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PREVALENCE, RISK FACTORS AND COMMUNITY AWARENESS OF HELICOBACTER PYLORI INFECTION AMONG PEPTIC ULCER PATIENTS ACCESSING COMMUNITY PHARMACY CARE IN YENAGOA METROPOLIS, BAYELSA STATE, NIGERIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Helicobacter **Background:** Helicobacter pylori is a World Health Organization Group I carcinogen and the dominant aetiological agent of peptic ulcer disease (PUD), yet community-level epidemiological data from Nigeria's Niger Delta region remain limited. This study determined the prevalence of H. pylori infection, identified associated risk factors, and characterised community awareness and treatment-seeking behaviour among PUD patients accessing community pharmacy care in Yenagoa metropolis, Bayelsa State, Nigeria. **Methods:** A descriptive analytical cross-sectional study was conducted in randomly selected community pharmacies across Yenagoa metropolis. A structured interviewer-assisted questionnaire was administered to 428 adults with self-reported PUD symptoms; 412 (96.3%) returned complete responses, of whom 183 met the case definition for PUD and constitute the analytical population. Data were analysed in IBM SPSS Statistics version 26.0 using descriptive statistics, chi-square tests of association, and binary logistic regression at $\alpha = 0.05$. **Results:** The prevalence of H. pylori infection among PUD respondents was 25.7% (95% CI: 19.4–32.0). The mean age was 36.6 ± 0.54 years; 59.7% were female. Crowded living conditions (34.4%), consumption of contaminated food or water (30.0%), and lack of clean water or sanitation (22.4%) were the dominant environmental risk factors and collectively achieved statistical significance (χ^2 test, $p = 0.001$). Community awareness of H. pylori was profoundly limited: 46.4% of respondents had never heard of the organism prior to the study, and only 18.0% considered themselves substantively aware. Awareness was statistically associated with perceived community prevalence ($p = 0.013$). Treatment-seeking was substantially delayed, with 30.1% of respondents waiting months before consultation and 16.9% never having sought care ($p = 0.003$). **Conclusion:** The 25.7% prevalence, while lower than historical Nigerian estimates, overlays a profound community awareness deficit and a clearly defined set of environmental and socio-economic risk factors that are amenable to intersectoral public health intervention. The findings argue for the integration of structured community sensitisation, low-cost point-of-care H. pylori diagnostic testing in community pharmacy practice, and continued investment in water and sanitation infrastructure as the cornerstones of H. pylori control in Bayelsa State.

KEYWORDS: Helicobacter pylori; peptic ulcer disease; prevalence; risk factors; wareness; community pharmacy; Nigeria; Bayelsa State.

1. INTRODUCTION

Peptic ulcer disease (PUD) remains a clinically and economically consequential gastrointestinal disorder, affecting approximately 10% of the global population at some point during life and contributing meaningfully to morbidity and mortality in low- and middle-income countries (Lanas & Chan, 2017). Among the established aetiological agents of PUD, Helicobacter pylori — the spiral, microaerophilic Gram-negative bacterium first isolated by Marshall and Warren (1984) — stands as the single most important. Following its designation as a Group I (definite) human carcinogen by the International Agency for Research on Cancer in 1994, H. pylori has been causally implicated not only in chronic active gastritis and peptic ulceration but also in mucosa-associated lymphoid tissue (MALT) lymphoma and non-cardia gastric adenocarcinoma, making accurate identification and effective eradication a globally recognised public health priority (IARC, 1994; Wroblewski, Peek, & Wilson, 2010).

The most recent global meta-analytic estimate places the worldwide prevalence of H. pylori infection at approximately 44%, with sub-Saharan Africa emerging as the most heavily affected region with a pooled prevalence of 79.1% (Hooi et al., 2017). Across Nigeria, hospital-based and laboratory-based studies have historically reported prevalence figures of 60–92% among symptomatic adults (Nwokediuko et al., 2012; Aje et al., 2010; Oluwasola et al., 2010), reflecting a substantial population burden driven principally by faecal-oral and oral-oral transmission within environments of socioeconomic deprivation (Brown, 2000; Eusebi, Zagari, & Bazzoli, 2014). However, prevalence estimates can vary widely with diagnostic method, case definition, and study setting; emerging African evidence suggests that prevalence may be declining as sanitation improves and antibiotic exposure increases, particularly among community-based populations (Smith et al., 2022; Onyenekwe, Onuoha, & Iwuagwu, 2024).

Bayelsa State, located in the South-South geopolitical zone of Nigeria, is characterised by a largely riverine ecology, persistent challenges in potable water access, and a community pharmacy sector that absorbs a substantial proportion of patients presenting with upper gastrointestinal symptoms (Erhun & Erhun, 2002; Pharmacists Council of Nigeria, 2018). Community pharmacies in Nigeria function as the de facto first point of contact for individuals with foregut symptoms, with pharmacists routinely dispensing eradication regimens and providing front-line patient counselling (Auta et al., 2019; Berenguer, La Casa, de la Matta, & Martín-Calero, 2013). Despite this central role, no published study to date has systematically characterised H. pylori prevalence, the distribution of associated risk factors, or the level of community awareness among PUD patients accessing community pharmacy care in Yenagoa metropolis — an evidence gap of direct consequence for the design of locally appropriate clinical and public health interventions.

This study was therefore designed to determine the prevalence of H. pylori infection, to identify the principal risk factors associated with infection status, and to characterise community awareness and treatment-seeking behaviour among PUD patients accessing community pharmacy care in Yenagoa metropolis, Bayelsa State.

2. MATERIALS AND METHODS

2.1 Study design and setting

A descriptive, analytical, cross-sectional study was conducted between [Month/Year] and [Month/Year] in community pharmacies located across Yenagoa metropolis, the administrative capital of Bayelsa State, Nigeria. Yenagoa is the largest urban centre in the state, with a heterogeneous population and a substantial network of registered community pharmacies serving as primary access points for the management of common gastrointestinal complaints.

2.2 Study population and eligibility

The target population comprised adults aged ≥ 18 years presenting at participating community pharmacies in Yenagoa with self-reported symptoms suggestive of PUD (epigastric pain, dyspepsia, nausea, vomiting, bloating, or weight loss of at least four weeks' duration). Eligible participants were those willing to provide written informed consent and able to communicate in English or Pidgin English. Exclusion criteria included gastrointestinal symptoms attributable to non-PUD conditions confirmed by a physician, acute critical illness at the time of approach, prior participation in this study, and being a pharmacy staff member.

2.3 Sample size and sampling

Sample size was determined using the Cochran (1977) formula for cross-sectional studies estimating a single proportion, with Z = 1.96 (95% confidence level), p = 0.50 (used to maximise sample size in the absence of definitive prior local data), and absolute precision d = 0.05, yielding a minimum requirement of 385 participants. A 10% non-response allowance was added, generating a target sample of 428 (Lwanga & Lemeshow, 1991). A multi-stage probability sampling strategy was employed: in stage one, the operational frame of registered community pharmacies in Yenagoa metropolis was obtained from the Pharmacists Council of Nigeria zonal office and the Bayelsa State Board of the Association of Community Pharmacists of Nigeria, and a sample of pharmacies was selected purposively for spatial diversity. In stage

two, the total sample of 428 was proportionally allocated across the selected pharmacies based on monthly PUD-related patient volume. In stage three, consecutive eligible patients were recruited at each pharmacy until the allocated quota was achieved.

2.4 Data collection instrument

Data were collected using a structured, interviewer-assisted questionnaire developed by the investigators following review of the published literature and validated for the present study by a panel of three experts in clinical pharmacy, public health, and gastroenterology. Content validity was assessed using Lynn's (1986) procedure, with all retained items achieving an item-level content validity index of ≥ 0.80. Internal-consistency reliability was tested in a pilot study of 30 respondents at a non-participating pharmacy, yielding a Cronbach's alpha of 0.81 (Cronbach, 1951; Nunnally, 1978). The instrument captured five domains: socio-demographic profile; symptom presentation and PUD history; H. pylori awareness and infection status (self-reported on the basis of any prior diagnostic test result); environmental and behavioural risk factors; and treatment-seeking behaviour.

2.5 Data management and statistical analysis

Completed questionnaires were reviewed for completeness, double-entered into IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA), and a 10% random sample manually verified against original forms (Barchard & Verenikina, 2013). Continuous variables were summarised as means with standard deviations; categorical variables as frequencies and percentages. Associations between categorical variables were tested using the chi-square or Fisher's exact tests, and continuous variables using Student's t-test or Mann-Whitney U test depending on distribution. Predictors of H. pylori positivity were examined using binary logistic regression, retaining variables with $p < 0.20$ on bivariate analysis. Statistical significance was set at $p < 0.05$, with 95% confidence intervals reported throughout.

2.6 Ethical considerations

Ethical approval was obtained from the [Institutional Health Research Ethics Committee, Approval Number XXX/YY/ZZZZ] and the Bayelsa State Ministry of Health Research Ethics Committee. Written informed consent was obtained from every participant. Data were de-identified at the point of entry and stored on password-protected devices accessible only to the research team. The study was conducted in accordance with the Declaration of Helsinki.

3. RESULTS

3.1 Response rate and socio-demographic profile

Of the 428 distributed questionnaires, 412 (96.3%) were returned with complete responses — substantially above the 70% threshold commonly regarded as acceptable in community health surveys (Polit & Beck, 2017). Within this sample, 183 respondents met the operational case definition for PUD and form the analytical population for this study. The socio-demographic profile of all 412 respondents is presented in Table 1. The majority were female (59.7%), with a mean age of 36.6 ± 0.54 years and a modal age category of 35–44 years (32.8%). Secondary education predominated (32.5%); 40.8% held postgraduate qualifications. Self-employment was the most common occupational category (37.4%), and 50.2% were married. Smoking prevalence was low (9.0% current smokers), while regular alcohol consumption was reported by 23.3%.

Table 1: Socio-demographic profile of study respondents (n = 412).

Characteristic	n	%	Mean (SD) / Note
Sex			
Female	246	59.7	
Male	152	36.9	
Did not disclose	14	3.4	
Age (years)			
18–24	36	8.7	Mean 36.6 ± 0.54
25–34	95	23.1	
35–44	135	32.8	
45–54	90	21.8	
≥ 55	56	13.6	

Characteristic	n	%	Mean (SD) / Note
Highest Education			
No formal/Primary	44	10.7	
Secondary	134	32.5	
Tertiary (Bachelor)	65	15.8	
Master's	103	25.0	
Doctorate	65	15.8	
Employment			
Self-employed	154	37.4	
Full-time employed	90	21.8	
Part-time employed	78	18.9	
Unemployed	55	13.4	
Retired/Student	35	8.5	
Marital Status			
Married	207	50.2	
Single	138	33.5	
Divorced/Separated	57	13.8	
Widowed	10	2.4	
Lifestyle			
Current smoker	37	9.0	
Never smoker	358	86.9	
Regular alcohol use	96	23.3	

3.2 Prevalence of H. pylori infection

Of the 183 respondents with PUD, 47 (25.7%; 95% CI: 19.4–32.0) reported documented evidence of H. pylori infection. This prevalence is substantially lower than the 60–92% figures reported in historical Nigerian hospital-based studies and may reflect a combination of methodological factors — including the use of self-reported diagnostic history rather than direct serological or breath-test confirmation, prior empirical antibiotic exposure potentially suppressing bacterial load, and the cross-sectional capture of infection status at a single point in time (Malfertheiner et al., 2017; Hooi et al., 2017). Nonetheless, the 25.7% figure represents a clinically meaningful burden and underscores the need for systematic screening protocols in this setting.

3.3 Symptom presentation and clinical correlation

Among H. pylori-positive PUD respondents, nausea (25.1%) and vomiting (25.1%) were the most frequently reported symptoms, followed by bloating (17.5%), weight loss (15.8%), and abdominal pain (14.8%); only 1.6% reported no symptoms. The chi-square test for symptom-status correlation yielded $p = 0.094$, indicating no statistically significant association between specific symptom patterns and H. pylori status — a finding consistent with the established literature on the symptomatic heterogeneity of H. pylori infection (Graham, 2014). The prominence of emetic symptoms over the classical pain-dominant presentation is noteworthy and supports the case for universal diagnostic testing in symptomatic individuals irrespective of specific symptom constellation (Sugano et al., 2015).

3.4 Risk factors associated with H. pylori infection

Table 2 presents the distribution of self-reported risk factors among H. pylori-positive respondents. Crowded living conditions (34.4%), consumption of contaminated food or water (30.0%), and lack of clean water or sanitation (22.4%) were the most frequently reported exposures, with close interpersonal contact with infected individuals accounting for 12.0% and only 1.1% reporting no identifiable risk factor. The chi-square test for the overall risk-factor distribution was statistically significant ($p = 0.001$), confirming a

meaningful association between environmental and social determinants and H. pylori exposure. These findings are concordant with the established epidemiological literature on faecal-oral and oral-oral transmission pathways for H. pylori in low- and middle-income settings (Brown, 2000; Eusebi et al., 2014; Etukudo, Williams, Ekrikpo, & Inyang, 2018).

Table 2. Distribution of risk factors, treatment-seeking behaviour and community awareness among H. pylori-positive PUD respondents (n = 47).

Variable	n	%	p-value
Risk factor (most prominent reported)			
Crowded living conditions	63	34.4	0.001
Contaminated food/water	55	30.0	
Lack of clean water/sanitation	41	22.4	
Close contact with infected persons	22	12.0	
No identifiable risk factor	2	1.1	
Treatment-seeking behaviour			
Sought care within days of onset	52	28.4	0.003
Sought care within weeks	45	24.6	
Sought care after months	55	30.1	
Never sought care	31	16.9	
Community awareness of H. pylori			
Never heard of H. pylori	85	46.4	0.013
Heard of it without knowledge	26	14.2	
Aware but limited knowledge	39	21.3	
Substantively aware	33	18.0	

3.5 Community awareness of H. pylori

Awareness of H. pylori was profoundly limited: 46.4% of PUD respondents reported never having heard of the organism prior to the study, and a further 14.2% had heard of it without substantive knowledge of its clinical significance or transmission. Only 18.0% considered themselves substantively aware, and an identical proportion regarded H. pylori as 'very common' in their communities. The chi-square test for the association between awareness and perceived community prevalence was statistically significant ($p = 0.013$). These figures, observed even in a relatively well-educated cohort (40.8% with postgraduate qualifications), point to a substantial community-level health literacy deficit that compromises both primary prevention (through behaviour change) and secondary prevention (through timely care-seeking) (Nutbeam, 2000; Aje et al., 2010).

3.6 Treatment-seeking behaviour

Treatment-seeking patterns were notably delayed: while 28.4% of respondents sought care within days of symptom onset and 24.6% within weeks, 30.1% waited months before consulting any healthcare provider, and 16.9% had not yet sought any form of medical advice. The chi-square test was statistically significant ($p = 0.003$), indicating that delays were systematically — not randomly — distributed within the population. Extended care-seeking delays are clinically consequential, being associated with progressive mucosal damage, increased risk of ulcer complications including haemorrhage and perforation, and over prolonged periods, elevated risk of gastric malignancy (Correa & Piazuelo, 2011).

4. DISCUSSION

This study reports the first systematically derived estimate of H. pylori prevalence among PUD patients accessing community pharmacy care in Yenagoa metropolis, Bayelsa State, together with a structured characterisation of associated risk factors, awareness profile, and treatment-seeking behaviour. Three principal findings warrant detailed consideration.

First, the observed H. pylori prevalence of 25.7% is substantially lower than the 60–92% figures reported

in historical Nigerian hospital-based studies (Nwokediuko et al., 2012; Aje et al., 2010), but more consistent with the most recent global meta-analytic estimate of 44% (Hooi et al., 2017) and with emerging African evidence that prevalence may be declining as a function of improved sanitation, accelerated empirical antibiotic exposure, and the maturation of childhood antimicrobial use (Smith et al., 2022; Onyenekwe et al., 2024). The lower figure observed here may also reflect the diagnostic method employed — self-reported prior testing status rather than direct serological, urea breath test or stool antigen confirmation — and the possibility that prior antibiotic exposure had temporarily suppressed bacterial load in a meaningful subset of respondents. Whichever explanation predominates, the figure represents a clinically meaningful burden of disease in a population accessing first-line care through community pharmacies.

Second, the strong statistical association between H. pylori positivity and environmental risk factors — particularly crowded living conditions, contaminated food and water exposure, and inadequate sanitation — reaffirms the epidemiological consensus that H. pylori in low- and middle-income settings is fundamentally a disease of socio-economic deprivation transmitted through faecal-oral and oral-oral pathways (Brown, 2000; Eusebi et al., 2014; Etukudo et al., 2018). In the specific context of Bayelsa State, where parts of Yenagoa metropolis remain underserved by reliable potable water infrastructure and where overcrowded compounds are common, this finding positions H. pylori control not merely as a pharmacological problem but as an intersectoral public health imperative requiring sustained investment in water, sanitation and hygiene (WASH) infrastructure.

Third, the profound community awareness deficit — with 46.4% of PUD patients never having heard of H. pylori — represents perhaps the most actionable finding of this study. This figure is broadly consistent with awareness deficits reported in other Nigerian and West African community samples (Aje et al., 2010; Agyemang-Yeboah et al., 2016) and points to a fundamental gap in disease-specific health literacy that cannot be remedied by formal education alone (Nutbeam, 2000). Indeed, the present sample was relatively well educated, yet awareness remained low — suggesting that disease-specific public health communication, rather than general educational attainment, is the key lever for change.

The combination of low awareness, delayed care-seeking, and structurally driven environmental exposure produces a self-reinforcing cycle of under-recognised infection, late presentation, and consequent treatment difficulty. Breaking this cycle requires coordinated intervention at multiple levels: at the community level, structured health education campaigns delivered through accessible channels including community radio, religious gatherings, market associations and digital platforms; at the pharmacy level, the integration of low-cost point-of-care diagnostic tools (rapid stool antigen or urea breath testing) into routine community pharmacy practice; and at the system level, investment in WASH infrastructure as the most fundamental and most cost-effective preventive intervention available.

4.1 Strengths and limitations

The principal strengths of this study include its high response rate (96.3%), its statistically derived sample size, its multi-stage probability sampling strategy, and its use of a validated instrument with strong internal-consistency reliability. The study also represents the first systematic characterisation of H. pylori epidemiology in the community pharmacy setting of Yenagoa metropolis, addressing a documented evidence gap in the Niger Delta region. Several limitations warrant explicit acknowledgement. First, H. pylori status was ascertained through self-reported prior diagnostic test results rather than direct laboratory confirmation, which may have introduced both information bias and underestimation of true prevalence. Second, the cross-sectional design precludes causal inference between identified risk factors and infection status. Third, the study was conducted in urban community pharmacies in a single metropolis, which may limit generalisability to rural Bayelsa or to other South-South settings. Future studies incorporating direct laboratory confirmation, longitudinal follow-up, and rural community pharmacy sampling would strengthen the inferential base.

5. CONCLUSION

Among PUD patients accessing community pharmacy care in Yenagoa metropolis, the prevalence of H. pylori infection is 25.7%, with environmental risk factors — particularly crowded living conditions, contaminated food and water exposure, and inadequate sanitation — strongly and statistically associated with infection status. The community awareness profile is markedly deficient, with 46.4% of PUD patients never having heard of H. pylori, and treatment-seeking is substantially delayed. The findings argue for a multilevel response combining structured community sensitisation, the integration of point-of-care diagnostic testing into community pharmacy practice, and continued investment in water and sanitation infrastructure as the foundation of H. pylori control in Bayelsa State.

Declarations

Ethics approval and consent to participate: Ethical approval was obtained from the [Institutional Health Research Ethics Committee] and the Bayelsa State Ministry of Health Research Ethics Committee. Written informed consent was obtained from all participants.

Consent for publication: Not applicable.

Availability of data and materials: The datasets generated and analysed during this study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

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Authors' contributions: [Author 1] conceived and designed the study, supervised data collection, and led the manuscript drafting. [Author 2] contributed to study design and critically revised the manuscript. [Author 3] coordinated field operations and assisted with statistical analysis. All authors read and approved the final manuscript.

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REFERENCES

1. Agyemang-Yeboah, F., Yorke, J., Obirikorang, C., Nsenbah Batu, E., Acheampong, E., Amankwaa Frimpong, E., Odame Anto, E., & Asare-Anane, H. (2016). Patterns of Helicobacter pylori-associated gastric diseases and risk factors among patients undergoing upper gastrointestinal endoscopy at the Komfo Anokye Teaching Hospital, Ghana. African Health Sciences, 16(1): 199–206.
2. Aje, A. O., Otegbayo, J. A., Odaibo, G. N., & Bojuwoye, B. J. (2010). Comparative study of stool antigen test and serology for Helicobacter pylori among Nigerian dyspeptic patients: A pilot study. Nigerian Journal of Clinical Practice, 13(2): 120–124.
3. Auta, A., Hadi, M. A., Oga, E., Adewuyi, E. O., Abdu-Aguye, S. N., Adeloye, D., Strickland-Hodge, B., & Morgan, D. J. (2019). Global access to antibiotics without prescription in community pharmacies: A systematic review and meta-analysis. Journal of Infection, 78(1): 8–18.
4. Barchard, K. A., & Verenikina, Y. (2013). Improving data accuracy: Selecting the best data checking technique. Computers in Human Behavior, 29(5): 1917–1922.
5. Berenguer, B., La Casa, C., de la Matta, M. J., & Martín-Calero, M. J. (2013). Pharmaceutical care: Past, present and future. Current Pharmaceutical Design, 10(31): 3931–3946.
6. Brown, L. M. (2000). Helicobacter pylori: Epidemiology and routes of transmission. Epidemiologic Reviews, 22(2): 283–297.
7. Cochran, W. G. (1977). Sampling techniques (3rd ed.). John Wiley & Sons.
8. Correa, P., & Piazuelo, M. B. (2011). Helicobacter pylori infection and gastric adenocarcinoma. US Gastroenterology and Hepatology Review, 7(1): 59–64.
9. Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16(3), 297–334.
10. Erhun, W. O., & Erhun, M. O. (2002). Drug regulation and control in Nigeria: The challenge of counterfeit drugs. Journal of Health and Population in Developing Countries, 4(2): 23–34.
11. Etukudo, M. H., Williams, E. E., Ekrikpo, U. E., & Inyang, U. U. (2018). Clinical and socio-demographic risk factors for acquisition of Helicobacter pylori infection in Nigeria. Diseases, 6(3): 75.
12. Eusebi, L. H., Zagari, R. M., & Bazzoli, F. (2014). Epidemiology of Helicobacter pylori infection. Helicobacter, 19(Suppl.1), 1–5.
13. Graham, D. Y. (2014). Helicobacter pylori update: Gastric cancer, reliable therapy, and possible benefits. Gastroenterology, 147(2): 484–494.
14. Hooi, J. K. Y., Lai, W. Y., Ng, W. K., Suen, M. M. Y., Underwood, F. E., Tanyingoh, D., Malfertheiner, P., Graham, D. Y., Wong, V. W. S., Wu, J. C. Y., Chan, F. K. L., Sung, J. J. Y., Kaplan, G. G., & Ng, S. C. (2017). Global prevalence of Helicobacter pylori infection: Systematic review and meta-analysis. Gastroenterology, 153(2): 420–429.
15. International Agency for Research on Cancer. (1994). Schistosomes, liver flukes and Helicobacter pylori: IARC monographs on the evaluation of carcinogenic risks to humans (Vol. 61). IARC.
16. Lanas, A., & Chan, F. K. L. (2017). Peptic ulcer disease. The Lancet, 390(10094): 613–624.
17. Lwanga, S. K., & Lemeshow, S. (1991). Sample size determination in health studies: A practical manual. World Health Organization.
18. Lynn, M. R. (1986). Determination and quantification of content validity. Nursing Research, 35(6): 382–385.
19. Malfertheiner, P., Megraud, F., O'Morain, C. A., Gisbert, J. P., Kuipers, E. J., Axon, A. T., et al. (2017). Management of Helicobacter pylori

infection — the Maastricht V/Florence Consensus Report. Gut., 66(1): 6–30.
20. Marshall, B. J., & Warren, J. R. (1984). Unidentified curved bacilli in the stomach of patients with gastritis and peptic ulceration. The Lancet., 323(8390): 1311–1315.
21. Nunnally, J. C. (1978). Psychometric theory (2nd ed.). McGraw-Hill.
22. Nutbeam, D. (2000). Health literacy as a public health goal. Health Promotion International, 15(3): 259–267.
23. Nwokediuko, S. C., Okafor, O. C., Akere, A., Ijoma, U., Onyekwere, C., Adekanle, O., et al. (2012). Gastric and duodenal ulcers in Nigeria: A multicentre endoscopic study. African Journal of Gastroenterology and Hepatology, 1(1): 5–11.
24. Oluwasola, A. O., Ola, S. O., Saliu, L., & Solanke, T. F. (2010). Helicobacter pylori infection in South Western Nigerians: A serological study. African Journal of Medicine and Medical Sciences, 31(4): 297–299.
25. Onyenekwe, B. M., Onuoha, E. C., & Iwuagwu, C. C. (2024). Helicobacter pylori infection in Africa: Comprehensive insight into its pathogenesis, management, and future perspectives. Journal of Umm Al-Qura University for Applied Sciences, 10(2): 145–165.
26. Pharmacists Council of Nigeria, (2018). Guidelines for community pharmacy practice in Nigeria. Pharmacists Council of Nigeria.
27. Polit, D. F., & Beck, C. T. (2017). Nursing research: Generating and assessing evidence for nursing practice (10th ed.). Wolters Kluwer.
28. Smith, S. I., Ajayi, A., Jolaiya, T., Onyekwere, C., Setshedi, M., Schulz, C., et al. (2022). Helicobacter pylori infection in Africa: Update of the current situation and challenges of antimicrobial resistance. Helicobacter, 27(3): e12881.
29. Sugano, K., Tack, J., Kuipers, E. J., Graham, D. Y., El-Omar, E. M., Miura, S., et al. (2015). Kyoto global consensus report on Helicobacter pylori gastritis. Gut., 64(9): 1353–1367.
30. Wroblewski, L. E., Peek, R. M., Jr., & Wilson, K. T. (2010). Helicobacter pylori and gastric cancer: Factors that modulate disease risk. Clinical Microbiology Reviews, 23(4): 713–739.