Integrated Journal of Medicine and Medical Sciences

Integr J Med Med Sci. 2026;5(2):73-83.

ASSESSMENT OF THE UTILISATION OF MULTIMODAL NON-PHARMACOLOGICAL INTERVENTION FOR POSTOPERATIVE PAIN MANAGEMENT AMONG SURGICAL NURSES IN TWO TERTIARY HOSPITALS IN NORTH-CENTRAL NIGERIA

[1]ZACCHAEUS Tolulope Dorcas {MNSc.}, [2]OYEDIRAN Olufemi Oyebanji {Ph.D.}, [3]OLAJIDE, Adetunmise {Ph.D.}, [4]OYEWUMI Zaccheus {Ph.D.} [5]OKEDIJI Sodiq Oluwaseun {MNSc.}, [1]ABDULKAREEM Silifat Romokem {MNSc.}, [1]OLAKUNLE Oluwatosin Oluwakemi {MNSc.}

[1]Department of Paediatric Nursing, College of Nursing Sciences, University of Ilorin Teaching Hospital, Ilorin.
[2]College of Health Sciences, Obafemi Awolowo University Ile-Ife, Nigeria.
[3]Department of Maternal/Child Health Nursing, LAUTECH, Ogbomoso, Nigeria,
[4]Department of Community/Public Health Nursing, LAUTECH, Ogbomoso, Nigeria
[5]State Hospital, Ogbomoso, Oyo state, Nigeria.

Corresponding Author: Zacchaeus Tolulope Dorcas Email: tolulopezacchaeus@gmail.com

Citation:
Zacchaeus TD, Oyediran OO, Olajide A, Oyewumi Z, Okediji SO, Abdulkareem SR, Olakunle OO. assessment of the utilisation of multimodal non-pharmacological intervention for postoperative pain management among surgical nurses in two tertiary hospitals in north-central Nigeria. Integr J Med Med Sci. 2026;5(2):73-83.

Received: April 8, 2026.
Accepted: June 29, 2026.
Published: July 31, 2026.

DOI:
https://dx.doi.org/10.4314/ijmms.v5i2.1

Abstract

Background: Effective postoperative pain management requires surgical nurses to integrate multimodal non-pharmacological interventions (MNPIs) alongside pharmacological therapies. However, despite evidence supporting their effectiveness, MNPIs remain underutilised and poorly integrated into clinical practice.

Aim: This study assessed the utilisation of MNPIs for postoperative pain management among surgical nurses in selected hospitals in Ilorin, Nigeria.

Methods: A descriptive cross-sectional study was conducted with 174 surgical nurses selected via proportionate random sampling. Data on knowledge, attitudes, and utilization were collected using a validated semi-structured questionnaire and analyzed via SPSS using descriptive and inferential statistics was set at ($p < 0.05$).

Results: The findings shows that majority (67.8%) of nurses possessed adequate knowledge, and 54.0% held positive attitudes toward MNPIs. Only 58.6% reported overall MNPI utilization. The most common methods were positioning and early mobilization, while aromatherapy and TENS were the least utilized. Knowledge and attitude were significantly associated with utilization. Factors such as high workload, lack of continuing education, and patient non-cooperation hindered use.

Also, nurses with 11–20 years of experience were more likely to use MNPIs. However, Nursing Officer I (7; 33.3%) and Chief Nursing Officers (21; 53.8%), as well as those in adult surgical (22; 55.0%) or theatre units (14; 56.0%), showed significantly lower utilization compared to their counterparts in pediatric wards (18; 90.0%).

Conclusion: Despite adequate knowledge, MNPI utilization remains suboptimal. Improving integration requires addressing institutional workload, enhancing professional education, and tailoring strategies to specific clinical environments to ensure comprehensive pain management.

Keywords: Post-operative pain management, Multimodal, Nurses, intervention, non-pharmacological.

INTRODUCTION

Postoperative pain is universally recognized as one of the most prevalent, distressing, and complex experiences reported by patients immediately following surgical procedures.[1] Defined by the International Association for the Study of Pain (IASP) as an unpleasant sensory and emotional experience associated with actual

or potential tissue damage, pain serves as a critical physiological signal.[2] In the clinical setting, its significance is so profound that it is frequently categorized as the "fifth vital sign," requiring the same level of monitoring and assessment as blood pressure, heart rate, respiratory rate, and temperature.[2]

Postoperative pain typically originates from the surgical site or procedure-related trauma and generally persists for a duration of three to seven days.[3,4] However, the nature of this pain is rarely static. It is a multidimensional and dynamic experience that can shift rapidly from acute nociceptive or inflammatory stages resulting from direct intraoperative trauma and the release of pro-inflammatory cytokines into chronic neuropathic states if neural structures are injured.[5] The intensity and duration of this experience are dictated by a myriad of factors, including the anatomical site of surgery, the degree of tissue manipulation, and even the positioning of the patient during the operation.[6]

Beyond the physical trauma, the perception of pain is heavily mediated by a patient's psychological, social, and cultural background. Research indicates that preoperative anxiety, depression, a lack of social support, and the financial burden of healthcare can significantly exacerbate the perceived intensity of pain.[1,7] Furthermore, religious beliefs and cultural coping mechanisms play a pivotal role in how a patient interprets and reports their suffering, making the management of postoperative pain a challenge that requires a holistic, rather than a purely mechanical approach.[7]

The failure to provide effective postoperative pain management (POPM) results in a cascade of adverse physiological and psychological outcomes. When pain is left untreated or poorly controlled, it triggers a systemic stress response that can lead to life-threatening pathophysiological complications. These include respiratory issues such as pneumonia and atelectasis, cardiovascular events like myocardial infarction, and vascular complications such as deep vein thrombosis.[8]

Psychologically, the impact is equally devastating. Patients suffering from acute, unmanaged pain often experience severe stress, depression, insomnia, and acute confused states.[9] One of the most significant long-term risks is the development of Persistent Postsurgical Pain (PPP), a chronic syndrome where pain lasts for weeks, months, or even years after the initial surgical injury.[5,10] This progression to chronicity results in social isolation, malnutrition, and a marked reduction in the overall quality of life. For the healthcare system, this manifests as delayed ambulation, longer hospital stays, increased readmission rates, and a significantly higher cost of hospitalization and burden of care.[10]

Traditionally, POPM has relied on a pharmacological framework involving systemic analgesia. This includes non-opioids, non-steroidal anti-inflammatory drugs (NSAIDs), opioids, and adjuvant therapies.[11] In modern practice, "multimodal analgesia," the combination of different classes of analgesics to target various pain pathways, has become the gold standard for achieving adequate control.[12]

However, despite their efficacy, pharmacological agents are not without serious drawbacks. The intensive and frequent administration of these drugs is often implicated in altered physiological functions.[13] Opioids, while potent, have become a global public health concern due to risks of tolerance, dependence, and addiction.[1] In clinical settings, they are associated with adverse effects like nausea, vomiting, constipation, and life-threatening respiratory depression, particularly in elderly patients.[14] Similarly, while NSAIDs are effective for inflammatory pain, their long-term or high-dose use can lead to gastrointestinal damage, impaired renal function, and cardiovascular risks. Even advanced techniques like nerve blocks and local anesthesia, though highly effective, require specialized equipment and carry risks such as nerve injury or post-dural puncture headaches.[15]

In light of these risks, regulatory bodies such as the Centre for Disease Control and Prevention (CDC) have increasingly emphasized the move toward non-opioid and non-pharmacological strategies as the first-line approach for managing mild to moderate pain.[16,17]

Non-pharmacological interventions (NPIs) represent a diverse range of physical, psychological, and integrative practices that manage pain without relying on drug therapy. These interventions can be categorized into Physical/Stimulation methods, Cognitive-Behavioural Methods and Integrative and Procedural Methods.[18,19]

Recent evidence highlights that the Multimodal Non-Pharmacological Intervention (MNPI) approach using two or more of these techniques simultaneously, is significantly more effective than any single method.[20] MNPIs provide a holistic approach to recovery by addressing not just the physical sensation of pain, but also its emotional, cognitive, and sociocultural dimensions. They are safe, cost-effective, and empower the patient by providing a sense of control over their recovery process.[14,21]

Surgical nurses are the linchpin of postoperative care. As the healthcare professionals most consistently present at the patient's bedside, they are uniquely positioned to implement MNPIs into routine practice.[4] The successful integration of these therapies depends heavily on the nurse's knowledge, attitude, and clinical skills.[22]

Despite the proven benefits of MNPIs, research from low- and middle-income countries suggests they remain critically underutilized. Often hindered by systemic barriers, including inadequate professional training, negative attitudes toward non-drug therapies, high patient-to-nurse ratios, and a lack of institutional support.[7,22]

In Nigeria, understanding the current utilization patterns and challenges faced by surgical nurses is essential for developing evidence-based strategies that improve holistic postoperative care, hence, the need for this study.

METHODS

Research Design and Settings

This study adopted a cross-sectional descriptive survey design to assess surgical nurses'(registered nurses who provides care before, during and after surgical procedures) knowledge, attitudes, and utilization of multimodal non-pharmacological interventions (MNPIs) for postoperative pain management at a single point in time, as well as the identification of factors influencing utilization among surgical nurses in the University of Ilorin Teaching Hospital (UITH) and Kwara State University Teaching Hospital (KWASUTH). These hospitals provides a wide range of clinical, diagnostic, and support services and also provides a range of surgical procedures, from general surgery to specialized surgeries like open heart surgery. An average of 200 and 80 surgeries every month respectively, which are carried out by trained consultants in various specialties and other healthcare personnel including over 275 nurses working in both surgical wards and surgical clinics, providing perioperative, intraoperative, and postoperative care. All these attributes make the settings very suitable for this research study.

Participants

The target population comprised 275 surgical nurses working directly with postoperative patients in the surgical units, including the operating theatre, intensive care, surgical wards, recovery rooms etc., and are most relevant for assessing the utilization of multimodal non-pharmacological interventions (MNPIs) in selected hospital, Ilorin.

Inclusion criteria

All surgical nurses who have worked for at least 6 months in the hospitals. Surgical nurses directly involved in postoperative care in Intensive Care Unit, emergency room, operating room, trauma ward, postnatal ward, paediatrics, orthopaedic, private and high dependency wards etc. Surgical nurses willing to participate in the research and provided informed consent.

Exclusion criteria

Surgical nurses on annual, maternity or sick leave and training. Surgical nurses who had not been working in surgical clinics, wards, operating rooms, for the last 6 months, and Surgical nurses not willing to participate in the research and unable to provide informed consent.

Sampling size determination

The sample size of the study was determined using Taro Yamane's formula which is 163. With attrition/Non-response rate the sample size became 179.

Ethical Approval

The approval for this study was obtained from the Health Research Ethics Committee of the University of Ilorin Teaching Hospital, Ilorin with approval number (PAN/2025/12/0637) and the Kwara State University Teaching Hospital (KWASUTH/IRC/246/VOL.II/122) respectively before the commencement of the study.

Instrument for Data Collection

The data for this study was collected using modified, semi-structured and validated questionnaires adapted from previous studies. Surgical nurses' knowledge and attitude regarding NPIs for postoperative pain management were assessed using the knowledge and attitude survey regarding pain (NKASRP) developed and revised by Ferrell and McCaffery in 2014, the Non-pharmacological methods questionnaire developed by Pölkki *et al.* in 2001, and factors influencing utilisation of MNPIs was adapted from previous studies by Jira *et al*. 2020[13] Ojo and Apata, 2021[14,] and Faleke *et al*. 2024[22]

Method of Data Collection

Before the beginning of data collection, three registered perioperative nurses were recruited and trained as Research Assistants for a day, to assist in data collection, understanding the objectives of the study, the data collection approach, the contents and significance of the study, the confidentiality of the information, as well as the rights of participants. The questionnaires were administered in person to surgical nurses during their shifts (morning, afternoon, and night) in the surgical wards/units, and time was provided for them to fill out and return the questionnaires.

Method of Data Analysis

For the purpose of adequate evaluation, the data obtained were analyzed using SPSS version 25 while the results were presented descriptive statistics.

RESULT

Demographic Characteristics

The respondents had a mean age of 40.64 years, with the 31–40 age group being the most represented (28.7%). The cohort was predominantly female (85.1%), married (64.9%), Yoruba (91.4%), and Christian (50.6%). Professionally, 56.9% held Registered Nursing certificate (RN) plus additional qualifications, while 40.2% possessed a Bachelor of Science in Nursing certificate (BNSc.). Chief Nursing Officers formed the largest grade (22.4%). Despite a mean experience of 9.80 years, 42.1% had practiced for under five years. Most worked at UITH (75.9%), with the largest ward-specific group (32.2%) based in the Female Surgical Ward.

Knowledge of surgical nurses

Table 1 shows that the majority of the respondents correctly identified interventions such as early ambulation and proper positioning (174; 100%), adequate patient education (172; 98.9%), and relaxation techniques (165; 94.8%). Conversely, fewer nurses correctly recognized distraction methods as effective for adults (65; 37.4%) or understood that NPIs are effective in severe pain (48; 27.6%). The mean knowledge score was 10.79 ± 1.28. Most (118; 67.8%) of the respondents had adequate knowledge, while 56 (32.2%) had inadequate knowledge of non-pharmacological interventions for postoperative pain management, as shown in Table 1.

Attitudes of surgical nurses

Table 2 shows that most respondents routinely offer non-pharmacological interventions to all postoperative patients (102; 58.6%), encourage patients to use these interventions (114; 65.5%) and combine them with pharmacological methods to achieve better pain control (88; 50.6%). Additionally, a majority recognized the role of NPIs in enhancing nurse-patient interaction and overall quality of care (96; 55.2%). The mean attitude score was 29.66 ± 2.92. Figure 4.2 shows that 94 (54.0%) of the respondents had positive attitude, while 80 (46.0%) had negative attitude toward non-pharmacological interventions for postoperative pain management (See Table 2).

Table 1: Assessment of Surgical Nurses' Knowledge of Non-pharmacological Interventions for Postoperative Pain Management (n=174)

Statement	YES	NO
	N (%)	N (%)
Non-pharmacological interventions can be used alone or in combination with medications for postoperative pain.	158 (90.8)	16 (9.2)
Adequate patient education is a form of non-pharmacological intervention	172 (98.9)	2 (1.1)
Heat therapy and cryotherapy at the surgical site can reduce pain and swelling in some patients.	153 (87.9)	21 (12.1)
Relaxation techniques, such as deep breathing, can help reduce the perception of postoperative pain.	165 (94.8)	9 (5.2)
Educating patients before and after surgery about pain management can reduce anxiety and pain.	171 (98.3)	3 (1.7)
Early ambulation and proper positioning can reduce postoperative discomfort and complications.	174 (100)	0 (0.0)
Distraction methods like music therapy, conversation and watching TV are non-pharmacological interventions that can be used for postoperative pain management effectively among children only and not in adults	65 (37.4)	109 (62.6)
Acupuncture and transcutaneous electrical nerve stimulation (TENS) are types of non-pharmacological intervention	166 (95.4)	8 (4.6)
Non-pharmacological interventions are only useful for mild pain and have little or no effect in severe pain.	48 (27.6)	126 (72.4)
Mind-body practices such as yoga and tai chi are forms of non-pharmacological intervention	163 (93.7)	11 (6.3)
Psychological techniques like guided imagery, mindfulness-based therapy, meditation, and cognitive-behavioural therapy (CBT) are forms of non-pharmacological intervention	159 (91.4)	15 (8.6)
Some non-pharmacological interventions, such as relaxation and guided imagery, can stimulate the release of endorphins, which reduces pain perception.	162 (93.1)	12 (6.9)
Knowledge Score: Mean(SD) 10.79±1.28		

Types of non-pharmacological interventions utilized by surgical nurses for postoperative pain management

Result shows that the most frequently utilized non-pharmacological interventions were patient positioning/repositioning (0.99 ± 0.08) and early mobilization/ambulation (0.99 ± 0.11), and patient education on safe mobility and positioning (0.98 ± 0.15). The least utilized interventions were aromatherapy and acupuncture/acupressure (0.19 ± 0.39) and transcutaneous electrical nerve stimulation (TENS) (0.22 ± 0.42) (See Table 3).

Overall level of utilization of multimodal non-pharmacological interventions

The result reveals that the majority of surgical nurses, 102 (58.6%), reported using multimodal non-pharmacological interventions, while 72(41.4%) reported non-utilization. Among individual categories, physical interventions (93; 53.4%) and emotional/supportive interventions (91; 52.3%) were the most frequently utilized, while cognitive-behavioural (75; 43.1%) and educational interventions (79; 45.4%) were utilized less often (Table 4).

Factors influencing the utilization of multimodal non-pharmacological interventions

The result shows that the most frequently reported factors influencing the use of multimodal non-pharmacological interventions were language differences (160; 92.0%), adequate training on NPIs (157; 90.2%), and staff shortage (149; 89.6%) (Table 5).

Table 2: Assessment of Surgical Nurses' Attitude toward Non-pharmacological Interventions for Postoperative Pain Management (n=174)

Statement	SA	A	D	SD
	N (%)	N (%)	N (%)	N (%)
I offer non-pharmacological interventions routinely to all postoperative patients.	37 (21.3)	102(58.6)	32 (18.4)	3 (1.7)
I always encourage patients to utilise non-pharmacological interventions for pain relief.	38 (21.8)	114(65.5)	20 (11.5)	2 (1.1)
I believe using Non-pharmacological interventions delays the provision of "real" pain relief.	13 (7.5)	62 (35.6)	81 (46.6)	18(10.3)
I believe Non-pharmacological interventions are time-consuming and less practical in busy surgical wards.	7 (4.0)	66(37.9)	71 (40.8)	30(17.2)
I combine non-pharmacological interventions with pharmacological methods to provide better pain management than pharmacological methods alone.	88 (50.6)	77 (44.3)	6 (3.4)	3 (1.7)
I feel it unnecessary to provide non-pharmacological interventions if patients are already receiving analgesics	37 (21.3)	104(59.8)	21 (12.1)	12 (6.9)
I educate patients about non-pharmacological interventions as part of routine postoperative management	60 (34.5)	103(59.2)	8 (4.6)	3 (1.7)
Non-pharmacological interventions are beneficial for patients who cannot tolerate high doses of analgesics.	60 (34.5)	86 (49.4)	25 (14.4)	3 (1.7)
Non-pharmacological interventions are beneficial for patients who cannot tolerate high doses of analgesics.	60 (34.5)	86 (49.4)	25 (14.4)	3 (1.7)
I prioritize pharmacological methods for post-operative pain management, as non-pharmacological interventions are less effective	20 (11.5)	78 (44.8)	60 (34.5)	16 (9.2)
Providing non-pharmacological interventions improves nurse-patient interaction and overall quality of care	96(55.2)	67 (38.5)	11 (6.3)	0 (0.0)
Attitude Score: Mean(SD) 29.66±2.92				

Table 3: Assessment of Types of Non-pharmacological Interventions for Postoperative Pain Management (n=174)

Non-Pharmacological Intervention	Mean±SD
Aromatherapy and Acupuncture/Acupressure	0.19±0.39
Transcutaneous Electrical Nerve Stimulation (TENS)	0.22±0.42
Guided imagery/mindfulness	0.40±0.49
Spiritual support	0.88±0.33
Distraction technique (music, television, conversation, games).	0.89±0.31
Cold/heat therapy	0.93±0.26
Relaxation techniques (e.g., deep breathing).	0.95±0.22
Emotional support and active listening	0.97±0.17
Guided relaxation and breathing exercises.	0.97± 0.18
Massage/therapeutic touch.	0.97±0.17
Patient education providing instruction on safe mobility and positioning to reduce pain	0.98±0.15
Early mobilisation/ambulation	0.99±0.11
Patient positioning/repositioning	0.99±0.08

Table 4: Assessment of Overall Utilization of Multimodal Non-pharmacological Interventions for Postoperative Pain Management (n=174)

Non-pharmacological Intervention	Mean±SD	Utilizer	Non-Utilizer
		N (%)	N (%)
Physical Intervention	**2.60±0.45**	93 (53.4)	81 (46.6)
Application of cold compress (ice packs)/heat therapy	2.28±0.84		
Positioning/repositioning for comfort.	3.55±0.64		
Massage/therapeutic touch	2.91±0.85		
Early mobilization/ambulation	3.48±0.68		
Application of Transcutaneous Electrical Nerve Stimulation (TENS)	0.74±1.11		
Cognitive Behavioural Therapy	**2.82±0.54**	75 (43.1)	99 (56.9)
Guided relaxation and breathing exercises	3.04±0.92		
Guided imagery/visualization techniques	1.72±1.13		
Providing reassurance to reduce anxiety	3.59±0.67		
Distraction (music, television, conversation, games)	2.76±0.91		
Positive reinforcement/goal-setting for activity	2.99±0.98		
Emotional/Supportive Intervention	**3.57±0.55**	91 (52.3)	83 (47.7)
Encouraging family involvement for comfort and support.	3.45±0.72		
Creating a comfortable environment	3.69±0.68		
Educational Intervention	**3.39±0.50**	79 (45.4)	95 (54.6)
Explaining expected postoperative pain and coping strategies.	3.37±0.72		
Teaching patients self-relaxation techniques (e.g., deep breathing).	3.21±0.86		
Providing instruction on safe mobility and positioning to reduce pain	3.60±0.64		
Multimodal Non-Pharmacological Interventions		**102 (58.6)**	**72 (41.4)**

Table 5: Assessment of Factors Influencing the Uptake of Multimodal Non-pharmacological Interventions for Postoperative Pain Management (n=174)

Factor	Response	
	Yes	No
	N (%)	N (%)
Adequate training on NPIs for postoperative pain	157 (90.2)	17 (9.8)
Lack of continuous professional education on the use of NPIs	117 (67.2)	57 (32.8)
Availability of adequate resources	142 (81.6)	32 (18.4)
High patient workload	137 (78.7)	37 (21.3)
Staff shortage	149 (89.6)	25 (14.4)
Hospital policies and protocols	143 (82.2)	31 (17.8)
Lack of administrative support	128 (73.6)	46 (26.4)
Patient's inability to accept and cooperate	120 (69.0)	54 (31.0)
Cultural or religious beliefs of patients	132 (75.9)	42 (24.1)
Language differences	160 (92.0)	14 (8.0)

Test of Hypotheses

Hypothesis One

$H_0$1: There is no significant relationship between surgical nurses' knowledge of non-pharmacological interventions and the level of utilization in postoperative pain management in selected hospitals in Ilorin.

The Hypothesis testing shows that there was a significant association between knowledge of non-pharmacological interventions and the level of utilization in postoperative pain management ($p = 0.000$). Surgical nurses with adequate knowledge were over six times more likely to utilize these interventions than those with inadequate knowledge (COR = 6.719; 95% CI: 3.31–13.64)

DISCUSSION

The study revealed that most surgical nurses were within the 31–40-year age group, representing a productive and professionally active phase. This aligns with typical career progression patterns in Nigerian tertiary institutions, where nurses consolidate clinical competence and assume greater responsibilities during early- to mid-career stages.[23] Such progression may enhance adaptability to evolving practices like multimodal pain management. The predominance of female respondents reflects global and national workforce trends, with women constituting about 85% of nurses globally and approximately 90% of frontline health workers.[23] The high proportion of married nurses is consistent with the age distribution and may reflect the maturity associated with surgical nursing roles.

The ethnic and religious composition corresponds with the North Central Nigerian setting. Most respondents held RN qualifications alongside additional credentials, with many possessing a B.Sc. degree, indicating a relatively well-educated workforce. This reflects ongoing professionalization in Nigerian nursing, supported by regulatory bodies such as the Nursing and Midwifery Council of Nigeria (NMCN). Educational attainment has been shown to significantly influence knowledge and practice of non-pharmacological pain management, suggesting that this profile supports the adoption of evidence-based practices.[13,17,22]

Although Chief Nursing Officers formed the largest cadre, many respondents had less than five years of experience, likely reflecting workforce dynamics such as recruitment, redistribution, or rapid career progression. The higher representation of nurses from female surgical wards and larger institutions such as UITH may be attributed to patient volume and staffing patterns.

Most nurses demonstrated adequate knowledge of non-pharmacological interventions (NPIs), possibly due to increased emphasis on evidence-based practice and routine exposure to postoperative care. This aligns with studies reporting moderate-to-high knowledge levels among nurses.[13,14,17] However, contrasting findings in some settings, such as poor knowledge reported by Elhusein et al.[24] and lack of training identified by Mohammed et al.[25] highlight the influence of institutional and educational differences.

In terms of attitude, slightly more than half of the respondents exhibited positive attitudes toward NPIs, while a considerable proportion showed negative attitudes, indicating some ambivalence. Positive attitudes may stem from awareness of multimodal pain management and recognition of NPIs as complementary approaches that improve patient comfort. Clinical experiences with the limitations of pharmacological therapies may further reinforce favorable perceptions. These findings are consistent with Ojo et al.[14] who reported positive attitudes among Nigerian nurses, although other studies have reported less favorable attitudes.[13,1] The presence of mixed attitudes underscores the need for interventions to strengthen nurses' confidence in NPIs.

Regarding utilization, positioning, early mobilization, and patient education were the most commonly used NPIs, while specialized interventions such as aromatherapy, acupuncture, and transcutaneous electrical nerve stimulation (TENS) were rarely used. This pattern reflects a preference for simple, routine, and resource-efficient interventions that are already embedded in standard nursing care.

Similar trends have been reported in previous studies.[11,19, 26] The limited use of specialized methods may be due to lack of equipment, insufficient training, or unclear scope of practice.

Overall utilization of multimodal NPIs was moderate, with physical and supportive interventions more frequently applied than cognitive-behavioral and structured educational approaches. This may be because physical and emotional interventions are easily integrated into routine care and require minimal resources. In contrast, cognitive-behavioral methods require more time, communication skills, and patient cooperation, which may be challenging in busy surgical settings. These findings align with previous studies,[8,11,26] while Mohamed-Bayoumi et al. identified time constraints and patient-related factors as key barriers.[27]

Despite adequate knowledge and moderately positive attitudes, utilization remained moderate, suggesting a gap between knowledge and practice. Similar discrepancies have been reported in other studies. [11,14] Higher utilization rates have been observed in settings with stronger institutional support,[28] while lower rates have been reported in resource-limited environments.[7,22,25] This highlights the role of systemic factors in influencing practice.

Key barriers identified in this study included language barriers, inadequate training, and staff shortages, emphasizing the combined influence of individual competence and organizational constraints. These findings are consistent with previous studies that identified workload, lack of knowledge, and limited resources as major barriers. [7,8,22,26] In contrast, studies in well-resourced settings have reported fewer barriers and higher utilization, underscoring the importance of institutional support and collaboration.[29]

The study also found significant associations between knowledge and utilization, and between attitude and utilization of NPIs. Nurses with higher knowledge levels and positive attitudes were more likely to implement these interventions. This supports previous findings that knowledge and attitude are key determinants of practice. [14,19,22,30]

Additionally, systemic and patient-related factors such as lack of continuous professional education, high workload, patient non-cooperation, and cultural beliefs significantly influenced utilization. These findings are consistent with prior research. [7,8,25,28] Interestingly, some institutional factors such as resource availability were not significant, suggesting that immediate clinical and patient-related factors may have a greater impact on practice.

Finally, multivariate analysis identified nursing grade, years of experience, and clinical unit as significant predictors of MNPI utilization. Senior nurses were less likely to use NPIs, possibly due to administrative responsibilities, while more experienced nurses demonstrated higher utilization, reflecting greater competence. [22,25] Nurses in paediatric surgical wards were more likely to use NPIs than those in adult surgical or theatre settings, likely due to greater emphasis on behavioural and supportive care, highlighting the influence of clinical context on practice.[17,29]

CONCLUSION

Despite relatively adequate knowledge and moderately positive attitudes, the utilization of multimodal non-pharmacological interventions remains influenced by individual, professional, and institutional factors. Strengthening continuous professional education, fostering positive attitudes, addressing workload constraints, and implementing ward-specific strategies are essential to enhance consistent adoption of MNPIs and improve postoperative pain outcomes in surgical settings. The current study found progress in adopting non-pharmacological pain management, gaps remain in attitude, consistency, and systemic support, indicating the need for improved training, staffing, and institutional frameworks.

Author contribution

1. Dr. Oyediran O.O. and Mr Akinoso: Conceptualization of study, study design.
2. Dr. Olajide and Dr. Adeniran: Literature reviews, and critical revision of the manuscript
3. Okediji S.O. Assisted with review of the manual script.

4. Abdulkareem S.R. and Olakunle O.O: Methodology development and were research assistants during my data collection and editing of the manuscript.

Funding: This study was self-funded

Conflicts of Interest

There are no conflicts of interest.

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Integrated Journal of Medicine and Medical Sciences

Integr J Med Med Sci. 2026;5(2):84-95.

PREVALENCE, PATTERNS, AND RISK LEVELS OF SUBSTANCE ABUSE AMONG SENIOR SECONDARY SCHOOL STUDENTS IN OYO STATE, NIGERIA

AYANYINKA Adebamike Adenike (MNsc.)[1*], ADEYEMO Florence Olufunke (Ph.D)[1], OYEWUMI Zacchaeus Opeyemi (Ph.D)[1], ADELOYE Adeniyi Ayokunle (B.Tech.)[2]

[1]Department of Community/Public Health Nursing, Faculty of Nursing Sciences, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria.
[2]Department of Physiology, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria.

Corresponding Author: AYANYINKA Adebamike Adenike Email: aaayanyinka@gmail.com +2348034624645

Citation:
Ayanyinka AA, Adeyemo FO, Oyewumi ZO, Adeloye AA. prevalence, patterns, a nd risk levels of substance abuse among senior secondary school students in Oyo state, Nigeria. Integr J Med Med Sci. 2026;5(2):84-95.

Received: April 30, 2026.
Accepted: June 29, 2026.
Published: July 31, 2026.

DOI:
https://dx.doi.org/10.4314/ijmms.v5i2.2

Abstract

Background: Substance abuse among adolescents has become a major global public health challenge especially in Nigeria. However, region-specific epidemiological data, particularly in Oyo State, remains limited.

Aim: This study aimed to determine the prevalence, patterns, and risk levels of substance abuse among senior secondary school students in Oyo State, Nigeria.

Methods: A cross-sectional descriptive study was employed. Six hundred (600) senior secondary school students were selected through multistage sampling from public secondary schools in Oyo State. Data were collected using the WHO Alcohol, Smoking and Substance Involvement Screening Test (ASSIST). Data were analysed using SPSS (version 27), and results were presented using frequency tables and inferential statistics. Statistical significance was determined at $p<0.05$.

Results: The mean age of the respondents was 15.45±1.73years. The prevalence of substance abuse was 35.7%. The most commonly abused substances were alcohol (125, 58.4%) and opioids (120, 56.1%), with 55 (25.7%) reporting polysubstance use. The ASSIST risk classification revealed that while the majority of students were at low risk (388, 64.7%), a substantial proportion were at moderate risk (63, 10.5%) and high risk (149, 24.8%). Significant associations were found between gender ($\chi^2 = 25.386$, $p<0.001$), family type ($\chi^2 = 13.043$, $p = 0.042$), living arrangement ($\chi^2 = 20.637$, $p = 0.002$) and the risk levels of substance abuse.

Conclusion: Substance abuse is prevalent among senior secondary school students in Oyo State, Nigeria, with a significant minority at moderate to high risk. There is an urgent need for school-based prevention and early intervention programmes targeting these specific substances and high-risk groups.

INTRODUCTION

Adolescence is a critical developmental stage characterised by heightened curiosity, experimentation, and increased sensitivity to peer influence, making it a period of vulnerability for substance use initiation.[1-2] Substance abuse among adolescents has become a major global public health challenge with significant consequences for individual well-being, community health, and national development.[3] It is referred to as the excessive, maladaptive or addictive use of substances for

non-medical purpose, despite the debilitating effects on physical, psychological, and social health.[4] The World Health Organisation estimates that about 275 million people use drugs globally, with over 35 million suffering from substance use disorders, a significant proportion being adolescents and young adults.[5]

In Nigeria, substance abuse among adolescents has reached alarming levels and remains one of the most challenging public health issues in Africa.[6] Recent studies across Nigerian states consistently document high prevalence rates. Studies have reported that 61.6% of adolescents reported illicit substance use, and prevalence rates of 37% in urban and 38% in rural settings in South-south states of Nigeria .[7,8] Among secondary school students in Northern Nigeria, 55.9% of them had used drugs for non-medical purposes.[9] A lifetime drug prevalence with alcohol at 29.1% was reported in Lagos, Nigeria.[10]

The most commonly abused substances among Nigerian adolescents include alcohol, cannabis, tramadol, and codeine-based cough syrups.[9,11,12] The misuse of prescription opioids, particularly tramadol and codeine, has emerged as a growing trend in West Africa, linked to their affordability, perceived therapeutic value, and widespread availability through informal channels.[9,11] Alarmingly, the perception of risk has declined globally, with a 40% drop in adolescents considering substance use harmful to health, and a 26% rise in users within a single year.[13]

Despite the growing body of research on adolescent substance use in Nigeria, there remains a significant geographical gap. There is no comprehensive study conducted using the validated WHO ASSIST instrument for epidemiological data specifically among senior secondary school students in Oyo State. Given the state's dense population, numerous educational institutions, and unique socio-cultural dynamics, context-specific data are essential for evidence-based intervention planning. Therefore, this study aimed to determine the prevalence, patterns, and risk levels of substance abuse among senior secondary school students in Oyo State, Nigeria.

METHODS

Study Area

This study was conducted in nine secondary schools across the three senatorial districts (Oyo North, Oyo Central, and Oyo South) in Oyo State, Nigeria. In 2025, the Oyo State SoGE Report indicated that there are over 1000 secondary schools distributed across Oyo state, which comprise boys' only, girls' only, and mixed schools that are either government, mission or and private-owned, with approximately 1.2 million (85.1%) in-school adolescents across the state.

Study Design

This study employed a cross-sectional descriptive survey design.

Study Population

The target population comprised all senior secondary school students (SS1-SS3) enrolled in selected public secondary schools in Oyo State, Nigeria. This study included students aged 14–19 years, enrolled in SS1–SS3, present during data collection, and whose parents/guardians provide consent, along with their assent, and are willing to participate in the study. Students in junior classes and those who are not willing to participate and provide informed consent.

Sample Size Determination

The sample size was determined using Fisher's formula;

$$n = \frac{z^2 pq}{d^2}$$

Where; n = sample size; Z = 1.96 for 95% confidence level; P = estimated proportion of the prevalence of adolescent substance abuse (using

61.6% (0.616)[7]. Q = 1−P; d = absolute precision or sampling error tolerated = 5% (0.05).

The sample size was approximately 364 participants after a**djusting for a design effect (DEFF);** $n_{deff} = 363.5 \times 1.5 = 545.3 \approx 545$. Attrition/Non-response rate; 10% of the sample size was added to the sample size, then the new size equals 600 senior secondary school students.

Sampling Technique

A multistage sampling technique was employed.

Stage 1 – the three senatorial districts (Oyo North, Oyo Central and Oyo South Senatorial Districts) were stratified into Local Government Areas (LGAs). Nine LGAs were selected to ensure balanced representation of urban, semi-urban, and rural populations.

Stage 2 – three schools, comprising boy's only, girl's only, and mixed gender school, were selected from each district, using purposive sampling technique. Hence, a total of nine schools were selected for this study.

Stage 3 – the total sample size of 600 students was divided across the nine schools using the proportional allocation method

Stage 4 – Students were selected using stratified random sampling, with class level as the stratum. After determining the sample size for each class, systematic random sampling was used to select students within each class. The class register served as the sampling frame. Sampling interval (K) was determined by dividing the total number of students in the class (N) by the allocated sample size (n);

$$K = \frac{N}{n}$$

A random starting point between 1 and K was chosen, after which the *kth* student was selected until the desired sample size for the class is reached.

Study Instrument

The quantitative data for this study was collected using adapted modified, semi-structured and validated questionnaires. Prevalence, types, substance use involvement/risk levels were assessed using the World Health Organization Alcohol, Smoking and Substance Involvement Screening Test (WHO ASSIST 3.0). The questionnaire was structured into four sections to elicit the objectives of the study.

SECTION I: Socio-demographic information of the respondents – this comprised 11 items age, gender, ethnicity, class (SS1-SS3), religion, living arrangements (with parents/guardians), parental occupation etc.

SECTION II: WHO Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) V3.0 – this section comprised 7 items to assess lifetime and recent use of common substances using a binary response "Yes or No". It also assesses frequency of use, craving, and substance-related problems for each substance.

Operational Definition of Terms

Prevalence of Substance Abuse – this refers to the proportion of senior secondary school students who reported using one or more psychoactive substances currently or at least once in their lifetime, with Yes = 1 (ever used) and No = 0 (never used). Overall prevalence for substance abuse was calculated as;

Prevalence (%) = Number of students who answered "Yes" x 100
Total number of respondents

Types of Substance Abuse – these refer to the specific categories of psychoactive substances reportedly used by students. In this study, the substances included alcohol, tobacco, cannabis, opioids, inhalants, sedatives, and other psychoactive substances identified by respondents.

Risk Levels of Substance Abuse – this refers to the degree of risk associated with students' involvement in psychoactive substance abuse as

measured by the WHO ASSIST scoring guidelines. The total score per substance was calculated by summing the responses to C2-C7. These were categorized according to WHO thresholds. For alcohol, scores of 0–10 indicated low risk, 11–26 moderate risk, and 27 or higher high risk. For all other substances, scores of 0–3 indicated low risk, 4–26 moderate risk, and 27 or higher as high risk. Low Risk – suggests occasional use/minimal intervention; Moderate Risk – Requires brief intervention/counselling; High Risk – Requires intensive treatment.

Pretesting of the Study Instrument

The reliability of the instrument was tested through pretesting of the study instrument, involving 10% of the respondents (pre-testing 60 senior secondary students) at Iluju Community High School, Iluju, Oriire LGA of Oyo State. Test-retest reliability was used with a one-week interval. Cohen's kappa coefficients showed substantial to almost perfect agreement across substances; alcohol (κ = 0.801), tobacco (κ = 0.757), cannabis (κ = 0.950), opioids (κ = 0.975), inhalants (κ = 0.950), and sedatives (κ = 0.875).

Method of Data Collection

Ten Community Health Nurses were recruited and trained as Research Assistants for a three days (two hours each day), to assist in data collection and facilitate the overall activities during data collection period. All students present in classrooms were requested to participate after the purpose of the study have stated and written consent obtained. The questionnaires were administered in person by the researcher and trained research assistants during school hours. The questionnaires took about 15-20 minutes to be completed and were collected immediately after completion. The questionnaires were reviewed by the Researcher and Research Assistants for completeness during the data collection period.

Data Analysis

Data analysis was done using the Statistical Package for Social Sciences (SPSS version 27). Descriptive statistics (frequencies and percentages) were used to summarise demographic characteristics, prevalence rates, types of substances used, and ASSIST risk classifications. Chi-square test was used for inferential statistics to test the association between socio-demographic characteristics and the risk levels of substance abuse. Statistical significance was determined at $p<0.05$.

Ethical Approval

Ethical approval was obtained from the Secondary Education Department of the Oyo State Ministry of Education, Science and Technology, with ethical code (reference number) (EDU215/T3/VOLII/158). Administrative permission was obtained from the Principals of the selected schools. Respondents were informed of the purpose of the research, voluntary nature of participation and assured of confidentiality by not requesting names or identifiable information in the questionnaire. Written consents were obtained from the parents, and assents from the students, and they were assured of their right to withdraw from the study at any time without penalty. Confidentiality, privacy and voluntary participation were strictly adhered to throughout the research process.

RESULTS

Socio-demographic Characteristics of the Respondents

A total of 600 students participated in the study. Table 1 presents the socio-demographic characteristics of respondents. The majority of respondents were aged 15–17 years (370; 61.7%) with a mean age of 15.45±1.73 years. Most were female (339; 56.5%) and in SSS1 (330; 55.0%). A greater proportion practiced Christianity (375; 62.5%) and were of Yoruba

ethnicity (437; 72.8%). In terms of family background, most respondents came from monogamous families (267; 44.5%) and lived with both parents (297; 49.5%). The highest proportion of fathers had secondary education (284; 47.3%) and were self-employed (291; 48.5%), while most mothers also had secondary education (291; 48.5%) and were self-employed (299; 49.8%).

Table 1: Socio-demographic Characteristics of Respondents (n=600)

		Frequency	Percentage (%)
Age: **Mean (SD) 15.45±1.73**	≤14years	180	30.0
	15-17years	370	61.7
	≥18years	50	8.3
Gender	Male	261	43.5
	Female	339	56.5
Class	SSS1	330	55.0
	SSS2	124	20.7
	SSS3	146	24.3
Religion	Christianity	375	62.5
	Islam	207	34.5
	Traditional	18	3.0
Ethnicity	Yoruba	437	72.8
	Igbo	66	11.0
	Hausa/Fulani	47	7.8
	Others	50	8.3
Family Type	Monogamous	267	44.5
	Polygamous	241	40.2
	Single Parent	67	11.2
	Others	25	4.2
Living Arrangement	Both Parents	297	49.5
	Single Parent	138	23.0
	Guardian	119	19.8
	Alone	46	7.7
Father's Educational Level	No Formal Education	49	8.2
	Primary Education	118	19.7
	Secondary Education	284	47.3
	Tertiary Education	149	24.8
Father's Occupation	Unemployed	94	15.7
	Self-employed	291	48.5
	Civil Servant	155	25.8
	Retired	60	10.0
Mother's Educational Level	No Formal Education	50	8.3
	Primary Education	106	17.7
	Secondary Education	291	48.5
	Tertiary Education	153	25.5
Mother's Occupation	Unemployed	93	15.5
	Self-employed	299	49.8
	Civil Servant	143	23.8
	Retired	65	10.8

Prevalence of Substance Abuse

Table 2 shows the prevalence of substance abuse among respondents. Of the 600 respondents, 214 (35.7%) reported using at least one substance, while 386 (64.3%) were non-users.

Table 2: Prevalence of Substance Abuse among Senior Secondary School Students (n=600)

Categories	Frequency	Percent
Substance Users	214	35.7
Non-Users	386	64.3

Types of Substances Used

Table 3 presents the types of substances used among the 214 substance users. Alcohol was the most commonly used substance (125; 58.4%), followed closely by opioids (tramadol, codeine, morphine) (120; 56.1%). A smaller proportion reported using tobacco (12, 5.6%) and cannabis (10, 4.7%). No respondents reported using inhalants or sedatives, while 55 (25.7%) of substance abusers reported using more than one substance (polysubstance use).

Table 3: Types of Substance Abuse among Senior Secondary School Students (n=214)

Substance	Frequency	Percentage
Alcohol (beer, wine, skushi, spirits)	125	58.4
Opioids (tramadol, codeine, morphine)	120	56.1
Tobacco (cigarettes, chewing tobacco, shisha, snuff etc.)	12	5.6
Cannabis (marijuana, "weed", "igbo")	10	4.7
Inhalants (glue, petrol, paint thinner)	0	0.0
Sedatives or Sleeping pills	0	0.0
More than 1 substance	55	25.7

Risk Level of Substance Abuse among Respondents (ASSIST Risk Classification)

Table 4 presents the ASSIST risk classification for each substance and overall risk level.

Alcohol: The majority (475; 79.2%) of the respondents were at low risk, 60 (10.0%) were at moderate risk and 65 (10.8%) at high risk.

Tobacco: Most respondents (475; 79.2%) were at low risk, with no respondents at moderate risk, but 125 (20.8%) were at high risk.

Cannabis: The vast majority (97.3%; n=584) were at low risk, with 6 (1.0%) at moderate risk and 10 (1.7%) at high risk.

Opioids: The majority (480; 80.0%) of the respondents were at low risk, 51(8.5%) were at moderate risk and 69 (11.5%) at high risk.

Inhalants and Sedatives: All respondents (100.0%; n=600) were at low risk for these substances.

Overall Substance Abuse Risk Level: Across all substances, the majority of respondents were at low risk (64.7%; n=388), while 63 (10.5%) at moderate risk, and 149 (24.8%) at high risk.

Table 4: Risk Level of Substance Abuse among Senior Secondary School Students (n=600)

	Risk Level of Substance		
	Low	Moderate	High
Substance	**N (%)**	**N (%)**	**N (%)**
Alcohol (beer, wine, skushi, spirits etc.)	475 (79.2)	60 (10.0)	65 (10.8)
Tobacco (cigarettes, chewing tobacco, shisha, etc)	475 (79.2)	0 (0.0)	125 (20.8)
Cannabis (marijuana, "weed", "igbo")	584 (97.3)	6 (1.0)	10 (1.7)
Opioids (tramadol, codeine, morphine)	480 (80.0)	51 (8.5)	69 (11.5)
Inhalants (glue, petrol, paint thinner)	600 (100.0)	0 (0.0)	0 (0.0)
Sedatives or Sleeping pills	600 (100.0)	0 (0.0)	0 (0.0)
OVERALL RISK LEVEL	**388 (64.7)**	**63 (10.5)**	**149 (24.8)**

Relationship between Socio-demographic Characteristics and Risk Level of Substance Abuse

Table 5 shows that gender (χ^2 = 25.386, p = 0.000), family type (χ^2 = 13.043, p = 0.042), Living arrangement (χ^2 = 20.637, p = 0.002) were significantly associated with the risk levels of substance abuse.

Table 5: Chi-square Test of Socio-demographic Characteristics and Risk Level of Substance Abuse (n=600)

Category		Substance Abuse Risk Level				
		Low N (%)	Moderate N (%)	High N (%)	χ^2	p-value
Age	≤14years	108 (60.0)	23 (12.8)	49 (27.2)	4.932	0.294
	15-17years	251 (67.8)	35 (9.5)	84 (22.7)		
	≥18years	29 (58.0)	5 (10.0)	16 (32.0)		
Gender	Male	140 (53.6)	33 (12.6)	88 (33.7)	25.386	**0.000***
	Female	248 (73.2)	30 (8.8)	61 (18.0)		
Class	SSS1	214 (64.8)	34 (10.3)	82 (24.8)	5.500	0.240
	SSS2	89 (71.8)	10 (8.1)	25 (20.2)		
	SSS3	85 (58.2)	19 (13.0)	42 (28.8)		
Religion	Christianity	240 (64.0)	42 (11.2)	93 (24.8)	2.662	0.616
	Islam	138 (66.7)	20 (9.7)	49 (23.7)		
	Traditional	10 (55.6)	1 (5.6)	7 (38.9)		
Ethnicity	Yoruba	285 (65.2)	47 (10.8)	105 (24.0)	8.136	0.228
	Igbo	36 (54.5)	5 (7.6)	25 (37.9)		
	Hausa/Fulani	33 (70.2)	6 (12.8)	8 (17.0)		
	Others	34 (68.0)	5 (10.0)	11 (22.0)		
Family Type	Monogamous	185 (69.3)	25 (9.4)	57 (21.3)	13.043	**0.042***
	Polygamous	139 (57.7)	27 (11.2)	75 (31.1)		
	Single Parent	44 (65.7)	10 (14.9)	13 (19.4)		
	Others	20 (80.0)	1 (4.0)	4 (16.0)		
Living Arrangement	Both Parents	210 (70.7)	27 (9.1)	60 (20.2)	20.637	**0.002***
	Single Parent	78 (56.5)	22 (15.9)	38 (27.5)		
	Guardian	79 (66.4)	9 (7.6)	31 (26.1)		
	Alone	21 (45.7)	5 (10.9)	20 (43.5)		
Father's Educational Level	No Formal Education	32 (65.3)	2 (4.1)	15 (30.6)	5.789	0.447
	Primary	83 (70.3)	10 (8.5)	25 (21.2)		
	Secondary	181 (63.7)	31 (10.9)	72 (25.4)		
	Tertiary	92 (61.7)	20 (13.4)	37 (24.8)		
Father's Occupation	Unemployed	50 (53.2)	15 (16.0)	29 (30.9)	12.004	0.062
	Self-employed	194 (66.7)	28 (9.6)	69 (23.7)		
	Civil Servant	106 (68.4)	10 (6.5)	39 (25.2)		
	Retired	38 (63.3)	10 (16.7)	12 (20.0)		
Mother's Educational Level	No Formal Education	34 (68.0)	5 (10.0)	11 (22.0)	1.394	0.966
	Primary	65 (61.3)	11 (10.4)	30 (28.3)		
	Secondary	190 (65.3)	29 (10.0)	72 (24.7)		
	Tertiary	99 (64.7)	18 (11.8)	36 (23.5)		
Mother's Occupation	Unemployed	56 (60.2)	9 (9.7)	28 (30.1)	5.977	0.426
	Self-employed	193 (64.5)	36 (12.0)	70 (23.4)		
	Civil Servant	97 (67.8)	9 (6.3)	37 (23.9)		
	Retired	42 (64.6)	9 (13.8)	14 (21.5)		

****p<0.05=significant***

DISCUSSION

The findings of the present study indicate that a substantial proportion of the students have used at least one psychoactive substance, while a larger proportion reported no history of use. This suggests that although abstinence predominates, substance abuse is sufficiently

widespread to constitute a public health concern within the school environment. These findings are consistent with studies in Nigeria and other sub-Saharan African countries. Prevalence rates of 37% in urban and 38% in rural settings in Rivers, Nigeria, and 29.1% lifetime alcohol prevalence in Lagos, Nigeria have been reported.[8,10] Similar patterns have been documented globally, with 12.3% in Rajasthan,[14] 18.8% in Nepal,[15] and 21% in Karnataka, India.[3] However, higher rates have been reported elsewhere, including 61.6% in Bayelsa, Nigeria and 52.5% in Northwest Ethiopia.[7,15] These discrepancies may be explained by variations in methodological approaches, such as differences in measurement tools, school type, and geographic location, which may further account for observed variations in prevalence rates.

Alcohol was the most commonly used substance, followed closely by opioids, with more than one-quarter of the students reporting polysubstance use. This pattern highlights not only the dominance of socially accessible substances but also the emergence of polysubstance use among adolescents. The predominance of Alcohol abuse may be attributed to its widespread social acceptance, cultural normalization, and ease of access within many communities, as it is often perceived as less harmful, lowering risk perception and increasing experimentation. Alcohol is readily available through informal markets, family environments, and social gatherings, further facilitating its use among young people. These findings align with previous studies where alcohol was the most commonly abused substance among secondary school students in Rivers, Lagos, and Akure, Nigeria.[8,10,17] Among female students in Sokoto, Nigeria, alcohol, marijuana, and prescription drugs were most common.[18] Similar findings have been reported in other African countries such as Zambia[19] and Tanzania[20] , where students frequently abused alcohol, followed by marijuana and cigarettes. About three-quarter of the substance abusers were alcohol users in Rajasthan, while one-quarter consumed alcohol in Karnataka [14,3]. Also, alcohol was the most commonly abused substance in Nepal. [15] The average alcohol intake in Denmark was 10 drinks per week, with almost half of the respondents engaged in binge drinking.[21]

The high level of opioid use, particularly tramadol and codeine, reflects a growing trend in West Africa, where the non-medical use of tramadol and codeine has been increasingly reported among young people due to its affordability, perceived therapeutic value, and widespread availability. Additionally, misconceptions regarding their safety, especially when obtained without prescription, may contribute to their increased use among students.[12] This is consistent with previous studies who have reported similar patterns. In Northern Nigeria, codeine, cough syrup, cannabis, Indian hemp and tramadol were most frequently abused, with most users taking them occasionally.[9,11] In South-east, Nigeria, commonly abused substances included tramadol, marijuana, cocaine, valium, and heroin.[12]

The occurrence of polysubstance use among a proportion of respondents further underscores the complexity of substance use behaviour in adolescence. It is associated with higher risk-taking, increased dependence, and more severe health and social consequences. Adolescents who engage in the use of multiple substances are often influenced by overlapping social, environmental, and psychological factors, including peer networks, accessibility, and exposure to diverse substance use behaviours.[22,23] In Bayelsa, over two-third of the students abused more than one substance, and students in Ekiti, Nigeria, abused a wide range of substances including marijuana,

cocaine, nicotine, inhalants, alcohol, and prescription drugs.[7,24] In contrast, some studies conducted in other regions have identified substances such as cannabis or tobacco as the most commonly used among adolescents.[3,14] These differences may be attributed to variations in substance availability, cultural norms, regulatory frameworks, and socio-economic conditions. For instance, stricter regulation of alcohol and prescription drugs in some countries may shift patterns of use toward other substances, while in less regulated environments, alcohol and pharmaceuticals remain more accessible.

This study further revealed that the majority of respondents were at low risk of substance abuse, although a significant proportion fell within moderate and high-risk categories, particularly for alcohol, tobacco, and opioids. The ASSIST risk classification provides a clinically relevant measure of intervention need, where moderate-risk students may benefit from brief intervention and high-risk students require intensive treatment. The predominance of low-risk involvement reflects that most adolescents are non-users or experimental users who do not progress to harmful patterns, consistent with developmental trajectories where initial experimentation does not always lead to sustained use.[1,2,25] However, the identification of moderate- and high-risk users suggests that a subgroup of students may be transitioning from experimental use to more problematic patterns characterized by increased frequency, craving, and associated functional impairments, influenced by peer pressure, substance availability, and psychosocial stressors.[22,23,26]

Higher risk for alcohol and opioids is attributed to their accessibility and perceived acceptability facilitating repeated use and escalation to harmful levels. In contrast, low-risk classification for cannabis, inhalants, and sedatives reflects lower prevalence or limited access, or stronger social and cultural deterrents against their use within the study setting. This is corroborated by studies which reported that only few consumed cannabis in Karnataka, India, and used marijuana in Sokoto, Nigeria.[3,27] It may also indicate that, where such substances are used, they are largely experimental rather than habitual. However, even small proportions of moderate- and high-risk users remain clinically significant given the potential for escalation and associated adverse outcomes.[12,24]

These findings are consistent with school-based studies in low- and middle-income countries, where most adolescents are low-risk but a subset demonstrates harmful patterns. In Bauchi State, most users took substances occasionally, while in Sokoto State, 22.2% used daily, 10.0% weekly, and 4.0% monthly.[9,27] In India, while over one-tenth of the adolescents were substance abusers, three-quarter of them wanted to quit because they believed substances were harmful.[14] However, higher proportions have been reported in high-risk or urban settings as reported in studies in South-south, Nigeria and Northwest Ethiopia.[7,16] The similarities observed between this study and previous research may be explained by the universal pattern of substance use initiation during adolescence, where most individuals remain at low levels of involvement. Differences, however, may arise from contextual factors such as availability of substances, enforcement of drug control policies, socio-economic conditions, and the presence or absence of school-based preventive interventions. Additionally, variations in measurement tools and classification criteria, particularly the use of standardized instruments such as the World Health Organization ASSIST, may influence the distribution of risk categories across studies.

Furthermore, this study revealed that several socio-demographic characteristics, particularly

gender, family type, and living arrangement, were significantly associated with substance abuse risk level among the study population. This is consistent with studies identifying gender as a determinant of substance abuse,[7,28] family type,[8] and living arrangement, which found that students from unstable family structures, and with poor upbringing were at higher risk drug abuse in Kenya.[22,29] The similarities between the present findings and existing literature may be explained by common socio-cultural dynamics that shape adolescent behaviour, particularly the influence of gender norms and family environments. Differences observed across studies may reflect variations in cultural settings, levels of urbanization, and the availability of social support systems.

CONCLUSION

This study concludes that substance abuse is prevalent among senior secondary school students in Oyo State, with alcohol and opioids as the most commonly used substances. Although most students fall within the low-risk category based on the WHO ASSIST, a significant proportion engage in moderate- and high-risk use and are at high risk of substance use disorders. Similarly, gender, family structure, and living arrangements were significant determinants of the risks of substance abuse among the students.

RECOMMENDATION

Based on the findings of this study, the following recommendations are made. The Government through the Ministry of Education should integrate annual substance use screening into school health services, with immediate referral pathways for students identified as high risk. School-based prevention programmes should prioritise alcohol and opioids, the most commonly used substances. Students at moderate risk should receive brief motivational interviewing, while those at high risk require urgent referral to specialist addiction services. Tobacco-specific cessation programmes and alcohol-focused brief interventions with parental engagement should be implemented. Gender-sensitive prevention programmes should be developed to address students' risk-taking norms and unique risk factors. Family-strengthening interventions should target students from polygamous families, and enhanced school monitoring and mentorship should be provided for students living alone or with a single parent. Finally, the Ministry of Health should strengthen pharmacy regulation of tramadol and codeine, and schools should collaborate with the National Drug Law Enforcement Agency on opioid awareness campaigns.

Limitations of the Study

First, the cross-sectional design cannot establish causality, hence, this study did not aim to establish causality but rather to estimate prevalence, patterns, and risk levels, which is appropriate and align with the study objectives. Second, data were collected using interviewer-administered questionnaires, which may have increased the likelihood of social desirability bias, potentially leading to underreporting. However, to address social desirability bias, anonymity was assured, and participants were encouraged to respond freely in a non-judgemental environment. Data was collected using the WHO ASSIST V3.0, a validated instrument with neutral wording, and administered by trained research assistants not affiliated with the school. Third, the study was conducted only in public schools in Oyo State, limiting generalisability to private schools or other states. Efforts were made to include multiple schools using stratified random sampling across the three senatorial districts to maximise representativeness, enhance variability within this population, and transferability of findings. Fourth, although the

motivations and contextual factors were not deeply explored in this quantitative study, the qualitative aspect of this study addressed contextual explanations, thereby providing complementary insights through methodological triangulation. These measures enhance the credibility and transparency of the findings.

DECLARATION: Author Contributions

All authors contributed to the study's conception and design. Ayanyinka A.A., and Adeloye A.A. wrote the first draft of the manuscript. All authors read and approved the final manuscript.

Acknowledgement: Nil

Funding: This work had no external funding.

Conflict of Interests: The authors declared no conflict of interest.

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Integrated Journal of Medicine and Medical Sciences

Integr J Med Med Sci. 2026;5(2):96-105.

ASSESSMENT OF OCCUPATIONAL HEALTH-HAZARDS AND THEIR PERCEIVED IMPACTS ON QUALITY OF LIFE AMONG HEALTHCARE WORKERS IN SELECTED HOSPITALS, OGUN STATE

SHOPEJU-LAWAL Barakat Oluwakemi (RPHN)[1], ADEYEMO Florence Oluyemisi (PhD)[1], OYEWUMI Zaccheus Opeyemi (PhD)[1], OYEWUMI Lydia Omowumi (PhD)[2]

[1]Department of Community/Public Health Nursing, Faculty of Nursing Sciences, Ladoke Akintola.
[2]Department of Nursing Science, Federal University of Health Sciences, Ila-Orangun, Osun State.

Corresponding Author: SHOPEJU-LAWAL Oluwakemi Barakat Email: barakatlawal@yahoo.com +234 8035682280

Citation
Shopeju-Lawal Bo, Adeyemo FO, Oyewumi ZO, Oyewumi LO. Assessment of occupational health-hazards and their perceived impacts on quality of life among healthcare workers in selected hospitals, Ogun state. Integr J Med Med Sci. 2026;5(2):96-105.

Received: May 15, 2026.
Accepted: June 29, 2026.
Published: July 31, 2026.

DOI:
https://dx.doi.org/10.4314/ijmms.v5i2.3

Abstract

Background: Occupational health hazards pose significant challenges to healthcare workers and may adversely affect their quality of life, ultimately influencing the quality of healthcare delivery. Despite growing concerns about healthcare service quality, workplace-related factors often receive insufficient attention.

Objective: This study assessed occupational health hazards and their perceived impacts on the quality of life of healthcare workers in selected hospitals in Ogun State, Nigeria.

Methods: A descriptive cross-sectional quantitative study was conducted among healthcare workers at State Hospital, Ijebu-Ode, and Olabisi Onabanjo University Teaching Hospital, Sagamu. A sample of 297 respondents was selected using simple random sampling. Data were collected using a self-structured questionnaire with a reliability coefficient of 0.82. Data analysis was performed using SPSS version 27. Descriptive statistics (frequencies and percentages) and Pearson Product-Moment Correlation were employed at a 0.05 significance level.

Results: Most respondents were female (86.9%), married (85.1%), and aged 30–39 years (30.3%). The most prevalent occupational hazards were work-related stress (92.6%), musculoskeletal disorders (87.8%), exposure to hazardous substances (83.9%), exposure to infectious diseases (83.8%), and cuts/lacerations (83.8%). Key predisposing factors included insufficient personal protective equipment (79.0%), inadequate staffing (69.5%), excessive workload (64.3%), and inadequate safety training (57.9%). Occupational hazards negatively affected general health (83.7%), emotional wellbeing (68.0%), physical wellbeing (66.2%), and vitality (58.4%). A significant positive relationship was found between occupational hazard exposure and poor quality of life ($r = 0.611$, $p < 0.05$).

Conclusion: Occupational health hazards are highly prevalent among healthcare workers and significantly impair their quality of life. Strengthening occupational health policies, ensuring adequate staffing, regular safety training, and sufficient PPE provision are essential to improve worker wellbeing and healthcare service delivery.

Keywords: Healthcare workers, Occupational hazards, Quality of life, Workplace safety.

INTRODUCTION

Healthcare workers (HCWs) are indispensable to the functioning of healthcare systems because they provide preventive, curative, rehabilitative, and emergency services necessary for population health improvement. Despite their critical role, healthcare workers are consistently exposed to multiple occupational hazards capable of causing physical injury, psychological distress, chronic illness, and reduced quality of life.[1,2] Occupational hazards in healthcare settings may include a few to all of the following: biological exposures, chemical hazards, ergonomic injuries, physical accidents, and psychosocial stressors, all of which may

adversely affect workers' wellbeing and compromise healthcare delivery.[3]

The International Labour Organization estimated, that millions of healthcare workers experience occupational injuries and work-related diseases annually, with a substantial proportion occurring in low- and middle-income countries where occupational safety systems remain weak.[2] World Health Organization (WHO) also reported that healthcare workers account for a significant proportion of occupational infections and injuries worldwide due to frequent exposure to blood, body fluids, contaminated instruments, and infectious pathogens.[1] During the COVID-19 pandemic, healthcare workers experienced increased rates of burnout, emotional exhaustion, anxiety, and occupational infections, thereby highlighting existing weaknesses in workplace safety practices and occupational health systems.[4]

Healthcare workers are particularly vulnerable to biological hazards because of their direct interaction with patients and contaminated materials. Needle-stick injuries, exposure to blood-borne pathogens such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV), as well as airborne diseases such as tuberculosis and COVID-19, remain significant occupational risks among healthcare personnel. [5,6] Ndejjo et al. and similar findings reported that healthcare workers in Uganda experienced high rates of occupational exposure to infectious diseases due to poor adherence to infection prevention protocols and limited access to protective equipment.[6,7]

Apart from biological risks, healthcare workers also experience substantial ergonomic and physical hazards. Long working hours, repetitive movements, manual patient handling, prolonged standing, and awkward body postures contribute significantly to musculoskeletal disorders among healthcare workers.[8,9] These musculoskeletal disorders may lead to chronic pain, absenteeism, reduced productivity, and long-term disability. Heavy workload, inadequate staffing, emotional strain, workplace violence, poor remuneration, and long shifts contribute to stress, burnout, sleep disturbances, anxiety, and depression.[10] Burnout among healthcare workers has been associated with reduced patient safety, lower job satisfaction, increased medical errors, and workforce turnover.[11] In Nigeria, Akinwale and George identified work stress and poor workplace conditions as major predictors of occupational injuries and reduced wellbeing among healthcare personnel.[12]

Quality of life (QoL) encompasses physical health, emotional wellbeing, social relationships, functional capacity, and occupational satisfaction.[13] Persistent occupational hazards can significantly impair healthcare workers' QoL through fatigue, chronic stress, emotional exhaustion, poor social functioning, and reduced physical capacity.[14] Studies conducted in different regions have demonstrated that healthcare workers exposed to high occupational stress and workplace hazards often report poorer quality of life and lower job satisfaction compared to workers in safer occupational environments.[15]

In Sub-Saharan Africa, occupational hazards among healthcare workers are worsened by inadequate healthcare infrastructure, shortages of healthcare personnel, insufficient workplace safety regulations, and weak occupational health systems.[16] Healthcare workers in many African countries often work under overcrowded conditions with inadequate infection control resources and limited institutional support.[17] These conditions increase the risk of occupational injuries, communicable disease transmission, and psychosocial distress.

In Nigeria, occupational health hazards remain highly prevalent among healthcare workers due to systemic healthcare challenges such as inadequate funding, poor staffing levels, inconsistent occupational safety enforcement, and limited access to personal protective equipment.[3,12] Studies conducted in Nigerian hospitals have documented high rates of needle-stick injuries, blood and body fluid exposure, work-related stress, musculoskeletal disorders, workplace violence, and sleep disturbances among healthcare workers.[7,18] Akpuh et al. further observed that inadequate protective equipment and inconsistent compliance with infection prevention practices contribute significantly to occupational exposure risks in Nigerian healthcare facilities.[19]

Despite growing evidence on occupational hazards among healthcare workers, most previous studies in Nigeria have focused on isolated hazards such as stress or needle-stick injuries with limited attention to the broader relationship between occupational hazards and quality of life. There is limited empirical evidence in Ogun State assessing the combined impact of multiple occupational hazards on the physical, emotional, and social wellbeing of healthcare workers. This study therefore assessed occupational health hazards and their perceived impacts on quality of life among healthcare workers in selected hospitals in Ogun State, Nigeria.

METHODS

Study Design and Setting

This study adopted a descriptive quantitative cross-sectional design. The study was conducted at State Hospital, Ijebu-Ode, a secondary healthcare facility with a target population of 48 doctors, 86 nurses, health attendants 79 and 35 laboratory personnels and Olabisi Onabanjo University Teaching Hospital (OOUTH), Sagamu, a tertiary healthcare institution in Ogun State, Nigeria comprise 281 nurses, 320 doctors, 102 laboratory personnels and 170 health attendants. Both facilities provide comprehensive healthcare services and serve as referral centres for a large population within and outside Ogun State.

Study Population

The target population comprised healthcare workers including doctors, nurses, and laboratory personnel working in the selected hospitals. Healthcare workers who had spent at least one year in their respective facilities were eligible to participate in the study while excluding those on leave.

Sample Size Determination and Sampling Technique

The sample size of 297 respondents was determined using Cochran's formula for cross-sectional studies. Stratified random sampling technique was employed to select eligible participants from different professional groups and departments within the hospitals. Proportionate allocation was used to select the study population of 161 and 136 respondents from OOUTH and State Hospital Ijebu-Ode to ensure fair representation of the various categories of healthcare workers.

Instrument for Data Collection

Data were collected using a validated self-structured questionnaire developed after extensive literature review. The questionnaire consisted of four sections: Section A assessed socio-demographic characteristics; Section B evaluated exposure to occupational hazards; Section C assessed perceived impacts on quality of life based on the 26 items of the World Health Organisation's Quality of Life – Brief version (WHOQoL-BREF); while Section D examined factors influencing occupational hazards among healthcare workers. Responses were measured using Likert-scale for sections C and D items while sections A and B were closed-ended questions.

Validity and Reliability of Instrument

The instrument was subjected to face and content validity by experts in Community /Public Health Nursing and occupational health research in the study areas. Reliability testing was conducted using a pilot study among healthcare workers outside the study settings. Cronbach's alpha reliability coefficient of 0.82 was obtained, demonstrating good internal consistency.

Data Collection Procedure

The study protocol (OGHREC /467 /2026 /1107 /APP) was approved by Ogun State Health Research Ethics Committee before commencement of the study. Permission was also obtained from hospital management. Respondents were informed about the purpose of the study, confidentiality of information, and voluntary nature of participation. Written informed consent was obtained from all participants prior to questionnaire administration.

Data Analysis

Data were entered, coded, and analyzed using SPSS version 27. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize respondents' characteristics and study variables. Inferential statistics using Pearson Product-Moment Correlation (PPMC) was employed to examine the relationship between occupational health hazards and quality of life. Statistical significance was set at $p < 0.05$.

RESULTS

Socio-demographic Characteristics of Respondents

A total of 297 healthcare workers participated in the study. Most respondents were female (86.9%), while males accounted for 13.1%. Respondents aged 30–39 years constituted the highest proportion (30.3%), followed by those aged 40–49 years. Majority of respondents were married (85.1%). Respondents from the Accident and Emergency department accounted for 22.9% of participants, while healthcare workers with 11–20 years of work experience constituted 42.8% of the study population, see table 1.

Table 1: Frequency Distribution of Respondents on Demographic Characteristics

Items	Frequency N=297	Percentage (%)
Age		
20-29 Years	55	18.5
30-39 Years	90	30.3
40-49 Years	73	24.6
50 Years & Above	79	26.6
Gender		
Male	39	13.1
Female	258	86.9
Department		
Accident/Emergency	68	22.9
Laboratory	52	17.5
Surgical/Medical wards	55	18.5
Gynaecology/obstetrics department	60	20.2
Operating Room	62	20.9
Years of Experience		
1-10 Years	105	35.3
11-20 Years	127	42.8
21-30 Years	40	13.5
31-35 Years	25	8.4
Marital Status		
Married	253	85.1
Single	29	9.8
Divorced	15	5.1
Religion		
Christianity	144	48.5
Islam	153	51.5
Traditional	0	0.0

Common Occupational Health Hazards among Healthcare Workers

The study revealed high prevalence of occupational hazards among healthcare workers. Work-related stress was the most commonly reported hazard, affecting 92.6% of respondents. Musculoskeletal disorders such as lower back pain, neck pain, and joint discomfort were reported by 87.8% of participants. Exposure to hazardous substances including disinfectants, laboratory reagents, and medication-related chemicals was reported by 83.9% of respondents, while exposure to infectious diseases and contaminated body fluids affected 83.8%.

Cuts and lacerations resulting from sharp instruments and medical procedures were also reported by 83.8% of healthcare workers. Long working hours and excessive workload were experienced by 78.8% of respondents, while direct contact with contaminated specimens was reported by 77.8%. Ergonomic-related issues including prolonged standing, awkward body posture, and repetitive strain were reported by 62.5% of participants.

The findings indicate that healthcare workers in the selected hospitals are exposed to multiple occupational hazards simultaneously, thereby increasing cumulative physical and psychological burden. The coexistence of biological, ergonomic, chemical, and psychosocial hazards suggests a highly demanding work environment capable of adversely affecting healthcare workers' wellbeing and productivity, see table 2.

Table 2: Frequency distribution of the respondents showing various occupational health-hazards commonly encountered among healthcare workers. A-Always O-Often R-Rarely N-Never.

s/n	Items		A	O	R	N	Total
1	Ergonomic issues (e.g., repetitive strain, poor posture)	F	97	89	71	40	297
		%	32.5	30.0	24.0	13.5	100.0
2	Work-related stress	F	90	185	15	7	297
		%	30.3	62.3	5.1	2.3	100.0
3	Noise levels in the workplace affect health and well-being	F	11	14	100	172	297
		%	3.7	4.7	33.7	57.9	100.0
4	Respiratory problem like inhalation of dusts, chemicals and other airborne substances	F	42	6	117	132	297
		%	14.1	2.1	39.4	44.4	100.0
5	Cuts and lacerations	F	132	117	12	36	297
		%	44.4	39.4	4.1	12.1	100.0
6	Falls and slips	F	151	30	95	21	297
		%	50.8	10.1	31.9	7.2	100.0
7	Poor air quality as a risk factor	F	38	50	78	131	297
		%	12.8	16.8	26.3	44.1	100.0
8	Musculoskeletal disorder	F	84	177	18	18	297
		%	28.2	59.6	6.1	6.1	100.0
9	Mental health disturbance	F	78	22	177	20	297
		%	26.3	7.4	59.6	6.7	100.0
10	Exposure to hazardous substances (e.g., chemicals, biohazards) as a risk factor	F	127	122	42	6	297
		%	42.8	41.1	14.1	2.0	100.0
11	Exposure to infectious diseases as a risk factor	F	117	132	36	12	297
		%	39.4	44.4	12.2	4.0	100.0
12	Direct contact with contaminated specimen as a risk factor	F	90	141	31	35	297
		%	30.3	47.5	10.4	11.8	100.0
13	Long working hours	F	90	141	31	35	297
		%	31.3	47.5	10.4	11.8	100.0

Perceived Impacts of Occupational Hazards on Quality of Life

Occupational hazards were found to negatively affect several domains of healthcare workers' quality of life. General health status was the most severely affected domain, with 83.7% of respondents reporting moderate to major negative impact. Emotional wellbeing was adversely affected among 68.0% of participants, while 66.2% reported negative effects on physical wellbeing.

Similarly, 58.4% of respondents indicated that occupational hazards reduced their vitality level, resulting in persistent fatigue, exhaustion, reduced energy, and poor concentration at work. Social functioning and interpersonal relationships were also negatively influenced among respondents experiencing chronic stress and excessive workload.

Conversely, economic/environmental wellbeing appeared less affected, with 57.6% of respondents reporting minor or no impact in this domain. This finding suggests that

although many healthcare workers maintained employment and income stability, their physical and emotional wellbeing remained significantly compromised by workplace hazards, see table 3.

Table 3A Frequency distribution of the respondents showing the perceived impacts of occupational health-hazards on Quality of Life among Healthcare Workers

A	PHYSICAL WELLBEING	Major Impact	Moderate Impact	Minor Impact	No Impact
1	Sleep	100(33.7%)	115(38.7%)	50(16.8%)	32(10.8%)
2	Choices of nutrition	55(18.5%)	60(20.2%)	120(40.4%)	62(20.9%)
3	Quality of surrounding	95(32%)	110(37%)	60(20.2%)	32(10.8%)
4	Absence of disease	85(28.6%)	130(43.8%)	50(16.8%)	32(10.8%)
5	Workload	105(35.4%)	110(37%)	50(16.8%)	32(10.8%)
6	Pain or discomfort	95(32%)	100(33.7%)	60(20.2%)	42(14.1%)
7	Ability to perform daily activity	110(37%)	95(32%)	60(20.2%)	32(10.8%)
	Total	**31%**	**35.2%**	**21.6%**	**12.2%**

Table 3B

B	VITALITY LEVEL	Major Impact	Moderate Impact	Minor Impact	No Impact
1	Demanding work environment	90(30.3%)	80(26.9%)	80(26.9%)	47(15.8%)
2	Working ability	85(28.6%)	75(25.3%)	90(30.3%)	47(15.8%)
3	Burnout	125(42.1%)	80(26.9%)	45(15.2%)	47(15.8%)
4	Significant psychological burden	90(30.3%)	85(28.6%)	80(26.9%)	42(14.1%)
5	Functional capacity	80(26.9%)	75(25.3%)	90(30.3%)	52(17.5%)
6	Daily activities	85(28.6%)	90(30.3%)	70(23.6%)	52(17.5%)
	Total	**31.2%**	**27.2%**	**25.5%**	**16.1%**

TABLE 3C

C	ECONOMIC/ENVIRONMENTAL WELLBEING	Major Impact	Moderate Impact	Minor Impact	No Impact
1	Financial security	50(16.8%)	70(23.6%)	140(47.1%)	37(12.5%)
2	Job security	65(21.9%)	75(25.3%)	110(37%)	47(15.8%)
3	Well-resourced work	60(20.2%)	80(26.9%)	110(37%)	47(15.8)
4	Ability to acquire basic needs	55(18.5%)	85(28.6%)	110(37%)	47(15.8%)
5	Education	40(13.5%)	70(23.6%)	140(47.1%)	47(15.8%)
6	Employment	65(21.9%)	70(23.6%)	110(37%)	52(17.5%)
7	Housing	50(16.8%)	65(21.9%)	140(47.1%)	42(14.1%)
8	Community safety	35(11.8%)	70(23.6%)	140(47.1%)	52(17.5%)
	Total	**17.8%**	**24.6%**	**42%**	**15.6%**

Factors Influencing Occupational Health Hazards

Several organizational and workplace-related factors were identified as major contributors to occupational hazards among healthcare workers. Insufficient personal protective equipment (PPE) supply was reported by 79.0% of respondents as a major factor influencing occupational exposure. Inadequate staffing levels were identified by 69.5% of participants, while 64.3% cited excessive workload and workplace pressure.

Inadequate workplace safety training was reported by 57.9% of respondents, suggesting deficiencies in institutional occupational health education and risk management practices. Additional factors identified included poor supervision, inconsistent implementation of infection prevention

protocols, inadequate hazard reporting systems, and limited access to ergonomic equipment.

Table 4: Frequency distribution of the respondents showing factors influencing occupational health-hazards among healthcare workers. SA (strongly Agreed), A (Agreed), D (Disagreed), SD (Strongly Disagreed).

s/n	Perceived Items		SA	A	D	SD	Total
1	Inadequate staffing	F	108	97	44	43	297
		%	36.7	32.8	15.8	14.7	100.0
2	Lack of training on workplace safety	F	64	113	72	48	297
		%	18.9	39.0	25.3	16.8	100.0
3	Poor communication and teamwork among staff	F	27	24	114	132	297
		%	9.5	4.2	40.0	46.3	100.0
4	Cultural factors or patient behaviour	F	72	450	68	107	297
		%	25.3	16.8	22.1	35.8	100.0
5	Insufficient personal protective equipment (PPE)	F	104	123	27	43	297
		%	35.8	43.2	7.3	13.7	100.0
6	Inadequate management response	F	45	42	81	129	297
		%	14.7	12.6	27.4	45.3	100.0
7	High workload and pressure	F	81	114	54	48	297
		%	25.3	39.0	18.9	16.8	100.0

Table 5: Association between occupational health-hazards and quality of life among healthcare workers

	N	Mean	Sd	Df	R	Decision
OHH	297	3.61	1.22	295	.611	significant
QoL	279	1.56	.41			

OHH – Occupational health hazards; QoL: Quality of Life. This table reveals a significant association between OHH and QoL (r=.611; df = 295; p<0.05).

Hypothesis Testing

Pearson Product-Moment Correlation analysis showed a statistically significant positive relationship between occupational health hazards and poor quality of life among healthcare workers ($r = 0.611$; $df = 295$; $p < 0.05$). This finding indicates that increased exposure to occupational hazards was significantly associated with worsening quality of life among healthcare workers.

Discussion

This present study revealed a high prevalence of occupational health hazards among healthcare workers in selected hospitals in Ogun State, Nigeria. Work-related stress emerged as the most common occupational hazard, affecting almost all of the respondents. This finding is consistent with studies conducted in Nigeria and other developing countries where healthcare workers experience significant psychosocial stress due to excessive workload, inadequate staffing, prolonged working hours, and emotionally demanding clinical environments [12,20]. Similar findings were reported by Orji et al., who documented high prevalence of work-related stress among healthcare workers in Nigerian teaching hospitals [18].

Musculoskeletal disorders were also highly prevalent among respondents, affecting more than three quarters of participants. This finding corroborates reports by Tinubu et al. and Rai et al., who identified manual patient handling, prolonged standing, repetitive movements, and poor ergonomics as major contributors to musculoskeletal pain among healthcare workers [8,9]. Nurses and frontline healthcare personnel are particularly vulnerable because of the physically demanding nature of patient care activities. Persistent musculoskeletal disorders may reduce productivity, increase absenteeism, and impair physical functioning over time.

Exposure to infectious diseases, contaminated body fluids, and hazardous substances was also widely reported among respondents. The prevalence of biological hazards observed in this study agrees with findings by Ndejjo et al. and Ogoina et al., who reported high occupational exposure to blood-borne pathogens and infectious materials among healthcare workers in African healthcare settings [6,21]. Inadequate compliance with infection prevention practices, poor waste disposal systems, and shortages of PPE continue to increase the risk of occupational infections among healthcare workers in Nigeria.

The study further demonstrated that occupational hazards significantly affected the quality of life of healthcare workers, particularly in the domains of general health, emotional wellbeing, and physical wellbeing. Healthcare workers who experienced repeated occupational stress, chronic fatigue, and musculoskeletal disorders reported poor vitality, reduced energy, emotional exhaustion, and diminished functional capacity. These findings align with WHO reports indicating that occupational stress and hazardous workplace conditions significantly impair healthcare workers' quality of life and mental health [13].

The significant impact on emotional wellbeing observed in this study may reflect the cumulative effects of workplace pressure, emotional labour, fear of infection, burnout, and inadequate institutional support. Previous studies have shown that chronic occupational stress among healthcare workers contributes to anxiety, depression, burnout syndrome, sleep disorders, and reduced psychological resilience [10,11]. Burnout and emotional exhaustion may further compromise patient safety and increase the likelihood of medical errors.

Interestingly, material wellbeing was comparatively less affected than other quality of life domains. This suggests that while respondents may maintain employment and income stability, occupational hazards continue to erode their physical and psychological wellbeing. Similar observations have been reported in studies examining healthcare workers' quality of life in resource-limited settings where financial stability does not necessarily translate into good health outcomes or occupational satisfaction [15].

The study also identified insufficient PPE, inadequate staffing, high workload, and inadequate workplace safety training as major factors influencing occupational hazards among healthcare workers. These findings highlight the critical role of organizational and systemic factors in occupational risk exposure. Consistent with the findings of Akpuh et al., inadequate protective equipment and weak occupational safety systems significantly increase healthcare workers' vulnerability to infections and workplace injuries [19].

Inadequate staffing and excessive workload remain major concerns in the Nigerian healthcare system. Healthcare workers frequently manage large patient volumes with limited personnel support, thereby increasing fatigue, emotional exhaustion, and exposure to occupational injuries. Several studies have established strong associations between heavy workload, burnout, workplace stress, and reduced quality of life among healthcare workers [10,20].

The significant positive correlation between occupational hazards and poor quality of life found in this study further emphasizes the adverse consequences of unsafe working environments on healthcare workers' wellbeing. Increased exposure to occupational hazards was associated with worsening quality of life among respondents. This finding supports previous studies demonstrating that occupational injuries, chronic stress, and unsafe working conditions negatively affect healthcare workers' physical health, psychological wellbeing, social functioning, and overall life satisfaction [14,15].

Overall, the findings of this study underscore the urgent need for comprehensive occupational health interventions in Nigerian healthcare facilities. Strengthening occupational safety policies, improving staffing levels, ensuring adequate provision of PPE, promoting ergonomic workplace practices, and implementing mental health support programmes are essential strategies for improving healthcare workers' wellbeing and sustaining healthcare service delivery.

Conclusion

The study established a significant relationship between occupational health hazards and

reduced quality of life among healthcare workers. Persistent occupational exposures negatively affect healthcare workers' productivity, emotional stability, physical functioning, and overall quality of life. Addressing occupational health hazards through effective workplace safety policies, adequate staffing, regular occupational health training, and provision of protective equipment is therefore essential for improving healthcare workers' wellbeing and strengthening healthcare delivery systems.

Declarations

Acknowledgments

The authors appreciate the management of Olabisi Onabanjo University Teaching Hospital and State Hospital Ijebu-Ode for granting approval for the study. Appreciation is also extended to the research assistant, Mr. Demilade, and all healthcare workers who participated in the study.

Author's Contribution: The first Author SHOPEJU-LAWAL Barakat Oluwakemi; designed the study. Other authors: ADEYEMO Florence Oluyemisi; read and approved the study. OYEWUMI Zaccheus Opeyemi and OYEWUMI Lydia Omowumi Read and approved the final draft of the manuscript.

Funding: The study was self-funded.

Conflicts of Interest: The authors declare no conflict of interest.

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Integrated Journal of Medicine and Medical Sciences

Integr J Med Med Sci. 2026;5(2):106-114.

INHIBITORY EFFECTS OF TRADITIONAL AFRICAN SCAR REMEDIES ON FIBROBLASTS DERIVED FROM RAT SCARS

OLAITAN Peter Babatunde {FWACS; FMCS}[1], ILORI Oluwatosin Stephen {FMCS}[2], AKANNI Olufemi Emmanuel {PhD}[3], OSENI Oyediran Ganiyu {FWACS}[4], SABAGEH Donatus {FMCPath}[5], OTENE Cletus Ikechukwu {FWACS}[6]

[1]Burns and Plastic Surgery Unit, Department of Surgery, UNIOSUN Teaching Hospital, Osogbo
[2]Plastic and Reconstructive Surgery Unit, Department of Surgery, LAUTECH Teaching Hospital, Ogbomoso, Nigeria
[3]Department of Chemical pathology, College of Health Sciences, UNIOSUN Teaching Hospital, Osogbo
[4]Burns and Plastic Surgery Unit, Department of Surgery, Aminu Kano University Teaching Hospital, Kano
[5]Formerly of Department of Histopathology, College of Health Sciences, Ladoke Akintola University of Technology, Ogbomoso, Nigeria.
[6]Department of Surgery, Delta State University Teaching Hospital.

Corresponding Author: Dr Ilori Oluwatosin S. Email: osilori@lautech.edu.ng | +2347031535783

Citation:

Olaitan PB, Ilori OS, Akanni A, Oseni OG, Sabageh D, Otene CI. Inhibitory Effects of Traditional African Scar Remedies on Fibroblasts Derived from Rat Scars. Integr. J. Med. Med. Sci. 2026;5(2):106-114.

Received: March 12, 2026.
Accepted: July 4, 2026.
Published: July 31, 2026

DOI: https://dx.doi.org/10.4314/ijmms.v5i2.4

Abstract

Background: Scars are the result of wound healing and arise largely from fibroblast activity during tissue repair. Among the Yoruba people of the South Western Nigeria, patients have reported symptomatic improvement and reduction of excessive scarring with traditional remedies like shea butter, snake oil, fish oil etc.

Objectives: This study investigated the effects of dietary shea butter, snake oil and omega-3 oil, compared with triamcinolone, on haematological parameters, serum biochemistry, and fibroblast density in experimental scars in rats."

Methodology: Male Sprague-Dawley rats (100-250g) were used in the randomized controlled study. The rats were randomly allocated into five groups: Control, Triamcinolone (0.5mg/kg), Shea butter (30mls/kg), Snake oil (30mls/kg) and Omega-3 oil (30mls/kg) based on the test substance added to their feeds. Each group had five different rats. Excision of a 2cm-by-2cm rectangular full thickness skin was done at the right dorsolateral part of their hind limbs. The wounds were dressed daily till they healed by secondary intention. On the 28th day of the experiment, all the rats were sacrificed and blood collected by cardiac puncture. All experiments were performed according to the "Guide for the Care and Use of Laboratory Animals". The resulting scars were excised and fixed in 10% formalin. The tissues were further processed and stained with Haematoxylin-and-Eosin stains (H & E). For each case, five high power fields were selected at random using the X40 objective lens. A standardized field size was employed using the Image J calibration. The fibroblasts in each photomicrograph groups were then counted using the Image J software by a blinded researcher. The fibroblast counts were expressed as mean cells per HPF per animal. Analysis was done using SPSS Version 22. One-way ANOVA with Tukey's post hoc test was used. The level of significance was $p < 0.05$. Data were expressed as mean ± standard deviation.

Results: Histological findings of the scars from the rats showed markedly increased fibroblast density in the control group compared to that of the one with agents administered. Scars from both triamcinolone and shea butter groups show almost the same quantity of fibroblasts while the scars which had snake oil administered show significant reduction of fibroblasts compared to the others. One-way ANOVA with Tukey's post hoc test was used. The level of significance was $p < 0.05$. Data were expressed as mean ± standard deviation.

Conclusions: The results showed reduction in the fibroblast level in all the agents used, with snake oil having the highest fibroblast suppressing effect.

Keywords: Traditional, African, Scar Remedies, Fibroblasts, Rat, Scars.

INTRODUCTION

Scars are defined as cutaneous developments resulting from the biological wound healing processes, wherein the skin restores lost tissues through the formation of new connective tissue with new vasculature.[1] Although the chemical components of a scar remain similar to those of intact skin, their organization differs markedly from that of normal dermis.[1] When wound healing proceeds aberrantly, two principal types of abnormal scars may develop: hypertrophic scars and keloids. Hypertrophic scars are raised, rigid lesions that remain within the

borders of the original wound and may regress over time.[1,2] Keloids, in contrast, are characterized by extensive growth beyond the boundaries of the original wound, with a haphazard distribution of collagen, and they rarely regress spontaneously.[2] Keloids are benign fibrous growths resulting from excessive connective tissue deposition, predominantly occurring in predisposed individuals.[3]

The pathogenesis of scar formation is a complex, multi-phase process involving hemostasis, inflammation, proliferation, re-epithelialization, and remodeling.[4] Following injury, platelets and damaged tissues trigger inflammatory responses by recruiting immune cells such as neutrophils and macrophages.[4] These cells, along with keratinocytes and endothelial cells, release a plethora of soluble inflammatory mediators, including cytokines, chemokines, and growth factors.[3,4] Dysregulated inflammation, characterized by persistent local inflammation, plays a pivotal role in the pathogenesis of both keloids and hypertrophic scars.[4] This aberrant inflammatory milieu drives the excessive proliferation of fibroblasts and their subsequent contribution to the excessive accumulation of extracellular matrix (ECM) in the dermis.[1] Both keloids and hypertrophic scars are fibroproliferative lesions marked by excessive collagen deposition and an imbalance between ECM deposition and degradation.[1] In keloids specifically, this is compounded by a lower apoptotic rate of fibroblasts and the haphazard distribution of collagen fibers.[3]

The management of keloids and hypertrophic scars presents a significant clinical challenge.[5] Current treatment modalities range from non-invasive options such as silicone gel sheeting and compression therapy to invasive interventions including intralesional corticosteroid injections, surgery, and radiotherapy.[5] Intralesional triamcinolone acetonide remains the criterion standard in the non-surgical management of these scars.[6] Despite these options, no single treatment is effective in all patients, and recurrence rates remain high.[6] Furthermore, access to advanced therapeutic modalities is often limited in low-resource settings, compounding the burden of these disfiguring conditions.[7] This therapeutic gap has sustained interest in indigenous and traditional remedies, particularly in regions where such scars are prevalent.

Among the Yoruba people of South Western Nigeria, traditional remedies such as shea butter, snake oil, and fish oil are widely used, with anecdotal reports suggesting clinical benefit.[8] Shea butter, an off-white or ivory-coloured fat extracted from the nut of the African shea tree (Vitellaria paradoxa), is rich in fatty acids, predominantly oleic acid (40–60%) and stearic acid (20–50%), with smaller amounts of palmitic and linoleic acids.[9,10] The active agents in shea butter responsible for its scar modulating properties are the triterpenes which include the α-amyrin, β-amyrin, lupeol and butyrospermol.[11] They are known to naturally inhibit the proliferation of keloid scar fibroblast, helping to reduce the swelling, thickness and roughness of scar tissue.[12,13] Its use in skin care is attributed to its hydrating properties and reputed effectiveness in softening scar tissue.[12,13] Shea butter has also long been incorporated into traditional medical practice in West and East Africa, based on observed anti-inflammatory and analgesic characteristics.[12,13] The application of snake oils for scar therapy has been known since the time of Galen, and Boa constrictor oil (BCO) contains essential fatty acids with anti-inflammatory properties.[14] Previous studies have assessed the activities of shea butter and snake oil on the inhibition of fibroblast growth in vitro.[9] Apart from its fibroblast-suppressing properties, snake oil has also been noted to inhibit UVB-induced tissue damage.[15,16] Additionally, a combination of butyrate (a short-chain fatty acid) with

docosahexaenoic acid (an omega-3 fatty acid) has demonstrated antifibrogenic effects on keloid fibroblasts in in vitro studies.[15,16]

Triamcinolone acetonide, a glucocorticoid currently administered intralesionally for the treatment and prevention of keloids and hypertrophic scars, has been established to inhibit the growth kinetics of fibroblasts in culture.[17] Furthermore, glucocorticoids inhibit both keratinocytes and fibroblasts, thereby preventing reepithelialization and the formation of new collagen fibres.[17] The present study investigated the haematological and serum biochemical parameters in rats treated with shea butter, snake oil, and omega-3 oil. It also assessed the effects of these agents on experimentally induced scars in rats, comparing their efficacy with that of triamcinolone. The results of this investigation were evaluated for the potential use of these agents in the treatment of abnormal scars in humans.

METHODS

Twenty-five male Sprague-Dawley rats (100-250g) obtained from the Animal Facility Centre, in Osun state University, Osogbo, Nigeria were used in the study. The rats were housed in plastic cages measuring 40x20x20cm with a temperature range of 22.5ºC±2.5ºC. It was ensured that the cages were not overcrowded and they were sited away from direct sunlight. The rats were fed with commercially available standard rodent chow (Top Feeds®, Nigeria) which contains 29% protein, 11% fat, 58% carbohydrate. They had access to the feed and water *ad libitum*. The animals were kept at the facility and were allowed to acclimatize for 14 days before the onset of the experiment. All experiments were performed according to the Principles of Laboratory Animal Care (National Research Council (US) Committee for the Update of the Guide for the Care and Use of Laboratory Animals).[18]

Animals were randomly allocated into five groups- 1. Control (no test agent was added to their feed) 2. Triamcinolone (0.5mg/kg) 3. Shea butter (30mls/kg) 4. Snake oil (30mls/kg) and 5. Omega-3 oil (30mls/kg) based on the test agent added to their feeds. Each group had five male rats. The criterium used to determine the number of rats used was the resource equation method[19] which states that the difference between the total number of animals and the total number of groups should strictly fall between 10 and 20.[19]

The first phase of the procedure was excision of a 2cm-by-2cm rectangular full thickness skin from the right dorsolateral part of the hind limb using scalpel and scissors under sterile condition. This was done under ketamine sulphate anaesthetic induction. The rats were anesthetized with Ketamine (Francotar®) 10ml in concentrations of 100mg/ ml and doses of 2.5mg/kg/rat) injection into the peritoneal cavity using 25G needles. Rats were put to sleep and aseptic preparation of the skin was carried out using povidone iodine. A 2cm-by-2 cm rectangular excision of the skin was done by the consultant plastic surgeon. Haemostasis was ensured by pressure application and all wounds were infiltrated at the edges with 0.1ml of 0.25% bupivacaine for post-operative pain control and the wounds were subsequently dressed with povidone iodine. Indelible marks were applied around the wound edges with gentiam violet to ensure that the particular area of the scars was not obscured following healing. Rats were observed till they woke up around 3-10 minutes after the procedure. The animals were monitored for laboured breathing and decreased activity. The presence of post-operative pain was also monitored twice daily using the appearance, behaviour and weight reduction in the rats. They were kept in different cubicles to avoid being perched by neighbouring rats.

Wounds were dressed daily with normal saline and guaze till they healed by secondary intention. The rats were fed with commercially available standard rodent chow (Top Feeds®,

Nigeria) to which was added the test agent for each group i.e. omega-3 oil(30mls/kg), snake oil(30mls/kg), shea butter(30mls/kg), and triamcinolone(0.5mg/kg) orally starting from the day of wound creation. All the test agents were mixed with the feed. The weight of feed and volume of water consumed by rats in each group were measured daily as the difference between the quantity of feed and water supplied and the amount remaining after 24 hours. The urine and stools of the experimental animals were examined daily to assess any change in colour or consistency.

Rats in all the groups were weighed twice weekly during the period of treatment and on the last day of study. Weighing was done before the administration of the experimental substances. All the rats had free access to food and water throughout the study and were observed daily for general symptoms of toxicity and mortality. Samples were collected for haematological (Full blood count) and biochemical analyses (Electrolytes, Urea and creatinine, total cholesterol). On the 28th day of the experiment, all the rats were euthanized after Diethyl ether inhalation and blood samples were collected by cardiac puncture. The animals were immediately ethically sacrificed by cervical dislocation. This time point was chosen to allow complete wound contraction and scar maturation in this model as seen in previous studies.[20,21] One portion of the collected blood sample was put into K^+ EDTA bottles for estimation of Haematocrit (HCT), haemoglobin concentration (Hb), red blood cell count (RBC), platelets, neutrophil, lymphocyte, white blood cell counts (WBC), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC), using an automated blood analyser (H18 Light [SFRi Medical Diagnostics, France] previously standardized for routine laboratory procedure). Another portion of the collected blood sample was dispensed into non-heparinized bottles, allowed to clot and centrifuged at 3500 rpm for 10 min. Before the analysis, the samples were stored in a refrigerator at 4^0C. The serum was used to analyze the serum electrolytes, urea, creatinine and the total serum cholesterol. The concentration of cholesterol in the sample was analyzed using the enzymatic colorimetric method while the electrolytes urea and creatinine were determined using automated chemistry analyzer (Genrui GS 100).

All experiments were performed according to the "Guide for the Care and Use of Laboratory Animals". The protocol was approved by the Ethical Review Committee of College of Health Sciences, UNIOSUN, Osogbo. The scars developed were excised immediately the rats were sacrificed. These were fixed in 10% neutral buffered formalin. The tissues were further processed and fixed on clean slides and stained with Haematoxylin-and-Eosin stains (H & E). For each excised tissue, five high power fields were selected at random using the X400 magnification and a photomicrograph was taken for each high-power field using a digital camera (Canon PowerShot 2500), that magnified the image 2.3 times. A standardized field size was employed using the Image J calibration (1.54r). The fibroblasts in each photomicrograph groups were then counted using the Image J software by the third author who was blinded from knowing what agent was used for each group labelled A, B, C, D, and E. The fibroblast counts were expressed as mean cells per HPF per animal. Data analysis was done using SPSS Version 22. One-way ANOVA with Tukey's post hoc test was used. The level of significance was $p< 0.05$. Data were expressed as mean ± standard deviation.

RESULTS

There was no change in the character of the stool, urine and eye colour of all the animals used in the test and control groups throughout the experiment period. No mortality was observed among the rats throughout the period of the experiments. Histological findings of the scars from the rats showed

markedly increased fibroblast density in the control group compared to that of the one with agents administered. Scars from both triamcinolone and shea butter groups showed comparable fibroblast counts, both lower than control but higher than snake oil."

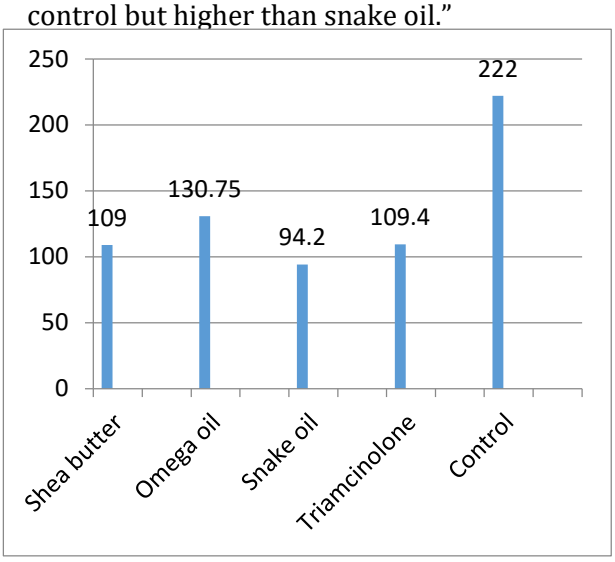


Figure 1: Mean number of scar fibroblasts/5 high power fields for each agent

The control group of the rats have the highest mean number of fibroblasts with 222 per field followed by omega oil, 130.75, shea butter and Triamcinolone with 109.0 each and the least with snake oil (94.2 fibroblasts per field (Figure 1). This reveals that the snake oil has the highest suppressing activities of the fibroblasts while omega-3 oil has the least suppressing ability.

All the agents also suppress fibroblasts growth to some extent as the control group has almost double the number observed in each of the other agents. The use of fibroblast number per high power field to determine fibroblast suppression is supported by histological and morphometric criteria.[22] Although fibroblast counts in omega-3 oil was less than that of the control, it was also observed to be higher than observed in other agents. Figures 2 to 6 show the photomicrographs of the scars of the animals fed with different agents revealing the varying distributions of the fibroblasts. No statistically significant changes were observed in the haematological and biochemical parameters of the rats with different agents and the control (Tables 1 and 2). Total serum cholesterol in the rats also show higher cholesterol levels in the rats fed with shea butter (128.8mg/dl) while those fed with triamcinolone had the lower total cholesterol (28.0mg/dl)) than the normal range of 50-115mg/dl [23] (Table 3).

Table 1: Average weight and blood parameters of animals in the five groups

Groups/ Variables	Control	Triamcinolone	Shea butter	Snake oil	Omega oil	**ANOVA Statistics**
Weight (g)	179.50±10.85	157.75±29.18	151.50±6.35	156.25±27.18	156.20±7.55	F test-1.6818 P value- 0.1936
WBC (10^9/L	7.10±1.04	8.05±0.93	6.98±0.49	7.05±0.82	7.25±2.35	F test-0.5734 P value- 0.6851
RBC (10^{12}/L)	5.55±1.00	4.69±1.51	6.11±0.27	4.35±1.15	5.45±3.00	F test-0.9100 P value- 0.4771
Platelet (10^{11}/L)	4.47±0.99	4.80±1.12	5.24±0.13	4.29±1.14	4.70±1.25	F test-0.6388 P value-0.6409
Hb conc	12.30±4.13	8.45±3.95	13.38±1.96	8.60±3.84	11.54±5.25	F test-1.5704 P value- 0.2208
HCT (%)	38.65±8.38	31.15±10.98	41.83±3.25	30.25±12.78	34.22±2.15	F test- 1.6539 P value-0.2001
MCV (fl)	69.23±3.19	67.18±1.25	68.40±2.43	68.18±1.14	67.32± 2.12	F test-0.7522 P value- 0.5682
MCH (pg)	20.58±4.09	19.30±8.04	20.78±2.35	18.20±7.12	20.46± 1.18	F test-0.2156 P value- 0.9267
MCHC (g/dl)	31.13±5.02	31.20±13.49	31.93±2.58	32.20±11.47	31.65±4.76	F test-0.0144 P value-0.9996

The mean difference is significant at the 0.05 level. *

Table 2: Eletrolytes urea and creatinine assessment of experimental rats

Agent	Na	K	Cl	HCO3	Urea	Creatinine
Normal value (Wistar Rat)	138-155 mmol/L	4.6-6.0 mmo/L	100-110 mmol/L	22.8-31.1 mEq/L	11-25 mg/dl	0.2-0.7 mg/dl
Control	106.67	5.97	76.3	24.0	5.87	174.67
Triamcinolone	170	5.0	135.0	20.0	6.5	79.0
Omega oil	125.0	5.0	93.5	23.5	7.4	103.0
Snake oil	105.0	4.9	75.2	23.5	6.2	102.8
Shea butter	100.0	5.2	73.5	20.2	7.5	130.0
Snake oil	105.0	4.9	105.0	75.2	6.2	102.8

Table 3: Mean total serum cholesterol of animals in different groups

Agent used	Mean total serum cholesterol level
Normal Range	50-115mg/dl
Control	54.2mg/dl
Triamcinolone	28.0mg/dl
Shear butter	128.8mg/dl
Omega oil	55,4mg/dl
Snake oil	76.4mg/dl

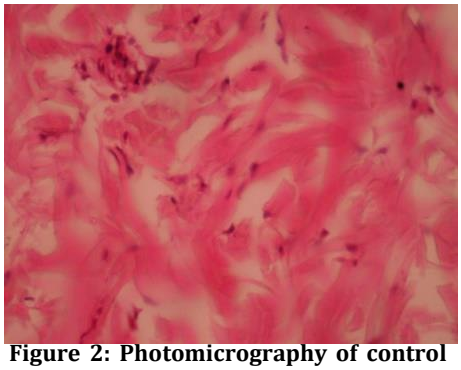


Figure 2: Photomicrography of control scar tissue (with no agent added) (x400 Mag).

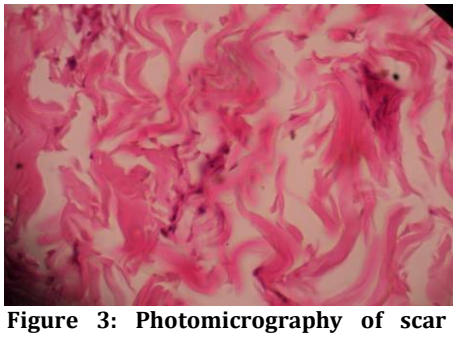


Figure 3: Photomicrography of scar treated with omega-3 oil (x400 Mag).

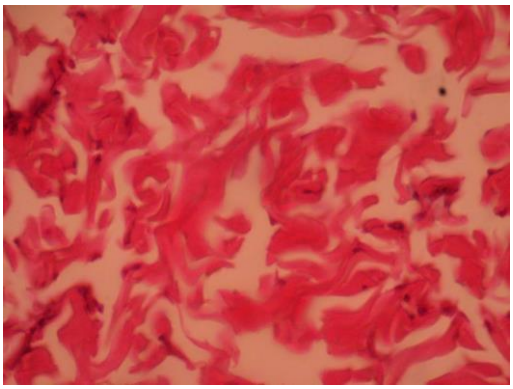


Figure 4: Photomicrography of rat scar treated with shea butter (x400 Mag).

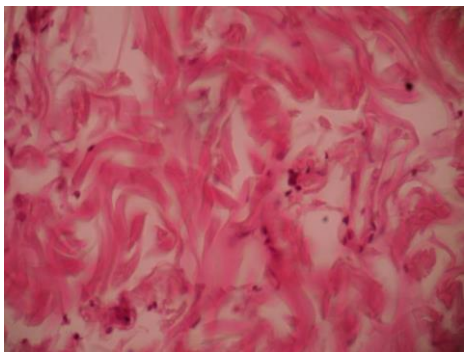


Figure 5: Photomicrography of scar treated with snake oil (x400 Mag).

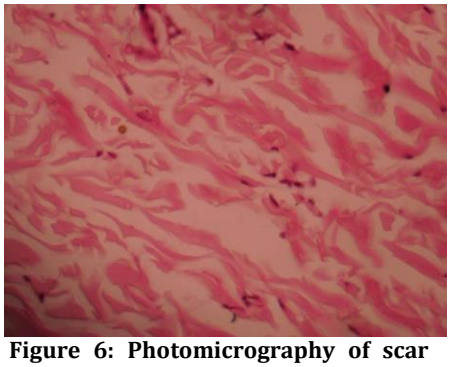


Figure 6: Photomicrography of scar treated with triamcinolone (x400 Mag).

DISCUSSION

This study investigated the effects of shea butter, snake oil, omega-3 oil and triamcinolone on the levels of fibroblasts and haematological/biochemical parameters of the rats. The results showed reduction in the fibroblast level in all the agents used except the control. It also revealed that the fibroblast density in the control > omega oil > shea butter ≈ triamcinolone > snake oil. In this in vivo model, snake oil's effect was comparable to triamcinolone, which is the current clinically relevant and acceptable treatment modality for excessive scarring.

The deficiencies of fatty acids have been hypothesized as a cause of keloids in some studies.[16] Lipids such as polyunsaturated fatty acids (PUFA) contribute significantly to cell membrane structure and tissue repair. Several studies have also suggested beneficial effects of polyunsaturated fatty acids in reducing scarring of burn wound.[14] Keloids have been found to contain lower amounts of, omega-3 fatty acids, omega-6 fatty acids, and eicosapentaenoic acid which have more of anti-inflammatory properties.[9] Omega-3 fatty acids cannot be synthesized by humans but they are produced by a variety of dietary sources like plants and from fishes.[24] Omega-3 fatty acid levels are also high in oils of reptiles, especially snakes.[24] These fatty acids, are similar to the lipids produced by the keratinocytes and the sebaceous glands of the human skin which function in maintaining the integrity of the epidermis.[25] The plant and animal oils have occlusive properties thereby improving the ability of the skin to retain moisture and reduce trans-epidermal water loss thus decreasing fibroblast proliferation.[12] Snake oil was found in this study to have the highest fibroblast suppressing effect. This finding support that which was obtained in an in vitro study where the effects of emulsions of BCO, fish oil, isolated omega-3 fatty acids, and shea butter were tested in comparison to triamcinolone regarding inhibition of cell growth in keloid and control fibroblast cultures.[9] In the study, it was observed that fish oil and BCO were more effective than triamcinolone.[9] The results of the in vitro study also suggested that oils rich in omega-3 fatty acids may be effective in reducing actively proliferating keloid fibroblasts.[9]

In another study where Boa constrictor fat was used, there was a successive decrease in the means of collagen concentration by 7.48%, 12.85% and 18.77% of their estimated original values and a dose dependent increase in collagenase activity with increasing amount of the fat.[26] They also demonstrated the inhibitory effects of boa constrictor fat (BCF) on the growth kinetics of keloid and normal dermal fibroblasts in the fibroblast cultures.[26]

The current study also showed that there were no statistically significant differences in the haematological and biochemical parameters of the rats fed with the different agents. There was however some reduction in the serum cholesterol of rats fed with shea butter. This finding is comparable to that discovered in a study by Malachi et al [10] on the effect of shea butter-based diet on the hepatic and renal enzymes and plasma lipid profile in albino rats. Malachi et al [10] showed that shea butter feed did not significantly affect the level of hepatic and renal enzymes but there was significant decrease in the total cholesterol, high density lipoprotein, low density lipoprotein and triglycerides.[10,11]

Strength and Limitations

This study addresses a critical gap in dermatological research by shifting the focus from western synthetic treatments to traditional African remedies. While scar management is well studied, the specific mechanism of action for these culturally significant remedies remain largely unexplored.

The rat scar model used in this study has implications for keloid management since there are no non-human keloid model hence the need for further validation in human

studies. The small number of rats used per group may also affect the inferences derived from the study this was however balanced up by the random group allocation and the uniformity in their weight. All agents used were given orally and mixed with feeds as opposed to real life use where they are given topically and intralesionally. Further studies using topical and intralesional application will be required.

Conclusions

The results showed reduction in the fibroblast level in all the test agents used, with snake oil having the highest fibroblast suppressing effect. This suggests that the commonly used African scar remedies can be as effective as the currently used triamcinolone.

Recommendations

Further studies are required in humans to validate the results from this study. The current routes of application of these scar therapies in clinical practice should also be used in further studies to validate the findings.

Conflict of interest- Nil

Authors' contribution: The authors were involved in the following aspects:
Conceptualization— PBO
Literature search— PBO, OSI, OGO, DS
Study design— PBO, OSI, OEA, OGO, DS, CIO
Data collection —PBO, OGO
Data analysis— PBO, OSI, OEA, OGO, DS, CIO

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Integrated Journal of Medicine and Medical Sciences

Integr J Med Med Sci. 2026;5(2):115-121

SERUM LIPID PROFILE ALTERATIONS IN HEPATITIS B INFECTION: EVIDENCE OF METABOLIC DYSREGULATION IN NIGERIAN MEN

OLANIYAN Oyejide Afolabi {MSc}[1*] EKPENYONG Emem Imeh {B.MLS}[2], IDOWU Olufemi Joseph {MSc}[2], UDO Etido Fidelis {MSc}[2], OLAWUYI Victor Oyetayo {MSc}[3], AYANLEKE Raphael {MSc}[4]

[1]Department of Chemical Pathology, LAUTECH Teaching Hospital, Ogbomoso, Oyo state.
[2]Department of Medical Laboratory Science, Bowen University, Iwo.
[3]Genesis Medical Diagnostics Centre, Ogbomoso, Nigeria.
[4]Bowen University Teaching Hospital, Ogbomoso, Nigeria.

Corresponding Author: Oyejide Afolabi OLANIYAN Email: peace_amazinggrace@yahoo.co.uk

Citation:

Olaniyan OA, Ekpenyong EI, Idowu OJ, Udoh FE, Olawuyi VO, Ayanleke R. Serum Lipid Profile Alterations in Hepatitis B Infection: Evidence of Metabolic Dysregulation in Nigerian Men. Integr J Med Med Sci. 2026;5(2):115-121.

Received: June 22, 2026.
Accepted: July 17, 2026.
Published: July 31, 2026.

DOI: https://dx.doi.org/10.4314/ijmms.v5i2.5

Abstract

Background: Hepatitis B virus (HBV) infection remains a significant global public health challenge, particularly in sub-Saharan Africa, where persistent infection contributes substantially to liver-related morbidity and mortality. Beyond hepatic injury, HBV infection may impair the liver's metabolic functions, including lipid synthesis, transport, and regulation, thereby resulting in alterations in serum lipid profile.

Objective: This study evaluated serum lipid profile alterations among male patients with HBV infection attending Bowen University Teaching Hospital, Ogbomoso, Nigeria.

Methods: A hospital-based, comparative, analytical cross- sectional study was conducted among 60 adult males comprising 30 confirmed HBV-infected patients and 30 HBV-negative apparently healthy controls. HBV infection was confirmed by serological detection of Hepatitis B surface antigen (HBsAg). Socio-demographic and clinical information was obtained using structured interviewer-administered questionnaires. Following an overnight fast, venous blood samples were collected, and serum concentrations of total cholesterol (TC), triglycerides (TG), and high-density lipoprotein cholesterol (HDL-C), were determined using standard enzymatic spectrophotometric methods, and low-density lipoprotein cholesterol (LDL-C) were estimated using the Friedewald formula. Data were analyzed using the Statistical Package for Social Sciences (SPSS), and group comparisons were performed using the independent Student's t-test at a significance level of $p < 0.05$.

Results: HBV-infected participants exhibited significantly lower serum total cholesterol (98.00 ± 10.08 mg/dL vs. 142.83 ± 22.26 mg/dL; $p < 0.001$) and HDL-C levels (52.00 ± 9.24 mg/dL vs. 93.23 ± 17.73 mg/dL; $p < 0.001$) compared with controls. However, no significant differences were observed in triglyceride ($p = 0.754$) and LDL-C concentrations ($p = 0.485$).

Conclusion: HBV infection is associated with significant reductions in serum total cholesterol and HDL-C, suggesting disruption of hepatic lipid metabolic pathways. Routine lipid profile assessment may provide additional clinical insight into metabolic alterations associated with HBV infection and support comprehensive patient management.

Keywords:
Chronic Hepatitis B; lipid metabolism; hypocholesterolemia; HDL cholesterol; metabolic dysregulation; Nigeria.

INTRODUCTION

Hepatitis B virus (HBV) infection remains one of the most important infectious diseases globally, with an estimated 296 million people living with chronic infection worldwide. The burden is disproportionately higher in sub-Saharan Africa, where perinatal transmission, limited screening programs, and delayed

diagnosis contribute to persistent endemicity. HBV infection is a major cause of progressive liver disease, including chronic hepatitis, cirrhosis, and hepatocellular carcinoma, all of which contribute significantly to global morbidity and mortality [1,2]. Beyond its well-established hepatic complications, HBV infection is increasingly recognized as a condition with systemic metabolic consequences. The liver plays a central role in lipid homeostasis, being responsible for the synthesis, storage, transport, and clearance of lipids and lipoproteins. Key metabolic processes such as cholesterol biosynthesis, apolipoprotein production, and lipoprotein assembly are tightly regulated within hepatocytes. Consequently, chronic viral infection that disrupts hepatocellular integrity may lead to measurable alterations in serum lipid profile [3, 4, 5]. Emerging evidence suggests that patients with HBV infection often exhibit abnormal lipid patterns, particularly reduced total cholesterol and altered high-density lipoprotein cholesterol (HDL-C) levels. These changes have been attributed to impaired hepatic synthetic function, altered expression of lipid metabolism genes, and viral interference with host metabolic pathways. However, findings across studies remain inconsistent, with some reports demonstrating significant lipid reductions, while others show minimal or no changes, suggesting possible influence of demographic, genetic, and environmental factors [3, 5, 6, 7].

In Nigeria, where HBV remains highly endemic, there is limited data on the metabolic profile of infected individuals, particularly among male patients attending tertiary healthcare facilities. Most available studies have focused on viral epidemiology and liver function indices, with relatively fewer investigations addressing lipid metabolic alterations in this population (5, 9). Understanding these changes is important, as dyslipidemia may not only reflect hepatic dysfunction but may also have implications for long-term cardiometabolic risk [1, 10, 11]. Therefore, this study aimed to evaluate serum lipid profile alterations in male patients with chronic Hepatitis B infection compared with HBV-negative controls in a tertiary hospital in Southwestern Nigeria. The findings are expected to contribute to improved understanding of the metabolic consequences of HBV infection and support more comprehensive clinical management strategies [9,10,11,12].

MATERIALS AND METHODS

Study Design

This study employed a hospital-based, comparative, analytical cross- sectional study design to assess serum lipid profile alterations among male patients with Hepatitis B virus (HBV) infection compared with HBV-negative controls.

Study Area

The study was conducted at Bowen University Teaching Hospital, Ogbomoso, Nigeria, between January and June 2025. The hospital serves as a major referral centre providing clinical, diagnostic, and laboratory services to surrounding communities.

Study Population

A total of 60 adult male participants were recruited for the study, comprising 30 HBV-positive patients (cases) and 30 HBV-negative apparently healthy individuals (controls), matched for age as much as possible.

Inclusion Criteria

Participants included were adult males aged 18 years and above. Cases were individuals with confirmed HBV infection, while controls were apparently healthy HBV-negative individuals with no known history of liver disease.

Exclusion Criteria

Individuals with known diabetes mellitus, chronic kidney disease, alcohol-related liver disease, other chronic viral hepatitis infections (such as HCV), or those receiving lipid-lowering medications or hormonal therapy were excluded from the study to avoid confounding metabolic effects.

Ethical Approval and Informed Consent

Ethical approval for the study was obtained from the Bowen University Research and Ethics Committee (with the approval number BUTH/REC-27058). Written informed consent was obtained from all participants before enrolment. Confidentiality and anonymity of participants were strictly maintained throughout the study.

Data Collection Procedure

A structured, interviewer-administered questionnaire was used to obtain relevant socio-demographic and clinical information from participants. The questionnaire captured data on age, marital status, educational level, occupation, income level, residence, and lifestyle-related factors. It also included relevant clinical history and potential risk factors associated with HBV infection.

Confirmation of Hepatitis B Infection

Hepatitis B virus infection status was confirmed using standard serological screening for Hepatitis B surface antigen (HBsAg) at the service laboratory of Bowen University Teaching Hospital, Ogbomoso. Positive cases were further verified using confirmatory diagnostic procedures according to standard laboratory protocols to ensure accuracy of classification. Only participants with confirmed HBV infection were enrolled as cases.

Sample Collection

Following an overnight fasting period of 8–12 hours, approximately 5 mL of venous blood was collected aseptically from each participant using sterile syringes into plain sample tubes. Samples were allowed to clot and retract at room temperature and were subsequently centrifuged at 3000xg for 10 minutes to obtain serum and biochemical analysis was done within six (6) hours of sample collections.

Biochemical Analysis

Serum lipid parameters were determined using standard enzymatic spectrophotometric methods.

Total cholesterol (TC) was measured using the cholesterol oxidase–peroxidase (CHOD-PAP) method. Triglycerides (TG) were determined using the glycerol phosphate oxidase (GPO-PAP) method. High-density lipoprotein cholesterol (HDL-C) was measured after precipitation of other lipoproteins using standard enzymatic procedures. Low-density lipoprotein cholesterol (LDL-C) was calculated using the Friedewald formula [13] .All analyses were performed in accordance with manufacturer's instructions and laboratory quality control standards.

Quality Control

Internal quality control sera were used to ensure accuracy and precision of biochemical assays. All procedures were performed following standard operating protocols (SOP) to minimize analytical errors.

Statistical Analysis

Data obtained were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 25. Results were expressed as mean ± standard deviation (SD). Independent Student's t-test was used to compare mean differences between HBV-positive and HBV-negative groups. Statistical significance was set at $p < 0.05$.

RESULTS

Socio-demographic Characteristics of Participants

A total of 60 male participants were enrolled in this study, comprising 30 chronic HBV-positive patients and 30 HBV-negative controls. The socio-demographic characteristics of the participants are presented in Table 1.0

HBV-positive participants were more likely to be older (≥40 years), reside in rural areas, have lower monthly income, and report higher rates of sexual activity compared with HBV-negative controls. Statistically significant differences were observed in educational level, residence, monthly income, and sexual activity ($p < 0.05$), while differences in age group and marital status were not statistically significant.

Table 1.0: Socio-demographic Characteristics of Participants

Variable	Category	HBV+ n (%)	HBV− n (%)	p-value
Age group	≥40 years	13 (43.3)	5 (16.7)	0.061
	<40 years	17 (56.7)	25 (83.3)	
Marital status	Married	18 (60.0)	7 (23.3)	0.054
	Single	12 (40.0)	23 (76.7)	
Education	Tertiary or higher	16 (53.3)	6 (20.0)	**0.042***
	Secondary or lower	14 (46.7)	24 (80.0)	
Residence	Rural	21 (70.0)	4 (13.3)	**<0.001***
	Urban	9 (30.0)	26 (86.7)	
Monthly income	<₦100,000	23 (76.7)	9 (30.0)	**<0.001***
	≥₦100,000	7 (23.3)	21 (70.0)	
Sexual activity	Yes	16 (53.3)	7 (23.3)	**0.016***
	No	14 (46.7)	23 (76.7)	

p < 0.05 is considered statistical significant

3.2 Serum Lipid Profile of Participants

The mean serum lipid profile of HBV-positive and HBV-negative participants is presented in Table 2.0. HBV-positive patients demonstrated significantly lower total cholesterol and HDL-C levels compared with controls. However, triglycerides and LDL-C showed no statistically significant differences between the two groups

Table 2.0: Serum Lipid Profile of Study Participants

Parameter (mg/dL)	HBV+ (Mean ± SD)	HBV− (Mean ± SD)	p-value
Total cholesterol	98.00 ± 10.08	142.83 ± 22.26	**<0.001**
Triglycerides	94.53 ± 23.11	96.67 ± 29.03	0.754
HDL-C	52.00 ± 9.24	93.23 ± 17.73	**<0.001**
LDL-C	28.30 ± 10.91	30.27 ± 10.74	0.485

**p < 0.05 is considered statistical significant*

Comparison of Lipid Parameters between Groups

Independent t-test analysis showed statistically significant reductions in total cholesterol and HDL-C among HBV-positive participants compared with controls. No significant differences were observed in triglycerides and LDL-C levels (Table 3.0).

Table 3.0 : Comparison of Lipid Parameters between Groups

Parameter	t-value	df	Mean Difference (mg/dL)	p-value
Total cholesterol	-10.048	40.417	-44.83	**<0.001**
HDL-C	-11.293	43.674	-41.23	**<0.001**
Triglycerides	-0.315	58	-2.13	0.754
LDL-C	-0.704	58	-1.97	0.485

**p < 0.05 is considered statistical significant*

DISCUSSION

This study observed significant alterations in serum total cholesterol and HDL-C among male patients with Hepatitis B virus (HBV) infection compared with HBV-negative controls. Specifically, total cholesterol and high-density

lipoprotein cholesterol (HDL-C) levels were significantly reduced in HBV-infected participants, while triglycerides and low-density lipoprotein cholesterol (LDL-C) showed no statistically significant differences between the two groups. These findings suggest disruption of lipid metabolic pathways in HBV infection [5, 6, 3, 7].

The observed reduction in total cholesterol among HBV-positive participants is consistent with the central role of the liver in cholesterol biosynthesis and regulation. Hepatocytes are responsible for the synthesis of cholesterol and its incorporation into lipoproteins; therefore, chronic viral infection may impair hepatocellular function and reduce hepatic synthetic capacity. HBV-related hepatic inflammation and cellular injury may downregulate key enzymes involved in cholesterol synthesis, leading to decreased circulating cholesterol levels. This hypocholesterolemic pattern has been reported in several studies of chronic liver diseases, where reduced cholesterol is often considered a surrogate marker of impaired hepatic function [7, 12, 13]. Similarly, the significant reduction in HDL-C observed in HBV-infected patients may reflect impaired apolipoprotein production and altered lipoprotein assembly. HDL particles are synthesized in the liver and intestines, and their formation depends on adequate hepatic protein synthesis. HBV infection may disrupt these processes through persistent inflammation and hepatocyte dysfunction, thereby reducing HDL-C concentration. Clinically, reduced HDL-C is of concern due to its protective role in reverse cholesterol transport and cardiovascular risk modulation [6, 14, 15].

In contrast, triglycerides and LDL-C levels were not significantly different between HBV-positive and HBV-negative groups. This may indicate that HBV infection does not uniformly affect all lipid fractions but rather exerts selective metabolic effects. Triglyceride metabolism is influenced by multiple pathways, including peripheral lipolysis and hepatic very-low-density lipoprotein (VLDL) secretion, which may remain relatively preserved in early or stable chronic HBV infection. Similarly, LDL-C levels may be maintained through compensatory metabolic mechanisms despite hepatic viral activity [7, 4, 2].

The findings of this study are in agreement with previous reports that have demonstrated reduced total cholesterol and HDL-C in patients with chronic hepatitis B infection and related metabolic disorders [5, 6, 16]. However, some studies have reported inconsistent results, suggesting that lipid alterations in HBV infection may vary depending on disease stage, viral replication status, host genetic factors, nutritional status, and coexisting metabolic conditions. These variations highlight the complexity of lipid metabolism in chronic viral hepatitis [1, 2, 10, 11].The observed lipid abnormalities may have important implications. Reduced total cholesterol and HDL-C may reflect underlying hepatic metabolic impairment and could potentially serve as indirect biochemical indicators of disease activity in chronic HBV infection. Furthermore, these alterations may contribute to long-term metabolic consequences, including changes in cardiovascular risk profiles, although this requires further longitudinal investigation [16, 17, 18].

This study is limited by its relatively small sample size and its cross-sectional design, which precludes causal inference. Additionally, socioeconomic disparities, absence of disease activity, disease stage assessment, viral load quantification and liver function enzyme correlations were not included, which could have provided deeper insight into disease severity and metabolic disruption. Despite these limitations, the study provides valuable data on lipid metabolic alterations in HBV-infected male patients in a Nigerian tertiary hospital setting. [3, 11, 19, 20]

CONCLUSION

This study demonstrates that Hepatitis B virus (HBV) infection is associated with significant alterations in serum total cholesterol and HDL-C among adult male patients. Specifically, total cholesterol and high-density lipoprotein cholesterol (HDL-C) were significantly reduced in HBV-infected individuals compared with HBV-negative controls, while triglycerides and low-density lipoprotein cholesterol (LDL-C) showed no statistically significant differences. These findings suggest a disruption of hepatic lipid metabolic pathways in chronic HBV infection, likely reflecting impaired hepatocellular function and altered lipid synthesis. The observed hypocholesterolemia and reduced HDL-C may serve as biochemical indicators of metabolic disturbance in affected individuals.

RECOMMENDATIONS

Regular assessment of serum lipid profile should be incorporated into the clinical management of patients with HBV infection to detect early metabolic alterations. HBV management protocols should adopt a more holistic approach that includes both hepatic function and metabolic risk evaluation, rather than focusing solely on viral suppression and liver enzymes. Patients with significantly reduced cholesterol and HDL-C levels should be considered for closer metabolic and cardiovascular risk assessment. Furthermore, increased awareness campaigns should be implemented to educate HBV-infected individuals on possible metabolic complications associated with chronic infection.

Further Research:

Longitudinal studies with larger sample sizes are recommended to explore the causal relationship between HBV infection and lipid metabolism, as well as the potential influence of viral load and disease stage on metabolic changes.

Author Contributions: OAO did the study design and EIE contributed to the conception of the study; OAO, EIE and VOO wrote the initial draft of the manuscript, led the data analysis, recruited study participants and data collection; EFU performed the statistical analysis; OAO, EIE and VOO provided critical resources and materials for the study; OAO, FEU, OJI and RA participated in the supervision and sample analysis. All authors reviewed the draft manuscript and provided constructive discussions. All authors have read and approved the manuscript for publication.

Funding: This work did not receive any financial support from any funding agency in the public, commercial, or non-profit sector.

Consent to participate: All study participants provided written informed consent to take part in the research.

Written consent for publication: All study participants gave consent for the data collected to be used in publication in anonymized form.

Competing interests: The authors declare no competing interests.

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Integrated Journal of Medicine and Medical Sciences

Integr J Med Med Sci. 2026;5(2):122-130.

PREVALENCE, PERCEPTION AND PREDICTORS OF RAPE AMONG ELEMENTARY STUDENTS IN OGBOMOSO NORTH LOCAL GOVERNMENT AREA, NIGERIA: A SCHOOL-BASED CROSS-SECTIONAL STUDY

OYEWUMI Zaccheus Opeyemi[1] {Ph.D}, OLUGBENGA-Bello Adenike Iyanuoluwa[1] {MBBS, FWACP}, OYEWUMI Lydia Omowumi[3] {MNSc}, FALADE Favour Ayobami[1] {BNSc}, IDOWU Adesanmi Babajide[2] {MBBS}, ADEGOKE Ridwan Adeyinka[2] {MBBS}

[1] Department of Community/Public Health Nursing, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria.

[2]Department of Community Medicine, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria.

[3]Federal University of Health Sciences, Ila-Orangun, Osun State, Nigeria.

Corresponding Author: OYEWUMI Zaccheus Opeyemi Email: **zooyewumi@lautech.edu.ng** Phone: **+2348037689685**

Citation:

Oyewumi ZO, Olugbenga-Bello AI, Oyewumi LO, Falade FA, Idowu AB, Adegoke RA. Prevalence, Perception and Predictors of Rape among Elementary Students in Ogbomoso North Local Government Area, Nigeria: a School-based Cross-sectional Analytical Study. Integr J Med Med Sci. 2026;5(2):122-130.

Received: July 10, 2026.
Accepted: July 24, 2026.
Published: July 31, 2026.

DOI: https://dx.doi.org/10.4314/ijmms.v5i2.6

Abstract

Background: Rape and other forms of sexual violence against children remain major public health and human rights concerns globally. Female school-aged children are particularly vulnerable due to developmental immaturity, dependence on adults, and limited capacity to recognize and report abuse. This study assessed the prevalence, perception, and predictors of rape among female elementary school pupils in Ogbomoso North Local Government Area, Nigeria.

Methods: A school-based cross-sectional analytical study was conducted among 520 female elementary school pupils selected through multistage sampling. Data were collected using a structured pretested questionnaire and analyzed using descriptive statistics, Chi-square tests, and multivariate logistic regression at $p < 0.05$.

Results: Most respondents were aged 11–14 years (66.7%), and 63.5% had heard about rape. The prevalence of self-reported rape was 17.5%; 16.3% experienced attempted rape, and 26.2% reported unwanted sexual touching or fondling. Rape experience was significantly associated with age group ($\chi^2 = 43.599$, $p < 0.001$), family order ($\chi^2 = 25.654$, $p < 0.001$), residence ($\chi^2 = 23.022$, $p < 0.001$), family type ($\chi^2 = 8.342$, $p = 0.004$), religion ($\chi^2 = 22.665$, $p < 0.001$), and tribe ($\chi^2 = 12.697$, $p = 0.002$). Significant predictors included age ≤10 years (AOR = 2.31, 95% CI: 1.40–3.82), urban residence (AOR = 1.76, 95% CI: 1.02–3.04), living with relatives (AOR = 2.45, 95% CI: 1.30–4.60), family size ≥4 children (AOR = 1.92, 95% CI: 1.15–3.18), and low parental supervision (AOR = 2.63, 95% CI: 1.52–4.53).

Conclusion: Rape remains a significant threat to female elementary school pupils and public health interventions should be geared towards reducing the menace.

Keywords: Rape; sexual violence; prevalence; perception; predictors; female elementary school pupils

INTRODUCTION

Sexual violence against children especially rape remains one of the most pervasive yet underreported violations of children's rights worldwide. It constitutes a major public health, social, and human rights challenge with profound consequences for the physical, psychological, reproductive, and social well-being of victims.[1–4] The United Nations Convention on the Rights of the Child recognizes freedom from all forms of violence, abuse, exploitation, and neglect as a fundamental right of every child.[5] Despite increasing global attention to child protection and safeguarding initiatives, sexual violence continues

to affect millions of children across diverse social, cultural, and economic settings.[2,6]

Rape represents one of the most severe forms of sexual violence and is generally defined as non-consensual sexual penetration achieved through force, coercion, intimidation, manipulation, abuse of authority, or exploitation of an individual's inability to provide informed consent.[1] Children are particularly vulnerable to sexual victimization because of their developmental immaturity, dependence on adults, limited understanding of sexual boundaries, and reduced capacity to recognize, resist, or report abusive situations.[7] According to the ecological systems theory, child sexual abuse results from complex interactions among individual, family, community, and societal factors, including poverty, inadequate parental supervision, social inequality, harmful gender norms, weak child protection systems, and poor access to education.[8]

Globally, the burden of child sexual abuse remains alarming. Meta-analytic evidence suggests that approximately one in five girls and one in thirteen boys experience some form of sexual abuse before the age of eighteen years.[9] Similarly, the United Nations Children's Fund (UNICEF) estimates that millions of children worldwide are exposed to sexual violence during childhood and adolescence.[2] However, the true magnitude of the problem is likely underestimated because many cases remain undisclosed due to fear, shame, self-blame, stigmatization, cultural silence, and inadequate reporting mechanisms.[10]

The consequences of rape and other forms of child sexual abuse extend beyond the immediate act of victimization. Victims frequently experience physical injuries, sexually transmitted infections, unwanted pregnancies, reproductive health complications, and increased risk of HIV infection.[11] The psychological effects are often profound and long-lasting, including depression, anxiety disorders, post-traumatic stress disorder, suicidal ideation, substance abuse, low self-esteem, and impaired social functioning.[7,12] Sexual violence during childhood may also adversely affect educational attainment through poor academic performance, school absenteeism, and premature school dropout, thereby limiting future opportunities and perpetuating cycles of social disadvantage.[13]

Sub-Saharan Africa continues to report a substantial burden of sexual violence against children and adolescents.[14] In Nigeria, sexual violence has emerged as a major public health concern affecting children across different socioeconomic, cultural, and geographical settings.[15] Findings from the Nigeria Violence Against Children Survey (VACS) revealed that a significant proportion of girls experience sexual violence before reaching adulthood, with many incidents occurring before the age of eighteen years.[16] Furthermore, studies conducted in various parts of Nigeria have shown that perpetrators of child sexual abuse are frequently individuals known to the victims, including family members, relatives, neighbours, teachers, caregivers, and family friends.[15,17,18] Such circumstances often complicate disclosure, delay reporting, and increase the risk of repeated victimization.

Despite increasing public awareness of child sexual abuse in Nigeria, sexual violence continues to occur in homes, schools, and communities. Evidence indicates that many incidents remain hidden because victims fear stigmatization, blame, retaliation, and social rejection.[10,16] Although several studies have examined rape and sexual violence among adolescents, university students, and out-of-school youths in Nigeria, there remains limited empirical evidence focusing specifically on female elementary school pupils.[15,17,19] This population represents a particularly vulnerable group because of developmental immaturity, dependence on adults, limited awareness of sexual boundaries, and reduced ability to recognize and report abuse.[7]

The paucity of data among female elementary school pupils in Oyo State constitutes a significant knowledge gap that may hinder the development of targeted prevention strategies, school-based interventions, parental education programmes, and child protection policies. Understanding

children's awareness, perceptions, experiences, and predictors of rape is essential for designing effective interventions that address both individual and environmental risk factors. Therefore, this study assessed the prevalence, perception, and predictors of rape among female elementary school pupils in Ogbomoso North Local Government Area of Oyo State, Nigeria, with a view to generating evidence for policy formulation, preventive programming, and strengthened child protection interventions.

METHODOLOGY

Study Design

This study employed a descriptive cross-sectional analytical design to assess the prevalence, perception, and predictors of rape among female elementary school pupils in Ogbomoso North Local Government Area, Oyo State, Nigeria.

Study Area

The study was conducted in Ogbomoso North Local Government Area of Oyo State, Southwestern Nigeria. Ogbomoso North is one of the 33 Local Government Areas in Oyo State and serves as a major urban center within the Ogbomoso metropolis. The Local Government Area is characterized by a mixture of public and private educational institutions, diverse socioeconomic groups, and predominantly Yoruba-speaking communities.

Study Population

The study population comprised female pupils in Primary 4 to Primary 6 attending selected public and private elementary schools in Ogbomoso North Local Government Area.

Sample Size and Sampling Technique

A total of 520 female pupils participated in the study. Respondents were selected using a multistage sampling technique. In the first stage, eligible public and private elementary schools were selected from the Local Government Area. Subsequently, proportionate sampling was used to determine the number of participants selected from each school, while eligible respondents were selected using systematic sampling procedures.

Instrument for Data Collection

Data were collected using a structured, pretested questionnaire developed from relevant literature on child sexual abuse and rape. The instrument consisted of sections on socio-demographic characteristics, awareness of rape, experiences of rape, perceptions of rape, and perceived risk factors associated with rape.

Validity and Reliability of Instrument

The questionnaire underwent face and content validation by experts in Community Health Nursing, Public Health, and Epidemiology. It was pretested with 52 elementary school pupils in Ogbomoso North Local Government Area, Oyo State. The school was excluded in the main study to avoid contamination. The pilot study objectives were to assess the questionnaire's clarity, appropriateness, sequence, comprehensibility, and administration time. Necessary modifications were made before the main survey commenced. The instrument's internal consistency reliability was evaluated using Cronbach's alpha, yielding a reliability score of 0.82.

Data Collection Procedure

Data were collected by the principal researchers with the assistance of trained research assistants who had undergone prior orientation on the study objectives, ethical principles, questionnaire administration, and child-friendly communication techniques. Before commencement of data collection, official permission was obtained from the Oyo State Educational Authority and the head teachers of the selected schools. Eligible pupils were identified based on the study inclusion criteria, while informed consent was obtained from parents or guardians and assent was obtained from the participating pupils in accordance with established ethical guidelines.

The questionnaires were administered in a conducive and private classroom environment during school hours to minimize distractions and ensure respondents' comfort. The research assistants provided standardized instructions and clarified questionnaire items where necessary without influencing the respondents' answers. Respondents completed the questionnaires

independently, and assistance was provided only to pupils who experienced difficulty understanding specific questions. To protect respondents' rights, no personal identifiers were collected, and respondents were assured that participation was entirely voluntary, with the freedom to decline or withdraw from the study at any stage without any academic or personal consequences.

Completed questionnaires were retrieved immediately after completion to minimize data loss and were checked on-site for completeness and consistency. Throughout the data collection process, strict confidentiality, privacy, and anonymity were maintained, and all completed questionnaires were securely handled and stored in accordance with approved research ethics protocols.

Data Analysis

Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics including frequencies and percentages were used to summarize the data. Pearson Chi-square test was used to determine associations between variables, while multivariate logistic regression analysis was performed to identify independent predictors of rape experiences. Statistical significance was set at $p < 0.05$.

Ethical Considerations

Ethical approval was obtained from the appropriate Health Research Ethics Committee of the local government before commencement of the study. Permission was obtained from relevant educational authorities and school administrators in the selected schools. Written informed consent was obtained from parents or guardians, while assent was obtained from participating pupils. Confidentiality, anonymity, and voluntary participation were ensured throughout the study.

Table 1: Socio-demographic characteristics of female elementary school pupils (N = 520)

Variable	Category	Frequency (n)	Percentage (%)
Age group	≤10 years	99	19.0
11–14 years	347	66.7	
≥15 years	74	14.2	
Sex	Male	—	—
Female	—	—	
Family order	1	142	27.3
2–3	123	23.7	
4–5	255	49.0	
Residence	Urban	440	84.6
Rural	80	15.4	
School type	Public	317	61.0
Private	203	39.0	
Family type	Monogamy	378	72.7
Polygamy	142	27.3	
Living arrangement	Both parents	264	50.8
Relatives	93	17.9	
Father & stepmother	78	15.0	
Stepfather & mother	37	7.1	
Father only	15	2.9	
Mother only	33	6.3	

Table 2: Socioeconomic Characteristics of Respondents

Variable	Category	Frequency (n)	Percentage (%)
Family income status	Rich	280	53.8
Middle income	110	21.2	
Poor	130	25.0	
Housing type	Flat	234	45.0
Face-to-face apartment	259	49.8	
Brick house	27	5.2	
Hawking after school	Yes	239	46.0
No	281	54.0	
Apprenticeship after school	Yes	328	63.1
No	192	36.9	

Table 3: Association Between Socio-Demographic Characteristics and Experience of Rape

Variable	Category	Yes n (%)	No n (%)	χ^2	p-value
Age group	≤10	39 (7.5)	60 (11.5)	43.599	<0.001
11–14	48 (9.2)	299 (57.5)			
≥15	4 (0.8)	70 (13.5)			
Family order	1	6 (1.2)	136 (26.2)	25.654	<0.001
2–3	23 (4.4)	100 (19.2)			
4–5	62 (11.9)	193 (37.1)			
Residence	Urban	62 (11.9)	378 (72.7)	23.022	<0.001
Rural	29 (5.6)	51 (9.8)			

Table 4: Prevalence and Characteristics of Rape Experiences

Variable	Category	Frequency (n)	Percentage (%)
Physically forced into sex	Yes	99	19.0
No	421	81.0	
Attempted rape	Yes	85	16.3
No	435	83.7	
Sexual touching/fondling	Yes	136	26.2
No	384	73.8	
Perpetrator	Father	28	5.4
Relative	29	5.6	
Family friend	42	8.1	
Teacher	15	2.9	

Table 5: Perception of Risk Factors for Rape

Risk Factor	Agree (%)	Indifferent (%)	Disagree (%)
Mother unavailable	8.7	51.2	40.2
Father unavailable	10.0	45.0	45.0
Living with relatives	5.8	45.2	49.0
Peer pressure	12.3	44.8	42.9
Left alone unsupervised	13.1	44.0	42.9

Discussion

This study assessed the prevalence, perception, and predictors of rape among female elementary school pupils in Ogbomoso North Local Government Area, Oyo State, Nigeria. The findings provide important insights into the burden of sexual violence among young school-aged girls and highlight factors that may increase vulnerability to victimization.

The socio-demographic profile of respondents showed that the majority (66.7%) of participants were aged 11–14 years and resided in urban areas. This age group corresponds to early adolescence, a developmental period characterized by increasing social interaction, greater independence from parents, and heightened exposure to external environments. These developmental transitions may increase vulnerability to exploitation and abuse, particularly in settings where adequate supervision and child protection mechanisms are lacking. Similar observations have been reported in previous studies that identified early adolescence as a critical period of risk for sexual victimization among girls.[1,2]

With respect to awareness, the findings revealed that approximately two-thirds (63.5%) of respondents had heard about rape. However, a closer examination of respondents' understanding of rape showed important misconceptions. While half (50%) of the respondents associated rape with sexual intercourse following threats to life, only one-quarter correctly identified rape as penile penetration without consent. Furthermore, some respondents considered forced smooching or touching of the breasts as rape, suggesting gaps in knowledge regarding the legal and public health definitions of rape. Although the relatively high level of awareness may reflect increasing media attention and community discussions surrounding rape, awareness alone does not necessarily translate into accurate knowledge or protective behaviors. Similar findings have been reported among Nigerian adolescents and students, where awareness of rape was relatively high but understanding of its forms, consequences, and reporting procedures remained inadequate.[3,4] This finding underscores the need for age-appropriate sexuality education and child protection programmes within primary school settings.

Furthermore, the study found that the prevalence of rape among female elementary school pupils was 17.5%, indicating that approximately one out of every six respondents had experienced rape. In addition, 19.0% reported being physically forced into sexual intercourse, 16.3% reported attempted rape, and 26.2% reported unwanted sexual touching or fondling. These findings demonstrate that rape constitutes a substantial burden among young girls in the study area. The prevalence observed in this study is consistent with evidence from Nigeria and other low- and middle-income countries showing that rape against children remains widespread despite increased awareness and advocacy efforts.[5,6] The findings further support reports from the Nigeria Violence Against Children Survey, which documented significant levels of sexual violence among Nigerian girls before the age of eighteen years.[7]

In addition, an important finding of this study is the identification of perpetrators. Family friends, relatives, fathers, and teachers were among the most frequently reported perpetrators of rape. This finding reinforces existing evidence that perpetrators of child sexual abuse are often individuals who are known to and trusted by victims rather than strangers.[8,9] The involvement of persons within the child's immediate social environment may explain the persistent problem of underreporting, as victims may fear retaliation, family conflict, social stigma, or disbelief. The finding further highlights the importance of strengthening safeguarding mechanisms within homes, schools, and communities.

Also, the present study identified several socio-demographic factors associated with rape experiences. Significant associations were observed between rape experience and age group, family size, and place of residence. Younger pupils were more likely to report rape experiences than older respondents. This finding explained that limited cognitive maturity, dependence on adults,

and reduced ability of younger children leads to risky situations or ability to resist coercion. Similar findings were reported in studies indicating that younger children often possess fewer protective skills and are therefore more vulnerable to exploitation.[1,10]

Family size also emerged as an important factor associated with rape experiences. Respondents from larger families reported higher rates of victimization than those from smaller families. This was related to reduced parental attention and supervision in larger households, potentially increasing children's exposure to unsafe environments. Previous studies have similarly identified inadequate parental monitoring and supervision as significant contributors to child vulnerability to sexual abuse.[11]

Residence was another significant factor associated with rape experiences, with respondents residing in urban areas reporting higher prevalence of sexual victimization than those in rural areas. This finding reflects greater population density, increased interaction with non-family members, social disorganization, and broader exposure to risk environments in urban settings. Urbanization has previously been linked to increased opportunities for child exploitation and reduced communal monitoring of children.[12]

The multivariate logistic regression analysis provided further evidence regarding predictors of rape. Pupils aged ten years and below were more than twice as likely to experience rape compared with older respondents. Similarly, urban residence, living with relatives, large family size, and low parental supervision significantly increased the likelihood of victimization. Notably, low parental supervision emerged as the strongest predictor of rape experiences. Children who lacked adequate parental supervision were more than twice as likely to experience rape than their counterparts who received adequate supervision. This finding emphasizes the central role of family oversight and child monitoring in protecting children from sexual abuse. It also supports ecological models of child abuse, which identify inadequate supervision and weak family protective structures as major risk factors for victimization.[13]

Regarding perception, the majority of respondents demonstrated a good overall perception of rape. Nevertheless, a substantial proportion still exhibited poor perception and uncertainty regarding rape awareness campaigns, reporting channels, and available support mechanisms. This suggests that although many respondents recognize rape as harmful, they may not possess sufficient knowledge regarding prevention, disclosure, and response strategies. The significant associations observed between perception and age, residence, and family type further suggest that social and environmental factors influence children's understanding of sexual violence. Older respondents and those residing in urban areas demonstrated better perceptions, possibly due to greater exposure to educational information and public awareness campaigns.

The findings relating to perceived risk factors also provide important insights. Although many respondents expressed indifference regarding several risk factors, some identified peer pressure, parental unavailability, and being left unsupervised as conditions that may increase vulnerability to rape. These perceptions correspond closely with the predictors identified in the regression analysis, particularly the role of supervision and family environment. The consistency between perceived risk factors and observed predictors suggests that children possess some awareness of the circumstances that may place them at risk, even though they may lack comprehensive knowledge of prevention strategies.

Taken together, the findings of this study demonstrate that rape remains an important threat to the safety and well-being of female elementary school pupils in Ogbomoso North Local Government Area, Oyo State, Nigeria. The observed prevalence, coupled with the influence of family, residential, and supervisory factors, highlights the need for comprehensive prevention programmes that extend beyond awareness creation. School-based sexuality education,

parental empowerment programmes, strengthened child protection systems, confidential reporting mechanisms, and community-wide safeguarding initiatives are essential for reducing vulnerability and improving the protection of children from sexual violence.

Limitations

This study has several limitations. First, the cross-sectional design limits the ability to establish causal relationships between predictors and rape experiences. Secondly, the use of self-reported data may introduce reporting bias due to stigma or fear of disclosure. Thirdly, the study was conducted in selected schools within Ogbomoso North Local Government Area, Oyo State, Nigeria and may not be generalizable to all regions of Nigeria.

Conclusion

This study provides empirical evidence on the prevalence, perception, and predictors of rape among elementary school pupils in Ogbomoso North Local Government Area, Oyo State, Nigeria. The findings indicate that a considerable proportion of pupils reported experiences of rape and reveal that vulnerability is influenced by a combination of socio-demographic, family, and environmental factors. The study also demonstrates variations in pupils' awareness and perceptions of rape, highlighting important contextual factors that may shape children's understanding of sexual violence and their responses to such experiences.

Overall, these findings contribute to the growing body of evidence on child sexual violence in Nigeria and provide context-specific information that may inform future research, policy formulation, and the development of interventions aimed at preventing sexual violence against children. The study further offers baseline data that may support stakeholders in designing evidence-informed child protection strategies and strengthening efforts to promote the safety, wellbeing, and rights of school-aged children.

Recommendations

Future research in this area will require a mixed-method qualitative study across wider settings, alongside the integration of comprehensive sexuality education into primary school curricula, the establishment of child-friendly reporting systems within schools, increased parental education and supervision programs, the strengthening of child protection laws and enforcement mechanisms, and collaboration between schools, healthcare institutions, and law enforcement agencies.

Funding: No funding was secured for this study.

Authors' contributions

Z.O conceptualized and designed the study. L.O and F.A conducted the literature review and data collection. A.I performed the statistical analysis and interpreted the findings. Z.O and A.I drafted the manuscript. A.B and R.A contributed to the revision of the manuscript while all the authors approved the final version, and agreed to be accountable for all aspects of the work.

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Integrated Journal of Medicine and Medical Sciences

Integr J Med Med Sci. 2026;5(2):131-139.

COMPARISON OF CARDIOVASCULAR RISK FACTORS, LIFESTYLE AND SOCIOECONOMIC STATUS OF URBAN AND RURAL DWELLERS IN LAGOS STATE, NIGERIA: RESULTS OF WORLD HEART DAY CAMPAIGNS

DANIEL Folasade Adeola[1,2] {MBChB,FMCP}, AJIBARE Adeola Olubunmi[1,2] {MBChB,FMCP}, OKUNUGA Oluwaseun Oyeyemi[2] {MBChB,FMCP}, OKOGUN Ehimien Osahon[2] {MBBS,FWACP}

[1] Department of Medicine, Lagos State University College of Medicine, Ikeja, Lagos State, Nigeria.
[2] Department of Medicine, Lagos State University Teaching Hospital, Ikeja, Lagos State, Nigeria.

Corresponding Author: Folasade Adeola DANIEL Email: **folasade.daniel@lasucom.edu.ng** Phone number: **08033164546**

Citation:

Daniel FA, Ajibare AO, Okunuga OO, Okogun EO. Comparison Of Cardiovascular Risk Factors, Lifestyle And Socioeconomic Status Of Urban And Rural Dwellers In Lagos State, Nigeria: Results Of World Heart Day Campaigns. Integr J Med Med Sci. 2026;5(2):131-139.

Received: June 11, 2026.
Accepted: July 24, 2026.
Published: July 31, 2026.

DOI: https://dx.doi.org/10.4314/ijmms.v5i2.7

Abstract

Background: Cardiovascular diseases are the leading cause of death worldwide, and the prevalence is increasing at an alarming rate. Hitherto, urbanization and westernization of lifestyle have been attributed to the rising prevalence. This study, therefore, seeks to compare the cardiovascular risk factors, lifestyles and socioeconomic status of both urban and rural dwellers in Lagos State, Nigeria.
Methods: During the World Heart Day (WHD) campaigns of 2019 and 2022, we recruited participants from rural (Agbowa) and urban (Oshodi) centres in Lagos State and compared their risk factors using the World Health Organization (WHO) STEPS questionnaire.
Results: The prevalence of self-reported hypertension in the rural and urban communities was 36.6% and 23.7% (p=0.49) respectively; the measured blood pressure were also higher in the rural dwellers(p<0.000). The prevalence of diabetes and the rates of physical activity were similar in both communities. There was a higher mean BMI in urban than rural areas: 28.16kg/m^2 vs 26.89kg/m^2 (p=0.471), however the rate of obesity was higher in the rural than urban area (28%vs25.7%; p=0.644) while adherence to anti-hypertension medication was 72.3% in Agbowa compared to 15.9% in Oshodi (p=0.000). The highest rates of hypertension were found in the low socioeconomic class while the middle socio-economic class had the highest rate of obesity. The Agbowa participants had a statistically higher prevalence of healthy lifestyle(p=0.000)
Conclusion: Some Cardiovascular disease risk factors are more prevalent in some rural than urban regions of Lagos state, and there is an urgent need for better education, intervention and greater access to health care.

Keywords: Cardiovascular risk factors, low-middle income countries, socioeconomic class, rural areas, urban areas.

INTRODUCTION

Cardiovascular diseases are the leading cause of death globally and the most important public health problem that the health care space is grappling with, causing 17.8 million deaths per year globally.[1] A large portion of these deaths are in low- and middle-income countries especially in sub-Saharan Africa. The projection for cardiovascular mortality in 2025 was 20.5 million, while the figures are expected to skyrocket to 35.6 million by 2050.[2] The World Health Organization and World Heart Federation are doing a lot to bring these figures down by 2030.[3,4] This is in keeping with the number 3.4 of the sustainable development goals of the United Nations "Good Health and well-being for all".[5] Hypertension is a major risk factor for cardiovascular diseases as well as obesity, which has been the focus of the

World Heart Federation among many other risk factors for which roadmaps have been developed to curb the impact of these conditions.[6,7,8]

One of the strategies is to offer counselling and drug therapy to prevent this magnitude of mortality in half of the people who are at moderate and high risk for cardiovascular events. The World Health Organization developed a cardiovascular disease risk scoring criteria which has specialized charts specific for use in various regions of the world.[9,10] The countries who are members of World Health Organization are committed to offer these services to individuals at high risk of cardiovascular disease by 2025. The achievement of these goals will only be achievable when we can identify those at high cardiovascular risk. The data available on risk factor prevalence is limited to small studies from various regions across Nigeria.[11,12,13]

Urbanization is thought to have an influence on the upward trend in cardiovascular risk factors and diseases especially those related to lifestyle in low and middle income countries (LMIC).[14,15] Studies on global trends in cardiovascular risk factors, especially hypertension, reveal that there is a higher burden of cardiovascular risk factors in LMIC than in high-income countries [16] .Studies done locally have found higher prevalence of obesity and overweight in rural dwellers than urban settlers.[17,18] Socio-economic status also plays a role in cardiovascular risk factors such as obesity and hypertension, and there appears to be an inverse relationship between Socio-economic class and body mass index.[19]

Our study was carried out to compare cardiovascular risk factors among urban and rural dwellers in Lagos State, South -West Nigeria and to correlate these factors with age, socio-economic status, gender and lifestyle. Also, we researched the prevalence of treatment for modifiable risk factors in the participants and compared the uptake between the rural and urban groups. The outcome of this study would have an impact on strategies to curb the menace of cardiovascular diseases, which are on the rise.

METHODS

Study site

This was a cross-sectional study carried out during World Heart Day campaigns held at Agbowa and Oshodi respectively in Lagos State, Nigeria in 2019 and 2022.

Lagos state is in the South-west of Nigeria ,West Africa and is a cosmopolitan area of Nigeria being the second most populous state of the thirty -six states in the country. It's bounded by the Atlantic ocean bay (Bight of Benin) on the south ,Benin Republic on the West and Ogun State on its North and East borders. The population of Lagos state is estimated to be 20 million on a land area of 3,500km^2.

Agbowa is a small town on the outskirts of the metropolis of 215,000 residents in which the major vocation is fishing and agriculture.[20] Oshodi is however densely populated with over 1.6 million residents in an area of 45km^2. World Heart Day is an initiative of the World Heart Federation [4] which affords cardiologists the opportunity to hold campaigns and screening camps for communities with the objective of creating awareness of cardiovascular risk factors and giving education on how to reduce these risk factors: World Heart Day has been commemorated for twenty-five years. Since 2015, the Cardiology unit of the Department of Medicine of the Lagos State University Teaching Hospital (LASUTH) has held campaigns yearly to raise awareness on cardiovascular diseases and their prevention. We also hold one-day screening camps in one local government area at a time.

Study participants

Participants were selected and recruited serially through a convenience sampling method. Adult subjects, aged 18 years and above were consecutively recruited into the study from the participants who visited the WHD campaign grounds in both Agbowa and Oshodi.

Demographics and other questionnaire- based variables

Data on demographics and lifestyle were collected by administering the WHO-STEPS questionnaire [21] on the participants, including use of tobacco and

alcohol, level of physical activity, and dietary habits. A history of previous diagnosis or screening for hypertension and diabetes were obtained. The patients also had anthropometric measurements taken, including height and weight, using a stadiometer and an OMRON weighing scale respectively.

Blood pressure measurements

Blood pressure measurements were obtained using OMRON blood pressure monitors by trained volunteers and doctors using standard protocols as highlighted by the standard guidelines. The blood pressures were measured three times, and the average of the second and third measurements was recorded. The history of hypertension was taken to be the treatment for hypertension or persistent blood pressure of ≥140/90mmHg.

Blood sugar was measured on all the participants using the Accu-Chek glucometer and the history of Diabetes was taken as being on treatment for diabetes mellitus or fasting blood sugar was ≥126mg/dl or 7 mmol/L

Obesity is defined as the body mass index (BMI) of ≥ 30Kg/M^2

Overweight is defined as a BMI of 25-29.9Kg/M^2; Healthy weight is BMI of 19 to 24.9Kg/M^2.

Socioeconomic classes were determined using the monthly income/earnings of the individual's family:

***Low socioeconomic class*:** monthly income <100,000 Nigerian Naira

***Middle socio-economic class*:** monthly income between 100,000 to 500,000 Nigerian Naira

***High socio-economic class*:** monthly income >500,000 Nigerian Naira.

Lifestyle was measured by the amount of physical activity carried out by the individual

A healthy lifestyle was interpreted to be the equivalent of carrying out at least 30 minutes of moderate intensity exercise >3 times a week and not eating out more than once a week.[22]

An unhealthy lifestyle was interpreted as not taking up to 3 days of exercise a week and eating out more than two times a week.

Quantifying fruit and vegetable intake

One serving of vegetables is the equivalent of half a cup of cooked vegetables or one cup of raw leafy green vegetables. One serving of fruit is one medium-sized piece of fruit, such as a banana/apple/slice of papaya or half a cup of raw, cooked or canned fruit or half a cup of natural fruit juice. Healthy eating is considered to be 5 servings of fruit/vegetables per day

Ethical consideration

We sought the approval of the Permanent Secretary of the State Primary Health Care Board to carry out these campaigns, and health educators were sent into different wards to publicize the campaign within the local government areas. We also obtained ethical approval from LASUTH HREC: approval number: LREC/06/10/2623. Informed consent was also obtained from the participants.

Data analysis

The data was entered into a personal computer and analyzed using SPSS version 25. Categorical data were expressed in percentages, while numerical data were presented as mean, median and mode. Correlation of the cardiovascular risk factors, lifestyle and socioeconomic status between the rural and urban dwellers was done using Pearson chi squared correlation analysis with significance level set at $p<0.05$. Comparisons were made using ANOVA.

RESULTS

A total of 187 respondents were recruited into the study from Agbowa in Epe local Government Area, and 155 respondents from Oshodi local Government area of Lagos State. There was a preponderance of female respondents in a ratio of 3:1. The mean ages were similar: 46.31 ±14.15 and 44.56±13.67 years respectively. The mean body mass index among Agbowa residents was 26.89kg/m^2 vs 28.16kg/m^2 for participants from Oshodi (p=0.471).More than forty percent of participants from either Agbowa or Oshodi had normal BMI; while a quarter of them were obese; the prevalence of obesity was 28% in Agbowa and 25.7% in Oshodi (p=0.644).The mean systolic blood pressure of respondents measured at the campaign from Agbowa was 137.12mmHg

compared with 129.29mmHg for Oshodi respondents (p=0.003); the mean diastolic blood pressure for Agbowa participants was 83.28mmHg compared with 80.38mmHg for Oshodi participants (p=0.065).

The prevalence of self -reported hypertension was 36.6% in Agbowa and 26.5% at Oshodi (p=0.032) meanwhile 55.2% from Agbowa recorded a high blood pressure versus 33.3% in Oshodi. Out of the participants who had hypertension 72.3% and 15.9% were on anti-hypertensive medication from Agbowa and Oshodi respectively (p=0.000). Regular blood pressure checks were carried out by 85.5% of Agbowa respondents compared to 74.1% of participants from Oshodi. The prevalence of diabetes was 6.4 % among Agbowa respondents and 4% among respondents from Oshodi although the detection of high blood sugar at the screening was 23% among participants from Agbowa and only 2.8% among Oshodi participants(p=0.000).

TABLE 1: BASELINE CHARACTERISTICS OF THE PARTICIPANTS

	Agbowa N=187	Oshodi N=155	P value
Male	53	30	0.062
Age	46.31±14.15	44.56±13.67	0.258
BMI	26.87±5.75	28.16±22.75	0.471
SBP	137.12±23.51	129.29±23.49	0.003*
DBP	83.28±14.27	80.38±23.49	0.065
FBS	93.24±31.01	111.45±26.08	0.059
Healthy lifestyle	62(33.2%)	148(95.5%)	0.000*
Socioeconomic class			
Low	67(26.2%)	103(66.9%)	0.0000*
Middle	42(22.7%)	41(26.6%)	
High	76(41.1%)	10(25.4%)	0.0000*
Hx of hypertension	68(36.6%)	40(26.5%)	0.049*
High blood pressure reading	79(55.2%)	48(33.3%)	0.000*
Normal BMI	77(44%)	63(43.8%)	0.603
Overweight	46(26.3%)	38(26.4%)	
Obese	49(28%)	37(25.7%)	
Diabetes	12(6.4%)	6 (4.0%)	0.334
Treatment of hypertension	47(22.3)	23(15.9)	0.000*
Treatment of diabetes mellitus	12	2	0.000*

BMI= body mass index; SBP= systolic blood pressure; DBP= diastolic blood pressure; FBS=fasting blood sugar.

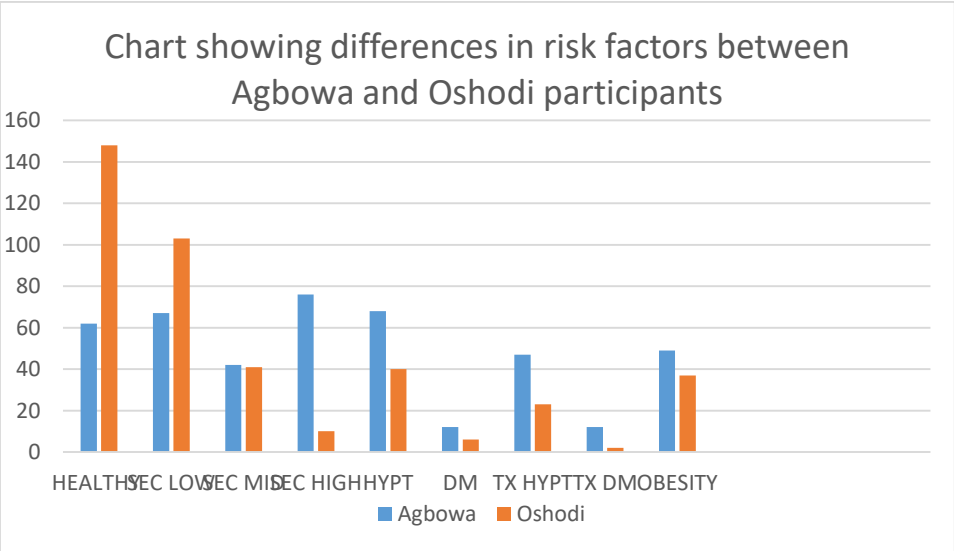


FIGURE 1: HLTH=healthy lifestyle; SC=socio-economic class; HYPT=hypertension; DM=diabetes mellitus; TX= treatment

TABLE 2:

socio-economic class	hyptn	non-hyptn	pvalue
high	15.6 %	46.3%	0.010
middle	27.9%	26.3%	
low	57.9%	30.4%	

HYPTN= hypertension

TABLE 3: TREATMENT ADHERENCE BY PARTICIPANTS

	Agbowa N(%)	Oshodi N(%)	P value
Treatment for hypertension	47(72.3)	23(15.9)	0.000
Treatment for diabetes mellitus	12(44.4)	2(1.5)	0.000

Screening for diabetes mellitus by carrying out blood glucose estimation from time to time was more prevalent in Agbowa (53.3%) than in Oshodi (27.6%) (p= 0.000). Almost half of the people with diabetes mellitus in Agbowa were using either insulin or oral hypoglycemic agents compared with 2% of the Oshodi participants(p=0.000).

SOCIOECONOMIC STATUS

The socioeconomic status of participants from Agbowa and Oshodi varied significantly when we consider the low and high socio-economic classes (SEC): there were 36% of participants from Agbowa in the low SEC compared to 66.9% of respondents from Oshodi. In the high SEC, there were more people from Agbowa (41.8)% than Oshodi (6.5%)(p<0.000).However the number of participants from either site in the middle socio-economic class were close (22.7% vs 26.6%). More of the individuals at Agbowa were employees of government establishments:28% compared with 5.9% of the participants from Oshodi and a majority of the latter were self-employed (73.9%). The low SEC had the highest prevalence of hypertension followed by the middle SEC overall and this was statistically significant(p=0.010). Half of the obese respondents were in the low SEC while 27% and 22% of the obese were from the middle and high SEC respectively. The persons who were overweight had a similar distribution across socioeconomic classes whereas almost half of the respondents with normal weight were from the low SEC. Only one participant in the high SEC was underweight and more than half of the underweight belonged to the middle SEC. The highest prevalence of diabetes was in the low SEC, followed by the middle SEC(p=0.317). The participants responded to their cholesterol levels being either normal or high: 44% of those with a high level of cholesterol were from the high SEC, while 24.6% were middle SEC (24%) and 31.1% from low SEC; this did not however differ statistically.

LIFESTYLE

Among the respondents from Agbowa the prevalence of smoking was 3.1%; while 4.6% participants from Oshodi smoked (p=0.469). Most of them smoked twice a week at most. Alcohol use was at a prevalence of 26.6% in Agbowa and 26.9% at Oshodi (p=0.92). The consumption of fruit among the respondents was investigated and generally an almost equal number of them ate fruits once, twice and three times a week while about one fifth ate fruit daily ;78.8% of them ate one to two portions of fruit daily while about 3% ate five or more portions daily. Comparing fruit intake among Agbowa and Oshodi residents: the trend differed significantly as more Oshodi residents ate fruits once a week than Agbowa (31.5% vs 17.7%) but more of Agbowa residents ate fruits daily (23.8%) as opposed to Oshodi residents among whom 13.8% took fruit daily (p=0.028).The mode frequency of vegetable consumption in

Agbowa was once a week(31.5%)with 13.7% of them eating vegetables daily whereas the distribution of weekly vegetable consumption in Oshodi was almost evenly distributed between one to three times a week(21.6%;19.4%;22.3% respectively (p=0.118).The rate of eating outside the home was higher among Agbowa residents than Oshodi (49% versus 23.7%) p value =0.0000 .

DISCUSSION

The purpose of this study was to document lifestyle and measurable cardiovascular disease risk factors among residents of two local government areas within Lagos state, and compare the indices in order to highlight the impact of urbanization.

The mean ages of participants from both locations were similar, with no significant difference between the populations. This is unlike some studies where the rural dwellers are generally older than those who inhabit urban locations.[11,23] This may be because elderly people in a cosmopolitan state may find it difficult to visit the WHD campaign ground, while younger people may find it easier to get there. There was a preponderance of female respondents in both locations; this may be related to lethargy on the part of the men or the fact that men may not want to respond to free screening of health indices or less likely to show up for events unrelated to ventures with economic value than women.[12,24,25] Oguomo et al however found out that more male participants were likely to have their blood pressures checked than women; this could be as a result of the level of education of the males being higher than that of women in the natives of Kwale, whom he studied.[26] In this study, our participants were made up of those who came to the health center following publicity through flyers. Also, elderly patients made up only 7.6% of the participants from our rural area, whereas in Ekiti, where Ogunmola et al carried out their study on residents without apparent cardiovascular disease, elderly patients made up almost 20%.[11]

The mean Body mass index (BMI) for the Agbowa participants was lower than that of the urban group from Oshodi, although there was a higher prevalence of obesity in Agbowa than in Oshodi. Dahiru observed only 7% obesity among his semi-urban participants,[12] which is far less than 25.7% in our study; the explanation for this may be due to differences in ethnicity and diet and as well as occupation. The study by Dahiru et al was carried out in a semi-urban settlement of Kaduna State, where there were mostly agrarian Hausa people whereas the majority of the Agbowa dwellers were civil servants and self -employed people. The observation of Adediran [18] when he compared urban and rural dwellers of the same ethnicity was that urban dwellers had a higher BMI than those who lived in the rural areas.

Akpa et al also found a 23% mean prevalence of obesity in thirteen African countries from a meta-analysis of about five major studies.[27] This is similar to a study in Ekiti, South-West Nigeria.[11] There is therefore a trend in which rural dwellers are less likely to be obese than urban dwellers, and this may be due to their level of physical activity through farming and walking. Bakare et al found that more urban dwellers were inactive compared to rural dwellers.[17] The employment status could also be a contributory factor: retired people and businessmen and women tend to lead sedentary lives, and these formed a significant portion of people from Agbowa. Generally there is a trend towards higher prevalence of obesity in urban than rural areas.[11,17,28]

The mean systolic blood pressure measured was higher among participants from Agbowa than Oshodi and this was statistically significant. In addition, the prevalence of hypertension was also higher in Agbowa compared to Oshodi. The findings in the MONICA study and Ibeju-Lekki align with these findings.[17,23] This was explained in Sweden due to older individuals who live in the rural regions and have higher prevalence of hypertension. The mean age of participants from the rural area of Agbowa was older than those from Oshodi however this was not statistically significant.

The participants were mostly in the low socioeconomic class, with the prevalence of hypertension being highest in that same class; the

high socioeconomic class had the lowest prevalence of hypertension. This association was also noted in rural China by Cai et al.[29,30] It was observed by Ranzani et al in a meta-analysis of urban -rural prevalence of hypertension in LMIC (low and middle income countries) that the difference in prevalence of hypertension between rural and urban dwellers closes up with development and the rural areas seem to overtake the urban in prevalence of hypertension.[15] This is especially so in low- and middle-income countries than in high-income countries, which may be due to improvement in countrywide socio-economic levels.

The higher prevalence of diabetes mellitus in the rural area may have to do with the older age and higher level of socio-economic status; this is also corroborated by authors in Sweden.[23] However, not all studies found this to be so. Oguomo opined that there is a significant burden of CVD risk factors among rural dwellers as well as other authors.[26,31,32,33,34] The uptake of drug treatment for hypertension differed between residents of Agbowa and Oshodi; there was a statistically significant higher uptake of antihypertensive use in Agbowa compared to Oshodi, which is an urban center. Similarly, treatment for diabetes mellitus was also higher in Agbowa than in Oshodi. The existence of a health center managed by the Lagos State University College of Medicine in the community could be responsible for the level of treatment uptake in the area. Other authors have observed the urban-rural discrepancy in risk factor screening and treatment and many of these are influenced by age and subscription to health insurance.[25]

CONCLUSION

The prevalence of obesity, hypertension and diabetes mellitus were higher in the rural area which we studied than the urban area. There was also a difference in the socio-economic status with lower socioeconomic class appearing to have a negative influence on the cardiovascular risk factors and treatment uptake, which would be deleterious on the long run because untreated risk factors lead to cardiovascular disease and deaths.

LIMITATIONS

This study was carried out as an opportunistic screening during World Heart Day campaigns, and the participants may not be a true representation of the whole population: the sampling was not stratified either. These results must therefore be interpreted with caution. Large scale state-wide surveys should be carried out to get a representative picture of the population. Lipid profile was not carried out on the participants which would have made the evaluation more robust.

CONFLICTS OF INTEREST

There are no conflicts of interest in carrying out this research.

AUTHOR CONTRIBUTIONS

FAD: Conceptualization of study and writing of the first and final draft

AOA: Mapping out the methodology and writing the second draft

OOO: Data collection and writing of the results section

EOO: Co-writing the final draft

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Integrated Journal of Medicine and Medical Sciences

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FAMILY HISTORY AND SUBSTANCE USE AMONG OUT-OF-SCHOOL ADOLESCENTS IN NIGERIA: DO OCCUPATION AND SELF-ESTEEM MODIFY THE ASSOCIATION?

AJAYI Adeola Olajumoke {MBBS, FMCPsych}[1,2], AKANDE Majek Ayodeji {MBBS, FMCPsych}[3], AJAYI Akindele Amos {FWACP}[4,5], ISHOLA Abdurahamon Ajibola {MSc, PhD}[6], ABEDIDE Charles Ayodele {MBBS, FMCPsych}[1,2], AKINYEMI Hezekiah Adebola {MBBS, MSc, FMCPath}[7,8], AKANDE Roseline Oluyemisi {MBBS, MPH, FMCPH}[9], OPAKUNLE Oladele Oladayo {MBBS}[10]

[1] Department of Psychiatry, Osun State University, Osogbo, Osun State, Nigeria.
[2] Department of Psychiatry, UNIOSUN Teaching Hospital, Osogbo, Osun State, Nigeria.
[3] Cygnet Heathers, Grout Street, West Bromwich B70 0HD, United Kingdom.
[4] Department of Family Medicine, Osun State University, Osogbo, Osun State, Nigeria.
[5] Department of Family Medicine, UNIOSUN Teaching Hospital, Osogbo, Osun State, Nigeria.
[6] Department of Audiology, Federal University of Health Sciences, Ila-Orangun, Osun State, Nigeria.
[7] Department of Anatomic Pathology and Forensic Medicine, Osun State University, Osogbo, Osun State, Nigeria.
[8] Department of Morbid Anatomy and Histopathology, UNIOSUN Teaching Hospital, Osogbo, Osun State, Nigeria.
[9] Department of Community Medicine, Faculty of Clinical Sciences, College of Health Sciences, LAUTECH, Ogbomoso, Oyo State, Nigeria.
[10] Department of Medical Microbiology and Parasitology, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Osun State, Nigeria.

Corresponding Author: Ajayi Adeola Olajumoke Email: adeola.ajayi@uniosun.edu.ng, phone: +234 803 439 6779

Citation:

AJAYI AO, AKANDE MA, AJAYI AA, ISHOLA AA, ABEDIDE CA, AKINYEMI HA, AKANDE RO, OPAKUNLE OO. Family History and Substance Use Among Out-of-School Adolescents in Nigeria: Do Occupation and Self-Esteem Modify the Association?. Integr J Med Med Sci. 2026;5(2):140-148.

Received: July 9, 2026
Accepted: July 24, 2026.
Published: July 31, 2026.

DOI: https://dx.doi.org/10.4314/ijmms.v5i2.8

Abstract

Background: This cross-sectional study examined whether occupation and self-esteem moderate the association between family history of substance use and psychoactive substance use among out-of-school adolescents in Nigeria.
Methods: Secondary analysis of cross-sectional data from 408 out-of-school adolescents (aged 10-19 years) in Osogbo, Nigeria, collected between February and October 2018, was conducted. Family history of substance use (parent or sibling use) was the primary predictor, and lifetime psychoactive substance use measured with the WHO Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) was the outcome. Moderation was examined using hierarchical logistic regression with product terms and adjustment for age, gender, socioeconomic class, family functioning, and parental control.
Results: Family history of substance use was associated with significantly higher odds of lifetime psychoactive substance use (adjusted OR=3.56, 95% CI: 2.14-5.91, p<0.001). The interaction between family history and occupation was not significant (OR=1.24, 95% CI: 0.59-2.60, p=0.568), and the interaction between family history and self-esteem was also not significant (OR=1.37, 95% CI: 0.60-3.13, p=0.458).
Conclusions: Family history of substance use is a robust and consistent correlate of substance use among out-of-school adolescents in Nigeria, and there was no evidence that occupation or self-esteem significantly modified this association. Universal screening for family history of substance use may help identify adolescents with higher odds of psychoactive substance use regardless of occupational setting or self-esteem level.

Keywords: Family history; substance use; out-of-school adolescents; moderation; occupation; self-esteem; Nigeria.

INTRODUCTION

A parent or sibling who uses psychoactive substances is among the strongest predictors of adolescent substance use across cultures.[1-3] The mechanisms involve genetic liability, such as variations in reward pathway genes, and social learning through observation and imitation within the family.[4] Among out-of-school adolescents in Nigeria, those with a positive family history of substance use have been reported to have more than three times the odds of lifetime substance use compared with those without such a history.[5]Whether this association differs in magnitude from in-school populations has not

been directly examined and remains an open question for future comparative research. However, risk factors rarely operate uniformly. Whether the effect of family history is amplified or attenuated by other characteristics of the adolescent or their environment has critical implications for prevention.

Two potential moderators stand out in the Nigerian out-of-school population. First, occupation divides these youth into distinct groups. Artisan apprentices (fashion designers, hairdressers, automobile mechanics) work under adult supervision in structured workshops with daily routines. Non-artisan youth (hawkers, bus conductors, the unemployed) operate in chaotic, unsupervised street environments such as motor parks and markets.[6-8] These differing contexts could alter the expression of familial risk. For non-artisan youth already exposed to open drug markets and substance-using peers, family history might add little extra risk, or the combination might be synergistic. For artisan apprentices, the structured workshop might buffer familial risk.[9]

Second, self-esteem has been implicated as both a risk and a protective factor.[10-12] Low self-esteem may increase susceptibility to family modelling: adolescents who feel worthless might seek approval from substance-using parents or use drugs as an escape.[13] High self-esteem might buffer against family history, providing internal resources to resist pressure. However, in extremely adverse environments, self-esteem may become irrelevant.[14]

No previous study has formally tested whether occupation or self-esteem moderates the family history–substance use relationship among out-of-school adolescents in Nigeria or elsewhere in sub-Saharan Africa.[15-17] This study tested two hypotheses: (1) occupation moderates the association, with a stronger effect among non-artisan youth; (2) self-esteem moderates the association, with a stronger effect among adolescents with low self-esteem.

Methods

Study design and setting

This study represents a secondary moderation analysis of a cross-sectional dataset collected between February and October 2018 among out-of-school adolescents in Osogbo, Osun State, Nigeria. The primary descriptive findings from this dataset were previously reported in a dissertation by Akande AM.[5] The present analysis addresses a distinct research question by examining whether occupation and self-esteem moderate the association between family history of substance use and adolescent psychoactive substance use.

Osogbo is the capital city of Osun State in south-western Nigeria. It is predominantly Yoruba-speaking and has substantial populations of artisan apprentices and street-connected out-of-school adolescents who congregate in workshops, motor parks, markets, and roadside trading areas.

Participant selection and sampling

The target population comprised out-of-school adolescents aged 10–19 years who were not enrolled in formal education at the time of the survey. For this study, out-of-school adolescents were defined as young people aged 10–19 years who were not enrolled in or attending any formal educational institution at the time of the survey. This included artisan apprentices, hawkers, bus conductors, unemployed adolescents, and other street-connected youth. Adolescents who were truant from school or simultaneously enrolled in school and apprenticeship were excluded. Adolescents who were truant from school or simultaneously enrolled in school and apprenticeship were excluded.

Sample size was calculated using Leslie Fisher's formula for cross-sectional studies: $n = Z^2pq/d^2$, where Z = 1.96 (95% confidence interval), p = 40% (consolidated prevalence of substance use among Nigerian out-of-school adolescents from a previous study[15]), q = 1-p = 0.60, and d = 0.05 (margin of error). The calculation yielded 369 participants. To account for an anticipated 10% non-response or incomplete data, the final sample was inflated to 406. A total of 408 out-of-school adolescents were enrolled, exceeding the target.

A multistage sampling method was employed. In the first stage, six wards were randomly selected from each of the two local government areas in Osogbo (Osogbo and Olorunda), producing 12 wards. In the second stage, 34 out-of-school adolescents (17 artisan apprentices and 17 non-artisan adolescents) were selected from each ward, giving a total of 204 artisan apprentices and 204 non-artisan adolescents. The specific sampling procedures for the artisan and non-artisan groups are described below.

For artisan apprentices: A census of hairdressing shops, fashion design shops, and automobile mechanic workshops was conducted in each selected ward. With the help of trade association chairpersons, the total number of registered apprentices per trade was estimated. The quota of 17 apprentices per ward was distributed proportionally among the three trades based on their population. Simple random sampling was used to select one shop or workshop per trade, and all adolescent apprentices in the selected shop were eligible. If a shop did not have enough eligible participants, a second shop was randomly selected. If a shop had more than the allotted number, final participants were chosen by balloting. The final artisan sample comprised: fashion designers (n=112), hairdressers (n=59), and automobile technicians (n=33).

For non-artisan adolescents: A census of motor parks was conducted in each selected ward. Simple random sampling selected one motor park per ward, and all out-of-school adolescents present in that park were eligible. If a park did not have enough participants, a second park was randomly selected. If a park had too many, balloting determined the final participants. The final non-artisan sample comprised: bus conductors (n=83), hawkers (n=91), and unemployed or beggars (n=30).

Measures

Prior to the main study, the study instruments were piloted to assess their clarity, applicability, and reliability in the study population.Inter-rater reliability for the ASSIST during the pilot study was assessed using Cohen's kappa and was 0.98. All instruments were translated from English to Yoruba using a rigorous back-translation procedure. Two bilingual Yoruba speakers (a language expert and a medical professional) independently translated the English versions. Their translations were harmonised by a third bilingual translator, then back-translated into English by a fourth translator to verify accuracy. The final versions were reviewed by the research supervisor before use.[5]

Primary outcome: Psychoactive substance use. Lifetime use of any psychoactive substance was measured using the World Health Organization's Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) Version 3.0.[18] The ASSIST is an 8-item interviewer-administered instrument that covers ten substance classes: tobacco products, alcoholic beverages, cannabis, cocaine, amphetamine-type stimulants, inhalants, sedatives or sleeping pills, hallucinogens, opioids, and "other drugs". It assesses lifetime use, frequency of use in the past three months, compulsion to use, health/social/legal problems, failure to meet role obligations, concerns expressed by others, failed attempts to cut down, and injecting drug use. For this study, the primary outcome was lifetime use (yes/no). In the pilot study, the ASSIST demonstrated excellent inter-rater reliability (0.98).[5]

Primary predictor: Family history of substance use. A single item asked: "Has any member of your family (parent or sibling) ever used psychoactive substances?" Response options were "yes" (coded 1) or "no" (coded 0). This binary measure served as the independent variable in all moderation analyses.[5]

Moderator 1: Occupation. Participants were classified into two groups based on their primary occupation. Artisan apprentices (fashion designers, hairdressers, automobile mechanics) were coded 0; non-artisan adolescents (hawkers, bus conductors, unemployed/beggars) were coded 1. This distinction reflected the degree of environmental structure and adult supervision.[9]

Moderator 2: Self-esteem. Self-esteem was measured using the Rosenberg Self-Esteem Scale (RSES).[13] This 10-item scale uses a 4-point Likert response format (0 = strongly disagree to 3 = strongly agree), with five reverse-scored items (items 2, 5, 6, 8, and 9). Total scores range from 0 to 30. Following established cut-offs, scores below 15 were classified as low self-esteem (coded 1), and scores of 15 or above as normal or high self-esteem (coded 0). In the pilot study, the RSES had a Cronbach's alpha of 0.809, indicating good internal consistency.[5]

Covariates. To isolate the unique moderating effects of occupation and self-esteem, the following covariates were measured and included in all regression models:

Age was recorded as a continuous variable (in years).[5]

Gender was coded as male = 1, female = 0.[5]

Socioeconomic class was measured using Oyedeji's classification,[19] which combines parental

occupation and education into five social classes. Classes 1–3 were categorised as "high" (coded 0) and classes 4–5 as "low" (coded 1).[5]

Family functioning was assessed with the Family APGAR scale,[20] a 5-item instrument measuring Adaptability, Partnership, Growth, Affection, and Resolve. Each item is scored on a 3-point scale (2 = almost always, 1 = sometimes, 0 = almost never). Total scores range from 0 to 10, with higher scores indicating better family functioning. In the pilot study, Cronbach's alpha was 0.896.[5]

Parental control was measured using a 7-item scale adapted from Asiyanbi et al.[3]Items assess the extent to which parents set rules and monitor behaviours (e.g., "Do your parents let you make your own decisions about the time you must be home on weekend nights?"). Responses were binary (2 = No, 1 = Yes). The seven items were summed to obtain an overall parental control score, which was analysed as a continuous variable, with higher scores indicating greater parental control. Pilot Cronbach's alpha was 0.732.[5]

Procedure

The study was conducted in two steps. In the first step, self-report questionnaires (socio-demographic form, Family APGAR, parental control scale, Rosenberg Self-Esteem Scale) were administered to participants at their usual aggregation points (workshops, motor parks) between 10:00 a.m. and 12:00 p.m. For participants with limited literacy, research assistants provided individual assistance. The questionnaires were available in both English and Yoruba; each participant chose the version they were most comfortable with.[5] In the second step, all participants were interviewed using the ASSIST by the researcher and three trained research assistants (resident doctors in psychiatry). Training included role-play and practice interviews to ensure consistency. Interviews were conducted in private areas within the workshops or motor parks to maintain confidentiality. Each interview lasted approximately 15–20 minutes. Participants whose ASSIST scores fell into the moderate or high risk category for any substance were counselled on the spot and referred to the psychiatry department of LAUTECH Teaching Hospital for further management.[5]

Statistical Analysis

Continuous covariates (age, family functioning, and parental control) were mean-centred to reduce multicollinearity.[22] Categorical variables were dummy-coded with the hypothesised lower-risk group as reference (family history: negative=0; occupation: artisan apprentice=0; self-esteem: normal/high=0).

A hierarchical binary logistic regression was fitted. Block 1 entered the covariates (age, gender, socioeconomic class, family functioning, parental control). Block 2 added the main effects of family history, occupation, and self-esteem. Two separate interaction models were then constructed. Model A added the product term family history × occupation. Model B added family history × self-esteem. A significant interaction ($p<0.05$) indicated moderation.[21] For any significant interaction, conditional odds ratios were computed using stratified logistic regression. For non-significant interactions, stratified odds ratios were reported descriptively while emphasizing that differences are not statistically reliable.

Analyses used SPSS version 21. All tests were two-tailed.

Ethical Considerations

Ethical approval was obtained from the Research Ethics Committee of LAUTECH Teaching Hospital, Osogbo.[5] Written informed consent was obtained from participants aged 18 years or older; assent plus guardian consent was obtained for those under 18 years. Confidentiality was assured.

RESULTS

Participant Characteristics

Table 1 presents the socio-demographic characteristics of the 408 respondents. The mean age was 16.8 years (SD=1.85). Late adolescents (17–19 years) comprised 63.7% of the sample. Males were 54.2%. Muslims (47.8%) and Christians (43.9%) predominated. Most participants were single (95.1%) and of Yoruba ethnicity (96.3%). Artisan and non-artisan apprentices were equally distributed (50.0%). Educationally, 47.8% had left primary school, 45.6% had left secondary school, and 6.6% had never attended. Monthly allowance was less than ₦3,500 for 65.4%, and parental support was the main income source (68.9%).[5]

Table 1. Socio-demographic characteristics of respondents (N=408)

Variable	n (%)
Age group	
10–13 years	30 (7.4)
14–16 years	118 (28.9)
17–19 years	260 (63.7)
Gender	
Male	221 (54.2)
Female	187 (45.8)
Religion	
Christianity	179 (43.9)
Islam	195 (47.8)
Traditional	34 (8.3)
Marital status	
Single	388 (95.1)
Married	20 (4.9)
Tribe	
Yoruba	398 (96.3)
Others	15 (3.7)
Occupation	
Artisan apprentice	204 (50.0)
Non-artisan	204 (50.0)
Highest level of education	
Nil	27 (6.6)
Primary	195 (47.8)
Secondary	186 (45.6)
Source of income	
Parent	281 (68.9)
Self	108 (26.5)
Other family members	19 (4.6)
Monthly income	
<₦3,500	267 (65.4)
≥₦3,500	141 (34.6)

Prevalence and Main Effect of Family History

Table 2 shows the prevalence of substance use and the main effect of family history. Lifetime substance use was reported by 52.7%. A positive family history was present in 58.8%. Among those with a positive family history, 63.3% were substance users, compared to 37.5% of those without (crude OR=3.56 (95% CI: 2.34–5.42), p<0.001). After adjusting for covariates, the main effect of family history remained significant (adjusted OR=3.56, 95% CI: 2.14–5.91, p<0.001). Occupation and self-esteem did not have significant main effects in the adjusted model (occupation: OR=1.38, p=0.182; self-esteem: OR=0.82, p=0.526).[5]

Table 2. Prevalence of substance use and main effect of family history

Variable	n (%)	OR (95% CI)	p
Lifetime substance use	215/408 (52.7)	–	–
Positive family history	240/408 (58.8)	–	–
Substance use by family history			
Positive family history	152/240 (63.3)	3.56 (2.14–5.91)	<0.001
Negative family history	63/168 (37.5)	1.00	–
Adjusted main effect		3.56 (2.14–5.91)	<0.001

Note: Adjusted for age, gender, socioeconomic class, family functioning, and parental control.

Moderation by Occupation

The formal test of moderation was conducted using a logistic regression model that included the interaction term between family history and occupation (Table 4). The interaction was not statistically significant (B=0.215, SE=0.376, p=0.568), indicating that occupation did not significantly modify the association between family history of substance use and lifetime psychoactive substance use. Although stratified analyses showed numerically different odds ratios across occupational groups, these differences were not statistically significant and are therefore not interpreted as evidence of moderation.

Table 4. Logistic regression test of occupation as moderator

Variable	B	SE	Wald χ^2	p	OR (95% CI)
Family history (yes vs no)	0.890	0.256	12.07	0.001	2.44 (1.48–4.02)
Occupation (non-artisan vs artisan)	0.322	0.241	1.78	0.182	1.38 (0.86–2.21)
Family history × Occupation	0.215	0.376	0.327	0.568	1.24 (0.59–2.60)

Note: Model adjusted for age, gender, socioeconomic class, family functioning, and parental control. All continuous covariates were mean-centred.

Moderation by Self-Esteem

The interaction between family history and self-esteem was examined using a logistic regression model that included the product term family history × self-esteem (Table 6). The interaction was not statistically significant (B=0.312,

SE=0.421, p=0.458), indicating that self-esteem did not significantly modify the association between family history of substance use and lifetime psychoactive substance use. Although subgroup analyses showed numerical differences in the estimated odds ratios, these differences were not statistically significant and should not be interpreted as evidence of moderation.

Table 6. Logistic regression test of self-esteem as moderator

Variable	B	SE	Wald χ^2	p	OR (95% CI)
Family history (yes vs no)	1.416	0.348	16.56	<0.001	4.12 (2.08–8.16)
Self-esteem (low vs normal/high)	-0.198	0.312	0.403	0.526	0.82 (0.45–1.51)
Family history × Self-esteem	0.312	0.421	0.549	0.458	1.37 (0.60–3.13)

Note: Model adjusted for age, gender, socioeconomic class, occupation, family functioning, and parental control. All continuous covariates were mean-centred.

Neither occupation nor self-esteem significantly moderated the relationship between family history of substance use and lifetime substance use. Although stratified analyses yielded numerically different odds ratios (range 2.44–4.12), the interaction terms were non-significant, and confidence intervals overlapped substantially. The main effect of family history (OR=3.56) remained robust across all subgroups.

Discussion

This study tested whether the well-established link between family history of substance use and adolescent drug involvement varies by the adolescent's occupational context or level of self-esteem. Using a rigorous moderation framework with a large sample of out-of-school adolescents in Nigeria, we found that neither factor significantly changed the magnitude of the family history effect. The odds of substance use associated with having a parent or sibling who uses substances were consistently higher across all subgroups. The absence of moderation by occupation challenges the intuitive notion that street-based youth, exposed to open drug markets and minimal supervision, would be more vulnerable to familial influences.[9] Several explanations are plausible. First, family history may operate through mechanisms largely independent of the adolescent's daily environment. Several explanations may account for the absence of significant moderation by occupation. Family history may reflect a combination of genetic vulnerability and shared environmental influences that operate across different occupational contexts. In addition, family modelling may continue to influence adolescents even when they spend substantial time in workshops or street environments. These explanations are plausible but cannot be directly tested using the present cross-sectional data and therefore should be interpreted cautiously.[4] Second, behavioural modelling occurs primarily within the family home, not on the street. Even non-artisan youth who spend long hours away retain the family as the primary source of observational learning.[14] Third, the street environment may introduce additional, competing risks that are orthogonal to family history, such as peer pressure and drug availability, but these do not amplify the specific effect of having a substance-using relative.[2] The non-significant interaction suggests that the association between family history and substance use did not differ significantly by occupational context in this sample.

The non-moderation by self-esteem is equally instructive. We hypothesised that low self-esteem would amplify familial risk, as adolescents with negative self-views might be more susceptible to modelling or use substances as an escape.[10-12] The data showed the opposite trend, a numerically larger odds ratio in the normal/high self-esteem group, but the interaction was non-significant. This null finding suggests that self-esteem did not significantly modify the association between family history and substance use in this sample. Family history may confer risk through pathways that bypass conscious self-evaluation, for example through implicit social learning, altered neurodevelopment, or shared environmental adversity that affects self-esteem and substance use independently.[13] However, the consistent absence of statistical interaction across two theoretically distinct moderators strengthens confidence that family history operates as a universal risk factor in this population.

The main effect of family history (OR=3.56) is consistent with previous Nigerian studies. [15-17] A recent systematic review of substance use in West Africa reported pooled prevalence estimates of 44% for alcohol and 30% for tramadol, with family influence identified as a key contributing factor.[16] Research among secondary school adolescents in Abuja has also shown that emotional neglect, family dysfunction, and parental substance abuse significantly predict drug use disorders.[7] The consistency of the family history effect across

different samples and settings supports its robustness.

Our findings are also broadly consistent with international literature showing that family history remains one of the strongest correlates of adolescent substance use across diverse cultural settings. Studies from North America and Europe have consistently demonstrated that parental or sibling substance use is associated with increased likelihood of alcohol, tobacco, and illicit drug use among adolescents. Although the specific mechanisms may differ across settings, including genetic vulnerability, family modelling, and shared environmental influences, the persistence of the association across different contexts supports the importance of family history as a broadly relevant indicator of vulnerability. The absence of significant moderation in the present study suggests that this association may remain relatively stable across different occupational and psychological subgroups within this Nigerian population.

Several recent studies have examined related moderators. Family dysfunction has been shown to moderate the relationship between personality and substance abuse among Nigerian youth.[6] Low self-esteem and lack of parental supervision have been identified as the strongest predictors of substance abuse among out-of-school adolescents, explaining over half of the variance.[2] However, none of these studies specifically tested whether occupation or self-esteem moderates the family history effect. Our findings fill that gap and suggest that, contrary to some assumptions, these factors do not change how family history operates.

The practical implication is straightforward: universal screening for family history of substance use should be implemented for all out-of-school adolescents, without restriction by occupation or self-esteem.[2] A single question about whether any parent or sibling has problems with alcohol or drugs identifies adolescents at roughly three times the odds of substance use. This screen can be administered by community health workers, vocational trainers, social workers, or even workshop owners and motor park leaders after brief training.[9]

Once identified, adolescents with a positive family history should receive preventive interventions regardless of their occupational setting or psychological profile. Evidence-based options include brief motivational interviewing, coping skills training, and referral to family-based programmes where feasible.[3] For out-of-school youth with limited family contact, individual skills-building approaches may be more practical, while preventive planning should also recognize that family history may reflect multiple pathways, including genetic vulnerability, social learning, and shared environmental influences.

The absence of moderation does not mean that occupation and self-esteem are irrelevant. Both factors may influence substance use through other pathways. Occupation affects exposure to peer drug use; self-esteem affects coping strategies.[11] But they do not change the magnitude of the family history effect. Prevention programmes that target only non-artisan youth or only those with low self-esteem would miss the majority of at-risk adolescents.[2]

Strengths and Limitations

Strengths include the first formal test of moderation of the family history–substance use relationship in out-of-school Nigerian adolescents using established moderation analysis methods (mean-centering, product terms, and interaction testing).[21-22] The sample size (N=408) provided adequate power to detect moderate-to-large interactions. Validated instruments and rigorous back-translation enhanced measurement validity. The 100% response rate minimized selection bias.[5]

Limitations include the cross-sectional design, which precludes causal inference. Although family history generally refers to exposure occurring before the assessment of adolescent substance use, the cross-sectional design does not allow temporal or causal relationships to be established. Family history was measured by a single self-report item; we did not distinguish between parent versus sibling use, substance types, or severity of family members' use. More detailed measurement might reveal moderation that was obscured by this binary classification. Self-report of substance use may be subject to social desirability bias, though the ASSIST is interviewer-administered and confidentiality was emphasised.[18] The sample was drawn exclusively from an urban Yoruba population; findings may not generalise to rural areas or other ethnic groups. The study did not assess peer substance use, which could interact with family history in complex ways. Finally, non-significant interactions may reflect insufficient statistical power for interaction detection, which requires larger samples than main effects, though the overlapping confidence intervals and point

estimates in opposite directions to hypotheses suggest that even with larger samples, meaningful moderation is unlikely.[22] Longitudinal studies are needed to examine whether occupation or self-esteem moderates the progression from initial use to problematic use or dependence.[17] Future research should use more nuanced measures of family history, such as number of affected relatives, type of substance, and age of onset, and should consider polygenic risk scores.[4] Qualitative studies could explore how out-of-school adolescents perceive the influence of family history on their own substance use decisions.[14]

Conclusion

Family history of substance use is a robust, consistent, and unmoderated risk factor for substance use among out-of-school adolescents in Nigeria. Neither occupation (artisan apprenticeship versus street-based work) nor self-esteem (low versus normal/high) significantly changes the magnitude of this association. Universal screening for family history of substance use is warranted, and prevention efforts should target all adolescents with affected relatives without restriction by occupational context or psychological profile.

Authors' Contributions

AAO (Ajayi Adeola Olajumoke) conceived the study, designed the research protocol, supervised data collection, performed the statistical analyses, and drafted the initial manuscript.

AMA (Akande Majek Ayodeji) contributed to the study design, interpretation of findings, and critically revised the manuscript for important intellectual content.

AAA (Ajayi Akindele Amos) contributed to the study methodology, interpretation of data, and revision of the manuscript.

IAA (Ishola Abdurahamon Ajibola) contributed to the literature review, interpretation of findings, and manuscript editing.

ACA (Abedide Charles Ayodele) contributed to study supervision, interpretation of psychiatric findings, and critical review of the manuscript.

AHA (Akinyemi Hezekiah Adebola) contributed to data interpretation, methodological review, and manuscript editing.

ARO (Akande Roseline Oluyemisi) contributed to the interpretation of the public health implications of the findings and critically reviewed the manuscript.

OOO (Opakunle Oladele Oladayo) contributed to the literature review, interpretation of data, and revision of the manuscript.

All authors read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

Funding

This research received no external funding.

Conflict of Interest

The authors declare that there are no conflicts of interest.

Data Availability Statement:

The datasets generated and/or analysed during the current study are available from the corresponding author upon reasonable request.

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