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Effect of Forensic Accounting Analysis on Fraud Detection in Nigeria: A Study of EFCC Gombe Office

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ABSTRACT

This study examined the effect of forensic accounting analysis, specifically biometric authentication and lifestyle analysis, on fraud detection at the Economic and Financial Crimes Commission (EFCC), Gombe Zonal Office. The research adopted a quantitative survey design. The target population comprised 97 EFCC staff in Gombe, from which a sample of 55 was selected using a stratified sampling technique in order to ensure representation across four functional units: Investigation, Legal and Prosecution, Forensic, and Administration. However, 46 valid responses were analyzed in the study. Primary data was collected using a structured questionnaire using a 5-point Likert scale, and data analysis was performed using SPSS version 27, employing correlation and multiple regression techniques. Findings revealed that both biometric authentication and lifestyle analysis significantly enhanced fraud detection. The regression model accounted 46.7% of the variance in fraud detection, confirming the relevance of these techniques. The study demonstrates that the combined application of biometric authentication and lifestyle analysis can substantially improve the EFCC's fraud detection capabilities and proposes focused staff training, capacity development, and refinement of institutional policies to facilitate effective implementation. It recommends that EFCC Gombe strengthen the use of these forensic tools through training, capacity building, and institutional policy reforms, with support from the EFCC headquarters, to standardize and optimize fraud detection practices across all zonal offices.

Keywords: Forensic Accounting, Biometric Authentication, Lifestyle Analysis and Fraud Detection

1.0 BACKGROUND TO THE STUDY

Globally, the increasing complexity of financial transactions and the globalization of business practices have significantly amplified the incidence of fraud,

impacting economies worldwide. In Africa, and specifically in Nigeria, this surge in financial malfeasance poses serious threats to economic stability and development. As financial fraud evolves, traditional audit methods have often proven inadequate, highlighting the necessity for specialized techniques to detect and prevent fraudulent activities effectively. Forensic accounting has emerged as a crucial field in this context, employing a blend of accounting, auditing, and investigative skills to scrutinize financial statements and transactions. This approach not only uncovers fraudulent activities but also provides evidence for legal proceedings, thereby enhancing the transparency and integrity of financial reporting and safeguarding stakeholders' interests.

In Nigeria, the Economic and Financial Crimes Commission (EFCC) plays a crucial role in combating economic and financial crimes, including fraud. Established on the 12th December 2002, and commence operations in April, 2003, the EFCC has been a leading force in the fight against corruption, money laundering, and other financial offenses nationwide. Within this national framework, the Gombe Zonal Office of the EFCC has been actively engaged in investigating and prosecuting financial crimes within its jurisdiction. Despite these significant efforts, the EFCC continues to face substantial challenges in effectively detecting and prosecuting fraud. These challenges are largely attributed to limited resources, a shortage of specialized forensic accounting expertise, and the increasing sophistication of fraudulent schemes that complicate detection and prosecution.

A recent document provides insight into the EFCC's activities and the notable financial recoveries achieved over the past year. According to the document, the EFCC received 15,753 petitions from May 2023 to May 2024, conducted investigations into 23,287 cases, and filed 5,376 cases in court involving both individuals and corporate entities. The document also details substantial monetary recoveries, including N231,623,186,004.74, $70,260,544.18, and £29,264.50, along with €208,297.10; ₹51,360 (Indian rupees); $3,950 (Canadian dollars); $740 (Australian dollars); 35,000 South African Rands; 42,390 UAE Dirhams; 247 Saudi Riyals; and ¥74,754 (Chinese Yuan) (Bisi Aboiye, 2024). These figures highlight the EFCC's considerable efforts but also underscore the pressing need for enhanced strategies to address sophisticated fraud techniques.

In response to these challenges, this study aims to examine the effect of forensic accounting analysis in improving fraud detection at the EFCC. Specifically, techniques such as Lifestyle Analysis, which can reveal discrepancies between an individual's known income and their standard of living, and biometric authentication, which improves the accuracy of identifying and verifying individuals involved in fraud, was scrutinized (Bello, 2020; Ali et al., 2020; Dada & Jimoh, 2020; Chepngeno & Fred, 2020; Okoye & Mbanugo, 2020).

Sectoral gaps also emerge, as prior researches predominantly examine banks, manufacturing firms and other industries (Eyo & Ebahi, 2020; Ewa et al., 2020;

Adesina et al., 2020), with limited focus on public institutions. Moreover, inconsistencies in findings, such as the contrasting conclusions of Eyo and Ebahi (2020) versus Bello (2020), indicate the need for further exploration into the contextual factors influencing forensic accounting analysis effectiveness in detecting fraud in Nigeria. Similarly, studies by Adebayo et al. (2020) and Yusuf et al. (2020) suggest that while forensic accounting plays a critical role in fraud detection, its impact varies across regulatory environments. Further, Ojo et al. (2020) and Ibrahim et al. (2020) identify limitations in forensic audit frameworks, particularly in addressing cyber-related financial crimes. Empirical studies by Uche et al. (2020) and Salami et al. (2020) emphasize the need for integrating emerging forensic technologies to enhance fraud detection in Nigeria. These gaps suggest this study on the effect of forensic accounting analysis on fraud detection at the EFCC Gombe Office.

2.0 LITERATURE REVIEW

2.1 CONCEPTUAL REVIEW

2.1.1 Fraud detection

Fraud detection is the process of identifying, investigating, and addressing deceptive practices aimed at securing financial gain through illicit means. This process is essential for maintaining the integrity of financial systems and protecting organizations from significant financial losses. At its core, fraud detection involves the identification of anomalies and discrepancies within financial data that deviate from established norms, indicating potentially fraudulent activity. To achieve this, organizations implement robust internal controls, conduct thorough risk assessments, and employ advanced methodologies. These methodologies include data analytics, which uses statistical and computational techniques to analyze large datasets for patterns indicative of fraud; forensic accounting, which involves the detailed examination of financial records and transactions by forensic accountants; and behavioral analysis, which observes and interprets individual behaviors and responses to detect signs of deception. Machine learning and AI models also play a significant role by continuously monitoring and analyzing transaction data in real-time, adapting to new fraud patterns.

2.1.2 Biometric authentication

Biometric authentication refers to the use of unique physical or behavioral characteristics of individuals to verify their identities. These characteristics can include fingerprints, facial features, iris patterns, voice prints, or even behavioral traits like typing rhythm or gait. Unlike traditional methods such as passwords or PINs, which rely on something a person knows (knowledge-based factors), biometric authentication relies on something a person is (inherent physiological or behavioral factors). This technology measures and analyzes these unique characteristics to confirm a person's identity, providing a highly secure method for accessing systems, devices, or conducting transactions. Biometric authentication enhances security by

reducing the risk of fraud and unauthorized access, as biometric traits are difficult to replicate or forge. It also offers convenience to users by simplifying the authentication process, eliminating the need to remember and manage passwords. However, the implementation of biometric authentication requires careful consideration of privacy concerns, data security, and regulatory compliance to ensure the ethical and effective use of biometric data.

2.1.3 Lifestyle Analysis

Lifestyle analysis is a forensic accounting methodology that examines an individual's lifestyle, financial habits, and personal expenditures to identify discrepancies between their known income and their standard of living. This method is particularly useful in detecting illicit activities such as embezzlement, money laundering, and bribery. Forensic accountants conducting a lifestyle analysis compare the suspect's reported income with their actual expenditures and lifestyle, looking for significant disparities that might indicate hidden sources of income or illicit activities. This process includes asset analysis, where the investigator examines properties, vehicles, and luxury items to see if they align with the suspect's reported financial status. Behavioral examination is another component, assessing patterns and personal relationships that might provide indirect evidence of fraudulent activities. Lifestyle analysis is broadly applicable in various contexts, including corporate fraud investigations, divorce settlements, and criminal cases. It is effective in uncovering hidden income streams that do not appear in official financial records, providing compelling evidence in legal proceedings by demonstrating inconsistencies between reported income and actual lifestyle.

2.2 EMPIRICAL REVIEW

Onyema et al. (2024) focused on the impact of forensic accounting on fraud management in deposit money banks using a survey research design. While it highlighted the importance of forensic techniques in fraud detection, it did not explore the role of advanced forensic tools like biometric authentication and lifestyle analysis. Additionally, the study's financial sector focus leaves a gap in understanding how these forensic methods operate within anti-corruption agencies like the EFCC, where fraud schemes and investigative approaches differ significantly. Similarly, Iheme (2024) examined forensic accounting from a policy perspective, specifically in addressing government revenue leakages. While it provided insights into the causes of financial fraud in public transactions, it did not empirically assess the effectiveness of forensic techniques in fraud detection. Furthermore, the study lacked an analysis of biometric authentication and lifestyle analysis as proactive forensic tools for tackling financial crimes. This gap necessitates research on their implementation within law enforcement agencies like the EFCC.

Oladutire et al. (2024) analyzed the impact of forensic accounting on financial performance in the banking sector, emphasizing risk assessment, legal services, and monitoring. However, it did not consider forensic accounting's direct role in fraud

detection beyond its financial performance implications. More importantly, it did not explore emerging forensic technologies such as biometric authentication and lifestyle analysis, which are critical for enhancing fraud detection in institutions like the EFCC. Also, Ogwiji (2023) investigated forensic accountants' attributes, including their knowledge, expertise, and litigation support services, in addressing financial crimes in the public sector. While it acknowledged the role of forensic accountants in fraud detection, it overlooked the integration of modern forensic techniques such as biometric authentication and lifestyle analysis. The study's reliance on traditional forensic expertise rather than advanced technological tools highlights a gap in understanding how technology-driven forensic methods can improve fraud detection in anti-corruption agencies.

Agboare (2021) focused on deposit money banks in Nigeria, emphasizing forensic inquiry and financial record reconstruction but limited the scope to only 10 internationally authorized banks, reducing the study's generalizability. Similarly, Jacob (2021) investigated forensic accounting in Nigeria's public sector, revealing its positive impact on fraud management but relying solely on subjective survey responses rather than concrete forensic case studies. Meanwhile, Gupta and Vij (2021) explored forensic accounting in the Indian corporate sector, employing advanced techniques such as Benford's Law and data mining; however, the study's reliance on a small, judgmentally selected sample raises concerns about selection bias. While all three studies affirm the effectiveness of forensic accounting in fraud detection, they exhibit methodological limitations, including restricted sample sizes and sector-specific constraints, necessitating further research that incorporates a broader scope and advanced forensic techniques.

Bello (2020) explored the impact of forensic accounting technology on fraud detection in Nigeria, using a qualitative approach with questionnaires administered to 38 investigators from the Economic and Financial Crimes Commission (EFCC). The study found a significant relationship between forensic accounting tools and improved fraud detection in Nigeria. Similarly, Chepngeno and Fred (2020) analyzed the effects of litigation support services on fraud mitigation in firms listed on the Nairobi Securities Exchange (NSE), utilizing purposive sampling to collect primary data. The results revealed a significant correlation between litigation support services and effective fraud mitigation within these firms. Eyo and Ebahi (2020) examined the effects of forensic accounting and litigation support services on fraud detection in Nigerian companies but found no significant effect. Their study involved primary data collected from employees of Zenith Bank and Union Bank in Calabar, analyzed using Analysis of Variance (ANOVA).

Further, Okoye and Mbanugo (2020) assessed the impact of forensic accounting on fraud cases in tertiary institutions in South East Nigeria, employing a descriptive survey design. The study concluded that forensic accounting significantly reduces fraud in tertiary institutions and highlighted the advantages of professional forensic accountants over traditional external auditors. Ali et al. (2020) focused on the UAE banking sector, specifically Islamic and conventional banks, and found a significant positive impact of forensic accounting on fraud detection. Dada and Jimoh (2020) investigated the role of forensic accounting in reducing financial crimes in

Nigeria's public sector, revealing that litigation support services significantly reduce financial crimes. Adesina et al. (2020) examined the relevance of forensic auditing in mitigating financial mismanagement in Nigeria's deposit money banks, recommending the establishment of forensic departments in all banks to enhance stability. Finally, Ewa et al. (2020) evaluated forensic accounting methods in Nigerian banks, discovering that practices like data mining, ratio analysis, and trend analysis significantly improved fraud detection and prevention. However, they noted limitations in the study's focus on only a small sample of banks in Rivers State.

These studies primarily focus on forensic accounting in financial institutions, government revenue leakages, and forensic accountants' competencies, but they fail to examine the application of advanced forensic techniques like biometric authentication and lifestyle analysis in fraud detection. This conceptual gap underscores the need for empirical research on their effectiveness within the EFCC, providing a basis for the current study.

2.3 THEORETICAL REVIEW

2.3.1 Fraud Triangle Theory

The theory was developed in the mid-20th century, with Cressey's seminal work on the subject published in the 1950s. The Fraud Triangle Theory identifies three key factors that must be present for fraud to occur: pressure, opportunity, and rationalization. This theory could help in understanding the dynamics of fraud within the EFCC:

Pressure: Within the EFCC, pressure could manifest as financial incentives or personal motivations that drive individuals to engage in fraudulent activities. For example, investigators or auditors facing financial difficulties might succumb to bribery or kickback schemes.

Opportunity: This pertains to internal control weaknesses or vulnerabilities within the EFCC's operations. For instance, inadequate segregation of duties or lax oversight of financial transactions could create opportunities for fraud perpetrators to exploit.

Rationalization: Fraud perpetrators often justify their actions to themselves, believing that their behavior is necessary or justified under the circumstances. Understanding the rationalization process within the EFCC can shed light on cultural or systemic issues that contribute to fraudulent behavior.

This theory anchors the current study by offering a foundational framework for analyzing the antecedents of fraudulent behavior within the EFCC. By focusing on the interplay between individual motivations, organizational vulnerabilities, and cultural justifications, the study is better positioned to identify specific risk areas and propose targeted interventions. The Fraud Triangle Theory also informs the study's emphasis on enhancing internal controls, promoting ethical culture, and reducing the pressures that make fraud more likely. In doing so, it supports the development of a comprehensive anti-fraud strategy tailored to the operational realities of the EFCC.

3.0 METHODOLOGY

The study employed a quantitative research approach, and used a survey research design. The target population comprised 97 staff members of the Economic and Financial Crimes Commission (EFCC), Gombe State, Nigeria. The study selected a sample of 55 respondents. A stratified sampling technique was adopted for this study to ensure representation across key sub-units directly involved in fraud investigation within the Economic and Financial Crimes Commission (EFCC), Gombe State. This technique allowed for the division of the population into distinct strata based on departmental responsibilities. The main units considered were: the Investigation Unit, Legal and Prosecution Unit, Forensic Unit, and Administration Unit. These units were selected due to their direct or supportive roles in the detection, analysis, and prosecution of fraud-related cases.

The table below presents the distribution of the population and the selected sample size across these strata:

Table 3.1: Population and Sample Size Distribution

Stratum (Unit)	Population (N)	Sample Size (n)
Investigation Unit	40	23
Legal and Prosecution Unit	25	14
Forensic Unit	18	10
Administration Unit	14	8
Total	**97**	**55**

Source: Author's compilation, 2024

The sample size of 55 was proportionally allocated across the strata based on their representation in the total population, ensuring fair and adequate representation of each unit.

The study utilized a primary source of data collected through a structured questionnaire. The questionnaire employed a 5-point Likert scale to measure respondents' opinions, with the following scale: Strongly Agree (5), Agree (4), Undecided (3), Disagree (2), and Strongly Disagree (1). The data collected were analyzed using the Statistical Package for the Social Sciences (SPSS) 27.0.

4.0 ANALYSIS AND RESULTS

4.1 DATA PRESENTATION

The study initially selected a sample size of 55 respondents, only 46 questionnaires were found to be duly completed and valid for analysis. The remaining 5 questionnaires were incomplete and inconsistently filled, while 4 were not returned, making them unsuitable for inclusion in the final data analysis. To maintain the integrity and reliability of the findings, only the valid 46 responses were analyzed using SPSS.

Table 4.1: GENDER

		Frequency	Percent
	MALE	36	78.3
	FEMALE	10	21.7
	Total	46	100.0

Source: SPSS 27.0 Output, (2024)

The gender distribution in the study shows that 78.3% (36) of respondents were male, while 21.7% (10) were female, highlighting a significant gender imbalance in forensic accounting roles at the EFCC Gombe Office. This male dominance reflects broader trends in law enforcement and accounting professions in Nigeria. Increasing female participation through targeted initiatives could enhance diversity, foster inclusivity, and improve fraud detection effectiveness.

Table 4.2: AGE

		Frequency	Percent
	18–27years	3	6.5
	28–37 years	30	65.2
	38–47 years	10	21.7
	48–57 years	2	4.3
	Over 58 years	1	2.2
	Total	46	100.0

Source: SPSS 27.0 Output, (2024)

The age distribution in the study shows that the majority of respondents (65.2%) were aged 28–37 years, followed by 21.7% aged 38–47 years. Younger respondents aged 18–27 years accounted for 6.5%, while older respondents aged 48–57 years and over 58 years made up 4.3% and 2.2%, respectively. This indicates that the workforce engaged in forensic accounting and fraud detection at the EFCC Gombe Office is predominantly in the 28–47 age range, suggesting a relatively young and middle-aged demographic. This age group likely reflects a balance of energy and experience, which is critical for handling the complex tasks involved in fraud detection.

Table 4.3: ACADEMIC QUALIFICATION

		Frequency	Percent
Valid	**ND/NCE**	12	26.1
	HND/B.Sc.	27	58.7
	MBA/M.Sc.	7	15.2
	Total	46	100.0

Source: SPSS 27.0 Output, (2024)

The academic qualification distribution shows that the majority of respondents (58.7%) hold HND/B.Sc. degrees, followed by 26.1% with ND/NCE qualifications, and 15.2% with MBA/M.Sc. degrees. This indicates that most personnel involved in forensic accounting and fraud detection at the EFCC Gombe Office have undergraduate-level qualifications, with a smaller proportion holding advanced degrees. The significant presence of HND/B.Sc. holders suggests a well-qualified workforce, while the relatively lower number of respondents with postgraduate qualifications highlights an opportunity for capacity building and advanced training to enhance expertise in forensic accounting.

Table 4.4: YEARS OF EXPERIENCE

		Frequency	Percent
	1–5years	10	21.7
	6–10years	29	63.0
	11–15years	7	15.2
	Total	46	100.0

Source: SPSS 27.0 Output, (2024)

The distribution of years of experience indicates that the majority of respondents (63.0%) have 6–10 years of experience, followed by 21.7% with 1–5 years of experience, and 15.2% with 11–15 years of experience. This suggests that most personnel involved in forensic accounting and fraud detection at the EFCC Gombe Office have moderate experience, reflecting a workforce with a solid foundation of practical knowledge. The smaller proportion of respondents with over 10 years of experience highlights the potential need for mentorship programs to leverage the expertise of seasoned professionals for capacity building within the organization.

4.2 RESULTS AND INTERPRETATIONS

Table 4.5: Correlations

		FRAUDD	BIOAUTH	LIFANA
Pearson Correlation	**FRAUDD**	1.000		
	BIOAUTH	.618	1.000	
	LIFANA	.599	.510	1.000

Source: SPSS 27.0 Output, (2024)

In interpreting Table 4.5: Correlations, which presents the relationships between the dependent variable FRAUDD (Fraud Detection) and the independent variables BIOAUTH (Biometric Authentication Analysis) and LIFANA (Lifestyle Analysis), it is clear that both independent variables show a positive relationship with fraud detection, albeit to different extents. The Pearson correlation between

BIOAUTH and FRAUDD is 0.618, suggesting a moderate positive correlation. This indicates that as biometric authentication analysis increases, the effectiveness of fraud detection also tends to improve.

Similarly, the Pearson correlation between LIFANA (Lifestyle Analysis) and FRAUDD is 0.599, reflecting a moderate positive relationship as well. This suggests that the more comprehensive the lifestyle analysis becomes, the better the ability to detect fraud. Lifestyle analysis, which involves examining personal habits and financial behaviors, is an important tool for identifying inconsistencies or fraudulent patterns that might not be detected through traditional methods.

Table 4.6: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		Durbin-Watson
				F Change	Sig. F Change	
.700	.491	.467	.53686	20.705	.000	1.457

Source: SPSS 27.0 Output, (2024)

In interpreting Table 4.6: Model Summary for the study provide insights into the goodness of fit of the regression model used to analyze the relationship between fraud detection and the independent variables (BIOAUTH and LIFANA). The model is statistically significant (sig. value less than 0.05). The Adjusted R square of 0.467 accounts for the number of predictors in the model and adjusts for any overfitting, showing that about 46.7% of the variation in fraud detection is explained by the independent variables in the model.

Table 4.7: ANOVA

Model		Sum of Squares	DF	Mean Square	F	Sig.
1	**Regression**	11.935	2	5.968	.705	.000
	Residual	12.393	43	.288		
	Total	24.329	45			

Source: SPSS 27.0 Output, (2024)

The results from Table 4.7: ANOVA indicate that the regression model used to analyze the effect of biometric authentication (BIOAUTH) and lifestyle analysis (LIFANA) on fraud detection (FRAUDD) is statistically significant. The F-statistic of 20.705 and the associated p-value of 0.000 confirm that the independent variables collectively explain a significant portion of the variation in fraud detection.

Table 4.8: Collinearity Statistics

	Tolerance	**VIF**
BIOAUTH	.740	1.352
LIFANA	.740	1.352

Source: SPSS 27.0 Output, (2024)

The collinearity statistics in Table 4.8 indicate that multicollinearity is not a concern in the model analyzing the effect of biometric authentication (BIOAUTH) and lifestyle analysis (LIFANA) on fraud detection (FRAUDD). Both BIOAUTH and LIFANA have a Tolerance value of 0.740 and a Variance Inflation Factor (VIF) of 1.352, which are well below the thresholds that would suggest problematic multicollinearity. A Tolerance value above 0.1 and a VIF value below 10 indicate that the independent variables are not highly correlated with each other, ensuring that each variable contributes independently to the model without distorting the analysis. This confirms that the regression model is valid and the effects of BIOAUTH and LIFANA on fraud detection can be interpreted accurately.

Table 4.9: Regression Coefficients Result

Model	**tandardized Coefficients**		**ndardized Coefficients**	**t**	**g.**
	B	**d. Error**	**Beta**		
ant)	.198	.508		389	09
UTH	.577	.173	.422	335	02
NA	.423	.139	.384	033	04

Source: SPSS 27.0 Output, (2024)

Test of Hypothesis

In interpreting Table 4.9: Regression Coefficients Results, we test the null hypotheses for each of the independent variables; BIOAUTH (biometric authentication analysis) and LIFANA (lifestyle analysis) to determine their significance in explaining fraud detection (FRAUDD).

Biometric Authentication (BIOAUTH) and Fraud Detection

For BIOAUTH, the unstandardized coefficient is 0.577, indicating that for every unit increase in biometric authentication, fraud detection increases by 0.577 units. The standardized coefficient (Beta) is 0.422, suggesting a moderate effect of BIOAUTH on fraud detection. The t-value of 3.335 and the p-value of 0.002 indicate that BIOAUTH is statistically significant at the 0.05 level, meaning we can reject the null hypothesis (which posits no effect of BIOAUTH on fraud detection). Therefore, finding reveals that BIOAUTH has a positive and significant effect on fraud detection under EFCC Gombe.

Lifestyle Analysis (LIFANA) and Fraud Detection

Similarly, for LIFANA, the unstandardized coefficient is 0.423, meaning that for every unit increase in lifestyle analysis, fraud detection increases by 0.423 units. The standardized coefficient (Beta) of 0.384 shows that LIFANA also has a moderate effect on fraud detection. The t-value of 3.033 and p-value of 0.004 indicate that LIFANA is statistically significant at the 0.05 level, allowing us to reject the null hypothesis (which suggests no effect of LIFANA on fraud detection). Therefore, finding reveals that LIFANA has a positive and significant effect on fraud detection under EFCC Gombe.

DISCUSSION OF FINDING

Biometric Authentication (BIOAUTH) and Fraud Detection

The finding that biometric authentication (BIOAUTH) has a significant and positive effect on fraud detection within EFCC Gombe ($\beta = 0.422$, $p = 0.002$) is consistent with several prior studies. Bello (2020) directly linked forensic technology tools to improved fraud detection among EFCC investigators, supporting the integration of biometric systems in fraud management frameworks. Gupta and Vij (2021) also affirmed the effectiveness of advanced forensic technologies like Benford's Law and data mining in fraud detection within the Indian corporate environment, reinforcing the idea that high-tech forensic methods are vital for combating sophisticated financial crimes. Similarly, Dada and Jimoh (2020) and Adesina et al. (2020) recognized the importance of forensic technology and auditing mechanisms in minimizing financial crimes and enhancing institutional accountability. These studies provide empirical backing for the assertion that biometric authentication—through tools such as fingerprint verification, iris scanning, and facial recognition—enhances the accuracy and objectivity of investigations, making it an indispensable component of modern forensic accounting.

However, this finding contrasts with Eyo and Ebahi (2020), who found no significant impact of forensic techniques on fraud detection in commercial banks. This disparity could stem from contextual differences: while their study focused on routine banking environments, the current study targets the EFCC, a specialized anti-corruption agency dealing with high-profile financial crimes where identity verification and traceability are crucial. Additionally, Agboare (2021) limited his forensic investigation to traditional accounting reconstruction without addressing technological innovations like biometrics, thus narrowing the scope of fraud detection mechanisms. The Fraud Triangle Theory supports this study's outcome through the lens of opportunity—biometric tools reduce opportunities for impersonation, unauthorized access, and manipulation of identity, which are common enablers of fraud. By limiting these vulnerabilities, EFCC Gombe can strengthen internal controls and increase fraud detection efficiency.

Lifestyle Analysis (LIFANA) and Fraud Detection

The finding reveals that LIFANA has a positive and significant effect on fraud detection under EFCC Gombe ($\beta = 0.384$, $p = 0.004$) aligns with earlier studies that advocate for expanded forensic tools. Onyema et al. (2024) and Iheme (2024) acknowledged the need for deeper forensic analysis in public sector fraud detection but did not empirically test the effectiveness of lifestyle analysis. This study builds upon their groundwork by validating lifestyle analysis as a measurable forensic tool. Jacob (2021) and Okoye and Mbanugo (2020) also support the role of forensic accounting in reducing fraud but focused on general practices in public institutions and tertiary education respectively, rather than specific tools like lifestyle audits. Furthermore, Ogwiji (2023) examined forensic accountants' attributes but overlooked modern detection tools such as LIFANA, suggesting a gap this study fills by offering empirical evidence that lifestyle analysis is a strategic tool in monitoring discrepancies between official income and observed living standards.

Conversely, Oladutire et al. (2024) and Chepngeno and Fred (2020) emphasized litigation support services and financial performance outcomes but neglected advanced investigative techniques like LIFANA. These omissions may explain the limited scope of their findings on fraud detection effectiveness. Also, Ali et al. (2020) and Ewa et al. (2020), although supportive of forensic accounting's general role, focused on ratio analysis and data mining, failing to address behavioral or lifestyle indicators as part of their methodology. The Fraud Triangle Theory offers a theoretical basis for understanding this finding. The pressure individuals face—such as financial strain or desire for luxury—may lead to fraudulent behavior, often manifested in conspicuous lifestyles. By analyzing assets, expenditures, and behavioral trends, lifestyle analysis exposes inconsistencies that traditional audits may miss. This makes LIFANA a crucial early warning and detection system, particularly valuable in the EFCC context where offenders often conceal illicit gains through lavish personal spending.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusion:

The study underscores the significant role of biometric authentication (BIOAUTH) and lifestyle analysis (LIFANA) in improving fraud detection processes. Forensic accounting techniques, such as these, should be integrated more systematically into anti-fraud practices within Nigeria's law enforcement agencies. This integration will lead to more accurate identification of fraudulent activities and more efficient investigations, which are essential for ensuring justice and accountability in both public and private sectors.

Recommendations:

i. Strengthening Forensic Accounting Techniques: Given the significant impact of BIOAUTH and LIFANA on fraud detection, it is recommended that the EFCC Gombe Office continue to invest in and enhance the implementation of biometric authentication systems and lifestyle analysis techniques in its fraud detection processes. This can improve the accuracy and efficiency of identifying fraudulent activities within the office.

ii. **Training and Capacity Building:** The **EFCC Gombe Zonal Office** should prioritize continuous training and capacity-building programs for its personnel, particularly those in investigation, forensic, and legal units. Emphasis should be placed on **advanced forensic accounting techniques**, including the integration of **biometric authentication systems** and **lifestyle analysis tools**. By equipping staff with these specialized skills, the commission will be better positioned to detect, investigate, and prevent complex fraud cases within its jurisdiction.

iii. **Institutional Policy Enhancement:** The **EFCC Gombe** should initiate internal policies that promote the routine use of **biometric verification** and **lifestyle monitoring** as part of its investigative framework. These tools should be institutionalized to complement existing fraud detection mechanisms. Furthermore, collaboration with the EFCC Headquarters in Abuja can help in advocating for the standardization and rollout of such policies across all zonal offices, thereby enhancing transparency, accountability, and the overall effectiveness of anti-corruption efforts at the regional level.

6.0 AUTHORS CONTRIBUTION

The introduction, as well as the conceptual and theoretical review of the study, were handled by Dr. Mabur Zumbung Danladi. Deshi Nentawe Nengak was responsible for the data analysis, discussion of findings, and formulation of the conclusion and recommendations. The methodological aspect of the study was undertaken by Nanchin Anna Christopher Faka, while Luqman Mohammed conducted the fieldwork and carried out the empirical review. Thereafter, all the authors red the manuscript for approval.

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Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
BIOMETRIC AUTHENTICATION	46	1.80	4.00	3.2261	.53766	-.683	.350	-.176	.688
LIFESTYLE ANALYSIS	46	1.80	4.20	3.1000	.66767	-.133	.350	-.703	.688
FRAUD DETECTION	46	1.00	4.00	3.3696	.73528	-1.415	.350	1.863	.688
Valid N (listwise)	46								

Correlations

		FRAUD DETECTION	BIOMETRIC AUTHENTICATION	LIFESTYLE ANALYSIS
Pearson Correlation	FRAUD DETECTION	1.000	.618	.599
	BIOMETRIC AUTHENTICATION	.618	1.000	.510
	LIFESTYLE ANALYSIS	.599	.510	1.000
Sig. (1-tailed)	FRAUD DETECTION	.	.000	.000
	BIOMETRIC AUTHENTICATION	.000	.	.000
	LIFESTYLE ANALYSIS	.000	.000	.
N	FRAUD DETECTION	46	46	46
	BIOMETRIC AUTHENTICATION	46	46	46
	LIFESTYLE ANALYSIS	46	46	46

Model Summary[b]

					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.700[a]	.491	.467	.53686	.491	20.705	2	43	.000	1.457

a. Predictors: (Constant), LIFESTYLE ANALYSIS, BIOMETRIC AUTHENTICATION

b. Dependent Variable: FRAUD DETECTION

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.935	2	5.968	20.705	.000[b]
	Residual	12.393	43	.288		
	Total	24.329	45			

a. Dependent Variable: FRAUD DETECTION

b. Predictors: (Constant), LIFESTYLE ANALYSIS, BIOMETRIC AUTHENTICATION

Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients			Correlations			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	.198	.508		.389	.699					
	BIOMETRIC AUTHENTICATION	.577	.173	.422	3.335	.002	.618	.453	.363	.740	1.352
	LIFESTYLE ANALYSIS	.423	.139	.384	3.033	.004	.599	.420	.330	.740	1.352

a. Dependent Variable: FRAUD DETECTION