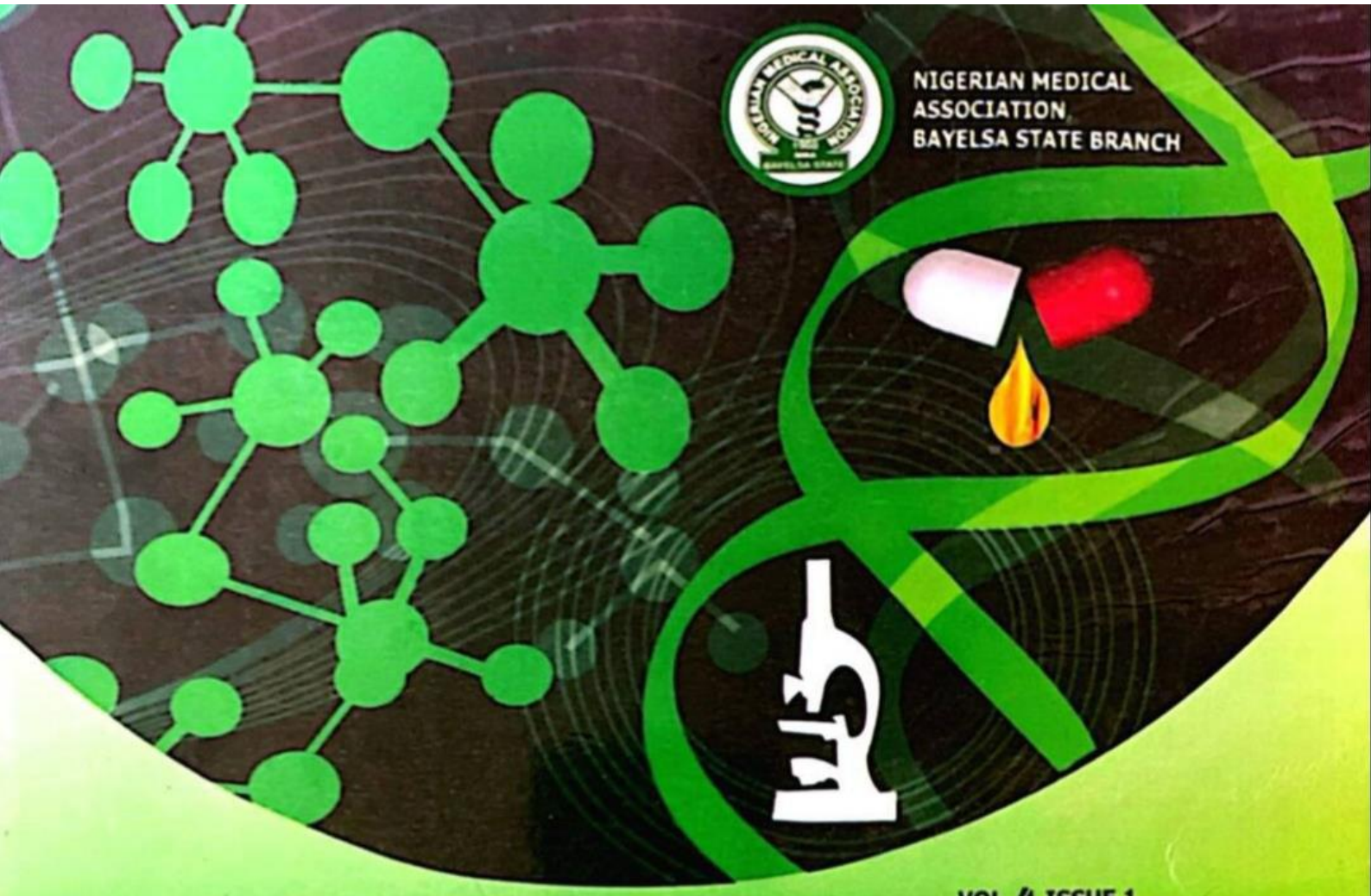

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Contents

Editorial Board

Editorial Note

We are pleased to welcome you to this edition of the *Niger Delta Journal of Medicine and Medical Research (NDJMMR)*. The *NDJMMR* serves as the official publication of the Nigerian Medical Association, Bayelsa State Branch, Nigeria. The journal is released quarterly, specifically in January – March, April – June, July – September, and October – December.

The *NDJMMR* publishes open-access, peer-reviewed content, including original research articles, review papers, case reports, letters to the editor, short communications, commentaries, viewpoints, book reviews, medical educational resources, and scholarly articles addressing socioeconomic, political, or legal issues related to medical practice.

Unless otherwise indicated, all opinions expressed in the articles are solely those of the respective authors and do not represent the official position of the *Niger Delta Journal of Medicine and Medical Research*, or the Nigerian Medical Association, Bayelsa State Branch.

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Aims and Scope

The *Niger Delta Journal of Medicine and Medical Research (NDJMMR)* aims to publish high-quality research papers, reviews, case reports, and short communications across all fields of medicine and medical science. In addition to traditional full-length research articles and short communications, the journal also welcomes submissions covering every stage of the research process, including study protocols, pilot studies, and pre-protocols.

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NDJMMR publishes four issues per year. Each issue operates on a rolling basis, and all officially accepted manuscripts are made available online immediately after acceptance.

TYPES OF ARTICLES

Research Articles: Primary research papers covering the full spectrum of medical and biomedical sciences.

Case Reports: Well-documented case descriptions intended for educational purposes or to highlight unusual presentations, treatment outcomes, disease transmission, or control measures. Authors must obtain written and signed consent from patients or their guardians. Case reports may include clinical images.

Case Studies: Detailed analyses of major healthcare interventions, primarily from a public health perspective. Favourable consideration is given to case studies that include rigorous assessments of intervention processes, outcomes, and recommendations for future practice. Case studies must not describe individual patients; such descriptions belong in the case report category.

Commentaries: Short, focused, and opinion-driven articles addressing timely issues or recent research findings within the journal's scope. Typically, around 800 words.

Reviews: Comprehensive reviews covering all aspects of medicine. While some reviews are commissioned, unsolicited submissions are welcome and undergo peer review. Reviews are not limited in length but must follow the journal's overall house style.

Opinion Articles: Brief, opinion-focused pieces on contemporary medical topics, including meeting reports or responses to recently published articles of relevance to NDJMMR readers. Both commissioned and unsolicited submissions are accepted and peer-reviewed.

NDJMMR also encourages scholarly engagement through "Comments," which allow readers to critically discuss previously published articles. All comments are moderated and remain linked to the original publication.

Original Article

MEDICAL ERRORS: AN ASSESSMENT OF AWARENESS AND PERCEPTION AMONG HEALTHCARE WORKERS IN SUB-URBAN, SOUTHERN NIGERIA

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Abstract

Background: Medical errors remain a global public health concern, significantly compromising patient safety and healthcare quality. With healthcare-associated infections and diagnostic inaccuracies disproportionately higher in resource-limited settings, understanding the awareness and perception of medical errors among healthcare workers is vital to ensuring patient safety.

Objectives: This study aimed to evaluate the awareness and perception of medical errors among healthcare workers in Okada, Edo State, Nigeria, and to identify determinants influencing these outcomes.

Methods: A cross-sectional study design was adopted, involving 324 healthcare workers selected using a multi-stage sampling technique. Data were collected through structured, self-administered questionnaires adapted from the WHO's patient safety assessment tools. Descriptive and inferential statistics were conducted using SPSS version 25.0, with logistic regression employed to identify significant predictors. A p-value of less than 0.05 was considered statistically significant.

Results: All respondents were aware of medical errors, with 62% demonstrating good awareness. Factors significantly associated with awareness included age ($p = 0.034$), profession ($p < 0.001$), and income ($p = 0.050$). Doctors showed the highest awareness (77.3%), while pharmacists had the lowest (40.3%). Good perception was reported by 75.9% of participants, with variations across professional roles, although not statistically significant. Positive perception was most prominent among pharmacists (85.1%) and medical laboratory scientists (82.8%).

Conclusion: The study revealed that although awareness of medical errors among healthcare workers in Okada is high, significant gaps exist in specific domains of error recognition and perception across professional groups. Factors such as profession, age, and income influence these variations. The findings emphasize the need for targeted training programs, fostering non-punitive reporting environments, and promoting interdisciplinary collaboration to enhance error prevention and patient safety.

Key words: Awareness, Determinants, Healthcare workers, Medical errors, Nigeria, Patient safety Perception, Okada.

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BACKGROUND

Medical errors remain a significant challenge to patient safety and healthcare quality across the globe[1]. The World Health Organization (WHO) reports that healthcare-induced injuries result in thousands of premature deaths daily, with a 1 in 300 chance of such an event occurring[2]. In developed countries, approximately 1 in 10 patients are harmed during hospital care[2,3] while the risk is even greater in the African region, where healthcare-associated infections are more than double that

of developed countries[4], and are seen in up to 22.1% of neonatal patients[5]. A critical component in minimizing medical errors is the development of a strong patient safety culture within healthcare organizations, which is defined by shared values, attitudes, and behaviours that influence how healthcare workers perceive and manage safety-related issues[6]. In healthcare environments with a positive safety culture, staff are more likely to acknowledge mistakes, and adopt practices focused on continuous improvement in patient safety, and the way errors are perceived—whether as inevitable, trivial, or mainly due to negligence—affects workers' engagement in error prevention and their approach to managing safety concerns[7,8].

The awareness and perception of medical errors are closely influenced by various determinants, including organizational culture, training, previous experiences, and personal attitudes[9]. Some workers may perceive errors as inevitable or not particularly harmful to patients, which may reduce their motivation to engage in preventive actions, while others may believe that errors are primarily caused by individual negligence or lack of attention, rather than systemic issues, influencing their approach to responsibility and accountability[10]. Additionally, healthcare workers' perceptions about the consequences of reporting errors—such as fear of blame or repercussions—can significantly impact their willingness to acknowledge and address errors[11].

This study aims to assess the awareness and perception of medical errors among healthcare workers as well as determinants that influence them.

MATERIALS AND METHODS

Study Area

The study was conducted in Okada, a town in Edo State, Nigeria, situated in the Ovia North-East Local Government Area. Edo State, located in the South-South geopolitical zone of Nigeria, spans an area of 17,802 km² and is bordered by Ondo State to the west, Kogi State to the north, and Delta State to the south. Okada is the administrative headquarters of the Ovia North-East Local Government Area and is home to a population of approximately 155,344 people, predominantly the Bini ethnic group. The town has a mix of urban and semi-urban features and is known for its commercial activities, with many residents engaged in farming, trading, and civil service. Key healthcare institutions in the area include the Igbinedion University Teaching Hospital, Okada Primary Health Centre, and several other primary healthcare facilities across the two wards—Okada East and Okada West. Okada's climate alternates between a warm, wet season and a hot, dry period, with annual rainfall of around 150 cm and temperatures ranging from 27°C to 44°C[12].

Study Population

The study targeted healthcare workers employed in healthcare facilities within Okada, Edo State. These included doctors, nurses, pharmacists, and medical laboratory scientists who were actively involved in patient care. The inclusion criteria for the study required healthcare workers to be present during the data collection period and provide informed consent to participate. Healthcare workers who were unavailable during the study or those who did not complete the questionnaires adequately were excluded from the study. The research aimed to assess their awareness, perception, and experiences regarding medical errors, including the prevalence, patterns, and determinants of errors in their practice.

Sampling Technique

A multi-stage sampling technique was employed to select study participants. In the first stage, healthcare facilities in Okada were selected using simple random sampling. Igbinedion University Teaching Hospital was chosen as the tertiary healthcare facility, and Okada Primary Health Centre was selected as a primary healthcare facility. In the second stage, stratified sampling was used to categorize healthcare workers into professional groups: doctors, nurses, pharmacists, and medical laboratory scientists. Each group was represented proportionally based on workforce distribution in the selected facilities. To ensure random selection, healthcare workers within each group were chosen using systematic sampling. The sample size was calculated to be 324, with an additional 5% non-response rate factored in to account for incomplete or missing responses.

Data Collection

The data collection for this study focused on assessing the awareness and perception of medical errors among healthcare workers in Okada, Edo State. A structured, self-administered questionnaire was used to gather relevant information. The questionnaire was derived from a research tool developed by WHO to assess awareness of patient safety in the work place[13] and was divided into two sections: one for awareness and the other for perception of medical errors. The awareness section included questions to determine whether respondents had heard of the term "medical errors" and what types of errors they were familiar with. It also explored the sources of their knowledge about medical errors. Respondents were asked to identify different types of medical errors, such as medication, diagnostic, and surgical errors. Their responses were scored based on the number of correct types identified, providing an overall measure of their awareness.

The perception section included 20 statements designed to gauge respondents' attitudes toward medical errors. These were presented using a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree." The statements addressed various aspects of medical errors, such as the belief in their inevitability, the importance of reporting, and the impact of errors on patient safety. Responses were scored to categorize perceptions as either positive or negative, with the overall perception score determining whether participants had a good or poor understanding of the issue. Data collection was carried out over a two-month period with the assistance of trained research assistants, ensuring that respondents' privacy and confidentiality were maintained throughout the process.

Ethical Considerations

Ethical approval for the study was obtained from the Igbinedion University Ethical and Research Committee, and permission was sought from the management of the healthcare facilities where the study was conducted. Informed consent was obtained from all participants, ensuring they were fully aware of the study's purpose, potential risks, and their right to voluntarily participate or withdraw without penalty. To protect privacy, all responses were treated with strict confidentiality, and participants were assured that their data would only be used for research purposes. The study adhered to ethical guidelines concerning personal data, and participants were given the opportunity to complete the questionnaires in private to ensure that their responses remained confidential.

Data Analysis

Data analysis was performed using the Statistical Package for Social Sciences (SPSS) version 25.0. Descriptive statistics were used to summarize categorical data, including frequencies, percentages, and proportions. Continuous data were presented as means and standard deviations. The association between categorical variables was analysed using bivariate analysis, specifically chi-square tests and Fisher's exact test. Multiple regressions were then used to build models for determinants of awareness and perception. A p-value of less than 0.05 was considered statistically significant. The findings were presented using frequency tables, pie charts, and prose to describe the awareness, perception, and their determinants among healthcare workers in Okada.

RESULTS

Sociodemographic characteristics

A total of 324 respondents participated in the study, with the majority aged between 26 and 30 years (135, 41.7%). The sample was nearly evenly split between males (167, 51.5%) and females (157, 48.5%). Most respondents were single (232, 70.7%), with a significant portion identifying as Christian (272, 84.0%). In terms of professional roles, doctors comprised the largest group (130, 40.1%), followed by nurses (70, 21.6%) and pharmacists (63, 19.4%). Regarding experience, 110 (34.0%) had between 6-10 years of practice, and 134 (41.4%) earned between ₦200,000-299,000 monthly.

Awareness of medical errors

All 324 respondents (100%) were aware of medical errors. Among them, 222 (68.5%) knew about surgical errors and wrong diagnoses, 205 (63.3%) were aware of wrong laboratory results, and 215 (66.4%) knew about equipment/system failures. Awareness of wrong

communication with patients was reported by 161 (49.7%) respondents, while 144 (44.4%) were aware of hospital infections. Overall, 201 (62.0%) healthcare professionals had a good awareness of medical errors, while 123 (38.0%) had poor awareness.

Factors associated with awareness of medical errors

Respondents aged 21-25 years showed the highest proportion of poor awareness (41, 35.3%), with a significant difference ($p < 0.001$). Awareness was also influenced by sex, with females showing better awareness (114, 67.9%) compared to males (87, 55.8%), and this difference was statistically significant ($p = 0.030$). Marital status did not show a significant association ($p = 0.249$), nor did religion ($p = 0.58$). Regarding job positions, doctors exhibited the highest awareness (99, 77.3%), followed by nurses (45, 63.4%), while pharmacists had the lowest (27, 40.3%), with a significant difference found ($p < 0.001$). Years of experience also influenced awareness, with those having less than 1 year of practice showing the lowest awareness (39, 60.0%), and this was statistically significant ($p = 0.006$). Income was another factor, as respondents earning less than ₦100,000 showed the highest awareness (30, 81.1%), while those earning between ₦100,000 and ₦199,000 had the lowest (69, 53.9%), with a significant difference at ($p = 0.050$).

Determinants of good awareness

Age was positively associated with awareness, as each year increase in age led to 1.064 times higher odds of being aware ($p = 0.034$). Marital status also showed a strong association, with singles having significantly higher odds (6.432 times) of being aware compared to married respondents ($p < 0.001$). Job position was another significant factor: doctors and nurses had lower odds of awareness, with odds ratios of 0.13 ($p < 0.001$) and 0.306 ($p = 0.007$), respectively, compared to medical laboratory scientists. Income was significantly associated with awareness, with respondents earning less than ₦100,000 having significantly lower odds (0.12, $p = 0.004$) compared to those earning ₦300,000 and above. Other factors such as sex, religion, years of experience, and income brackets of ₦100,000-199,000 and ₦200,000-299,000 were not significant predictors of awareness.

Factors associated with good perception

Although not significant, age showed a trend where respondents aged 41 years and above had the highest proportion of good perception at 23 (88.5%), compared to 33 (67.3%) among those aged 31-40 years ($p = 0.222$). Sex did not show a significant association, with 130 (77.4%) of females and 116 (74.4%) of males having good perceptions ($p = 0.603$). Marital status was similarly not significant, as 70 (78.7%) of married respondents and 176 (74.9%) of single respondents had good perception ($p = 0.561$). Across professional roles, pharmacists and medical laboratory scientists had relatively higher proportions of good perception at 57 (85.1%) and 48 (82.8%), respectively, compared to doctors at 90 (70.3%) and nurses at 51 (71.8%), though the association was not significant ($p = 0.060$). Years of experience and income categories also lacked significant associations. Respondents earning ₦300,000 and above demonstrated the highest proportion of good perception at 22 (88.0%), while those earning ₦200,000-299,000 had the lowest at 94 (70.1%, $p = 0.150$).

Determinants of perception

Age was not a significant predictor, with an odds ratio (OR) of 0.983 (95% CI: 0.929–1.040; $p = 0.555$). Sex showed that males had higher odds of good perception than females (OR = 1.598, 95% CI: 0.880–2.900), but the result was not statistically significant ($p = 0.124$). Marital status similarly showed no significance, with single respondents having an OR of 0.836 (95% CI: 0.402–1.736; $p = 0.630$) compared to married respondents. Religion and professional roles were also not significant predictors. Doctors and nurses had slightly higher odds of good perception (OR = 1.473 and OR = 2.078, respectively), but the results were not significant ($p = 0.444$ and $p = 0.116$). Pharmacists had reduced odds compared to medical laboratory scientists (OR = 0.703, $p = 0.498$). Years of experience and income levels also did not show significance. Respondents with less than one year of experience had an OR of 1.157 (95% CI: 0.455–2.945; $p = 0.759$), while those earning ₦200,000–299,000 showed higher odds of good perception (OR = 2.618, 95% CI: 0.686–9.987), though not significant ($p = 0.159$).

Table 1: Socio-demographic characteristics of respondents

Variable	Frequency (n = 324)	Percent (%)
Age (years)		
21-25	112	34.6
26-30	135	41.7
31-40	51	15.7
41 and above	26	8.0
Mean (±S.D)	**29.0 ± 7.4**	
Sex		
Male	157	48.5
Female	167	51.5
Marital status		
Single	232	70.7
Married	86	27.5
Cohabiting	3	0.9
Separated/Divorced	3	0.9
Religion		
Christian	272	84.0
Muslim	42	13.0
Traditional Religion	10	3.1
Position/Job title		
Doctor (Physician/Surgeon)	130	40.1
Nurse	70	21.6
Pharmacist	63	19.4
Medical Laboratory Scientist	61	18.8
Years of practice		
< 1	63	19.4
1-5	69	21.3
6-10	110	34.0
>10	82	25.3
Average income (₦)		
<100,000	37	11.4
100,000-199,000	125	38.6
200,000-299,000	134	41.4
≥300,000	28	8.6

Table 2: Awareness of medical errors among respondents

Variable	Frequency (n = 324)	Percent (%)
Awareness of medical errors		
Yes	324	100
No	0	0.0
Surgical errors		
Yes	222	68.5
No	102	31.5
Wrong diagnoses		
Yes	222	68.5
No	102	31.5
Wrong laboratory results		
Yes	205	63.3
No	119	36.7
Equipment/system failures		
Yes	215	66.4
No	109	33.6
Wrong communication with patients		
Yes	161	49.7
No	163	50.3
Hospital infections		
Yes	144	44.4
No	180	55.6
Source of information		
Colleagues	247	76.2
Social media	172	53.1
Internet	155	47.8
Television	91	28.1
Radio	68	21.0

Table 3: Logistic regression model for predictors of good perception regarding medical errors

Factors	β (Regression co-efficient)	Odds Ratio	95% CI for OR		p-value
			Lower	Upper	
Age (years)	-0.017	0.983	0.929	1.040	0.555
Sex					
Male	0.469	1.598	0.882	2.900	0.124
Female		1			
Marital status					
Single	-0.180	0.836	0.402	1.736	0.630
Married		1			
Religion					
Christian	-0.016	0.984	0.415	2.333	0.971
Muslim		1			
Position/Job title					
Doctor (Physician/Surgeon)	0.387	1.473	0.546	3.973	0.444

Nurse	0.731	2.078	0.836	5.164	0.116
Pharmacist	-0.352	0.703	0.254	1.945	0.498
Medical Laboratory Scientist		1			
Years of practice					
Less than 1 year	0.146	1.157	0.455	2.945	0.759
1-5 years	0.122	1.130	0.480	2.663	0.779
6-10 years	0.007	1.007	0.470	2.158	0.985
Above 10 years		1			
Average income (₦)					
<100,000	0.474	1.606	0.313	8.248	0.570
100,000-199,000	0.356	1.428	0.346	5.885	0.622
200,000-299,000	0.962	2.618	0.686	9.987	0.159
>300,000		1			

DISCUSSION

In terms of awareness, all respondents (100%) reported awareness of medical errors, yet significant variations were noted in the level of awareness regarding specific types of errors. For instance, awareness of medication errors was highest at 72.8%, while awareness of hospital infections was lowest at 44.4%. This pattern is consistent with findings from a study in Jordan in 2021, where healthcare workers were more familiar with medication errors than iatrogenic infections, due to their frequent occurrence, immediate effects and clinical emphasis[14]. In contrast, hospital infections, though prevalent, may be under-recognized as medical errors due to their systemic and multifactorial nature. The public health significance of this finding lies in the fact that low awareness of errors such as hospital infections limits efforts to prevent these adverse events, which are common in resource-limited settings. It is recommended that healthcare training programs emphasize all forms of medical errors, including those related to infections and communication, through periodic workshops and standardized educational materials.

Income was significantly associated with awareness of medical errors, with respondents earning less than ₦100,000 demonstrating the highest level of awareness (81.1%), compared to 53.9% among those earning ₦100,000–199,000 ($p = 0.050$). This finding contrasts with studies conducted in Oman in 2009, where higher-income earners exhibited better awareness of medical errors among respondents[15]. A possible explanation for the current study's result is that lower-income workers may actively engage in training opportunities provided by their institutions as part of mandatory or subsidized programs, while higher-income workers, often in senior positions, may have competing responsibilities that limit their participation. This finding emphasizes the importance of making continuous training programs accessible and mandatory for all healthcare workers, regardless of income level, to ensure uniform awareness of medical errors.

Job position also showed significant associations with awareness, with doctors exhibiting the highest awareness (77.3%), followed by nurses (63.4%) and pharmacists (40.3%). Similar findings have been reported in studies conducted in Palestine in 2022, where doctors, due to their leadership roles and direct involvement in clinical decision-making, demonstrated higher awareness of medical errors, with over 71% having good awareness, as opposed to 27% of pharmacists and 59% of nurses[16]. This gap exposes the need for interdisciplinary collaboration and patient safety training programs tailored to the roles of all healthcare professionals. By fostering a holistic understanding of medical errors across professions, healthcare systems can reduce the likelihood of adverse events and improve patient outcomes.

For the perception of medical errors, 246 respondents (75.9%) demonstrated good perception, with notable variations across professional roles. Pharmacists and medical laboratory scientists had better perceptions at 85.1% and 82.8%, respectively, compared to doctors

(70.3%) and nurses (71.8%). This result agrees with findings from studies in Pakistan in 2023, where doctors had the lowest perception scores, although, in comparison to pharmacists and nurses, it was non-significant[17]. The current study's findings may reflect the nature of work environments for pharmacists and laboratory scientists, where stringent protocols and error reporting systems create heightened sensitivity to patient safety. The public health significance of this finding lies in recognizing that positive perceptions encourage proactive identification and mitigation of errors. Healthcare managers should prioritize open communication and non-punitive error reporting systems to reinforce positive perceptions of medical errors among all professional groups.

For the determinants of awareness, multiple logistic regression analysis revealed that age, marital status, profession, and income were significant predictors. Age was positively associated with awareness, whereas older respondents had higher odds of being aware ($p = 0.034$). This finding disagrees with a study conducted in Kaduna, Nigeria in 2023, which found was not significantly associated with awareness levels concerning medication errors[18]. This implies that all medical professionals require targeted mentorship and exposure to patient safety practices at every stage of their careers to strengthen their awareness levels.

Income was another significant determinant, with respondents earning less than ₦100,000 having significantly lower odds of awareness (OR = 0.12, $p = 0.004$) compared to those earning ₦300,000 and above. Economic barriers in resource-limited settings can exacerbate disparities in awareness and participation in safety training programs, and as such, healthcare institutions should provide subsidized or mandatory training programs to ensure all healthcare workers, regardless of income, are adequately equipped to identify and prevent medical errors[19,20].

CONCLUSION

This study shows the high level of awareness of medical errors among healthcare workers in Okada, Edo State, Nigeria, while revealing significant disparities in specific aspects of error recognition and perception across professional groups. Doctors demonstrated the highest awareness levels, whereas pharmacists were less informed, indicating the need for targeted interventions. Positive perceptions of medical errors were prevalent but varied across roles, with pharmacists and medical laboratory scientists exhibiting better perceptions compared to doctors and nurses.

The findings emphasize that determinants such as age, profession, and income significantly influence awareness, while the perception of medical errors was shaped by factors not fully explained in this study, warranting further exploration. The results display the need for tailored training programs to address gaps in knowledge and perception, with a focus on promoting a strong patient safety culture. This includes implementing non-punitive reporting systems, nurturing interdisciplinary collaboration, and providing equitable access to training for all healthcare workers, regardless of their professional role or income level.

Ultimately, improving awareness and perception of medical errors through structured interventions can enhance patient safety and healthcare quality in resource-limited settings like Okada.

REFERENCES

1. Flott K, Fontana G, Darzi A. The Global State of Patient Safety. London: Imperial College London; 2019.
2. World Health Organization (WHO). Patient safety. WHO Africa; November 29, 2024.
3. Dhingra-Kumar N, Brusaferro S, Arnoldo L. Patient Safety in the World. In: Donaldson L, Ricciardi W, Sheridan S, Tartaglia R. Textbook of Patient Safety and Clinical Risk Management. Cham (CH): *Springer* 2020: 93-98.
4. Abubakar U, Amir O, Rodríguez-Baño J. Healthcare-associated infections in Africa: a systematic review and meta-analysis of point prevalence studies. *J Pharm Policy Pract* 2022;15: 1–16.

5. Lloyd LG, Bekker A, Van Weissenbruch MM, Dramowski A. Healthcare-associated infections in very low birth-weight infants in a South African neonatal unit: disease burden, associated factors and short-term outcomes. *Pediatr Infect Dis J*. 2022; 41: 911–916.
6. Anjum F, Din BR, ASHRAF S. Patient Safety and Quality Improvement: Reducing Medical Errors in Healthcare. *Multidisciplinary Journal of Healthcare* 2024: 1(2):13-23.
7. Reis CT, Paiva SG, Sousa P. The patient safety culture: a systematic review by characteristics of hospital survey on patient safety culture dimensions. *International Journal for Quality in Health Care* 2018: 30(9); 660-677.
8. Daker-White G, Hays R, McSharry J, Giles S, Cheraghi-Sohi S, Rhodes P, Sanders C. Blame the patient, blame the doctor or blame the system? A meta-synthesis of qualitative studies of patient safety in primary care. *PloS one* 2015: 10(8): 128-329.
9. Brady AM, Malone AM, Fleming S. A literature review of the individual and systems factors that contribute to medication errors in nursing practice. *Journal of nursing management* 2009: 17(6); 679-97.
10. Alser M, Böttcher B, Alfaqawi M, Jlambo A, Abuzubaida W, Abu-El-Noor N. Undergraduate medical students' attitudes towards medical errors and patient safety: a multi-center cross-sectional study in the Gaza Strip, *Palestine. BMC Medical Education* 2020: 20; 1-9.
11. Vrbnjak D, Denieffe S, O'Gorman C, Pajnkihar M. Barriers to reporting medication errors and near misses among nurses: A systematic review. *International journal of nursing studies* 2016: 63; 162-78.
12. Izevbuwa O. The Okada Region. University press; 2017.
13. World Health Organization (WHO). *Patient Safety Curriculum Guide: Topic 1A Questionnaire;* 2011.
14. Ta'an WF, Suliman MM, Al-Hammouri MM, Ta'an A. Prevalence of medical errors and barriers to report among nurses and nursing students in Jordan: A cross-sectional study. *Nurs Forum* 2021: 56(2); 284-290.
15. Al-Mandhari AS, Al-Shafaee MA, Al-Azri MH, Al-Zakwani IS, Khan M, Al-Waily AM, et al. A survey of community members' perceptions of medical errors in Oman. *BMC Med Ethics* 2008: 9(13) 674-692.
16. Damin Abukhalil A, Amer NM, Musallam LY, Al-Shami N. Medication error awareness among health care providers in Palestine: A questionnaire-based cross-sectional observational study. *Saudi Pharm J* 2022: 30(4); 470-477.
17. Khanzada S, Mustafa G, Samiullah S, Watanpal A, et al. Knowledge, attitude and practice about medication errors reporting system among health care professionals in public hospitals of Pakistan. *Asia-Pac J Pharmacother Toxicol* 2023: 3; 7-15.
18. Sufiyan MB, Abdulkareem SB, Joshua IA, Suleiman AG, Umar AA, Amadu L. Knowledge and perception of medication errors among health care workers in Ahmadu Bello University Teaching Hospital Zaria, Kaduna State, North-west Nigeria. *Niger Postgrad Med J* 2023: 30(2); 150-155.
19. Mahmoud HA, Thavorn K, Mulpuru S, McIsaac D, Abdelrazek MA, Mahmoud AA, et al. Barriers and facilitators to improving patient safety learning systems: a systematic review of qualitative studies and meta-synthesis. *BMJ Open Qual* 2023: 12(2); 21-34.
20. Endalamaw A, Khatri RB, Erku D, Zewdie A, Wolka E, Nigatu F, et al. Barriers and strategies for primary health care workforce development: synthesis of evidence. *BMC Prim Care* 2024: 25; 99-142.

Original Article

COMPLIANCE IN COMPLETING LABORATORY REQUEST FORMS IN A PAEDIATRIC NEUROLOGY CLINIC

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Abstract

Background: In developing countries, investigation request forms are still being manually filled by different cadre of doctors thereby making it possible not to completely fill these forms. Returned investigation request forms to a paediatric neurology clinic were audited for their level of completeness.

Methodology: The study was a prospective descriptive one that evaluated the degree of completeness of patient and clinic details of 1194 different laboratory request forms returned to the Paediatric Neurology Clinic over a period of 12 months. The laboratory forms analysed were microbiology, haematology, chemical pathology and serology forms. The forms were assessed for degree of completeness of patient data (surname, name, age, sex, tribe, folder number, department/ward) while clinical details were specimen type, clinical summary/detail/diagnosis, name of requesting doctor, consultant, signature and legibility of the writing).

Results: A total of 1194 forms were analysed over a period of 12 months January 1st 2021 to December 31st 2021. They consisted of 317 Microbiology, 309 Haematology, 237 serology, 243 Chemical Pathology and 88 Histopathology forms. The most completed aspects in the forms were other names (99.7%), surnames (99.4%), sex (98.8%), type of specimen (98.4%) while the writings were legible in 98.6% of forms. The clinical summary was documented in 74.5% of the forms; folder number (63.7%), department/ward (59.3%) name of requesting doctor (48.6%) and signature in 41.7%. Only 1 form was 100% completed while about 44% were at least 70% completed.

Conclusion: Incomplete filling of laboratory request form is still a problem in developing countries. However, our study noted remarkable improvement. Training and retraining of doctors are advised to improve the completeness of filling investigation forms. A compliance team from the laboratory would be beneficial. Physician assistants may also be deployed to assist in complete filling of investigation request forms.

Keywords: Effective communication, Laboratory report, Laboratory request forms, Paediatrics, Paediatric neurology, Pathologists

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INTRODUCTION

Documentation is extremely important in managing patients. Laboratory request forms are an effective way of communication between the requesting doctor and the pathologist. [1,2,3,4] A laboratory investigation request form is in reality a consultation from the clinician to the pathologist. It is the main link between the laboratory and the users (the Users are the clinicians; those primarily in the wards and the clinics).

The complete filling of forms will enable the Laboratory physician get a true picture of the patient whose investigations is being carried out. Inadequate filling of laboratory request forms can lead to medical errors in diagnosis and treatment and misinterpretation of results. [2] They can also lead to mistaken identity. It is a global problem and doctors of all cadre have been implicated. In carrying out researches, completely filled forms in eligible writing is a plus as it adds value and meaning to the data. [5] Every item on the form is important and every doctor is expected to be compliant in providing the details required on the form. The name and surname would differentiate one patient from another; the age is important as certain illnesses are more common at a certain age. In addition to this, some laboratory parameters vary with age and actually have age dependent reference ranges. [4] Some illnesses have a higher prevalence with particular sexes. [4] Writing the name of a requesting doctor and his signature authenticates a laboratory request form. The consultant oversees a unit and the patients in that unit therefore it is important that the name of the consultant be put on the requesting form. The consultant can be easily contacted if the patient's result requires urgent attention and treatment. The essence of writing/documentation is for communication hence all writing must be legible. [5]

The bottom line of this communication is competent patient care. The clinician may depend on laboratory results and its interpretation to make important and accurate decisions in the management of patients. Filling the form adequately and completely is therefore imperative for effective communication. The pathologist gives a report on the results. This report or interpretation of results helps the clinician make critical decisions. Ineffective communication can lead to patient mismanagement, waste of time, money, and hopefully not lives. [5]

Existing data from developing countries, has shown over time that sometimes the laboratory request forms are not properly filled. [4,6] This might affect developing countries more because many of the transmission processes are still done manually. [1,4,6,7,8] A study done in Jos Nigeria, showed that no form was 100% filled. 54.7% had clinical information missing, 43% had sex missing, 20.9% had incomplete records for the age column. [1]

Oyelekan et al in western Nigeria found out that only 5% of the forms in their centre were completely filled. [2] In another one done in Kenya, only one percent (1%) of the forms were properly filled. [3] In South Africa, Nutt reported that 37.3% of the diagnoses were written in short or abbreviated format and this led to inadequate transcribing by the reception staff. [5] This also made interpretation of results difficult. In Northwest Nigeria, it was reported that 20.9% of the people in the study had a repeat X-ray done because the area of interest wasn't properly specified in the first instance. This means that they had an unnecessary prolonged or extra exposure to radiation. [7]

A Private attorney in South Carolina reported that in 2017, 34% of medical malpractice financial claims were from diagnostic errors. [9]

This study is being carried out to establish the picture in our centre - to establish if is similar or better than what has been reported elsewhere. If there has been an improvement from what has been recorded in other centres locally and report specifically what happens in our centre as no such information has been published to the best of our knowledge about the compliance of doctors to completely filling investigation request forms. The information from this study may be useful in continuous medical education on the need to comply with requested laboratory information.

MATERIALS AND METHODS

Study Design: The study was a prospective cross-sectional and descriptive study.

Study Area: It was carried out in the Paediatric Neurology clinic of the Rivers State University Teaching Hospital (RSUTH) Port Harcourt. The RSUTH is a 500-bed capacity hospital located in the South-South region of Nigeria in the West African Sub-Saharan region. Ethical clearance for the study was from the Rivers State University Teaching Hospital Ethical committee.

Study population: All the forms which were returned to the paediatric neurology clinic over a period of 12 months were analysed for completeness. Exclusion criteria. Forms that were not returned back to the clinic even though they left were not included in this study.

Sample Size: A total of 1,194 forms were returned back to the clinic. The forms were for investigations carried out for patients in Haematology, Chemical Pathology, Anatomical pathology and Serology laboratories.

Sampling technique: The forms were filled by different cadre of doctors namely consultants, senior residents, junior residents and house officers. Within the period of 12 months the house officers rotated through the department 3 monthly giving a total of 4 batches of house officers. The resident doctors also rotated through different units in the department for 3-6 monthly rotations while the consultants manned their units. The Paediatric neurology clinic holds once a week and investigation requests are made by doctors working in the unit and doctors from other units who are referring the patients to the paediatric neurology clinic. On each given clinic day, at least one each of all cadre of doctor is present and consulting independently (A consultant, a senior registrar, a junior registrar and a House Officer).

Data collection method: The researcher and a research assistant took the records every clinic day and documented the information on a proforma. The returned investigation forms in the folders of patients attending the Paediatric Neurology clinic who had done various laboratory investigation were consecutively analysed and degree of completeness of each form analysed. The forms were analysed in terms of completeness of patient data, clinical details, doctor details, legibility and signature. These data were entered into excel sheet. Each folder and form were marked to avoid entering it twice. The legibility was ascertained by one of the investigating doctors and the research assistant per time and was determined as legible (if one could make out the information documented) or illegible if the writing was not legible. Any forms filled by the investigation doctor was excluded to avoid bias.

They were classified as 100% completed, 90-99%, 80-89%, 70-79%, 60-69% 50-59%, 40-49%, 30-39%, 20-29%, 10-19% and 0-9% completed. They were also classified according to the specific laboratory, and according to aspects that are fully completed. The data was analysed using SPSS 23 and results presented in tables and charts.

RESULTS

A total of 1,194 forms were analysed from Microbiology, Haematology, Chemical Pathology, Serology and Histopathology laboratories.

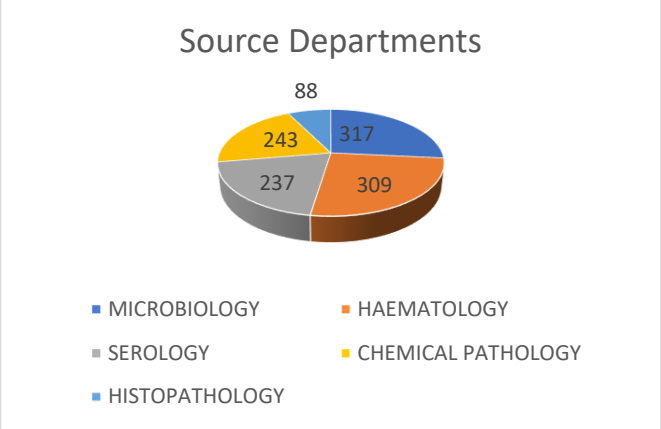

Figure 1: Distribution of departments

In terms of completeness of filling the forms only 1 form (0.08%) was completely filled with all the required data. 55 forms (4.6%) were 90-99% completed, 307 (25.7%) were 80-89% completed, 165 (13.8%) were 70-79% completed, 263 (23.7%) were 60-69% completed, 155 (13.0%) were 50-59% completed, 222 (18.6%) were 40-49% completed while 8 were 30-39% completed. The most completed aspects in the forms were other names (99.7%), surnames (99.4%), sex (98.8%), age (98.1%), type of specimen (98.4%) while the writings were legible in 98.6% of forms. The clinical summary was documented in 74.5% of the forms; folder number (63.7%), name of consultant (63.6%), department/ward (59.3%) name of requesting doctor (48.6%) and signature in 41.7%.

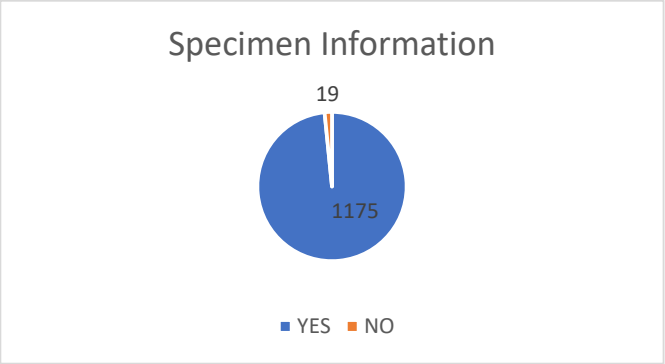

Figure 2: Number of forms that had the specimen information filled

An average of 59% (708) had the department/ward information in the forms. While 40.7% (486) did not have the information.

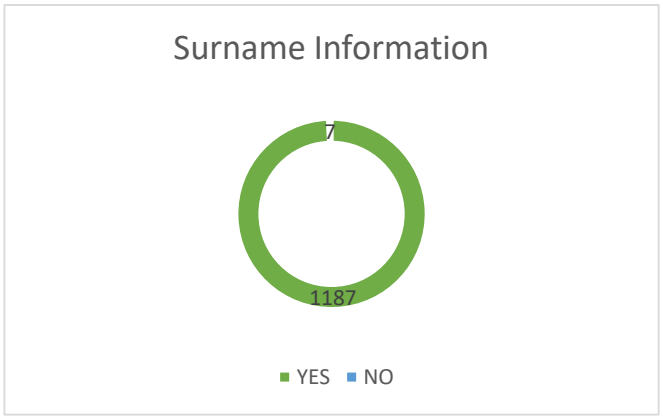

Figure 3: Proportion of forms with surname filled

Almost all the forms (99.7%/1190) had other names (second names) filled. About 98.1% had the age of the patient filled. While 1.9% (23) were unfilled. This was the exact same statistics for sex.

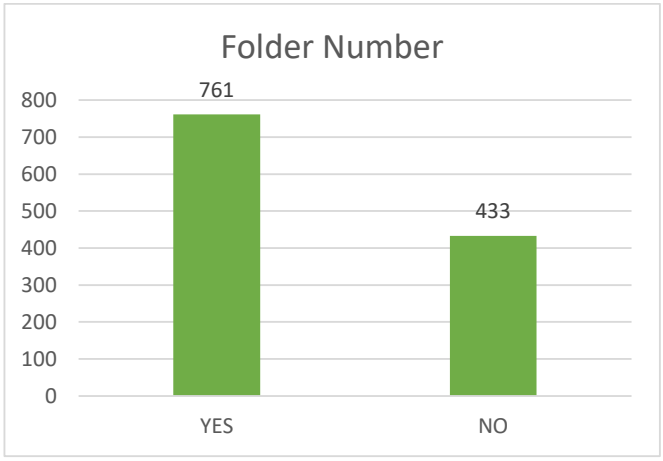

Figure 4: Proportion of forms with folder number information

Over seventy-four percent 74.5% (990) had the clinical details/summary filled. About 98.6% (1177) of all forms were legible. Less than fifty percent, 48.6% (580) of all forms had the name of the requesting doctor. Those with signatures were 41.7% (498).

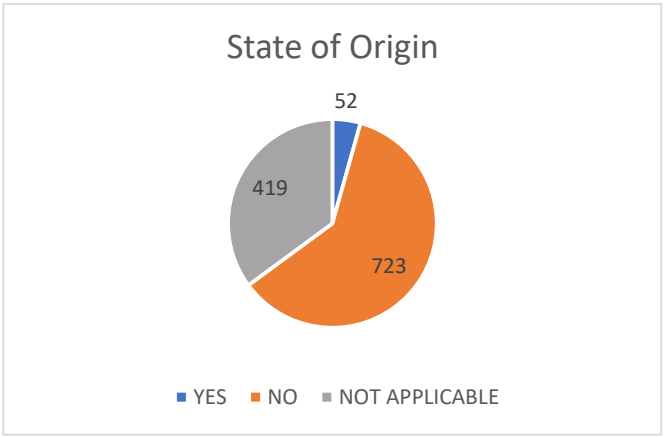

Figure 5: Distribution of forms with State of Origin Information

Some of the laboratory forms do not have provision to write the State of origin. All affected forms were tagged as not applicable.

DISCUSSION

In this study, just one form was properly and completely filled (0.08%). This is similar to findings reported by Nutt et al in South Africa [5] Oyedeji et al in Lagos [11] and Oyelekan [2] et al who reported 1.0%, 1.3 and 0.2% respectively of complete filling.

The patient's names were written in more than 99% of the forms. This is similar to the report by Oyedeji in Lagos [11], Kikpalei in Kenya [3] and Nutt in South Africa [5]. This is the most basic information and usually the first information filled on most forms and hence the most likely reason for near absolute compliance in documentation.

The patient's gender was documented in 98.8% of cases similar to the reported 99.7% in Kenya [3].

The ages of patients were documented in 98.1% of the forms similar to the 98.3% reported from Kenya [3] This is unlike the 68% in the study by Oyedeji [11]. The reason may be because our study was among paediatricians who are conscious that age makes a whole world of difference in sickness and health.

While the ward/department where the sample was sent from was documented in only 59.3% of all the forms, Kikpalei and Lotodo [3] reported a compliance of 96.9% in Kenya, Nutt reported 95.1% in South Africa, Jegede et

al in Kano 100% while Adegoge [10] reported 99.7% in Ile Ife.

It is commendable that the sex and type of specimen were filled in more than 98% of the forms. Over 98% were legible as well. All the above parameters when compared to the 2019 study is Jos, shows far better compliance. [1] For sex more than 50% better compliance and for age almost 80%. When it comes to the number of forms completely filled, most of the previous studies show the same thing, 0-5%. This is too poor. A study done in Lagos established that after 6 months of consistently training and re-training Clinicians through various means on the importance of filling forms properly, there was a remarkable improvement. [4] This shows that consistent retraining is key to changing this narrative.

Interestingly, the name of the requesting physician (48,6%) and the signature of the requesting doctors (41.7%) were the least filled in our study. A sharp contrast to the 96.9% reported in Kenya. [3] This is different from the report by Oyedeji in Lagos where the name of the referring doctor was filled in 99.0% of the forms. The name and signature of the referring physician authenticates the request from the clinic and they were the ones overlooked. In the UK, improperly filled request forms lacking key information is a criterion for specimen rejection. [13] with the exception of precious specimen which incidentally includes paediatric specimen, though the age of paediatric patients here was not specified). Precious specimen includes CSF, bone marrow aspirates, tissue specimen, body fluid and paediatric specimen. [13] Having the doctor's name specified is also necessary so the doctor can be alerted when there is a critical value. (a laboratory value outside the reference range that can be life threatening) [14] This is especially necessary in our environment where most hospitals do not have an effective intercom system.

Overall, the compliance rate in our study was higher in parameters like name, sex, age and clinical details when compared to other studies. However, the response to Consultant's name and doctor's signature was less than 50%. This is too poor and unacceptable.

In the UK there is a compliance team to monitor how well the laboratory forms are filled with monthly reviews done. [5] In our hospital, there is no such compliance team and no review. Moving forward this is a strong recommendation that can be adopted by Nigerian Hospitals to increase compliance.

Doctors may have reasons for not completing forms of patients in this study. A previous questionnaire-based study carried out at an event for doctors in the entire State in 2019 established that though medical doctors knew some of the advantages of filling a laboratory request form, compliance was an issue, because they felt too busy (44.1%), or that the information required was too much (34.1%) and they felt it was unnecessary (26.1%). [12] The reason for not completely filling the forms is beyond the scope of this study.

CONCLUSION

This study shows that manually filled investigation request forms are not properly completed. Continuous medical education, the use of physician assistants to fill the forms completely as well as use of electronic systems may improve this.

REFERENCES

1. Obeta MU, Olamu BO, Alla OJ, Michael EP, Nedolisa AC, Oyero SK et al. Assessment of patient's medical laboratory request forms from compliance in Jos University teaching hospital, Jos -Nigeria. *Am J Biomed Sci Res.* 2019;6(4):334-339.
2. Oyelekan AA, Ojo OT, Olawale OO, Adeleye OO, Sogebi OA, Osinupebi OA et al. Pattern of completion of Laboratory request forms in a tertiary health facility. *Ann of health Res.* 2018;4(2):155-161.
3. Kipkalei JC, Lotodo TC. Evaluation of the completeness in the filling of laboratory request forms submitted to the haematology laboratory at a tertiary hospital in Kenya. *Health.* 2019;7(11):862-868.
4. Oseigbe ID, Afolabi O, Onyenekwe CP. The Effectiveness of Clinician Education on the Adequate Completion of Laboratory Tests Request Forms at a Tertiary Hospital. *Ann Med Health Sci Res.* 2016;6:90-4.
5. Nutt L, Zemlin AE, Erasmus RT. Incomplete laboratory request forms: the extent and impact on critical results at a tertiary hospital in South Africa. *Annals Clin Biochem.* 2008;45(5):1-8.

6. NHS foundation trust. (York & Scarborough TH) Laboratory Medicine: Completing request forms and labelling samples policy version 09. August 2022-August 2024. [Internet] [Cited 2024 Aug 24]. Available from https://www.yorkhospitals.nhs.uk/seecmsfile/?id=962
7. Garba I, Bashir HS, Mohamed S, Dambele M, Hikoma MS, Lawal Y et al. Evaluation of inadequately filled radiology request forms with its impact on patient radiation exposure and waiting time in a tertiary care hospital: A preliminary report from Northwest Nigeria. *West Afr J Radiol.* 2021:28:55-60.
8. Jegede F, Mbah HA, Dakata A, Gwarzo DH, Abdulrahman SA, Kuliya-Gwarzo A. Evaluating lab request forms submitted to haematology and Blood Transfusion dept in a hospital in North West Nigeria. *Afr. J Lab Med.* 2016;5(1):381.
9. Randall Hood S. Laboratory Testing Errors Can Lead to Claims of Medical Malpractice. Medical Malpractice. 2018. [Internet] [Cited 2024 Sep 7]. Available from https://www.mcgowanhood.com/2018/04/24/laboratory-testing-errors-can-lead-to-claims-of-medical-malpractice/
10. Adekoge, OA, Idowa AA, Jeje OA. Incomplete Laboratory Request Forms as a Contributory Factor to Preanalytical Errors in a Nigerian Teaching Hospital. *Afric J Biochem Res.* 2011;5:82-85.
11. Oyedeji OA, Ogbenna AA, Iwuala SO. An audit of Request forms submitted in a multidisciplinary Diagnostic centre in Lagos. *Pan Afric Med J.* 2015;20:423.
12. Wonodi W, Jaja ID, Ogolodom MP, Mbaba AN, Alzigha N, Uzosike T et al. Evaluation of Reasons for Non-Complete Filling of Investigation Request Forms by Medical Doctors in Rivers State, Nigeria. *Critical Care Obs Gyn.* 2021;31:1-5.
13. Health Services Laboratory UK. Sample rejection criteria. [Internet] [Cited 2024 Sept 8]. Available from https://www.hslpathology.com/tests/sample-rejection-criteria/
14. Rocha BCB, Alves JAR, Pintos FPD, Mendes ME. The critical value concept in clinical laboratory. *Bras Patol Med Lab.* 2016;52(1):17-20.

Original Article

SICKLE CELL DISEASE: AN ASSESSMENT OF ITS AWARENESS AMONG UNDERGRADUATE STUDENTS IN NIGER DELTA UNIVERSITY, BAYELSA STATE, NIGERIA

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Abstract

Background: Sickle cell disease (SCD), an autosomal recessive trait characterized by the presence of an abnormal heamoglobin in the red blood cell is termed a serious health issue that is increasingly affecting newborns. This study aims to assess the knowledge, attitude and practice of screening among undergraduates.

Methods: A well-structured, multi section questionnaire was used for data collection. The questionnaire was administered to 390 students and was divided into sections, containing information comprising of socio-demographic data, attitude of undergraduate students towards Screening for SCD and the knowledge of SCD.

Results: The result showed that majority of our study population 86.3% have not done SCD screening, another 65.7% have no knowledge of SCD and although some 18.1% of the undergraduates agree to the importance of genotype screening to enable them make wise decision in choosing their marriage partners, a large number disagree/strongly disagree (36.8%/28.3%) to compulsory screening before marriage. This may be stemming from religious believe and poor knowledge of the risk factors associated with SCD.

Conclusion: This study revealed a significant knowledge gap, poor attitude, and low practice of screening for SCD among undergraduate students in Niger Delta University and so the needs for active education on sickle cell disease in this study population.

Keywords: knowledge, attitude, premarital screening, sickle cell disease.

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INTRODUCTION

Genetic Testing and Screening have turn out to be parts of contemporary medicine and public health initiatives. These terms are usually used interchangeably, but the term ―Testing denotes a genetic test done on an individual on a voluntary basis, while ―Screening implies large-scale public health initiative [1, 2].

Genetic disorder arises as an effect of mutations, which possibly will be grave and cause varying degrees of damage. It's an off shoot of a modification in the nucleotide sequence in the Deoxyribonucleic acid (DNA) molecules in a particular section of chromosomes. The altered genes are called "Mutant Genes". Gene alteration may result in loss, accumulation or reshuffle of bases in the gene. The mutation leads to; doubling-up, insertion, removal, inversion and swap of bases. SCD, hemophilia, cystic fibrosis and phenylketonuria are among diseases that arise as a consequence of substitution mutation [3].

SCD, an autosomal recessive disorder comes up as a creation by swapping of glutamic acid with valine at the 6th position of the haemoglobin beta chain, ensuing in the synthesis of abnormal haemoglobin and the resultant making of the distinctive sickled red blood cells. Sickle cell anaemia is the homozygous form where two Sickle haemoglobin (HbS) genes are inherited, whilst in SCD, the HbS is inherited together with an additional abnormal haemoglobin eg Haemoglobin E (HbE), Haemoglobin C (HbC), etc [4,5]. The weight of SCD in the African Region and especially in Nigeria as the most populous African nation is on the rise. This borders on high socioeconomic and public health concerns [6, 7].

Nigeria with an estimation of over 200 million populations as recorded by the National bureau of statistics has a yearly growth rate of 3.2%. There is an approximation of 2.3% of Nigerians who suffer from SCD and about 25% healthy carriers of the abnormal gene [7]. The detection of SCD as an imperative public health concern is indispensable to make sure that young ones are conscious of sickle cell anaemia and how genotype test may possibly lend a hand to them in avoidance of genotype incompatibility [6, 7].

The essence for this study is to make out the strength and gaps of young people's awareness and attitudes towards genotype testing.

For a long time in Nigeria, genotype testing has been a real issue for young intending couples. It is so critical that several couples have put on hold their marriage plans due to refusal or failure of a partner to undergo test prior to their marriage. While others have completely terminated their marriage due to genotype incompatibility with resultant mental health issues at its wake. There exists likelihood that there may be many young people who do not buy into the idea of genotype testing prior to marriage [8].

Genotype mismatch is a big issue amongst young people who have it in mind to get married. Of late, this has turn out to be quite a significant indicator for people considering marriage as many with mismatched genotypes who got married previously without proper investigation of this issues, end up having offspring's with SCD who are high maintenance children with the accompanied trepidation that they may have short life span. Thus, lots of such relationships with the abovementioned troubles do not see the light of day. Therefore, it has become very necessary for intending couples to perform genotype testing as part of their marriage plans in avoidance to by cut the mistake of previous generation. The sure-fire way in solving this concern is to educate intending couples of the need to perform genotype test prior to marriage planning [9].

Therefore, this present study was intended to evaluate the knowledge and willingness to perform premarital screening for SCD among undergraduate in Niger Delta University.

This study is significant as it will show the importance of genotype testing such as providing personalized information about health, disease risk, and other traits among undergraduates. Premarital screening will also help in the early detection of disease and may well avert further severe form of the disease or prevent couples from having sick kids.

The research will also add to education of students as it has a possibility of equipping this study population with insight on the understanding, outlook and practice towards genotype test and the preference of marriage partner with the intention of preventing future complications.

This study will also help improve the formulation of policies on Premarital Screening for Sickle cell disease as it'll create awareness and education on the importance of Premarital Screening before marriage.

MATERIALS AND METHODS

A well-structured, multi section questionnaire was used for collection of data. The questionnaire was sectioned into 4 viz: A, B, C and D. Section A comprises demographic data, "B" for attitude of undergraduate students towards Premarital Screening for SCD; "C" for practice towards Premarital Screening for SCD and "D" for knowledge of SCD. The questionnaire was the most appropriate method of data collection for this study as it allows access to large data sets and the use of advanced statistical techniques.

A total \of 390 questionnaires was administered to undergraduate students of the College of Health Sciences,

Niger Delta University but 385 were retrieved for this study.

Ethical approval was gotten from the College ethics committee before the commencement of this study while an informed consent was obtained from each participant before data collection. Data collected was subjected to statistical analysis.

RESULTS

The demographic data of the participants showed that the younger age group of 15-24 years are more in number (175) making up 45.5% of the study population while age group 35-44 years were the lowest (103). 55.3% of the study population was single while 33.8% were married. The knowledge scale of the participants towards SCD and premarital screening was also evaluated and presented in tables.

Table 1: Showing Demographic data of participants

Statement	Frequency	Percentage
Age:		
15-24.	175	45.5%
25-34	107	27.8%
35-44	103	26.7%
Marital Status		
Single	213	55.3%
Married	138	35.8%
Divorced	34	8.9%
Religion:		
Christian	284	74.3%
Pagan	26	6.8%
Muslim	72	18.4%
Others	0	0%
Level of Education:		
100l	82	21.5%
200l	25	6.5%
300l	73	19.1%
400 and above.	202	52.9%

Table 2: Showing response to knowledge towards premarital screening for sickle cell disease.

Statement	Frequency	Percentage (%)
Have you heard about sickle cell?		
Yes	132	34.8
No	251	65.2
If yes, source of information		
Friends	26	6.7
Mass media	182	47.3
Health education	93	24.1
Others	84	21.8
Symptoms of sickle cell		

Fatigue and weakness	69	18.1%
Shortness of breath	90	23.6%
Rapid heart rates	82	21.5%
Pale skin	110	28.8%
Headaches	106	27.7%
Fever	100	26.2%
Do not know	267	69.9%
Risks factors of sickle cell:		
Pregnancy complications	1	0.3%
Sickle cell trait	9	2.4%
Family history	10	2.6%
Genetics	35	9.2%
Age	2	0.5%
Do not know	194	50.8%
Screening test of sickle cell:		
Blood test	129	33.8%
Genetic testing	31	8.1%
Imaging and urine test	45	11.8%
Do not know	2	0.5%
Treatment for SCD		
Medication	131	34.3%
Blood transfusion	109	28.5%
Bone marrow transplant	34	8.9%
Do not know	0	0%

Table 3: showing the frequency and percentage of participants attitude towards Premarital Screening for SCD

Genotype testing is compulsory before marriage	Frequency	Percentage
Strongly agree	69	18.1%
Agree	20	5.2%
Neutral	42	11%
Disagree	142	27.2%
Strongly disagree	109	28.5%
It's advisable for a non sickle cell disease carrier to marry a sickle cell disease carrier		
Strongly agree	96	25.1%
Agree	108	28.3%
Neutral	117	30.6%
Disagree	15	3.9%
Strongly disagree	46	12%

Do you agree to marry someone who has a sickle cell disease?		
Strongly agree	117	30.6%
Agree	108	28.3%
Neutral	15	3.9%
Disagree	46	12%
Strongly disagree	96	25.1%
Partner's genotypes should influence decision for getting married.		
Strongly agree	96	25%
Agree	46	12%
Neutral	15	3.9%
Disagree	108	28.3%
Strongly disagree	117	30.6%

Table 4 showing participants response to practice towards Premarital Screening for SCD

Statement	Frequency	Percentage
Have you ever practiced any sickle cell screening?		
Yes	56	14.9%
No	326	85.3%
If yes, what sickle cell screening method		
Blood test	48	12.6%
Imaging and urine test	8	2.1%
Genetic testing	2	0.5%
If no, what are your reasons for not practicing sickle cell screening		
Lack of knowledge	251	65.7%
Did not have any symptom	78	20.4%
Forgetfulness	1	0.3%
Lack of time	2	0.5%
I don't want to	13	3.4%
In your opinion, what methods can be recommended for educating students and young adults about SCD		
Organizing workshop and seminars	193	50.5%
Inviting guests speakers who specialize in SCD	194	50.7%
Community outreach programs	200	52.4%
Use of visual materials	175	45.5%

DISCUSSION

The findings of this study reveal a concerning trend among undergraduate students in Niger Delta University regarding their knowledge, attitude, and practice towards premarital screening for sickle cell disease. Despite the importance of premarital screening in preventing the transmission of genetic disorders, the majority of students demonstrated poor knowledge, attitude, and practice towards this crucial health intervention.

A high percentage 65.7% of the student population under study has no knowledge of SCD as shown in table 3. This is worrisome as the disease is increasingly noticed among Nigerians. Also, awareness of the disease is of importance especially within this age group since marriage and child birth is their next focus after graduation as this will help prevent them from choosing a partner that is not genetically compatible.

There is a 50.8% of the study population who does not know about the risks factors associated with SCD. So this requires adequate sensitization of this population group even though WHO has recommended dedicated screening and counseling centers be made available in regions where Hb disorders are frequent [7, 10], it is evident from the result of this study that more work is required. The poor knowledge of students about SCD and the importance of premarital screening is a significant concern, as it indicates a lack of understanding about the causes, symptoms, and consequences of the disease. This finding is in sync with the results by Uche et al.; Boadu & Addoah [10, 11]. This knowledge gap may lead to a lack of awareness about the importance of premarital screening, which can result in the transmission of the disease to offspring.

Also worrisome about the attitude of the population under study, is the lack of willingness to undergo screening before marriage. A total of 142 students disagree to compulsory genotype testing before marriage while 109 also strongly disagree to premarital testing. This may be due to various factors, including cultural or religious beliefs, lack of awareness, or fear of stigmatization. The findings suggest that there is a need for education and awareness campaigns to promote the importance of premarital screening and address the misconceptions and myths surrounding the practice. A large percentage (86.3%) has not done screening before and so do not know their genotype. This is quite discouraging and goes further to show the lack of awareness of the transmission mode of SCD which if known and precautions taking will largely reduce the occurrence of SCD in our society. This study therefore supports the position of Adewoyin et al., who in their study observed that entry requirement for school should include amongst others, premarital screening as a means to check carrier status of students [12, 13].

There is indeed a need for intervention by the government to advocate the importance of premarital screening by students and to set up more centers for screening sickle cell. Also public lectures and campaigns should be an ongoing measure to bring awareness to the risk factors, transmission mode and prevention of SCD to the public.

The study's findings highlight the need for comprehensive education and awareness campaigns to promote knowledge, attitude, and practice towards premarital screening for sickle cell disease among undergraduate students in Niger Delta University. Healthcare providers, educators, and policymakers must work together to address the knowledge gap, dispel misconceptions, and promote the importance of premarital screening. By doing so, we can reduce the transmission of sickle cell disease and promote healthy reproductive choices among young adults.

CONCLUSION

This study revealed a significant knowledge gap, poor attitude, and low practice of premarital screening for sickle cell disease among undergraduate students in Niger Delta University. The findings highlight the need for urgent intervention to address the lack of awareness and understanding about the importance of premarital screening in preventing the transmission of genetic disorders. The study's findings have implications for healthcare providers, educators, and policymakers. Firstly, healthcare providers must prioritize education and awareness campaigns to promote knowledge and understanding of premarital screening among young adults. Secondly, educators must incorporate genetic education into the curriculum to empower students with the knowledge and skills necessary to make informed reproductive choices. Finally, policymakers must develop and implement policies that promote premarital screening

and provide accessible and affordable healthcare services for all. The poor attitude and low uptake of premarital screening among the students underscore the need for targeted interventions to address these issues. By addressing the knowledge gap, poor attitude, and low practice of premarital screening, we can reduce the transmission of sickle cell disease and promote healthy reproductive choices among young adults. This study contributes to the existing literature on genetic testing and screening, emphasizing the need for early detection and prevention of genetic disorders. The findings of this study can be used to inform strategies to promote premarital screening and improve reproductive health outcomes among young adults in Niger Delta University and beyond.

REFERENCE

1. World Health Organization. Regional office for Africa. Sickle cell disease: a strategy for the WHO African region: Report from the Regional Director (AFR/RC60/68) Geneva, Switzerland. World health organization 2010. Guidelines for the Control of HaemoglobinDisorders. Sardinia. *World Health Organization*; 1994.
2. World Health Organization. Guidelines for the Control of Haemoglobin Disorders. Sardinia. *World Health Organization*; 1994.
3. Abioye, M., & Kuteyi, K. Sickle cell knowledge, premarital screening and marital decisions among local government workers in ile-lfe, Nigeria. *Afr J Prm Health care fam med;* 2019; 1(1): 22-5.
4. Bunn HF. Pathogenesis and treatment of sickle cell disease. *N Engl J Med* 1997;337:762-9.
5. Serjeant GR. Sickle Cell Disease. 3rd ed. New York: Oxford University Press; 2001. p. 3-15.
6. Ogundipe. S, Obinna, C. The burden of sickle cell disorder; health special, News letter 2019, Nov 14.
7. Sickle Cell Anaemia. Agenda Item 11.4. In: 59th World Health Assembly; 27 May, 2006. Available from: http://www.who.int/gb/ebwha/pdf_files/WHA59-RECI/e/.
8. Adeyemo, O.A, & Soboyejo O.B. Frequency distribution of ABO, RH blood groups and blood genotypes among the cell biology and genetics students of University of Lagos. *African Journal of Bio technology*; 2016; 5(22): 2062-5
9. Odunlade, A.K., (2015): Basic Concepts in Genetics. 1st Edition. Grace of God. Publishers, Lagos. pp. 134-145.
10. Uche E, Olowoselu O, Augustine B, Ismail A, Akinbami A, Dosunmu A, *et al*. An assessment of knowledge, awareness, and attitude of undergraduates toward sickle cell disease in Lagos, Nigeria. *Niger Med J*. 2017;58:167-72.
11. Boadu I, Addoah.T. Knowledge, beliefs and attitude towards sickle cell disease among university students. *J Community Med Health Educ* 2018; 8:1-5.
12. Oludare, G.O., & Ogili, M.C. Knowledge, Attitude and Practice of Premarital Counseling for Sickle Cell Disease Among Youth in Yaba, Nigeria. *Afr J Reprod Health* 2013; 17[4]: 175 – 182.
13. Adewoyin AS, Alagbe AE, Adedokun BO, Idubor NT. Knowledge, attitude and control practices of sickle cell disease among youth corps members in Benin city, Nigeria. *Ann Ib Postgrad Med* 2015;13:100-7.

Original Article

IDENTIFICATION AND CHARACTERIZATION OF *PSEUDOMONAS SPECIES* IN WOUND SAMPLES COLLECTED FROM FEDERAL MEDICAL CENTER (FMC), YENAGOA, BAYELSA STATE, NIGERIA

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Abstract

Background: Pseudomonas species are Gram-negative, motile rods bacteria which are motile rod-like in shape and capable of widely being distributed in diverse environments with P. aeruginosa species notably effecting humans.Phenotypic identification of Pseudomonas species is less reliable, time consuming and not 100 percent accurate due to errors made by scientists and accurate identification and characterization of Pseudomonas species is essential for appropriate selection of antibiotics for treatment. Molecular technique particularly 16SrRNA gene amplification and sequencing is a more reliable accurate and precise tool been introduced for pseudomonas aeruginosa.

Methodology: A prospective study aimed at the identification and characterization of Pseudomonas species in wound samples collected from patients in Federal Medical Center (FMC), Yenagoa was carried out. Of the 50 wound samples collected, identified and characterized using standard phenotypical and 16SRNA amplification techniques.

Results: The distribution was as follows; age range was between 11- 60years, 38(64%) samples yielded no growth and 18 (34%) yielded growth, of which 7(39%) were Pseudomonas aeruginosa and others isolated were Staphylococcus spp', Escherichia coli and Kiebsieila spp. The isolates of Pseudomonas aeruginosa analyzed statistically, showed no statistical difference. The molecular characterization confirmed the identity of the organism as of phenotypic features.

Conclusion: Molecular characterization appears to be more accurate and precise than the phenotypic method. It is recommended that Government should provide molecular diagnostic tools and equipment's in the health care system to help in accurate diagnosis and identification of bacteria and also fund the training of relevant Scientists on molecular techniques for easy diagnosis.

Key Words: Pseudomonas spp., Molecular characterization, 16SRNA amplification

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INTRODUCTION

A wound may be defined as disruption of the normal continuity of bodily structures due to trauma, which may be penetrating or non-penetrating [1].

Wound infection is a process where microorganisms invade a wound and continuously proliferate within it initiating local and systemic responses in the host. The microorganisms in the wounds thus accumulate causing damage to the tissues and delay in wound healing. to a level that initiates a local and systemic response in the host. Wound infection can be caused by different group of organisms like bacteria, fungi and protozoa [2].

Pseudomonas species are aerobic Gram-negative, motile rods that belongs to the order Pseudomonadales, family-Pseudomonadaceae and Genus Pseudomonas. There are more than 120 species of Pseudomonas widely distributed in moist environments such as water and soil ecosystems, infecting humans, plants and animals [3]. Pseudomonas can easily be detected on agar because of their ability to produce a fluorescent, yellow-green pigment, pyovordine and a blue-green pigment, pyocanin [4]. Within the Pseudomonas species, P. aeruginosa is most frequently associated with causing human infection; however, it naturally exists in the environment. This bacterium is a rod shaped and an opportunistic pathogen, causing various types of infection (e.g., skin, eyes, ears, respiratory tract, urinary tract, gut-derived sepsis, soft tissue infections, bone and joint infections). Immunocompromised patients and patients on immunosuppressive treatments, such as patients suffering from cystic fibrosis, burn wounds, AIDS and cancer, are the most frequently infected by this organism. Strains of Pseudomonas aeruginosa are naturally resistant to several antibacterial drugs, and because of their nominal nutritional requirement, they have the ability to survive in soil, plant surfaces, waste water, moist environment, surface water, or even on inert materials [5], it can be transmitted from person to person during the use of life support equipment, cosmetics, dilute antiseptics and even through the use of washing liquids and soaps. Phenotypical identification of Pseudomonas species is less reliable, time consuming and not 100 percent accurate due to errors made by

scientists. It is crucial to accurately identify and characterized Pseudomonas species for appropriate selection of antibiotics for treatment purposes. Molecular technique, particularly 16SrRNA gene amplification and sequencing is a more reliable, accurate and precise tool been introduced for the identification and characterization of Pseudomonas aeruginosa. The study was thus aimed at the identification and characterization of Pseudomonas species using 16SrRNA amplification and sequencing technique from wound samples collected from patient in Federal Medical Center (FMC), Yenagoa, Bayelsa State.

SUBJECT, MATERIALS AND METHODS

The study was carried out in the Niger Delta University, Wilberforce Island, Bayelsa State. Bayelsa is a cosmopolitan state in the southern part of Nigeria, which is geopolitically located at Latitude 04º15º North, 05º23º South, Latitude 05º22º West and 06º45º East. It has an area of 706 km and has boundaries with Delta State on the North, Rivers State on the East and the Atlantic Ocean on the West and South respectively.

The population of this study consisted of all patients with wound at the Federal Medical Center (FMC), Yenagoa, Bayelsa state. Ethical approval was sought and obtained from the Ethical Committee of the Federal Medical Center (FMC) Yenagoa, Bayelsa State prior to sample collection.

A cross-sectional study design was adopted and a stratified sampling technique was used to select 50 samples. Taro Yamane formula [6] with 95% confidence level, was used to determine the sample size of this research.

A sterile swab stick was used to collect samples from wounds cultured using standard bacteriological techniques on blood agar, MacConkay agar, and chocolate agar respectively, and incubated over night at 37^0 C for 24 hours under aerobic conditions. After 24 hours, colonies were identified based on; Cultural characteristics/colonial morphology, standard Gram staining technique using Lugo's iodine. Biochemical test was done for speciation of the organism using oxidase, Kligler iron agar, citrate, and indole. Pseudomonas aeruginosa was positive to oxidase and citrate utilization test. Antibiotic susceptibility testing of the isolates was carried out by agar disc diffusion method.

Molecular Identification was done by first extracting the bacterial DNA using methods described by the manufacturer, Zymo [7]. The ultra-pure DNA was also quantified by protocols described by the manufacturer, [8], and stored at -20 degrees for other downstream analysis.

rRNA amplification was done by amplifying the 16s RNA region of the rRNA genes of the isolates using the 27F:5'-AGAGTTTGATCMTGGCTCAG-3' and 1492R:5'-CGGTTACCTTGTTACGACTT-3' primers using standard protocol described by Frank et al 2008 [9]. The

product was resolved on a 1% agarose gel and visualized on a UV transilluminator for a 281bp product size [8].

Sequencing was done using the Big Dye terminator kit using standard protocols by the manufacturer [8]. Obtained sequences were edited using the bioinformatics algorithm, Trace edit. The evolutionary history was inferred using the Neighbor-Joining method in MEGA 6.0 [10]. The bootstrap consensus tree inferred from 500 replicates [11] was taken to represent the evolutionary history of the taxa analyzed. The evolutionary distances were computed using the Jukes-Cantor method [12]. The statistical analysis was carried out using chi-square test.

RESULTS

Age-gender profiling shows amongst 50 participants, 23 (46%) were males while 27 (54%) were females. Of the 8 subjects within the age of 11-20 years, 3 (37.5%) were males and 5 (62.5%) were females. Of the 9 aged between 51-60 years, 5 (55.6%) were males and 4 (44.4%) were females (Table 1).

Table 1: Distribution of participants by age and gender

Age range Years	Male % No (%)	Female % No (%)	Total % No (%)
11-20	3(37.5%)	5(62.5%)	8(16%)
21-20	9(40.9%)	15(59.1%)	22(44%)
31-40	3(50.0%)	3(50.0%)	6(12%)
41-50	3(60.0%)	2(40.0%)	5(10%)
51-60	5(55.6%)	4(44.4%)	9(18%)
ujTotal	**23(46%)**	**27(54%)**	**50(100%)**

The distribution of isolates in wound samples revealed that of the 18 bacteria isolated, 7 (39%) were suspected Pseudomomas, 5 (28%) Staphylococcus, 4 (22%) Klebsiella species and 2 (11%) Escherichia (Figure 1).

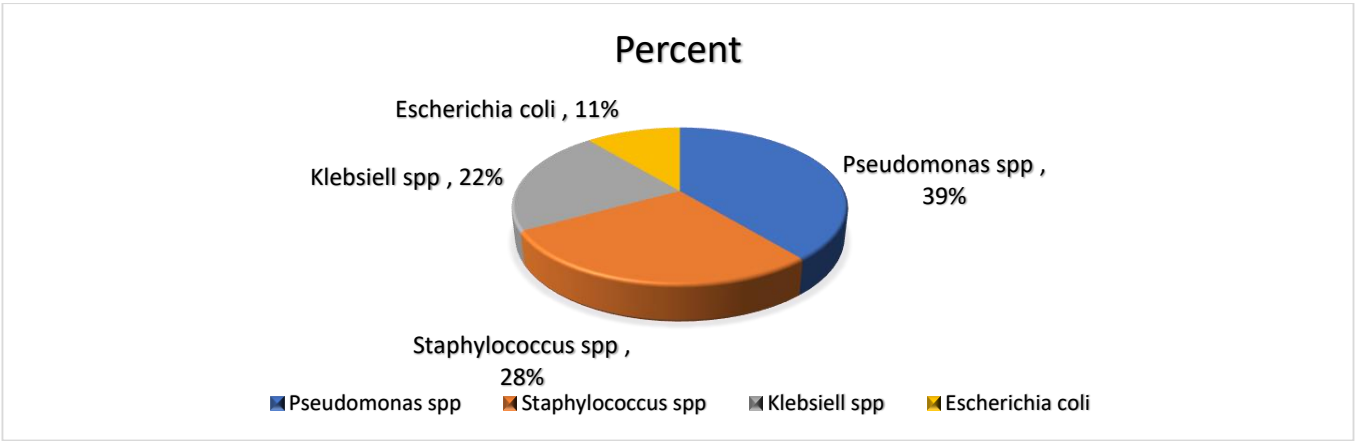

Fig 1: Pie chart illustrating distribution of bacteria isolates from wound samples

The distribution of isolates in male samples based on age revealed that those within 11-20 years age range has the highest prevalence isolates, 3 (30%), followed by age range 21-30 years which yielded 2 (25%) isolates, the least number of isolates from 31-40, 41-50 years and 51-60 years which yielded 1 (12.5%) isolate. The isolate with the highest prevalence is Pseudomonas aeruginosa (Table 2).

Table 2: Distribution of bacteria isolates by age amongst male subjects

Age range Years	Pseudomonas Spp	Klebsiella Spp.	Eschericha spp.	Staphylococcus Spp	Total %
11-20	1(33.33%)	-	1(33.33%)	1(33.33%)	1(37.5%)
21-20	2(100%)	-	-	-	2(25.0%)
31-40	-	1(100%)	-	-	1(12.5%)
41-50	-	-	-	1(100%)	1(12.5%)
51-60	-	-	-	1(100%)	1(12.5%)
Total	**3(37.5%)**	**1(12.5%)**	**1(12.5%)**	**3(37.5%)**	**8(44.4%)**

The distribution of isolates in female samples based on age revealed that those within 51-60 years age range has the highest prevalence isolates 4 (40%), followed by age range 11-20 years which yielded 3 (30%) isolates age range 41-50 yielded 2 (20%) isolates, the least number of isolates were from 21-30 years which yielded 1 (10%) isolates. Age 31-40 years yielded no isolates. The isolate with the highest prevalence is *Pseudomonas aeruginosa* (Table 2b).

Table 2b: Distribution of bacteria isolates by age amongst female subjects

Age range Years	Pseudomonas Spp	Klebsiella Spp.	Eschericha spp.	Staphylococcus Spp	Total %
11-20	1(33.33%)	2(66.67%)	-	-	3(30.0%)
21-20	-	-	-	1(100%)	1(10.0%)
31-40	-	-	-	-	-
41-50	1(50.0%)	1(50.0%)	-	-	2(20.0%)
51-60	2(50.0%)	-	1(25.0%)	1(25.0%)	4(40.0%)
Total	**4(40.0%)**	**3(30.0%)**	**1(10.0%)**	**2(20.0%)**	**10(55.6%)**

The susceptibility pattern of the Pseudomonas isolates revealed sensitivity to Ciprofloxacin 5 (71%). Sulfamethaxozole-trimthoprim 4 (57%), Augmentin 3 (57%) and resistant to Pefloxacin 5 (71%), Ampicillin 4 (57%) and tarivid 3 (43%) (Table 3).

Table 3: Antimicrobial susceptibility testing

	SXT	CH	SP	CPX	AM	AU	CN	PEF	OFX	S
Isolates	S/R	S/R	S/R	S/R	S/R	S/R	S/R	S/R	S/R	S/R
PA 1	+	+	-	+	-	-	+	-	-	+
PA 2	+	-	+	-	+	-	+	-E	+	+
PA 3	-	+	+	+	-	+	-	+	+	-
PA 4	-	-	-	-	+	_	+	-	-	+
PA 5	-	+	-	+	-	+	-	+	+	_
PA 6	+	-	+	+	+	-	+	-	-	+
PA 7	+	+	-	+	-	+	-	-	+	+
Total	4(57%)	4(57%)	3(43%)	5(71%)	3(43%)	3(43%)	4(57%)	3(43%)	4(57%)	5(72%)
(%)	3(43%)	3(43%)	4(57%)	2(26%)	4(57%)	4(57%)	3(43%)	5(72%)	3(43%)	3(43%)

PA: Pseudomonas aeruginosa, +: Sensitive, -: Resistance, SXT: Sulfamethaxozole-trimethoprim, CH: Chloramphenicol, SP: Sparfloxacin, CPX: Ciprofloxacin, AM: Ampicillin, AU: Augumentin, CN: Gentamiein, PEF: Pefloxacin, OFX: Tarivid, S: Streptomyein

Agarose gel electrophoresis (AGE) revealed the migration of 16Sr RNA gene band for the isolates. The result from the gel electrophoresis of the 16SrRNA gene band reveals the suitability and integrity of the extracted RNA for molecular analysis and also allow species identification and other genetic analysis of Pseudomonas species. Agarose gel electrophoresis of selected bacteria isolates. Lanes1-3 represent 16SrRNA gene bands (1500bp). Lane J represents the 100bp DNA ladder (Figure 2). Agarose gel electrophoresis of selected bacteria isolates. Lanes1-3 represent 16SrRNA gene bands (1500bp). Lane J represents the 100bp DNA ladder (Figure 2).

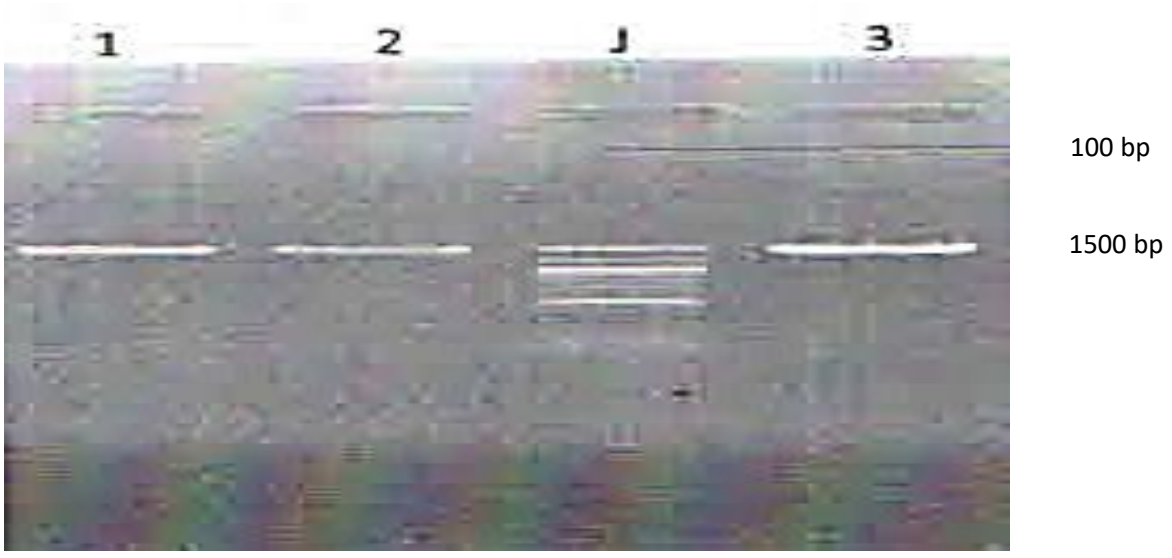

Fig 2: AGE that show selected fragments of amplified 16SrRNA

Obtained 16s rRNA sequences subsequently edited, downloaded and aligned by standard protocol. The phylogenetic placement of the 16s of the bacteria isolates placed in Pseudomonas spp ; revealed a closely relatedness to pseudomonas aeruginosa (Figure 3).

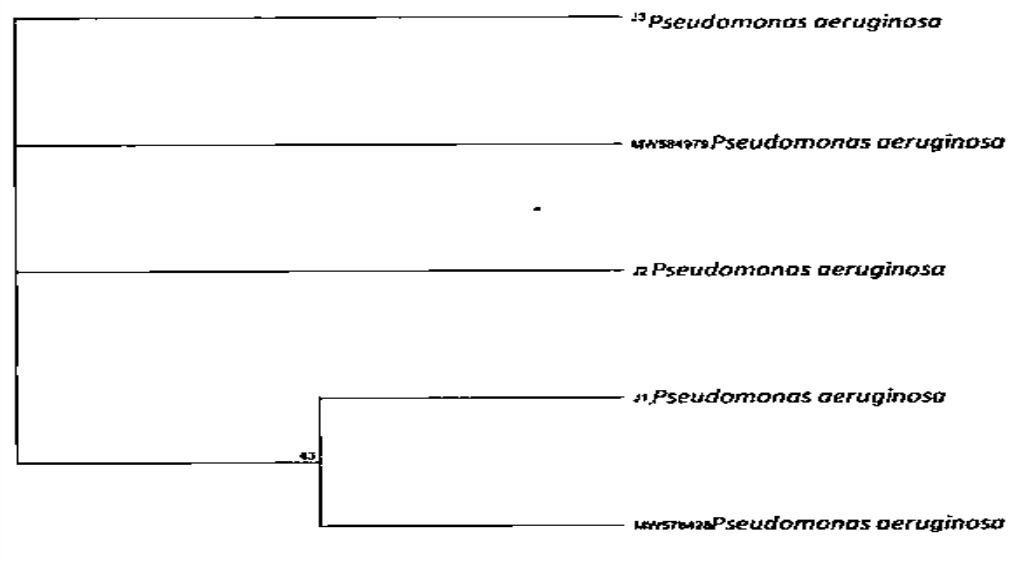

Fig 3: Phylogenetic tree of evolution gap amongst bacteria isolate

DISCUSSION

The distribution of samples for both males and females were within the age range of 11-60 years. Of the 50 wound samples collected in all age groups, the age range 21-30 had the highest distribution rate of 22 (44%), and females tend to have the highest distribution rate of 27 (54%) than males, 23 (46%), which is in contrast with Kumari, [13] whose work showed that male patients were more than females (Table 1).

Of the total samples collected and cultured, 32 yielded insignificant bacterial growth and 18 yielded significant bacterial growth with pseudomonas aeruginosa having the highest prevalence value of 7 (39%) among other isolates such as 5 (28%) Staphylococcus species, 4 (22%) Kiebsiella species, and 2 (11%) Escherichia coli. This is in agreement with studies by Puca, [14] who showed that Gram-negative bacteria are the most prevalent microorganisms in wound infections compared to Gram positive organisms (Figure1)

The results of this study showed that females have a higher prevalence rate of bacterial wound infection 10 (55.6%) than males 8 (44.4%) which is in contrast with Dias et al [15], whose studies showed that males are generally more susceptible to bacterial infections. He also mentioned that women have stronger immune response to self and foreign antigen than men. This study also showed that Pseudomonas aeruginosa has the highest prevalence rate of infection in wounds (see Table 2a and Table 2b).

Agarose gel electrophoresis revealed the migration of l6Sr RNA gene band for the isolates. The result gotten from the gel electrophoresis of the 16SrRNA gene band reveals the suitability and integrity of the extracted RNA for molecular analysis and the procedure also allows for species identification and other genetic analysis of Pseudomonas species.

The obtained 16s rRNA sequences from the isolate were edited using the bioinformatics and algorithm trace edite. The phylogenetic placement of the 16s of the bacterial isolates revealed that the 16s of the isolates were placed in Pseudomonas spp and revealed a close relatedness to pseudomonas aeruginosa. (Figure 3).

CONCLUSION

Phenotypic characterization of bacteria involves characterizing their observable trait, such as morphology, growth characteristics and metabolic activities of the bacteria. Examples of some commonly used phenotypic method are; morphology, Gram staining, biochemical test and motility which is less reliable because of human errors in interpreting the biochemical results while molecular identification and characterization of bacteria which involves the use of molecular techniques to analyze their genetic material, primarily, deoxyribonucleic acid (DNA), proved to be a superior method, henceforth, molecular techniques are advised for prompt diagnosis. Thus, it is worth recommending that the Government provide molecular diagnostic tools and equipment in the health care systems to help in accurate diagnosis and identification of bacteria and also fund the training of relevant scientists on requisite molecular techniques.

Competing Interests:

The authors declare that the research was conducted without any commercial or financial relationships that could potentially create a conflict of interest.

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REFERENCES

1. Aftab S, Tank MM, Siddique MA, Yusuf MA. Clinical and Microbiological Aspect of Wound Infection: *Bangladesh J. Inf. Dis*. 2014;1(2):32-37.
2. Siddiqui AR, Bernstein JM. Chronic Wound Infection: Facts and Controversies. *Clin. in Derm.* 2010;28(5):519-526.
3. Peix A, Ramirez-Bahena MH, Velazquez H. Historical evolution and current status of the taxonomy of genus Pseudomonas: *Inf. Genet Evol.* 2009;9(6):1132-47.
4. Lamont IL, Martin LW. Identification and characterization of novel pyoverdine synthesis genes in Pseudomonas aeruginosa: *Microbiology*. 2003;149(4):833-42.
5. Rakesh S, Anand TS, Payal G, Pranjal K. A Prospective, Randomized, Double-Blind Study of Coblation versus Dissection Tonsillectomy in Adult Patients: *Indian J Otolaryngol Head Neck Surg*. 2012;64(3):290-4.
6. Yamane Taro. Statistics: an introductory analysis. *New York, Harper & Row*. 1973: PP 12.
7. Zymo Research Quick-DNA fungal /bacterial miniprep kits [Internet] [Cited 2025 Mar 9]. Available from: https://zymoresearch.eu/collections/quick-dna-fungal-bacterial-kits
8. Thermo Fisher Scientific. PureLink® Genomic DNA Mini Kit User Guide [Internet] [cited 2025 Mar 9]. Available from: https://assets.thermofisher.com/TFS-Assets/LSG/manuals/cms_081527.pdf
9. Atiyeh BS, Costagliola M, Hayek SN, Dibo SA. Effect of silver on burn wound infection control and healing: *Rev. of the lit. burns* 2007;33(2):139-48.
10. Saitou N, Nei M. The neighbor-joining method: A new method for reconstructing phylogenetic trees: *Mol. Biol. and Evol.* 1987; 4:406-425.
11. Felsenstein J. Confidence limits on phylogenies: an approach using the bootstrap. *Evolution*. 1985;39(4):783-79.
12. Jukes TH, Cantor CR. Evolution of protein molecules: In Munro HN, editor, Mammalian Protein Metabolism, *Acad. Press, New York*. 1969; pp. 2:1-132.
13. Jing JLJ, Pei Yi T, Bose RJ, McCarthy JR, Tharmalingam N, Madheswaran T. Hand sanitizers: a review on formulation aspects, adverse effects, and regulations: *Intern. J. of Environ. Res. Pub. health*. 2020;17(9):33-26.
14. Public Health England. Identification of Pseudomonas species and other Non-Glucose Fermenters: *UK Stands. for Microb. Investigs*. 2015; 17:3.
15. Dias LD, Duarte LS, Naves PL, Napolitano HB, Bagnato VS. Self-Disinfecting Urethral Catheter to Overcome Urinary Infections: From Antimicrobial Photodynamic Action to Antibacterial Biochemical Entities. *Microorganisms*. 2022;10(12):2484.

Original Article

KNOWLEDGE AND PRACTICE OF EXCLUSIVE BREASTFEEDING IN SAMPOU/KALAMA WARD, KOLOKUMA/OPOKUMA LOCAL GOVERNMENT AREA, BAYELSA STATE

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Abstract

Background: Despite strong evidence supporting exclusive breastfeeding (EBF) for the first six months, its global practice remains low. In Nigeria, while breastfeeding is nearly universal, only 17% of infants under six months are exclusively breastfed.

Objective: This study assessed the knowledge and practice of EBF in Sampou community, KOLGA, Bayelsa State.

Materials and Method: A universal sampling technique was used. Data were collected from 261 households with children under five using interviewer-administered questionnaires and analyzed with SPSS version 22.

Results: Among 261 households surveyed, most respondents had poor knowledge of EBF. Only 27.6% of mothers practiced EBF. Key influencing factors included socio-demographic aspects like maternal age and family structure, obstetric factors such as antenatal care (ANC) registration (37.3%), number of ANC visits (10.5%), and hospital delivery (35.3%). Socioeconomic factors, including husband's support (36.9%) and expressing breast milk into bottles (64.3%), also impacted EBF rates.

Conclusion: A study on the Primary Health Care (PHC) system in Sampou is needed to assess the efficiency of ANC services, which play a crucial role in educating mothers on EBF. Accessible family planning services are also essential, as having many children contributes to low EBF rates. Additionally, government and NGOs should empower women by improving healthcare, education, and social services in Sampou and Bayelsa State.

Keywords: Exclusive breastfeeding, Knowledge, Practice, Factors

Cite this article: Oranefo DO, Osain PJ, Ramoni AW, Uriel CD, Wodi F, Tuduo TT, et al. Knowledge and Practice of Exclusive Breastfeeding in Sampou/Kalama Ward, Kolokuma/Opokuma Local Government Area, Bayelsa State. Niger Delta J Med Med Res. 2025;4(1):30–41.

INTRODUCTION

Breastfeeding remains the simplest, healthiest and least expensive feeding method that fulfills the infant's needs.[1] Exclusive breastfeeding (EBF) which involves giving breast only and no other liquid except drops or syrup with vitamins, minerals supplements, or medicines, is superior to non-exclusive breastfeeding with a protective effect against both morbidity and mortality.[2] Infants who are exclusively breastfed develop fewer infections, have less severe illnesses and mothers who practice exclusive breastfeeding enjoy the benefit of extended lactation, amenorrhea and have less risk of conditions such as breast and ovarian cancer.[3]

In recognition of the need to protect, promote, and support breastfeeding in our communities, the Federal Ministry of Health and Social Services, in conjunction with UNICEF and WHO, launched the Baby-Friendly Hospital Initiative (BFHI) to protect, promote, and support breastfeeding in Nigeria.[4,5] In August 1990 in the Italian city of Florence the world adopted the Innocenti Declaration. The

Declaration says all women should be enabled to practice exclusive breastfeeding for 4 to 6 months as a global goal for optimal maternal and child health and nutrition.[6]

The prevalence of EBF in the developing world particularly in West and Central Africa is low.[7] In Nigeria, breastfeeding is universal with almost all babies being breastfed. Even though the practice of exclusive breastfeeding is rising, from 17% in 2013 to 29% in 2018, among children younger than six months,[8] the rise is still very slow. It has been discovered that most nursing mothers use infant formula feeds as either a supplement or substitute for breast milk based on the perception that breast milk may not be sufficient for babies despite the high cost of this artificial milk.[9] The age of breastfeeding mothers also affects EBF with teenage mothers and older women less likely to exclusively breastfeed their children.

Therefore, this study is aimed at determining the awareness of the knowledge and practice of exclusive breastfeeding in Sampou community Bayelsa State, Nigeria.

MATERIALS AND METHOD

Study area

The study was carried out in Sampou community. The community is a small rural area in Kolokuma/Opokuma local government area (LGA), Bayelsa State. The LGA has a population of about 175,000 people while the community has a population of 3,422. The community is located between latitude 5.1435 N and longitude 6.3525E and is indigenous to the Ijaw people who are known for fishing, farming, canoe-carving, and palm oil production. The community is also the location for final year medical students' rural posting. It has a health facility which trains the students in primary health care.

Study design

The study design was a descriptive cross-sectional study. Information on the knowledge and practice of exclusive breastfeeding was obtained by administering questionnaires to a sample of individuals in the community. The questionnaire was interviewer-administered.

Study duration

Data collection for the study lasted for a month.

Study population

The study population was resident women of Sampou community within the reproductive age of 15 years to 49 years.

Inclusion criteria and exclusion criteria

The study included households with children less than 5 years of age. The study excluded mothers who have never breastfed and mothers who were temporary visitors to the community.

Sample size

The study was carried out among all households with children less than 5 years of age. The total number of households with children less than 5 years of age in the community was 261. This was used as the sample size for the study.

Sampling technique

A Universal Sampling Technique was used. All households with children less than 5 years of age were selected for the study. One respondent was selected from each household.

Data collection

The tool that was used for data collection was a structured interviewer questionnaire. Questions were developed based on the objectives and the questionnaire was divided into four sections:

Section A: Bio-data

Section B: Information on the knowledge of exclusive breastfeeding

Section C: Information on the practice of exclusive breastfeeding

Section D: Information on factors influencing the practice of exclusive breastfeeding

All six members of the group were actively involved in the distribution of the questionnaires.

Data analysis

Data from the questionnaire were cleaned, entered into a spreadsheet, and analyzed using the IBM SPSS Statistics software (version 22 for Windows). Frequency and percentage were used to represent categorical data. A chi-squared test was conducted to examine the association between sociodemographic factors, obstetric factors, and socioeconomic factors with the practice of exclusive breastfeeding (EBF). Statistical significance was set at a 95% confidence interval, with P = 0.05.

Ethical consideration

Ethical approval was obtained from the Niger Delta University Teaching Hospital Research Ethics Committee. A community entry permit was obtained from the community. Informed consent was obtained from the study participants after explaining the purpose of the study and the right to withdraw from it if so desired. The respondents were assured of confidentiality.

RESULTS

The total number of questionnaires administered was 261. The response rate was 100% as all 261 questionnaires administered were returned completed. Tables and pie charts were used to represent the results from the data collected.

Table 1 shows majority of the women were aged between 31—40 years (39.1%), had secondary level of education (53.6%), were Christians by religion (97.3%), Farmers by occupation (53.6%), most were married/cohabiting (89.7%), lived in New Layout Compound (51.0%), and were Bayelsans (75.9%).

Figure 1 showed that a greater percentage of the respondents had poor knowledge on EBF, a few had fair knowledge while some had good knowledge.

Table 3 showed that majority of the women didn't practice EBF. Just a low percentage did. Majority breastfed for 6 months (35.2%), commenced breastfeeding immediately after birth (40.6%), fed with first breast milk (67.4%), breastfed 8 times daily (33.0%), added water to breast milk in the first 6 months of life (71.3%).

Table 4 showed that the age of women (χ^2= 8.64; P=0.013) and the compound a woman belonged to (χ^2 = 17.09; p=0.009) were the only socio-demographic characteristics significantly related to exclusive breastfeeding practice in Sampou. The level of education, religion and marital status were not related to exclusive breastfeeding practice in the community. Furthermore, women aged 31 – 40 years were found to be 2 times more likely to practice exclusive breastfeeding (OR – 2.81; p=0.005) when compared to their counterpart who were aged 41 – 50 years of age.

Table 1: Socio-demographic characteristics of households with under-five children in Sampou

Characteristics	Frequency N = 261	Percent (%)
Age Group		
16 – 30 years	96	36.8
31 – 40 years	102	39.1
>40 years	63	24.1
Level of Education		
None	18	6.9
Primary	67	25.7
Secondary	140	53.6
Tertiary	36	13.8
Religion		
Christian	254	97.3

Muslim	3	1.1
African Traditional Religion	4	1.5
Occupation		
Farmer	140	53.6
Civil Servant	19	7.3
Trader	46	17.6
Artisan	31	11.9
Others	25	9.6
New Marital Status		
Single	17	6.5
Married/Cohabit	234	89.7
Widowed/ Separated	10	3.8
Compound Name		
Ebabawari	37	14.2
Ebenepele	13	5.0
Ezonwari	15	5.7
Esedani	16	6.1
Kalamaowei	54	20.7
New layout	81	31.0
Kalama	45	17.2
State		
Bayelsa	198	75.9
Others	63	24.1

Table 2: Response pattern to statements assessing knowledge of exclusive breastfeeding among residents of Sampou

Characteristics	Responses – Frequency N = 261 (%)		
	True	**False**	**Non-response**
EBF means giving a baby no other food or drink including no water except breast milk from birth to 6 months.	222 (85.1)	28 (10.7)	11 (4.2)
Breastfeeding is started within 30 minutes to 1 hour after birth of the baby.	185 (70.9)	63 (24.1)	13 (5.0)
Breast milk only is sufficient for the baby in the first 6 months of life.	185(70.9)	65 (24.9)	11 (4.2)
EBF prevents diarrhea and pneumonia in children.	190 (72.8)	55 (21.1)	16 (6.1)
EBF is a method of preventing pregnancy.	158 (60.5)	87 (33.3)	16 (6.1)
EBF increases mother infant bonding.	236 (90.4)	12 (4.6)	13 (5.0)
EBF is cost effective.	228 (87.4)	18 (6.9)	15 (5.7)

Breast milk is more easily digested than formula.	186 (71.3)	58 (22.2)	17 (6.5)
Pumped breast milk can be stored up at room temperature up to 8 hours.	77 (29.5)	161 (61.7)	23 (8.8)
Breast milk supply can be sustained by having good nutrition/eating well.	233 (89.3)	14 (5.4)	14 (5.4)

EBF – Exclusive Breast feeding. The mean knowledge score about exclusive breastfeeding among respondents was 15.2 points with a standard deviation of 3.0.

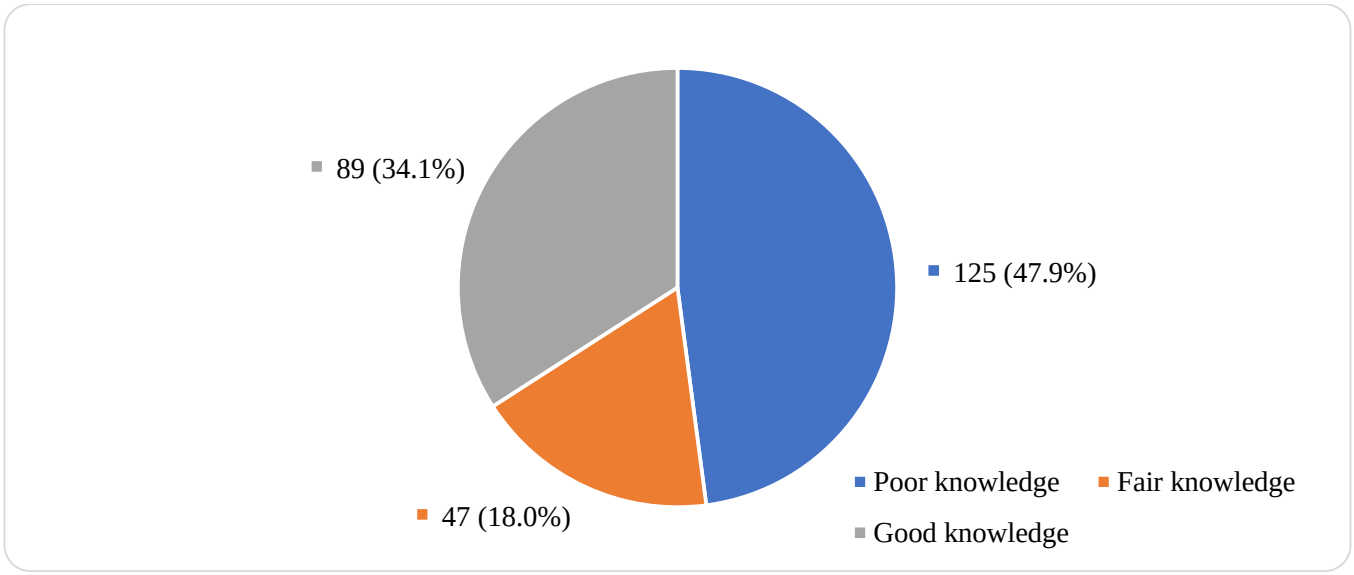

Figure 1: Pie chart showing the percentage of women with poor, fair and good knowledge on EBF.

Table 3: Practice of Exclusive breastfeeding among mothers in Sampou community

Characteristics	Frequency N = 261 (%)
Duration of Exclusive Breastfeeding	
No exclusive breastfeeding	81 (31.0)
2 months	21 (8.0)
4 months	24 (9.2)
6 months	92 (35.2)
>6months	43 (16.5)
Commencement of breastfeeding	
Immediately after birth	106 (40.6)
30 minutes after birth	46 (17.6)
1 hour after birth	29 (11.1)
2 hours after birth	18 (6.9)
>2 hours after birth	62 (23.8)

Handling of first breast milk	
Discard	56 (21.5)
Feed	176 (67.4)
No response	29 (11.1)
Number of times child was breastfed daily	
4 Times	26 (10.0)
6 Times	72 (27.6)
8 Times	86 (33.0)
>8 times	77 (29.5)
Added water to breastmilk in the first 6 months of life	
Yes	186 (71.3)
No	75 (28.7)

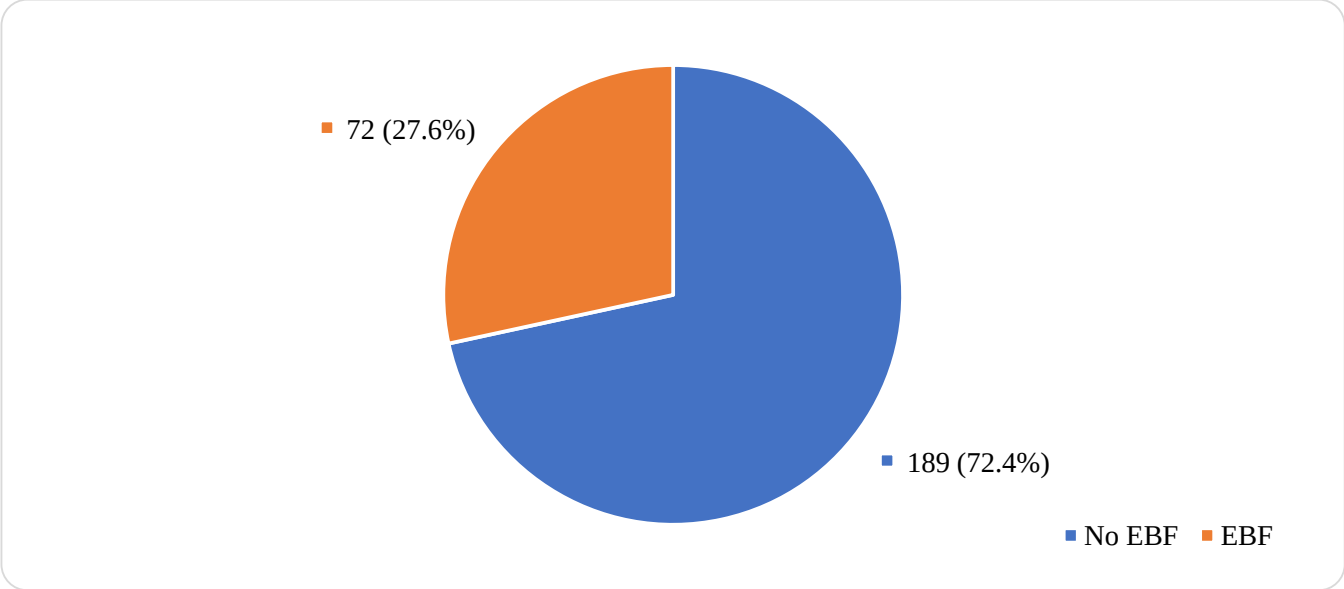

Figure 2: Pie chart showing the prevalence of exclusive breastfeeding among mothers in Sampou community.

Table 4: Socio-demographic factors and the practice of exclusive breastfeeding among mothers in Sampou

Characteristics	Exclusive breastfeeding		Chi-square (pValue)	OR (95%CI)	pValue
	Yes	No			
Age Group					
16 – 30 years	23 (23.9)	73 (76.1)	8.64 (0.013)	1.49 (0.63 – 3.69)	0.330
31 – 40 years	38 (37.3)	64 (62.7)		2.81 (1.25 – 6.67)	0.005*
41 – 50 years	11 (17.5)	52 (82.5)		1	
Level of Education					
None	2 (11.1)	16 (88.9)	3.91 (0.271)	1	
Primary	16 (23.9)	51 (76.1)		2.51 (0.52 – 12.10)	0.252
Secondary	42 (30.0)	98 (70.0)		3.42 (0.75 – 15.57)	0.111
Tertiary	12 (33.3)	24 (66.7)		4.00 (0.78 – 20.31)	0.095
Religion					
Christian	69 (27.2)	185 (72.8)	5.67 (0.059)	1	
Muslim	0 (0.0)	3 (100.0)			
ATR	3 (75.0)	1 (25.0)		8.04 (0.82 – 78.63)	0.730
New Marital Status					
Single	4 (23.5)	13 (76.5)	1.82 (0.403)	2.76 (0.26 – 29.04)	0.444
Married/Cohabit	67 (28.6)	167 (71.4)		3.61 (0.44 – 29.05)	0.396
Widowed/ Separated	1 (10.0)	9 (90.0)		1	
Compound Name					
Ebabawari	5 (13.5)	32 (86.5)	17.09 (0.009)	1	
Ebenepele	4 (30.8)	9 (69.2)		2.84 (0.62 – 12.85)	0.174
Ezonwari	1 (6.7)	14 (93.3)		0.45 (0.04 – 4.28)	0.493
Esedani	7 (43.8)	9 (56.3)		4.97 (1.27 – 19.49)	0.021
Kalamaowei	17 (31.5)	37 (68.5)		2.94 (0.97 – 8.86)	0.055
New layout	18 (22.2)	63 (77.8)		1.82 (0.62 – 5.37)	0.273
Kalama	20 (44.4)	25 (55.6)		5.12 (1.68 – 15.55)	0.004*
No of Children					
1 – 2 children	29 (33.0)	59 (67.0)	4.13 (0.127)	1.96 (0.99 – 3.88)	0.131
3 – 4 Children	25 (30.1)	58 (69.9)		1.72 (0.85 – 3.46)	0.052
≥5 Children	18 (20.0)	72 (80.0)		1	

Table 5: Obstetric factors and socio-economic factors related to exclusive breastfeeding among mothers in Sampou

Characteristics	Exclusive breastfeeding		Chi-square (pValue)	OR (95%CI)	pValue
	Yes	No			
Registered for Antenatal					
Yes	66 (37.3)	111 (62.7)	25.91 (0.001)	7.73 (3.19 – 18.71)	0.001
No	6 (7.1)	78 (92.9)		1	
Number of ANC visit					
No ANC visit	10 (10.5)	85 (89.5)	32.57 (0.001)	1	
4 visits	14 (22.6)	48 (77.4)		2.47 (1.02 – 6.00)	0.044
6vistis	48 (46.2)	56 (53.8)		7.28 (3.40 – 15.58)	0.001
Smoke during pregnancy					
Yes	1 (50.0)	1 (50.0)	0.51 (0.477)	2.64 (0.16 – 42.90)	0.493
No	71 (27.4)	188 (72.6)		1	
Household Income					
10,000 – 49,000	53 (28.3)	134 (71.7)	2.55 (0.466)	1	
50,000 – 99,000	14 (23.3)	46 (76.7)		0.76 (0.39 – 1.51)	1.515
100,000 – 149,000	5 (41.7)	7 (58.3)		1.80 (0.54 – 5.94)	5.942
>200,000	0 (0.0)	2 (100.0)			
Husband support Breastfeeding					
Yes	58 (36.9)	99 (63.1)	17.27 (0.001)	3.76 (1.96 – 7.21)	0.000
No	14 (13.5)	90 (86.5)		1	
Belief against Breastfeeding					
Yes	4 (16.7)	20 (83.3)	1.58 (20.9)	0.49 (0.16 – 1.50)	0.217
No	68 (28.7)	169 (71.3)		1	

Express breast milk in a feeding bottle					
Yes	9 (64.3)	5 (35.7)	9.97 (0.002)	5.25 (1.69 – 16.27)	0.004
No	63 (25.5)	184 (74.5)		1	
Place of Delivery					
Hospital	41 (35.3)	75 (64.7)	13.39 (0.001)	1	
TBA	15 (14.9)	86 (85.1)		0.31 (0.16 – 0.62)	0.001
Home	16 (36.4)	28 (63.6)		1.04 (0.50 – 2.15)	0.904

Table 5 showed that Obstetrics factors; Registration for ANC (χ^2= 25.91; p=0.001), number of ANC visits (χ^2= 32.57; p=0.001), and place of delivery (χ^2= 13.39; p=0.001) were significantly related to EBF. Socioeconomic factors; Husband support (χ^2= 17.27; p=0.001) of EBF and expressing breast milk in feeding bottles (χ^2= 9.97; p=0.002) were significantly related to EBF.

DISCUSSION

From the study conducted, it was found that the community had poor knowledge of Exclusive Breastfeeding (EBF) compared to a study conducted in a tertiary health facility in Enugu, South Eastern Nigeria. In that study, 95.3% of the women demonstrated good knowledge of EBF.[10] The high percentage observed in that study could be attributed to the setting—a tertiary health facility—where mothers are likely to have better health-seeking behaviors and more access to information on EBF.[11] Similarly, when compared to a study involving mothers from all banks in Mainland Lagos State, where 94% of participants had sound knowledge of exclusive breastfeeding, the higher percentage may also be explained by the urban setting, where mothers are generally more exposed to healthcare information.[12] In contrast, the current study, carried out in the Sampou community, suggests that women in Nnewi and Lagos have better access to healthcare services, education, and information about EBF. These factors may have contributed to their higher knowledge levels compared to the women in Sampou.

Further comparison with a study conducted among 350 mothers in Mizan Aman Town, South West Ethiopia, revealed that only 34.7% of the mothers were knowledgeable about EBF.[13] This finding suggests that while EBF is not an unfamiliar practice among the study population, in-depth knowledge of the concept is lacking. A similar lack of detailed knowledge was observed in the Sampou community. This is consistent with another study in Chamo Town, northern Nigeria, where only 40.5% of mothers had sufficient knowledge about EBF.[14] One possible explanation for these similar knowledge patterns is the low level of education in these regions. In many low-income countries, women's education levels tend to be low, and this can make it difficult for women to fully understand the concept of exclusive breastfeeding and its benefits.[15] Concepts like micro- and macronutrients and their importance in child development may be beyond the understanding of women who are primarily concerned with ensuring their babies are healthy and alive, without a deeper understanding of nutritional factors.[16]

In terms of EBF practice, the study showed that only 27.6% of the Sampou community practiced exclusive breastfeeding, while 72.4% did not. This indicates poor practice of EBF among the mothers in the Sampou community. In comparison, a study conducted at two teaching hospitals in Ogun State, Nigeria—Babcock University in Ilishan Remo and Olabisi Onabanjo University Teaching Hospital in Sagamu—found that 58.8% of lactating mothers exclusively breastfed their babies for six months.[17] This higher percentage may reflect the fact that the study was conducted in a hospital setting, where women are more likely to attend antenatal clinics and receive comprehensive education about exclusive breastfeeding. The hospital-based nature of the study may explain the higher percentage of exclusively breastfed babies compared to the Sampou community,

where a household survey was conducted. This underscores the importance of antenatal clinic attendance in promoting exclusive breastfeeding.[11]

The comparison between Sampou and a study in Northern Tanzania showed notable similarities. Both studies used the "recall since birth" method, with the Tanzanian study reporting 24.2% EBF, while the Sampou community study reported 27.6%. The similarities between these findings may be attributed to the fact that both communities are in developing nations where healthcare is often underprioritized by governments.[19] Additionally, both communities lack significant investment in female education and access to quality healthcare facilities, which hinders the delivery of information about EBF.[20, 21]

In terms of factors influencing exclusive breastfeeding, the study found that socio-demographic factors (such as age and family), obstetric factors (such as antenatal care registration, number of visits, and place of delivery), and socio-economic factors (such as husband support and the use of feeding bottles for expressed breast milk) were significantly related to EBF. The study revealed that a significant proportion of women across all age groups in Sampou did not practice EBF. Among women aged 15-30 years, a staggering 76.1% did not practice exclusive breastfeeding. Many of these women are young, working, or attending school, and may not have the time or opportunity to breastfeed as they would like to.[22] Similarly, a study in Accra, Ghana showed that EBF rates were lower among young working-class women.[23] Additionally, many women in this age group are unmarried and may lack spousal support.

Women aged 31-40 years had a higher percentage of EBF practice compared to other age groups. This could be because women in this age range are typically more family-oriented, often married, and have spousal support. A study in Turkey found that women who received spousal support during the post-partum period had higher breastfeeding rates compared to those without support.[24] The Sampou study aligns with these findings, showing that married women with spousal support had a higher percentage of EBF practice than their counterparts without such support. Given that childbirth and childcare are complex and demanding, having a supportive spouse likely makes breastfeeding more manageable for these women.[25]

Interestingly, women aged 41-50 had the highest percentage of non-EBF practice. This could be due to older women being more accustomed to the traditional African practice of introducing local infant formulas early.[26]

Registering for antenatal care had a significant impact on EBF practice in Sampou. The study found that women who registered for antenatal care were more likely to practice EBF compared to those who did not. Furthermore, women who completed the full six antenatal visits had higher compliance with EBF than those who had fewer than four visits, and women who did not attend any visits had the lowest rates of EBF practice. These findings are similar to those of a study in Northwest Ethiopia, which showed that women who attended antenatal care were more likely to practice exclusive breastfeeding.[27]

In Sampou, women who gave birth at home or with a Traditional Birth Attendant (TBA) had lower rates of EBF than those who gave birth in a health facility. This may be because women who give birth outside healthcare settings may not have registered for antenatal care, depriving them of essential education on the practice and importance of EBF.[28] This aligns with research in Katsina State, Northwest Nigeria, which found that traditional birth attendants and the place of delivery influenced how women adhered to EBF practices.[29]

A study in Perth, Australia, found that women who expressed breast milk were more likely to breastfeed for up to six months.[30] This aligns with findings from Sampou, where women who expressed breast milk in feeding bottles were more likely to practice EBF. Expressing breast milk allows babies to receive breast milk even when the mother is unavailable, making it easier for mothers to maintain breastfeeding while balancing other responsibilities.[22]

In comparison, a study in Katsina State, North-West Nigeria, showed that factors such as place of delivery, traditional birth attendants, maternal awareness, family support, and health workers all influenced EBF practices.[29] Similarly, a study in Enugu State, South-East Nigeria, found that age (21-30 years), higher levels of

education, antenatal care services, and maternal knowledge of EBF were significant factors influencing EBF practice.[31] In Sampou, however, factors such as education, religion, and marital status were not significantly related to EBF practice, which is consistent with findings from other studies in Nigeria.

CONCLUSION AND RECOMMENDATION

From the study, it was determined that the number of mothers with knowledge of Exclusive Breastfeeding (EBF) was low. This was attributed to the low level of education among the female population in Sampou community.

Furthermore, it was found that the practice of EBF was significantly low. This can be attributed to the lack of education and limited access to quality healthcare facilities. The study also identified several factors contributing to the low knowledge and practice of EBF in Sampou, including inadequate antenatal visits, the presence of traditional birthing practices, and the lack of spousal and family support for mothers in the community.

RECOMMENDATIONS

1. We recommend conducting a study of the Primary Health Care (PHC) delivery system in Sampou community. This study will help collect sufficient data to determine whether the health center runs an antenatal clinic regularly and efficiently. Since antenatal services play a crucial role in educating expectant mothers about the importance of exclusive breastfeeding, assessing this service is essential.
2. Implement community health mobilization and educational programs on the importance of exclusive breastfeeding.
3. Family planning services should be made accessible to members of the community. A high number of children has been identified as a contributing factor to the low practice of exclusive breastfeeding in Sampou community.
4. Both government and non-governmental organizations should work towards empowering women in Sampou community and Bayelsa State at large to access better healthcare, education, and social services.

CONFLICT OF INTEREST: Non to declare

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REFERENCE

1. Kramer MS, Kakuma R. Optimal duration of exclusive breastfeeding. *Cochrane Database Syst Rev*. 2012;(8).
2. Motee A, Jeewon R. Importance of exclusive breastfeeding and complementary feeding among infants. *Curr Res Nutr Food Sci.* 2014;2(2). Available from: http://www.foodandnutritionjournal.org/?p=814.
3. Labbok MH, Wardlaw T, Blanc A, Clark D, Terreri N. Trends in exclusive breastfeeding: findings from the 1990s. *J Hum Lact*. 2006;22(3):272–6.
4. Pérez-Escamilla R. Evidence-based breastfeeding promotion: the Baby-Friendly Hospital Initiative. *J Nutr*. 2007;137(2):484–7.
5. WHO/UNICEF. The Innocenti Declaration on protection, promotion, and support of breastfeeding: policy makers meeting. Breastfeeding in the 1990s: A Global Initiative, Florence, Italy, 1–7 August 1990.
6. Cai X, Wardlaw T, Brown DW. Global trends in exclusive breastfeeding. *Int Breastfeed J*. 2012;7:12.
7. National Population Commission (NPC) (Nigeria), ICF. Nigeria Demographic and Health Survey 2018. Abuja, Nigeria and Rockville, Maryland, USA: NPC and ICF; 2019.
8. Mensah KA, Acheampong E, Anokye FO, et al. Factors influencing the practice of exclusive breastfeeding among nursing mothers in a peri-urban district of Ghana. *BMC Res Notes*. 2017;10:466.
9. Wickes IG. A history of infant feeding. I. Primitive peoples; ancient works; Renaissance writers. *Arch Dis Child*. 1953;28(138):151–8.
10. Eke C, Okafor V, Tagbo B, Onyire N, Ukekwe F, Muoneke U. Predictors of exclusive breastfeeding duration among mothers attending immunization clinic in a tertiary health facility in Enugu, Nigeria. *Open J Pediatr*. 2019;9:62–74.

11. Tang K, Wang H, Tan SH, et al. Association between maternal education and breastfeeding practices in China: a population-based cross-sectional study. *BMJ Open.* 2019;9.
12. Osibogun OO, Olufunlayo TF, Oyibo SO. Knowledge, attitude, and support for exclusive breastfeeding among bankers in Mainland Local Government in Lagos State, Nigeria. *Int Breastfeed J*. 2018;13:38.
13. Hashim T, Mgongo M, Uriyo J, Jeremia D, Stray-Pedersen B, Msuya S. Exclusive breastfeeding up to six months is very rare in Tanzania: A cohort study of infant feeding practices in Kilimanjaro area. *Sci J Public Health.* 2015;3(2):251–8.
14. Sabo A, Abba J, Ibrahim M, Alzoubi M, Al-Mugheed K, Alsenany S, Farghaly Abdelaliem S. Knowledge, attitude, and practice of exclusive breastfeeding among mothers of childbearing age. *Front Public Health.* 2023;11.
15. Smith ER, Hurt L, Chowdhury R, Sinha B, Fawzi W, et al. Delayed breastfeeding initiation and infant survival: a systematic review and meta-analysis. *PLOS ONE.* 2017;12(7).
16. Admasu J, Atomsa G, Bassore D, Feleke F**.** Effect of maternal nutrition education on early initiation and exclusive breastfeeding practices in South Ethiopia: A cluster randomised control trial. *J Nutr Sci*. 2022;11:1–13.
17. Akadri A, Odelola O. Breastfeeding practices among mothers in Southwest Nigeria. *Ethiop J Health Sci*. 2020;30(5):697–706.
18. Henry NC, Anthony CI, Chukwuma BD, Kenechi AU. The practice of exclusive breastfeeding and its sociodemographic determinants among nursing mothers at a tertiary healthcare institution in Southeast Nigeria. *Open J Prev Med*. 2017;7(4).
19. Apeagyei AE, Lidral-Porter B, Patel N, et al. Financing health in sub-Saharan Africa 1990–2050: donor dependence and expected domestic health spending. *PLOS Glob Public Health*. 2024;4(8).
20. Diamond G. Social norms and girls' education: a study of eight sub-Saharan African countries. GCI Policy Paper. United Nations Girls' Education Initiative (UNGEI), New York; 2022.
21. Venkatachalapathi S, Mannu A, Subramaniyam K. Uncovering the barriers to exclusive breastfeeding for mothers in a rural setting in southern India. *J Pediatr Res.* 2021;8(2):181–7.
22. Sarimin DS, Pasambo Y, Desyani NLJ. Digital mentoring on expressing breast milk for working mothers. *Br J Midwifery*. 2024;32(6):296.
23. Abekah-Nkrumah G, Antwi MY, Nkrumah J, et al. Examining working mothers' experience of exclusive breastfeeding in Ghana. *Int Breastfeed J.* 2020;15:56.
24. Durmazoğlu G, Çiçek Ö, Okumuş H. The effect of spousal support perceived by mothers on breastfeeding in the postpartum period. *Turk Arch Pediatr*. 2021;56(1):57–61.
25. Ayla A, Selda Y. The role of positive family relationships and spousal support in breastfeeding self-efficacy and success of mothers in the early postpartum period. *Prog Nutr*. 2022;24(1).
26. Wanjohi M, Griffiths P, Wekesah F, et al. Sociocultural factors influencing breastfeeding practices in two slums in Nairobi, Kenya. *Int Breastfeed J*. 2016;12:5.
27. Biks GA, Tariku A, Tessema GA. Effects of antenatal care and institutional delivery on exclusive breastfeeding practice in northwest Ethiopia: a nested case–control study. *Int Breastfeed J*. 2015;10:30.
28. Gebeyehu NA, Tegegne KD, Shewangashaw NE, et al. Knowledge, attitude, practice, and determinants of exclusive breastfeeding among women in Ethiopia: systematic review and meta-analysis. *Public Health Pract.* 2023;5:100373.
29. Tadele N, Habta F, Akmel D, DegesE. Knowledge, attitude, and practice towards exclusive breastfeeding among lactating mothers, MizanAman Town, Southwestern Ethiopia: a descriptive cross-sectional study. *J Health Educ Res Dev*. 2016;3:149.
30. Win NN, Binns CW, Zhao Y, et al. Breastfeeding duration in mothers who express breast milk: a cohort study. *Int Breastfeed J*. 2006;1:28.
31. Ihudiebube-Splendor CN, Okafor CB, Anarado AN, Jisieike-Onuigbo NN, Chinweuba AU, Nwaneri AC, Arinze JC, Chikeme PC. Exclusive breastfeeding knowledge, intention to practice, and predictors among primiparous women in Enugu, South-East Nigeria. *J Pregnancy.* 2019;2019:9832075.