



Professional Development and Teaching Attitudes/Effectiveness among Female Secondary School Teachers in Ekiti-North Senatorial District, Nigeria

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ABSTRACT

Background: Professional development (PD) is central to strengthening teachers' knowledge, instructional skills, and capacity to respond to changing classroom demands in secondary education. However, existing Ekiti-based studies have largely examined teachers collectively, school-level outcomes, or gender differences, rather than focusing specifically on female secondary-school teachers. Thus, knowledge regarding the relationship between female teachers' participation in PD programmes, teaching attitudes, and effectiveness is limited. A gap this current study fills.

Objective: This study examined the association between female teachers' participation in professional development, their teaching attitudes, and effectiveness in selected secondary schools in Ekiti North Senatorial District, Nigeria.

Methods: A correlational research design was adopted for the study. The population of the study comprised female teachers in selected local government areas of Ekiti North Senatorial District, Ekiti State. A sample of 75 female teachers was selected for the study using the multistage sampling procedure (via the purposive, simple random, and stratified sampling techniques). Data were collected using a structured questionnaire titled: Female Teachers' Participation in Professional Development, Teaching Attitudes and Effectiveness Questionnaire (FTPPDTAE), measuring PD programme participation, teaching attitudes, and teaching effectiveness, with $\alpha = 0.82$. Data collected were analyzed using descriptive (frequency counts and percentages, mean and standard deviation) and inferential statistics (Pearson product-moment correlation).

Results: Results indicate that Ekiti North Senatorial District female teachers hold a positive attitude towards teaching (grand mean = 3.19), a high level of teaching effectiveness (grand mean score = 3.57), and participate in PD programme to a high extent (grand mean score = 3.61). A positive, statistically significant relationship exists between female teachers' participation in PD, teaching attitudes ($r(73) = .766, p < .001$), and teaching effectiveness ($r(73) = .851, p < .001$).

Conclusion: Secondary school female teachers' participation in PD programmes is positively associated with their teaching attitudes and teaching effectiveness.

Unique Contribution:

This study expands the body of knowledge regarding the role of PD programmes in female teachers' teaching attitudes and effectiveness indicators.

Key Recommendations: Government and Education Boards in Ekiti North Senatorial District (Nigeria) should mandate regular PD programmes for female teachers and eradicate issues related to bias in the selection of attendees. Principals and head teachers should provide support, recognition, and incentives for female teachers who participate in professional development to boost further participation, and the Ekiti State Ministry of Education should allocate sufficient budgetary provisions for professional development initiatives, particularly for female teachers.

Keywords: Professional Development Engagement, Teaching Attitudes, Teaching Effectiveness, Female Secondary School Teachers.

INTRODUCTION

Education remains a crucial factor in human and societal development, and teachers are the main drivers of these factors. The quality of education provided in schools depends largely on teachers' attitudes and effectiveness indicators. To remain effective in the classroom, teachers need continuous professional development through conferences, workshops, seminars, in-service training, mentoring, and higher academic qualifications (Fajobi et al., 2026). Professional Development (PD) empowers teachers with current knowledge, skills, teaching methods, and motivation that affect classroom instruction and students' learning outcomes (Abeba, 2021; Etherington, 2026; Fajobi et al., 2026; Osiesi et al., 2024a, 2024b, 2025). On the other hand, female teachers do constitute a major proportion of the teaching workforce, yet they seem to often face unique challenges such as work-life balance, limited career progression, and fewer access opportunities to PD and training (Li et al., 2023). Still, the extent to which PD is associated with female teachers' attitudes toward teaching and their classroom effectiveness is not fully documented in many contexts, especially in resource-constrained settings including Ekiti State in Nigeria.

Female teachers play a significant role in the development of education (Aibangbe, 2026; Ziwa et al., 2025). The primary aim of training teachers, particularly female secondary school teachers in Ekiti State, is to convey the curriculum's content to learners, irrespective of their educational inclination, and to benefit school systems and facilitate learner behavior modification (Osiesi & Adeyemo, 2019). It also promotes positive teaching attitudes, job satisfaction, commitment, and professional competence (Zhao et al., 2025). Studies have shown that teachers who regularly participate in professional development programmes demonstrate greater confidence, benefit classroom management, and higher teaching effectiveness than teachers who have not received training (Fajobi et al., 2026; Osiesi et al., 2024a, 2024b, 2025; Zhao et al., 2025). There is every likelihood that these may affect their teaching attitudes and effectiveness.

Teaching attitude refers to a teacher's feelings, beliefs, commitment, enthusiasm, and willingness to perform teaching responsibilities effectively (Papagiannopoulou & Vaiopoulou, 2024). A positive teaching attitude promotes dedication, creativity, punctuality, and healthy teacher-student relationships, while a negative attitude may adversely impede these. Teaching effectiveness refers to the ability of teachers to achieve instructional objectives through effective lesson planning, classroom management, communication, student assessment, and the use of innovative teaching methods (Mensah et al., 2025). A teacher is effective if he or she has the requisite skills, competencies, knowledge, and expertise in activating active learning (Chen et al., 2025).

Governments in Nigeria, particularly those of Ekiti State, organize several PD programmes, yet teacher performance and negative attitudes toward teaching seem to persist. Female teachers in particular report burnout, low motivation, and challenges adapting to curriculum changes. It is unclear whether current PD initiatives address their specific needs or actually benefit their teaching attitude and effectiveness (Ayoola & Oyeromi, 2024). Still, few studies in the extant literature have examined the dynamics of these PD programmes on female teachers' characteristics (Adriana et al., 2024; Johnson, 2020; Osiesi et al., 2024; Ziwa et al., 2025). This study, therefore, investigates how participation in professional development affects female teachers' teaching attitudes and effectiveness in selected secondary schools in Ekiti North Senatorial District, Nigeria. This study's findings provide useful information for educational policymakers, school administrators, teacher training schools, and other



stakeholders in organising effective PD programmes that could affect female teachers' teaching attitudes and effectiveness. The specific questions guiding the study include: What is the attitude of female teachers towards teaching in selected secondary schools in Ekiti North Senatorial District? What is the level of female teachers' teaching effectiveness in selected secondary schools in Ekiti North Senatorial District? To what extent do female teachers participate in PD programmes in Ekiti North Senatorial District secondary schools? What is the relationship between female teachers' participation in PD and teaching attitudes in Ekiti North Senatorial District secondary schools? What is the relationship between female teachers' participation in PD and effectiveness in Ekiti North Senatorial District secondary schools?

LITERATURE REVIEW

Professional development is a continuous process that enables teachers to better their instructional practices and adapt to changes in educational policies, classroom interactions, and curriculum design, while also encouraging interaction among teachers, improving confidence, and improving instructional delivery (Nyirahabimana et al., 2026). In particular, as it is with Ekiti State PD programmes, the focus is on equipping teachers (including female teachers) to become active, competent, and up-to-date, particularly in this fast-paced technological era (Gu et al., 2025). Darling-Hammond et al. (2018) maintain that an effective PD programme is continuous, collaborative, content-focused, and focused on classroom practices.

According to Olaleye (2023), positive teaching attitude is reflected in enthusiasm, commitment, patience, responsibility, and willingness to adopt new teaching methods, while a negative attitude may reduce teacher effectiveness and students' learning results. Johnson (2020) and Tang and Hu (2022) maintain that teachers' attitudes affect their teaching approaches, classroom interactions, and students' motivation to learn. Their study found that positive teacher attitudes encourage students' interactions and better learning outcomes, whereas discouraging attitudes negatively affect students' academic interest and participation. In secondary schools in Ekiti State, Nigeria, Akomolafe (2022) investigated the connections between gender, teaching efficacy, and teaching attitudes through the survey research design. The results showed that teachers had high levels of teaching effectiveness and typically had good opinions toward the teaching profession.

Osiesi et al. (2024b) explained that teaching effectiveness is shown in teachers' ability to plan lessons accurately, employ learner-centered instructional strategies, motivate students, manage classrooms successfully, and assess learning outcomes appropriately. Their study further found that teachers who attended regularly in professional development programmes demonstrated meaningfully higher levels of teaching effectiveness than those with minimal opportunities. Similarly, in Ekiti State, Nigeria, Tiliye and Adeyemi (2024) and Adeyemi et al. (2024) examined the role of PD on secondary school teacher efficacy. The results demonstrated that teachers' involvement in development programmes significantly increased school effectiveness. In other contexts, Langres (2026) investigated the relationship between PD and teaching effectiveness of teachers in public schools in the Philippines. Findings from the study revealed a high level of professional development practices and a high level of teaching effectiveness across identified domains, as well as a significant relationship between professional development and teaching effectiveness.

Gibson (2020) also carried out a qualitative study to explore the role of professional development on effective teachers in low-performing schools in Florida. The findings showed



that PD has positive outcomes for both teachers and learners. Adriana et al. (2024) and Ziwa et al. (2025) assessed the participation of female teachers in PD programmes in Zambia and how this affects their teaching attitudes and effectiveness. Findings indicate that participating in professional development by female teachers affects their teaching attitudes, as it fosters proper teaching and learning of students and overall academic success. Similar findings have been indicated in Cameroon (Tante, 2024) and China (Rosalie, 2026). Still, this current study extends the literature by contextualizing the study in Ekiti State, Nigeria through the correlational (quantitative) research design.

The theoretical frameworks that informed this study are the Guskey PD and Self-Determination theories. Guskey's model (Guskey, 2020; 2022) explains that when female teachers participate in PD programs, they acquire new knowledge and teaching skills that affect their classroom practices. As they observe positive learning outcomes among their students, their attitude towards teaching becomes more positive, thereby increasing their overall teaching effectiveness. Therefore, the model provides a suitable theoretical foundation for examining the role of professional development in influencing female teachers' teaching attitudes and effectiveness.

Self-determination theory (developed by Ryan & Deci, 1985, 2000) is a theory of human motivation that explains how people's behaviors, performance, and well-being are affected by the satisfaction of three basic psychological needs: autonomy, competence, and relatedness (Deci et al., 2020). The theory suggests that when these needs are met, individuals become more motivated, committed, productive, and satisfied with their work. In education, SDT explains that teachers who receive opportunities for professional development and support are more likely to develop positive teaching attitudes and become more effective in their instructional practices (Chui, 2022). Self-determination theory underpins this study because it explains how professional development can positively affect female teachers' motivation, teaching attitude, and effectiveness. Through participation in PD programmes, female teachers gain new knowledge and skills, competence, receive professional support from colleagues and mentors (relatedness), and become more confident in making instructional decisions (autonomy). These experiences encourage positive attitudes toward teaching and benefit classroom effectiveness. Therefore, the theory provides a foundation for explaining the relationship between PD, teaching attitude, and teaching effectiveness among female teachers in selected secondary schools in Ekiti North Senatorial District, Nigeria.

METHODOLOGY

Research Design

This study adopted a correlational research design. The design is appropriate because it enables the researcher to collect data from respondents regarding their opinions, experiences, and attitudes over a given period, with relationships among them, without manipulating the study variables (Aggarwal & Ranganathan, 2019).

Population, Sampling Techniques, and Sample

The population of this study comprised female teachers in public secondary schools in the selected Local Government Area of Ekiti North Senatorial District, Ekiti State, Nigeria. These teachers constituted the target population because they are directly involved in classroom instruction and are expected to have participated in one or more PD programmes organized by the Ministry of Education, TESCO, or other educational bodies. The multistage sampling

procedure was adopted for this study. At the first stage, a purposive sampling technique was used to select Ekiti North senatorial district from the three senatorial districts in Ekiti State. The district was purposively selected because it has a considerable number of public secondary schools with female teachers who are relevant to the study. At the second stage, for more representativeness, the stratified sampling technique was used to select three (3) Local Government Areas (LGAs) from Ekiti North Senatorial District (Oye, Ido/Osi, Ilejemeje LGAs). Also, the simple random sampling technique was used to select ten (10) public secondary schools from the selected LGAs. Simple random sampling technique was used to select the required number of female teachers (75 female teachers) from the selected schools. Only female teachers who consented to participate in the study were included and constituted the sample for the study and responded to the research questionnaire.

Research Instrument

The instrument for data collection was a structured questionnaire titled: Female Teachers' Participation in Professional Development, Teaching Attitudes and Effectiveness Questionnaire (FTPPDTAE). The questionnaire consisted of four sections, A to D, as follows: Section A consisted of demographic information of the respondents, including (local government, year of teaching, religion, age, marital status, qualification); Section B consisted of 10 items measuring teachers' attitudes; Section C consisted of 11 items measuring teaching effectiveness; while Section D consisted of 4 items measuring teachers' professional development. These were rated on a four-point Likert scale of Very true of me (VT)=4, not true of me (NT)=3, rarely true of me (RT)=2, and not true of me (NT)=1.

The questionnaire, since adapted from a previously validated one (Osiesi et al., 2024), was further scrutinised by two experts in instrument design in the field of Test and Measurement and Educational Evaluation at the Faculty of Education in the researcher's university. Their observations and recommendations were used to modify the instrument before the final administration to ensure that it adequately measures the variables under study. A pilot study was conducted with 20 female teachers from public secondary schools outside the study area. The responses were analyzed using Cronbach's alpha, with the instrument yielding a reliability coefficient of 0.82, indicating that it is reliable for the study.

Method of Data Collection

The data for this study were collected through the face-to-face method of questionnaire administration.

Method of Data Analysis

Data for this study were analyzed using the Statistical Package for the Social Sciences (SPSS), version 26. Ideally, descriptive statistics such as frequency counts and percentages, mean and standard deviation, and inferential statistics (correlational analysis) were used to analyse the data.

RESULTS

Demographic Variables of Respondents

As shown in Table 1, the demographic characteristics of respondents are presented in terms of local government area, years of teaching experience, religion, age, marital status, and academic qualification. See the Table for further information.



Table 1: Respondents' Demographics

Variable	Frequency	Percentage (%)
Local Government		
Oye	27	36.0
Ido-Osi	27	36.0
Ilejemeje	21	28.0
Total	75	100
Years of Teaching Experience		
1-5 years	35	46.7
6-10 years	25	33.3
10 years and above	15	20.0
Total	75	100
Age		
25-34 years	30	40.0
35-44 years	34	45.3
45-54 years	5	6.7
55 years and above	6	8.0
Total	75	100
Religion		
Christianity	35	46.7
Islam	30	40.0
Traditional	10	13.3
Total	75	100
Marital Status		
Single	33	44.0
Married	31	41.3
Widowed	5	6.7
Divorce	6	8.0
Total	75	100
Academic Qualification		
NCE	38	50.7
Degree	16	21.3
Masters	15	20.0
PhD	6	8.0
Total	75	100

RQ1: What is the attitude of female teachers towards teaching in selected secondary schools in Ekiti State?

The mean scores of all 10 items in Table 2 are above the criterion mean of 2.50, ranging from 3.04 to 3.31, with a grand mean of 3.19, suggesting that there is a generally high level of agreement about the teachers' teaching attitudes. This implies that the female teachers generally hold a positive attitude towards teaching as a profession.



Table 2: Teachers' Attitude towards Teaching

S/N	Items	Mean	Std. Dev.	Decision
1	Teaching is the ideal profession	3.31	.885	Agree
2	I am happy to be a teacher	3.05	.999	Agree
3	I really hope to be a teacher in my next life	3.24	.970	Agree
4	I prefer the teaching profession to any other	3.13	.977	Agree
5	I feel proud telling others that I am in the teaching profession	3.25	.960	Agree
6	I am fulfilled as a teacher	3.04	.992	Agree
7	I have a high level of satisfaction in teaching	3.19	.968	Agree
8	I love the teaching profession	3.31	.900	Agree
9	I feel so happy encouraging others to join the teaching profession	3.29	.835	Agree
10	I am excited about the teaching profession	3.05	.971	Agree
	Grand Mean	3.19		Agree

RQ 2: What is the level of female teachers' teaching effectiveness in selected secondary schools in Ekiti State?

The results presented in Table 3 above show that all 11 items on the teaching effectiveness measure had mean scores ranging from 3.43 to 3.71, with a grand mean of 3.57. However, all items were rated as effective. This indicates that female teachers are generally effective to a high extent.

Table 3: Teaching Effectiveness Measure

S/N	Items	Mean	Std. Dev.	Decision
1	The teacher explains concepts clearly and effectively	3.71	.588	Effective
2	The teacher effectively manages classroom behavior	3.59	.639	Effective
3	The teacher provides relevant and useful feedback on student work	3.68	.524	Effective
4	The teacher encourages student participation and engagement	3.67	.684	Effective
5	The teacher provides opportunities for collaboration and teamwork	3.43	.756	Effective
6	The teacher demonstrates enthusiasm for the subject matter	3.47	.875	Effective
7	The teacher effectively adapts instruction to meet the needs of diverse learners	3.51	.812	Effective
8	The teacher communicates expectations and objectives clearly	3.71	.514	Effective
9	The teacher creates a positive classroom environment	3.48	.760	Effective
10	The teacher encourages critical thinking and problem-solving skills	3.59	.737	Effective
11	The teacher provides timely and meaningful assessments of student learning	3.45	.723	Effective
	Grand Mean	3.57		Effective

RQ 3: To what extent do female teachers participate in professional development programmes in Ekiti State?

Table 4 presents the extent to which female teachers in selected secondary schools in Ekiti North Senatorial District participate in PD programmes. The results show that all 4 items reported high mean scores ranging from 3.57 to 3.68, with a grand mean of 3.61. Similarly, all items and the grand mean were rated as "High Extent".



Table 4: Teachers' Professional Development measure

S/N	Items	Mean	Std. Dev.	Decision
1	To what extent did the professional development activity help you acquire new knowledge and skills related to your teaching	3.59	.660	High Extent
2	How confident do you feel in applying the new knowledge and skills you acquired during the professional development activity in your teaching	3.57	.597	High Extent
3	How relevant is the professional development activity to your current teaching practice	3.61	.634	High Extent
4	How much did the professional development activity facilitate your teaching practice	3.68	.549	High Extent
Grand Mean		3.61		High Extent

RQ 4: What is the relationship between participation in professional development, female teachers' teaching attitudes, and effectiveness?

Table 5 presents the Pearson product-moment correlation analysis of the relationship between participation in professional development and female teachers' teaching attitudes and effectiveness. The results showed a strong positive and significant relationship [PD and female teachers' teaching attitudes, $r(73) = .766$, $p < .001$; PD and teaching effectiveness, $r(73) = .851$, $p < .001$].

Table 5: Pearson Correlation between Participation in Professional Development and Female Teachers' Teaching Attitude and Effectiveness

CORRELATIONS

		Participation in Professional Development	Female Teachers' Teaching Attitude
PARTICIPATION IN PROFESSIONAL DEVELOPMENT	Pearson Correlation	1	.766***
	Sig. (2-tailed)		< .001
	N	75	75
FEMALE TEACHERS' TEACHING ATTITUDE	Pearson Correlation	.766***	1
	Sig. (2-tailed)	< .001	
	N	75	75
FEMALE TEACHERS' TEACHING EFFECTIVENESS	Pearson Correlation	.851***	1
	Sig. (2-tailed)	< .001	
	N	75	75

N = 75. *** $p < .001$

DISCUSSION

This study has examined the impact of PD programmes on secondary school female teachers' teaching attitudes and effectiveness. Findings indicate that sampled female teachers hold positive attitudes towards teaching. Because teaching is supported by state-level policies and school practices that (imperfectly) support women's participation in education, female teachers in Ekiti State typically report more positive teaching attitudes. This finding is in line with the findings of Adriana et al. (2024) and Ziwa et al. (2025), whose studies found that the majority of secondary school female teachers had a more positive attitude towards the profession than their male counterparts.



Findings also indicate a high level of agreement about the level of female teachers' teaching effectiveness in selected secondary schools in Ekiti State. This pattern indicates that these female teachers are generally effective in their instructional practices. This tallies with the findings of Akomolafe (2022), Tiliye and Adeyemi (2024), Adeyemi et al. (2024), Mduma and Mkulu (2021), Ozkan (2020), and Osiesi et al. (2024b), who reported that the level of teaching effectiveness of female teachers in secondary schools is high, as well as readiness to demonstrate a high level in the subjects taught. Contrarily, Degi and Zangmu (2023) reported findings that disagreed with these findings and reported in their study that many female teachers lacked adequate motivation and professional support, which limited their effectiveness despite willingness to teach. Context-based factors could be the reason for this contrast.

Findings also reveal that a strong positive and significant relationship exists between participation in professional development, female teachers' teaching attitudes, and effectiveness. The strong positive and significant relationship between female teachers' participation in professional development (PD) and their teaching attitude in Ekiti State arises because PD simultaneously builds competence, reinforces professional identity, and signals institutional recognition—processes that are especially salient for women in a context where teaching is both a key route to status and a domain shaped by gendered expectations. This supports the findings of Fajobi et al. (2026), Fejoh and Faniran (2022), and Ntuno et al. (2024), whose findings stressed that professional development programmes significantly affect teachers' general attitudes, pedagogical competence, and classroom performance.

The findings align closely with both Guskey's PD theory and Self-Determination Theory (SDT). Guskey posits that effective PD produces changes in teachers' knowledge and skills, which then shift classroom practices and ultimately affect student learning; the very large PD–effectiveness correlation indicates that PD participation is tightly coupled with more effective instructional behavior, consistent with Guskey's causal chain from PD to practice to outcomes. At the same time, SDT argues that when professional experiences satisfy teachers' needs for competence, autonomy, and relatedness, they foster more self-determined motivation and positive affect toward the work. The strong PD–attitude link suggests that PD is experienced by female teachers as competence-enhancing and identity-affirming (and, via peer interaction, relationally supportive), thereby nurturing internalized motivation and a favorable evaluation of the profession. As such, these results imply that PD in Ekiti functions both as a mechanism for improving instructional capability (Guskey) and as a motivational resource that satisfies basic psychological needs, sustaining positive attitudes and high effectiveness among female teachers (SDT).

CONCLUSION

The findings indicate that female secondary school teachers in Ekiti North Senatorial District hold positive attitudes towards teaching and demonstrate a high level of teaching effectiveness. They also report substantial participation in professional development (PD) programmes. These results suggest that PD participation is positively associated with teachers' attitudes towards teaching and their effectiveness in the classroom. These findings underscore the importance of sustained, relevant, and accessible professional development in supporting female teachers' professional growth. However, because the study establishes an association rather than causation, the results should not be interpreted as proof that PD participation directly produces more positive attitudes or greater effectiveness. Within this limitation, the study highlights PD as an important area for continued attention by education authorities and school leaders seeking to support effective teaching in the district.



This study contributes context-specific evidence on the relationship between professional development (PD), teaching attitudes, and teaching effectiveness among female secondary school teachers in Ekiti North Senatorial District. Its findings show that the sampled teachers reported high participation in PD programmes, positive attitudes towards teaching, and high teaching effectiveness; they also indicate a positive association between PD participation and both teaching attitudes and effectiveness. This evidence helps foreground female teachers' professional development as an important consideration in efforts to strengthen secondary education in Ekiti State, while recognising that the observed relationships do not establish causation. For policy and practice, the findings support the continued provision of accessible, relevant, and sustained PD opportunities for female secondary school teachers across Ekiti State. The Ministry of Education and relevant agencies could use the results to review whether existing programmes address teachers' classroom needs and to strengthen follow-up support that helps teachers apply what they learn. PD planning should also be accompanied by systematic evaluation of participation, classroom application, and teaching outcomes so that future policy decisions are informed by evidence about programme effectiveness.

RECOMMENDATIONS

The following recommendations are proffered based on the findings of the study:

- i. Government and Education Boards should mandate regular professional development for female teachers to enable continuous updating of their pedagogical skills and knowledge and thereby contribute to their teaching effectiveness.
- ii. Government and Education Boards, through the school managements, should eradicate issues related to bias in the selection of male teachers over female teachers for professional development programmes.
- iii. Principals and head teachers should provide support, recognition, and incentives for female teachers who participate in professional development to boost further participation.

Limitations of the Study and Future Research Direction

The study was limited to female teachers in public secondary schools in the selected local government area of Ekiti North Senatorial District, Ekiti State, Nigeria. This study examined participation in professional development, teaching attitude, and teaching effectiveness. Being self-reported data as collected from the sampled female teachers, issues of response and self-report bias may have affected the findings of the study. Future research should advance beyond these.

Ethical clearance

Ethical approval was obtained from the Research Ethics Committee of the Faculty of Education, Federal University Oye-Ekiti, Ekiti State, Nigeria (FUOYE/FED/GC/04/2026/11). Consent was sought and obtained from the participants in this study. They were made to understand that the exercise was purely for academic purposes, and their participation was voluntary.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



Authors' Contributions

Mensah Prince Osiesi conceived and conducted the study, including the design, data collection, analysis and interpretation. The author has critically reviewed and approved the final draft, and is responsible for the content and similarity index of the manuscript.

Data availability statement

The datasets on which conclusions were made for this study are available upon reasonable request.

Artificial Intelligence (AI) Use Disclosure

The author(s) declare that no generative Artificial Intelligence (AI) or AI-assisted technologies were used in the writing, analysis, or preparation of this manuscript.

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