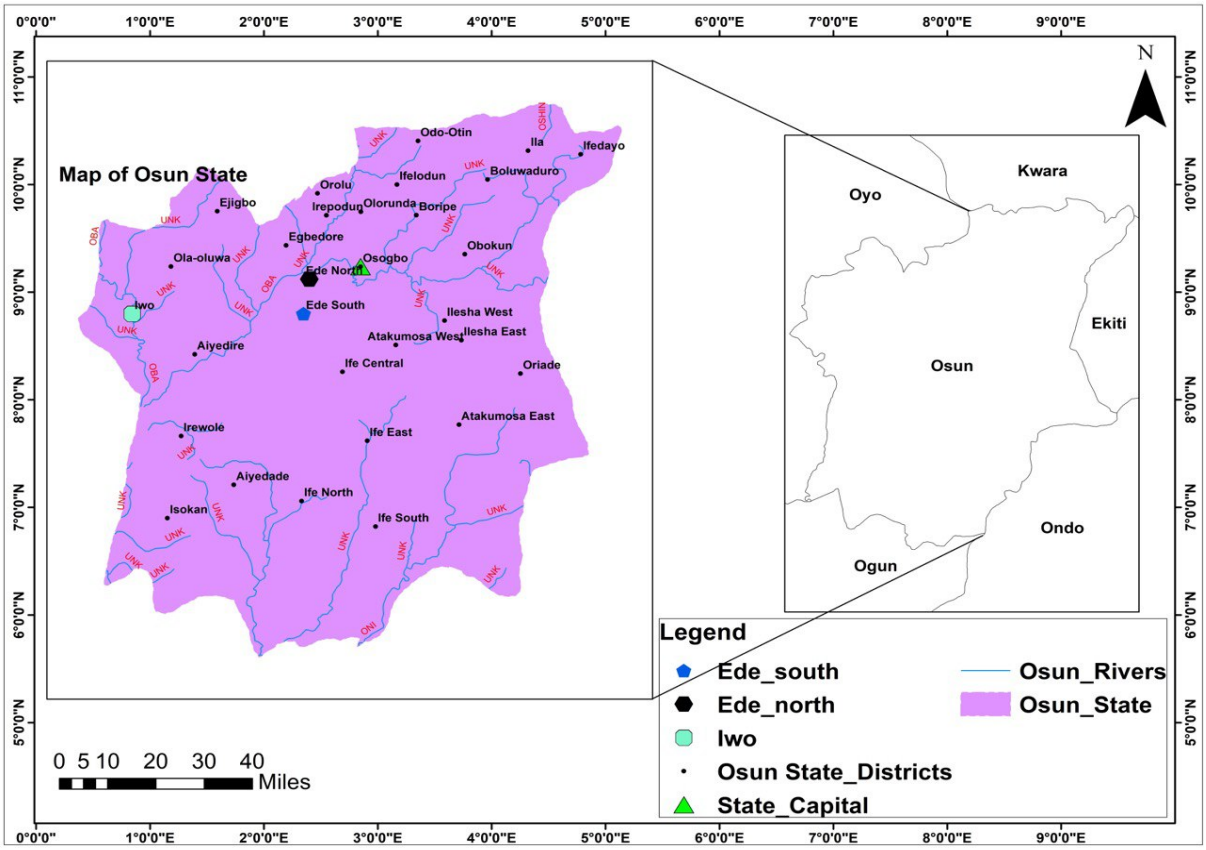

Fig. 1. Map of Osun State, Nigeria
Source: Simwa (2018)

Sampling Procedure and Sample Size

A sample size of 150 artisanal fishers was determined from a total population of 240 artisanal fishers using Yamane's (1969) formula, with a confidence interval of 95 % (Margin of error 5 %). The study population was obtained from the local fisher extension officers of the zones. To ensure methodological rigour, explicit eligibility criteria were used to define the sample. Respondents included were artisanal fishers who: (i) had been actively engaged in fishing for at least the past two years, and (ii) relied on fishing as their primary or significant source of livelihood. Excluded were part-time fishers, fish processors not directly involved in fishing, and individuals under the legal working age of 18. These criteria ensured that the sample reflected active artisanal fishing households and improved the reliability and replicability of the study.

Furthermore, a multistage sampling technique was used to collect data from the respondents. In the first stage, Osun State was stratified into three strata by local government: Iwo, Osogbo, and Ede South, based on the existing Agricultural Extension zonation prepared by the Extension Department in the area. In stage two, simple random sampling was used to select one community from each of the three (3) zones, given the homogeneity of artisanal fishers across the zones. Finally, simple random sampling was used to select 50 artisanal fishers from each of the three communities (Ede, Iwo, and Osogbo), for a total of 150.

Data Collection

Data collection was conducted through structured questionnaires administered by five trained research assistants from the University of Ibadan who spoke Yoruba. To enhance the accuracy and reliability of responses, the questionnaire was pre-tested in Ede North Local Government Area (Oja Timi), and necessary adjustments were made. Data collection occurred between April and June, 2020. Data collection was conducted face-to-face in Yoruba. Ultimately, 129 completed questionnaires were retrieved, representing a response rate of 86 %. The survey instrument gathered information on demographic characteristics, fishing practices, species harvested, sustainability practices, and food security. Food security status was measured using the Household Food Insecurity Access Scale (HFIAS), developed by the Food and Nutrition Technical Assistance (FANTA) Project. This internationally validated tool captures the multidimensional nature of food insecurity by assessing household-level access, availability, and adequacy of food. Household Food Insecurity Access Scale comprises nine occurrence questions with frequency-of-occurrence responses coded as rarely (1), sometimes (2), or often (3). Scores are summed to give a continuous index ranging from 0 (food secure) to 27 (severely food insecure). Households are then classified into four categories: food secure, and food insecure, comprising mildly food insecure, moderately food insecure, and severely food insecure.

Sustainability was measured in terms of environmental, social, and economic. Environmental sustainability had eleven (11) indicators, economic sustainability (10) and social sustainability (10), which were obtained from the literature. Sustainable fishing practices were measured on a 10-point Likert scale from 1 (very slowly) to 10 (very highly), with 0 = not applicable/can't tell.

Table 1. Reliability Test Results

Subscale	Number of questions	Cronbach's Alpha Value	Cronbach's Alpha Value based on standardised items
Food security	9	0.931	0.930
Social Sustainability	10	0.840	0.840
Economic Sustainability	10	0.610	0.733
Environmental Sustainability	11	0.793	0.835

The reliability test revealed that the Cronbach's alpha value for the food security and sustainability indicator met the minimum threshold of 0.70 proposed by Van Schoor (2010), as shown in Table 1. Thus, the constructs are appropriate to measure food security and sustainability.

Data Processing and Analysis

Data collected from the structured questionnaires were first screened for completeness and consistency before analysis. Data entry and cleaning were performed using Stata 15.0 statistical software. Continuous variables such as age, education, household size, and fishing experience were summarised using means and standard deviations, while categorical variables were summarised using frequencies and percentages. The econometric analysis employed two main techniques: the SUR and the binary logistic regression. Model validity and robustness were confirmed using diagnostic tests. For the SUR, the Breusch-Pagan test of independence confirmed significant cross-equation correlations, justifying the use of the system estimator. For the logistic regression, model adequacy was verified through the Wald chi-square test, log-likelihood statistics, and the Hosmer-Lemeshow goodness-of-fit test. Statistical significance was considered at the 5 % level ($p < 0.05$).

For the SUR, sustainability indicators (economic, social, and environmental) were modelled as interdependent response variables, with demographic characteristics and fish species type serving as predictors. The choice of SUR was motivated by the likelihood of correlated error terms across sustainability dimensions, making single-equation models less efficient. Before estimation, multicollinearity among predictors was checked, while model fit was confirmed using the Hosmer-Lemeshow test. This operationalisation ensured that the results presented in the findings section are directly derived from the specified equations, thereby enhancing reproducibility and transparency.

Model Specification

The SUR was used to analyse the factors affecting the sustainability practice of artisanal fishers in the study area**.** The SUR model follows Mokumako (2023), in which stacked general linear models serve as the backbone of the SUR framework, which is limited by its stochastic specification and by the linear relationships between response variables and covariates (Taylor, McGuire, 2005). Model specifications in Zellner's SUR framework are organised into blocks, which are systems of m > 1 equations, and T observations each (Peremans, Stefan, 2018), indicating the i[th] cell in the matrix as:

$$y_i = X_i\beta_i + \varepsilon_i \qquad i = 1, \dots, m \tag{1}$$

Where y_i and ε_i are T-dimensional vectors, X_i is $T \times K_i$ and βi is a K_i-dimensional vector. Stacking all m equations gives:

$$\begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_m \end{bmatrix} = \begin{bmatrix} X_1 & 0 & \cdots & 0 \\ 0 & X_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & X_m \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_m \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_m \end{bmatrix}$$

Which compact to be written as: $y = X\beta + \varepsilon$ (2)

Where, y = a vector of the observed values of the response variable, X = a vector of predictor variables, β = a K-dimensional vector of the regression parameters, and $K = \sum_{i=1}^{m} K_i$. ε = constitutes its error term. For the mT X 1 vector of stacked disturbances, the assumptions are that $E(\varepsilon_j) = 0$, and cov $E(\varepsilon_i\varepsilon_j) = \sigma_{ij}I_T$, where T represents T X T an identity matrix. According to these presumptions, the T disturbances in each of the m equations are independent, with a mean of zero and a variance of one (Baltagi, 2008).

In this study, the dependent variables in the SUR framework were the three sustainability dimensions of artisanal fishing: environmental, economic, and social. Each of these dimensions was measured as a continuous variable derived from composite indices reflecting fishers' practices and perceptions (Table 1). The decision to model these three sustainability outcomes simultaneously rather than independently rests on both conceptual and statistical grounds. Conceptually, the three sustainability dimensions are inherently interlinked: for instance, adopting environmentally friendly fishing practices may reduce immediate income but enhance long-term ecological stability, while socially cohesive practices can reinforce both economic and ecological outcomes. Statistically, the disturbance terms across the three equations are likely to be correlated, since unobserved factors such as institutional capacity, cultural norms, or climatic variability can simultaneously influence all dimensions of sustainability. The SUR framework is therefore appropriate, as it not only improves efficiency by accounting for contemporaneous correlation among error terms but also allows for the identification of cross-effects between sustainability dimensions. This approach is consistent with Zellner's (1962) original formulation, in which seemingly unrelated outcomes are best analysed jointly to capture shared influences and reduce bias in parameter estimates. In this context, treating environmental, economic, and social sustainability as a system of equations ensures a more holistic and rigorous evaluation of artisanal fishers' sustainability practices.

Binary logistic regression was used to analyse the effect of artisanal fish species catches on sustainable fishing and food security. Although food security can indeed be conceptualised along a spectrum, from mild to severe insecurity, this study employed a binary logistic regression model for both methodological and contextual reasons. The Household Food Insecurity Access Scale (HFIAS)

data were reclassified into two categories: food secure and food insecure, consistent with widely used approaches in food security research (Azam et al., 2022; Dwomoh et al., 2023; Worku et al., 2022), where the emphasis is on identifying whether households cross the threshold into insecurity rather than the intensity of that insecurity. This binary operationalisation aligns with the study's core policy objective of distinguishing artisanal fishers who are food secure from those who are not, thereby simplifying the translation of findings into actionable interventions. While multinomial or ordered models may capture nuance, the binary approach provides sharper, policy-relevant insights without compromising statistical reliability. Additionally, it allows us to estimate the probability of artisanal fishers being food secure or otherwise. The dependent variable, food security, was categorised into 1 = food secure, and 0 = food insecure. The general form of the logistic function is given as;

$$p(x) = \frac{1}{1+e^{-(B_0+B_1x)}} \quad (3)$$

Where ß$_0$ is the intercept and ß$_1$ is the slope of the log odds as a function of x. Due to the logit transformation linking the dependent variable to the independent variables, the logit link will be of the form; Logit (p_i) = log ($\frac{p_i}{1-p_i}$) (4)

Where, Logit (p_i) = the odd of the event occurring, p_i= the probability that the event will occur, and 1- p_i= the probability of the event not occurring.

Given; p_i= Pr(Y=1|$X = x_i$), the outcome variables are written in the form;

$$\Pr(Y_i=y|X=x_i)=\begin{cases} p_i & if\ y=1 \\ 1-p_i & if\ y=0 \end{cases}$$

y = 1, indicates the artisanal fisher is food secure and y = 0 implies the artisanal fisher is food insecure (sometimes, rare and often). Then the logistic model is written as;

$$\text{Logit}(p_i) = \log\left(\frac{p_i}{1-p_i}\right) = ß_0 + ß_1X_1 + \ldots + ß_nX_n + e \quad (5)$$

Where $X_1 \ldots X_n$ = Independent Variables and e = Error term

The odds are captured as;

$$\frac{p_i}{1-p_i} = \exp(ß_0 + ß_1X_1 + \ldots + ß_nX_n + e) \quad (6)$$

The dependent variables used and their aprior expectation are captured in Table 2 as:

Table 2. Variables and A Priori Expectations

Variables	**Definition and Measure**	**A Priori Expectations**
Food Security	Food security status of respondents. Dummy; 1 = food secure, and 0 = food insecure	
Environmental Sustainability	Perceived practices that protect the environment; Continuous variable	+
Economic Sustainability	Perceived practices that promote resource growth and the well-being of respondents; Continuous variable	+
Social Sustainability	Perceived practices that protect and promote societal well-being and interaction; Continuous variable	+

Variables	Definition and Measure	A Priori Expectations
Catfish (catch type)	Fishes that belong to the order Siluriformes. Dummy; 1-yes 0-no	+
Carp (catch type)	Fishes that belong to the family Cyprinidae. Dummy; 1-yes 0-no	+
Tilapia (catch type)	Fishes that belong to the family Cichlidae. Dummy; 1-yes 0-no	+
Others (catch type)	Other families of fishes other than the stated. Dummy; 1-yes 0-no	+
Marital Status	Relationship status of respondents. Dummy; 1-married, 0-otherwise	+/-
Sex	Biological makeup of respondents. Dummy; 1-Male, 0-otherwise	+/-
Age	Years at last birthday. Measured in years	+
Education	Years of schooling. Measured in Years	+
Status in household	Position in the household. Dummy; 1-Head, 0-otherwise	+
Fishing Experience	Years of being an artisanal fisher. Measured in years	+
Reason for fishing	Motivation for being an artisanal fisher. Dummy; 1-Income, 0-otherwise	+
Access to credit	Ability to obtain credit from a financial institution for artisanal fishing activities. Dummy; 1-yes, 0-otherwise	+
Household size	The number of individuals who live under a roof. Number of people under a roof	-
Fishing type	The nature of artisanal fishing carried out. Dummy; 1-Migratory, 0-otherwise	+/-

Source: Computed from Field Survey (2020)

In this study, continuous variables such as age, years of education, fishing experience, household size, and sustainability indices were analysed in their natural measurement scales. Standardisation or transformation was not applied, as the objective was to preserve the interpretability of coefficients in terms of the original units, which is essential for policy relevance.

The effect sizes (η^2) as reported in Table 3 were interpreted using conventional benchmarks recommended in the social and behavioral sciences (Cohen, 1988; Richardson, 2011). Specifically, values between 0.01 and 0.05 were considered small, values between 0.06 and 0.13 were considered moderate, and values greater than 0.13 were considered large. These thresholds provide a standardised way to evaluate the magnitude of association between fish species caught and food security status, beyond mere statistical significance.

Ethical Considerations

This study was reviewed and approved by the Institutional Review Board of the University of Ibadan, Nigeria, in line with national ethical guidelines and the principles of the Declaration of Helsinki. All respondents were fully informed about the objectives of the research, their right to decline or withdraw at any time, and the voluntary nature of participation. Verbal informed consent was obtained before administering the questionnaires. To protect confidentiality and anonymity, no identifying information was recorded, and all responses were treated with strict confidentiality for research purposes only. Given that fieldwork occurred during the COVID-19 pandemic (2020), all research activities adhered to Nigeria Centre for Disease Control (NCDC) and World Health Organization (WHO) COVID-19 safety protocols. These included the use of face masks, physical distancing, hand sanitisation, and minimising group interactions during data collection to ensure the safety of both respondents and research assistants.

3. Results

Demographic Characteristics of Respondents

Table 3 presents the summary statistics of the demographic characteristics of the respondents. It indicates that the majority of the artisanal fishers sampled are male (71.9 %), a common feature in many fishing communities globally. The majority 77 % of the fishers are married, as marriage is often seen as a stabilising factor in fishing communities. Also, the vast majority of respondents fish for income (89.4 %), indicating the economic reliance on fishing as the main livelihood. Again, a considerable portion of respondents engage in migratory fishing (57.9 %), a practice that allows fishers to follow seasonal fishing stocks and optimise catch. This type of fishing is often associated with higher risks but can yield better income, compared to stationary fishing. The low access to credit (19 %) is a serious barrier for fishers and may affect their livelihood. The high percentage of those without credit access suggests limited financial inclusion, which can stifle progress.

Table 3. Summary Statistics of Demographic Characteristics of Respondents

Variable	Category	Frequency (n = 129)	Percentage
Sex	Male	91	70.54
	Female	38	29.46
Marital status	Married	97	75.19
	Otherwise	32	24.81
Status in household	Head	92	71.32
	Otherwise	37	28.68
Reason for fishing	Income	110	85.27
	Otherwise	19	14.73
Fishing type	Migratory	73	56.59
	Otherwise	56	43.41
Access to credit	Yes	30	23.26
	No	99	76.74
Continuous Variables		**Mean**	**SD**
Age		36.97	13.51
Education		10.65	3.59
Fishing Experience		15.27	9.31
Household Size		6.61	3.07

Source: Computed from Field Survey (2020)

Also, the average age of respondents is 37 years, suggesting that the population engaged in artisanal fishing is relatively young. Furthermore, the average artisanal fisher spends 11 years schooling and 15 years fishing, indicating that the fishers have extensive experience in fishing. Household size averaging 7 members is common in rural and fishing communities.

Fish Species caught by Artisanal Fishers and food security status

Table 4 shows that the artisanal fishers' food security status is different depending on the kind of fish they catch. Compared to other types of fish caught, artisanal fishers who specialise in harvesting African catfish, silver catfish, and Tilapia guineansis are more likely to be food secure. The ability of artisanal fishers to catch in-demand fish varieties contributes to increased income, allowing them to purchase a diverse range of food products.

The effect size demonstrates that the proportion of variance in food security explained by the type of fish caught varies by size. Significant variables, such as Heterobranchus longifilis (Sampa), Ctenopharygodon idella (Grass carp), and Tilapia guineensis, had moderate effects on food security.

Sustainability Practices of Artisanal Fishers

Table 5 shows the economic sustainability practices of artisanal fishers. The mean score for the economic sustainability questions posed to artisanal fishers was 7.26 (SD-2.55), as shown in Table 4. This suggests that the majority of artisanal fishermen prioritise economic sustainability in

their operations. Most of the fishers were aware of the economic aspects of their work, thereby actively engaging in practices to promote sustainability.

Table 4. Test of Fish Species caught by Artisanal Fishers and food security status

Type of fish Caught	Fish Caught	Food Security Status		t-value	p-value	Eta-square	Effect Size
	Yes (%)	No	Yes				
Catfish							
Heterobranchus bidorsalis (African catfish)	96.6	47	82	0.237	0.813	0.003	Small
Chrysicthys nigrodigitatus (silver catfish)	91.7	53	76	0.941	0.356	0.016	Small
Clarias gariepinus (North African catfish)	86.3	61	69	0.887	0.380	0.019	Small
Heterobranchus longifilis (Sampa)	50.0	67	63	2.337	0.027*	0.082	Moderate
Carp							
Ctenopharygodon idella (Grass carp)	22.6	69	61	3.338	0.003*	0.114	Moderate
Cyprinus carpio (common carp)	50.0	67	62	2.041	0.050	0.066	Moderate
Tilapia							
Tilapia guineansis	69.0	58	71	4.916	0.000*	0.098	Moderate
Mullet (Mugil cephalus)	8.0	69	60	0.549	0.588	0.023	Small
Tilapia zillii	62.5	66	64	1.444	0.159	0.046	Small
Others							
Heterotis niloticus	43.3	69	61	0.273	0.787	0.010	Small
Oreochromis niloticus (Nile Tilapia)	89.6	63	67	1.664	0.103	0.026	Small

Source: Computed from Field Survey, 2020; *p < 0.05 Effect Size: 0.01-0.05-Small 0.06-0.13-Moderate > 0.13-Large; n = 129

Table 5 presents the social sustainability practices of artisanal fishermen. It shows that the average score for artisanal fishers' social sustainability index is high (Mean-7.34, SD-2.10). This suggests that artisanal fishers actively participate in activities that promote social sustainability in their fishing operations.

Table 5. Sustainability Practices of Artisanal Fishers

Economic Sustainability	Mean	SD	Interpretation
Economic gains when employing sustainable fishing practices are not convincing	6.18	3.72	Moderate
Sustainable fishing can improve income	8.42	2.18	High
Net fishing income may decrease when a fisherfolk implements sustainable fishing practices	4.35	3.61	Moderate
There may be insufficient labour for the workload required in sustainable fishing	4.65	3.32	Moderate
The primary goal of fishing should be to maximise the catch, efficiency, and profitability of their fishing	8.32	2.00	High
Fish caught will increase only if there is a reduction in mesh	6.12	3.82	Moderate

Economic Sustainability	**Mean**	**SD**	**Interpretation**
size			
Practicing sustainable fishing leads to employment	8.29	2.34	High
Sustainable fishing leads to value for money	8.70	1.40	High
Sustainable fishing makes fish catch profitable	8.76	1.65	High
Sustainable fishing will lead to economic growth	8.83	1.41	High
Composite	**7.26**	**2.55**	**High**
Social Sustainability			
Sustainable fish catch should produce an adequate food supply to feed the world population	7.71	2.36	High
Adoption of sustainable fishing practices will be easier for fisherfolks who have both cropped and livestock enterprises	7.91	2.75	High
Sustainable fishing practices would work well on any water body	7.46	2.74	High
Sustainable fishing practices may require additional management beyond conventional practices	8.22	2.09	High
Fishersfolks in sustainable fishing lives more in harmony with nature	8.11	2.18	High
Practicing sustainable fishing promotes health and education of workforce and local fishing community	8.36	2.30	High
Practicing sustainable fishing promote positive image of the local fishing community	8.56	1.96	High
Non-sustainable fishing is a serious threat to my health and the health of future generation	8.42	2.31	High
Sustainable fish product is healthier for consumption	8.65	2.30	High
Sustainable fishing is a source of healing, inner peace and inspiration	8.41	2.47	High
Composite	**7.34**	**2.10**	**High**
Environment Sustainability			
The best way to control overfishing is to use sustainable fishing methods	8.58	2.33	High
Recommended fishing methods for sustainable fishing have potential for more fish health challenges	7.62	3.30	High
An advantage of sustainable fishing practices is reduction in the use of chemical in fishing	8.75	2.48	High
Sustainable fishing practices help protect the environment and natural resources	8.91	2.09	High
Application of fish aggregating devices is not necessary in sustainable fishing	7.36	3.23	High
Sustainable fishing can reduce fish loss and by catch	8.45	2.43	High
Environmental balance is one basis for sustainable fishing practices	8.78	1.94	High
Sustainable fishing makes the most efficient use of sustainable fishing method to preserve fish and other natural resources	8.66	2.38	High
I often return unwanted and under size fish back into the river	5.90	4.07	Moderate
If you realised your fishing method is harmful to the environment, will you stop fish catch	7.51	3.56	High
I am actively involved in political and social actions to protect the natural environment	6.67	3.94	Moderate
Composite	**8.72**	**3.18**	**High**

Source: Computed from Field Survey (2020); n=129 1-3.99 (Low), 4-6.99 (Moderate) and 7-10 (High)

Furthermore, Table 5 shows the environmental sustainability practices of artisanal fishermen. It shows that artisanal fishers have a high mean score of 8.72. (SD-3.18) for practicing environmental sustainability. The high mean score indicates that, on average, artisanal fishers prioritise environmental sustainability in their fishing practices, and recognise the importance of environmental protection for the long-term viability of their livelihoods and ecosystems.

Correlation of Sustainability Indicators

Table 6 shows the correlations between sustainability indicators. The findings indicate that there is a strong positive correlation among the various sustainability indicators. The strong positive correlation indicates that the sustainability indicators are closely related and tend to move together. This implies that improvements or deterioration in one aspect of sustainability are likely to be reflected in others. The interlinked relationships among the sustainability indicators underscore the need to use the SUR rather than other regression forms.

Table 6. Correlation of Sustainability Indicators

Sustainability Indicators	**1**	**2**	**3**
Economic	1		
Social	0.531*	1	
Environmental	0.525*	0.700*	1

* $p < 0.05$

Factors Influencing Sustainability Practices

The SUR results for the factors influencing artisanal fishers' sustainability practices are presented in Table 7. It shows that gender influences how fishers prioritise and act on various aspects of sustainability. Environmental sustainability often takes a back seat to the priorities of male fishers, who seem more concerned with economic and, to a lesser degree, social sustainability.

Table 7. SUR results of factors Influencing Sustainability Practices

Variables	**Environmental**		**Economic**		**Social**	
	Coef.	**Std. Err**	**Coef.**	**Std. Err**	**Coef.**	**Std. Err**
Sustainability						
Environmental			17.138*	6.480	1.138*	0.231
Economic	4.822	5.297			-0.444	0.227
Social	2.306	4.671	-20.291*	5.705		
Fish Species Type						
Catfish	10.258	8.060	5.774	7.575	-0.136	0.298
Carp	-48.621	25.042	6.639	24.680	1.285	0.848
Tilapia	9.362	8.109	10.236	7.594	0.200	0.291
Others	30.759*	10.531	-18.304	10.116	-1.098*	0.469
Demographics						
Marital Status	-5.519	7.884	-3.074	7.352	0.312	0.362
Gender	-31.097*	8.476	21.906*	7.727	1.373*	0.362
Age	0.002	0.236	0.532*	0.234	0.008	0.010
Education	0.131	0.894	1.827*	0.741	0.026	0.033
Status in household	-7.888	6.186	6.589	6.314	0.272	0.255
Fishing Experience	1.965*	0.448	-1.080*	0.453	-0.075*	0.022
Reason for fishing	-10.459	9.658	-4.176	8.971	0.308	0.344
Access to credit	47.352*	11.864	15.120	14.399	-0.551	0.559
Model Specification						

Variables	Environmental		Economic		Social	
Observation	129		129		129	
Parameters	14		14		14	
RMSE	14.524		12.819		0.552	
R-Square	0.995		0.993		0.997	
F-stat	286.22		186.80		528.39	
P-value	0.000		0.000		0.000	

Source: Computed from Field Survey (2020); *p < 0.05; n = 129

The results also reveal that newer fishermen are more likely to participate in sustainability practices related to economics and society. In contrast, more seasoned fishermen are more likely to practice environmental sustainability. This outcome emphasises the complex relationship between fishers' experiences and their adoption of sustainable practices. While more seasoned fishermen emphasise environmental sustainability as they gain life experience, new fishermen may be more concerned with social and economic sustainability as they build their careers and provide for their families.

Economic sustainability appears to be the most important form of sustainability to older fishers, according to the positive relationship. It seems that older fishers are more focused on tactics and activities such as making the most efficient use of their available resources to help them financially in the fishing business. Environmental sustainability, as opposed to other types, is more common among artisanal fishers who have access to financing. When fishermen have access to credit, they can invest in environmentally friendly practices like sustainable fishing, equipment upgrades, and habitat restoration.

The result further shows that low-educated fishers prioritise economic sustainability over other types of sustainability. This shows that educational opportunities have a substantial impact on fishermen's perspectives, understanding, and actions concerning economic decision-making in the fishing industry. More educated fisherfolk may be less concerned about the long-term viability of the industry than those with less education, because they may have other options for making a living besides fishing.

Table 8 shows the follow-up test of the SUR. The low correlational values detected indicate that the dataset contains no highly correlated variables. This suggests that the regression model's independent variables are not redundant or highly interrelated, which is required for accurate regression coefficient estimates. The absence of multicollinearity improves the model's interpretability and reduces the likelihood of inflated standard errors or unstable parameter estimates.

Table 8. Correlation matrix of residuals of sustainability

	1	2	3
Environmental	1		
Economic	0.206	1	
Social	0.448	0.149	1

Breusch-Pagan test of independence: chi2(3) = 4.774, Pr= 0.189

The Breusch-Pagan test of independence was used to test for heteroskedasticity in the study, and the results show that there is no heteroskedasticity (p-value greater than 0.05). This implies that the variance of the errors in the regression model remains constant across different levels of the independent variables. The absence of heteroskedasticity ensures that the regression coefficients' standard errors are unbiased and consistent, allowing for valid statistical inference. The absence of multicollinearity and heteroskedasticity improves the reliability and validity of the regression model. These tests ensure that the model meets the key assumptions of classical linear regression, thereby increasing confidence in the model's robustness and the accuracy of its conclusions.

Food Insecurity Among Artisanal Fishers

Figure 2 depicts respondents' responses to food insecurity scale constructs. The result indicates that 43 % of respondents were food secure, while 57 % experienced various levels of food

insecurity. This finding suggests that factors such as limited access to food resources, insufficient income, and a lack of social support play a significant role in household food insecurity.

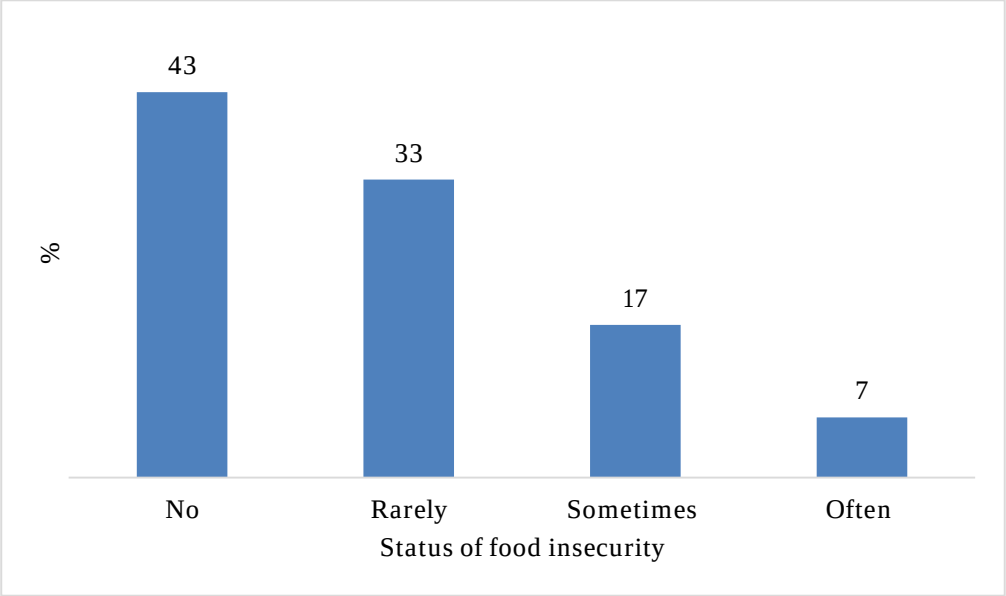

Fig. 2. Occurrence of food insecurity among Artisanal fishers

Effect Of Fish Species Catches and Sustainable Fishing on Food Security

Table 9 presents the binary logistic regression results on the effect of artisanal fish species catch and sustainable fishing on food security. The model's significance, combined with the goodness-of-fit assessment, provides evidence that the logistic regression model is valid in predicting food security. Beyond the Hosmer–Lemeshow test, the sensitivity-specificity classification plot (Figure 3) demonstrates that the logistic regression model has reasonable discriminative ability. At probability thresholds between 0.65 and 0.75, both sensitivity and specificity exceed 0.75, suggesting the model effectively balances the identification of food-secure and food-insecure artisanal fishers. This strengthens the evidence that the model is both well-calibrated and practically useful for policy targeting.

Artisanal fishers who prioritise social sustainability practices benefit from improved food security. According to the marginal effect of social sustainability, artisanal fishers who participate in social sustainability activities improve their food security status by an average of 1.9 %.

Table 9. Effect of fish species catches and sustainable fishing on food security

Food Security	**Odd Ratio**	**Std. Err**	**dy/dx**	**Std. Err**
Sustainability				
Economic	0.937	0.043	-0.007	0.005
Social	1.185*	0.093	0.019*	0.007
Environmental	0.908	0.055	-0.011*	0.005
Fish Species				
Catfish	34.214*	42.452	0.387*	0.085
Tilapia	0.235	0.249	-0.159	0.150
Demographics				
Household size	0.942	0.268	-0.007	0.030
Education	1.213*	0.115	0.021	0.013
Credit	0.389	0.549	-0.104	0.177
Fishing Experience	1.024	0.049	0.003	0.005
Fishing type	0.732	1.002	-0.034	0.152
Model Specification				

Food Security	Odd Ratio	Std. Err	dy/dx	Std. Err
Observations	129			
Wald chi2(10)	20.46			
Prob>chi2	0.0252			
Log pseudolikelihood	-11.165			
Hosmer-Lemeshow chi2(8)	4.23			
Prob>chi2	0.836			

Source: Computed from Field Survey (2020); *p < 0.05; n = 129

In contrast, environmental sustainability practices have a negative impact on artisanal fishers' food security status. The marginal effect suggests that engaging in environmental sustainability activities is less likely to result in a 1.1 % decrease in food security status. This reflects trade-offs or challenges associated with implementing environmental conservation measures, such as fishing practice restrictions or changes in fishing locations, which may have an impact on artisanal fishers' food availability or livelihood opportunities.

The type of fish species targeted by artisanal fishers has a significant impact on food security. Artisanal fishers who primarily fish for catfish have a 38.7 % higher chance of improving their food security than those who target other species. This suggests that certain fish species may have higher nutritional value, greater market demand, or greater resilience to environmental change, resulting in better food security outcomes for artisanal fishers who rely on them as their primary source of income and subsistence.

Years of education were positively associated with food security, with each additional year increasing the odds of being food secure by 21.3 % (OR = 1.213, p < 0.05). However, the marginal effect was small (2.1 % points) and not statistically significant. This discrepancy reflects the non-linear transformation from odds to probabilities, whereby increases in education improve the odds of food security but yield only modest changes in the predicted probability given the sample's baseline conditions.

4. Discussion

The demographic characteristics of artisanal fishers reveal a relatively homogenous profile. Quantitatively, 71.9 % of respondents were men, predominantly engaged in direct fishing due to the physical demands of the activity, while women, as supported by qualitative evidence in prior studies, contribute significantly through post-harvest and processing roles (Pickett, Hofmans, 2019; Stacey et al., 2019). Collaborative efforts between spouses are common in small-scale fisheries, reinforcing household resilience (Locke et al., 2017). However, the reliance on fishing as the primary income source (Agbeja et al., 2019) increases economic vulnerability and drives migratory fishing, particularly when local fish stocks decline (Asiedu et al., 2022). Larger household sizes, averaging nearly 7 members in this study, further intensify fishing pressure, creating the risk of overfishing as families strive to sustain livelihoods (Knudsen, 2016). These findings suggest that household dynamics and gendered labour divisions must be explicitly considered in fisheries policies. For example, extension services could design gender-responsive training and provide family-centred livelihood diversification programs to reduce dependence on migratory fishing.

The study revealed that catfish and tilapia are the most commonly caught fish varieties among artisanal fishers. Consistent with Burchi and De Muro (2016) and Iyiola and Jenyo-Oni (2023), the findings suggest a positive relationship between income generation in the fishing sector and food security. However, significant differences in food security were observed only for Heterobranchus longifilis (Sampa), Ctenopharyngodon idella (Grass carp), and Tilapia guineensis, indicating that specific fish species have varying impacts on artisanal fishers' food security. Therefore, the type of fish caught plays a crucial role in determining food security outcomes. Factors such as market demand, cultural preferences, and the ecological characteristics of each fish species can significantly influence their effect on food security (Smith, 2023; Sogbesan, Kwaji, 2018). This indicates the need for policy interventions that encourage the cultivation and conservation of nutritionally and economically strategic species such as catfish and tilapia, while also supporting biodiversity to reduce overreliance on a narrow range of species.

This study examined the sustainability practices of artisanal fishers across economic, social, and environmental dimensions. The observed economic sustainability practices align with the findings of Nunoo et al. (2015) and Begossi (2014), which indicated the critical role of economic sustainability for the survival and prosperity of artisanal fishers. Regarding social sustainability, the study revealed a multifaceted approach that considers health, community image, and the practical challenges of implementing sustainable practices. These findings are consistent with de Lara and Corral (2017), who state that social sustainability in this sector involves participatory planning, local knowledge sharing, and collaborative decision-making. Addressing both intrinsic motivations and external constraints is crucial for promoting socially responsible fishing practices. However, the study also revealed a disparity between artisanal fishers' environmental awareness and their actual practices. While environmental sustainability is valued, it is not consistently reflected in their fishing activities. This divergence suggests a potential area for targeted interventions, such as training and resource provision, to align actions with environmental values. Promoting selective fishing practices and educating fishers on the importance of returning undersized fish can help maintain healthy fish populations.

The SUR analysis underscores the need to address gender disparities and promote gender-inclusive approaches to sustainability initiatives in fisheries management and conservation. This aligns with findings by Meinzen-Dick et al. (2014) and Muallil et al. (2013), who demonstrated gender's significant role in shaping sustainability contributions. Furthermore, the study indicates that fostering intergenerational knowledge sharing can enhance the sustainability of fisheries. This finding is supported by Kelty and Kelty (2011), who found that fishers value natural resources and are concerned about the impacts of development. Experienced fishers, possessing greater insight into market opportunities and risk mitigation, contribute to long-term financial viability. However, Lloret et al. (2018) note that economic pressures, particularly among younger fishers facing limited profitability and alternative job opportunities, can prioritise economic gains over ecosystem sustainability. Education levels also influence fishers' perspectives. Higher education is associated with greater awareness of social and environmental issues, potentially leading to greater prioritisation of sustainability. Therefore, efforts to improve economic sustainability should consider fishers' educational backgrounds and tailor interventions accordingly. Lloret et al. (2018) further emphasise that limited alternative employment options, aligned with fishers' skills and aspirations, reinforce the tendency to prioritise economic needs over long-term sustainability. These findings suggest that policies must be differentiated: youth-targeted programs could emphasise long-term environmental benefits while simultaneously addressing immediate livelihood concerns, and education initiatives should integrate sustainability literacy into both formal and informal training.

Findings indicate that social initiatives, including community engagement, equitable resource distribution, and access to support networks, contribute to improved food security in artisanal fishing communities. This aligns with Lang and Barling (2012), who advocate for the holistic integration of social, environmental, and economic factors for sustainable food security, which extends beyond daily caloric intake to include understanding food origins and production. Renard and Tilman (2021) further emphasise the critical role of government policies and biodiversity-based practices in promoting social sustainability and equitable food security. Supporting these findings, Jennings et al. (2016) highlight the significant role of fish species in daily nutrition and food security. Belton and Thilsted (2014) reinforce this by emphasising the importance of fish species diversity, particularly in regions with diverse food availability, and the cultural preference for indigenous fish species, which bolsters food security. Additionally, small, low-market-value fish from capture fisheries serve as a crucial economic buffer, acting as a "bank in the water" during seasonal cash shortages.

5. Limitation

The study was affected by COVID-19 restrictions, as data collection occurred during the pandemic, which made it impossible to reach all respondents. Also, the data collection process of the study took longer than expected due to the routine of artisanal fishers and the inaccessibility of some settlements in Osun state. Again, the reliance on self-reported data through structured questionnaires may have introduced self-reporting bias, as respondents could overstate or understate their fishing practices, sustainability measures, or household food security status. Also,

the study recorded a non-response rate of 14 % (21 out of 150 fishers did not return questionnaires). While the overall response rate was strong, non-response bias remains possible if the views and experiences of non-participants systematically differed from those who completed the survey. Lastly, the sampling frame was drawn from lists provided by extension officers, which may not comprehensively represent all artisanal fishers in the State. This reliance raises the possibility of sampling bias, particularly if certain groups of fishers were inadvertently excluded.

6. Implications of the study

Theoretically, the study contributes to and supports the Sustainable Livelihoods Framework by demonstrating the relationships among livelihood activities, multidimensional sustainability, and food security. Additionally, the findings challenge the often-assumed synergy between environmental sustainability and food security by indicating a potential trade-off between conserving resources and meeting immediate nutritional needs. This observation adds a critical layer to existing sustainability literature and suggests that contextualised trade-off management strategies are necessary. The study also provides empirical evidence relevant to the food systems discourse, demonstrating how localised artisanal practices intersect with macro-level development challenges, including resource degradation, income insecurity, and undernutrition.

From a practical standpoint, the study has notable implications for policymakers, practitioners, and fishers. The findings indicate the need for multisectoral interventions that enhance economic and social sustainability through capacity-building, financial inclusion, and access to social services. In particular, the positive association between species diversification and food security underscores the value of species-specific support programs, especially for high-demand fish species such as catfish and tilapia.

7. Conclusion and Recommendation

Artisanal fisheries in Nigeria provide a crucial protein source, yet escalating demand threatens fish stocks, raising concerns about sustainability and food security. This study examined these dynamics in Osun State and found that Oreochromis niloticus, Chrysichthys nigrodigitatus, and Heterobranchus bidorsalis (Tilapia, Silver catfish, and African catfish, respectively) are the predominant species caught, indicating higher demand for them. Food security among fishers varies significantly based on target species. Those primarily harvesting Tilapia, Silver catfish, and African catfish exhibit higher levels of food security. Furthermore, the adoption of environmental sustainability practices can paradoxically reduce short-term food availability. Such findings indicated a broader sustainability trade-off widely debated in global scholarship: the tension between ensuring immediate food security and conserving ecosystems for future generations.

Internationally, scholars highlight that conservation policies such as fishing restrictions, seasonal bans, or gear regulations, though critical for biodiversity, can constrain livelihoods and exacerbate food insecurity in the short term. Our evidence from Osun State illustrates this dilemma at the local scale. Artisanal fishers face a difficult balancing act: ecological stewardship often entails immediate costs, while prioritising yields can undermine the long-term resilience of fish stocks. This reflects the sustainability trilemma, the need to reconcile ecological integrity, economic viability, and social well-being. However, the study also demonstrates that social sustainability practices such as collective action, community participation, and equitable access to resources can enhance food security outcomes. This aligns with global calls for context-sensitive, win-win solutions, in which food security goals are not pursued in isolation but are integrated with biodiversity conservation and social equity.

By embedding training, finance, and market-based strategies into artisanal fisheries governance, Nigeria can align local realities with global sustainability debates-protecting aquatic ecosystems while safeguarding the food and nutrition security of fishing communities. To operationalise these solutions, the study recommends that: State Ministry of Agriculture and Food Security, through the Department of Fisheries and Aquaculture, should provide training modules for artisanal fishers that combine ecological education with hands-on guidance in selective gear use, stock management, and climate-resilient practices, ensuring that environmental goals do not translate into immediate food insecurity. State Ministries such as Agriculture and Food Security, and the Ministry of Finance should provide credit schemes targeted at sustainable fishing, enabling fishers to invest in modern gear, cold storage, and habitat-friendly technologies. Financial

inclusion would reduce the short-term economic costs of adopting conservation measures. Again, the State in dealing with issues of artisanal fishing should consider a multifaceted approach that enhances collaboration between stakeholders such as the Agriculture and Food Security, Ministry of Environment and its parastatals, Nigeria Communication Commission, National Population Commission, Works and Housing, Nigerian Meteorological Agency and Federal Ministry of Finance. Also, the study recommends that the Ministry of Agriculture and Food Security, through the Department of Fisheries and Aquaculture, should encourage Artisanal fishers to diversify their fishing activities to reduce the environmental impact of continuous fishing while improving their economic well-being. Furthermore, the Ministry of Agriculture and Food Security, through the Department of Fisheries, should educate artisanal fishers on the relevance of sustainable fishing and its impact on their society and food security.

8. Declarations

Ethical and informal consent statement

Consent of participating respondents was sought from the University of Ibadan and the extension agent responsible for the zones used for the study.

Consent for Publication

Not Applicable

Availability of data

Data and materials relevant to this manuscript are available upon request.

Conflict of interest statement

The authors declare no conflict of interest

Authors' contributions

S.A. O and S.O. designed and collected the study data. R.K.D and A.T.K.N analysed the data. All authors contributed to writing, reviewing, reading and approval of the manuscript.

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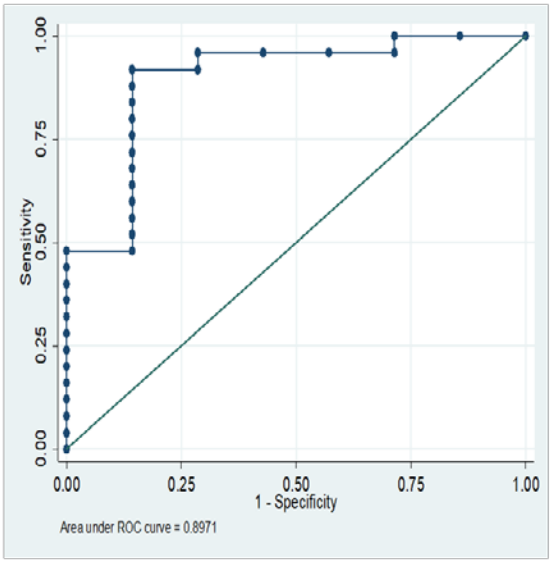
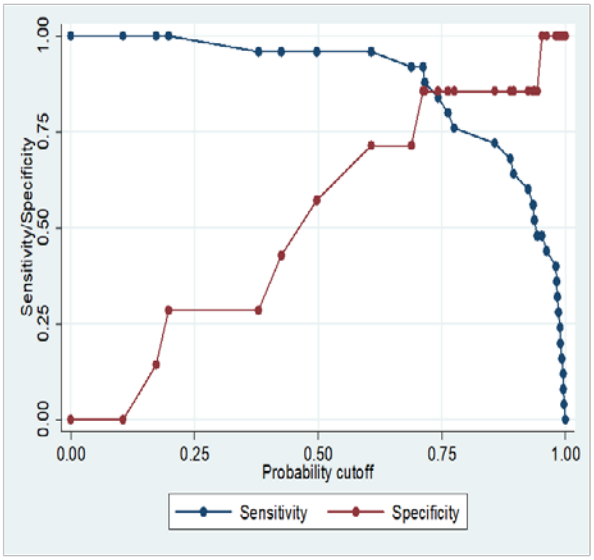
Appendix 1


Sensitivity
0.00
0.25
0.50
0.75
1.00
1 - Specificity
Area under ROC curve = 0.8971


Sensitivity/Specificity
0.00
0.25
0.50
0.75
1.00
Probability cutoff
Sensitivity
Specificity