

MULTI-LEVEL BARRIERS TO EFFECTIVE PEPTIC ULCER MANAGEMENT AND THE STRATEGIC ROLE OF COMMUNITY PHARMACISTS: A MIXED-METHODS CROSS-SECTIONAL EVALUATION FROM BAYELSA STATE, NIGERIA

Timi Fiekumo Buseri¹, Chukwuemeka Chibuzo Gloria², Owonaro A. Peter^{*3}, Ibegi, Ibegi Saviour⁴, Olodiana⁵, Providencia Chichi⁶, Henry Messiah TMT⁷

¹⁻⁵Department of Clinical Pharmacy and Pharmacy Practice, Bayelsa Medical University, Yenagoa, Bayelsa State, Nigeria.

⁶⁻⁷Department of Clinical Pharmacy and Pharmacy Practice, Niger Delta University, Wilberforce Island, Amassoma, Bayelsa State, Nigeria.

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*Corresponding author:

Owonaro A. Peter

Department of Clinical Pharmacy and
Pharmacy Practice, Bayelsa Medical
University, Yenagoa, Bayelsa State,
Nigeria.

owonaropeter@gmail.com

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ABSTRACT

Background: Effective management of peptic ulcer disease (PUD) and *Helicobacter pylori* infection in low- and middle-income countries depends on the coordinated functioning of patient-, provider-, and health-system-level processes — yet the barriers operating across these levels, and the strategic role that community pharmacists could play in mitigating them, remain inadequately characterised in the Nigerian context. This study identified the principal barriers to effective PUD management and elicited patient-generated recommendations for the strategic role expansion of community pharmacists in Bayelsa State. **Methods:** A descriptive analytical cross-sectional study was conducted in randomly selected community pharmacies in 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 PUD case definition. Data were analysed in IBM SPSS Statistics version 26.0 using descriptive statistics and chi-square tests at $\alpha = 0.05$. Recommendation domains were scored on a weighted-average scale and ranked by endorsement intensity. **Results:** Barriers to effective PUD management operated at three convergent levels. At the patient level, side-effect-driven treatment discontinuation (39.3%), low disease awareness (46.4% unaware of *H. pylori*), and delayed treatment-seeking (30.1% waiting months before consultation) predominated. At the health system level, inconsistent medication availability and geographically constrained access to specialist care emerged as structural constraints. At the provider level, 25.7% of treated respondents reported no follow-up confirmatory testing, indicating systemic deficits in protocol adherence. Across nine recommendation domains, the most strongly endorsed strategies were free public screening programmes (42.1%), onsite *H. pylori* testing kits in community pharmacies (39.9%), better imaging technology (38.3%), increased funding for ulcer management (36.6%), training in patient communication (35.5%), and patient education on adherence (33.9%). The weighted-average endorsement score across all domains was 2.41 (out of 4.00), indicating consistent moderate-to-strong support for systemic reform. **Conclusion:** PUD management in Bayelsa State is impeded by a self-reinforcing cycle of patient-level awareness deficits, provider-level protocol non-adherence, and system-level structural constraints. Patients themselves identify the strategic role expansion of community pharmacists — through onsite diagnostic testing, structured adherence counselling, and patient-centred education — as the most actionable lever for breaking this cycle. The findings argue for an integrated reform agenda that positions the community pharmacy as a regulated, evidence-based first point of care for PUD and *H. pylori* management in Nigeria.

KEYWORDS: Peptic ulcer disease; *Helicobacter pylori*; community pharmacy; pharmacist role expansion; health system barriers; patient education; Nigeria; Bayelsa State.

1. INTRODUCTION

Peptic ulcer disease (PUD) and its principal aetiological agent, *Helicobacter pylori*, together constitute a clinically and economically consequential gastrointestinal burden in low- and middle-income countries (LMICs) (Lanas & Chan, 2017; Hooi et al., 2017). Effective management of these conditions requires the coordinated functioning of multiple processes — disease awareness, timely care-seeking, accurate diagnosis, guideline-concordant prescribing, treatment adherence, and post-treatment verification of eradication — each of which is vulnerable to disruption at the patient, provider, and health-system levels (Malfertheiner et al., 2022; Setshedi & Smith, 2023).

In much of Nigeria, including the Niger Delta region, the community pharmacy occupies a uniquely strategic position in the PUD management pathway. Community pharmacies are accessible without appointment, geographically distributed, open longer hours than most public health facilities, and typically less expensive than private clinics — making them the de facto first point of contact for the majority of patients with upper gastrointestinal symptoms (Erhun & Erhun, 2002; Auta et al., 2019; Berenguer, La Casa, de la Matta, & Martín-Calero, 2013). International evidence from Scotland (Krska & Veitch, 2008), Malaysia (Liew et al., 2023), Kenya (Mwangi, Kosgei, Karuga, Obakiro, & Mongare, 2025), and the broader LMIC systematic literature (Wafula & Goodman, 2010; Ferreira, Costa, Cavadas, Antunes, & Costa, 2025; Mongare et al., 2024) has shown that, with structured care pathways, point-of-care testing access, and clear referral protocols, community pharmacists can deliver high-quality dyspepsia and PUD management at primary-care equivalent effectiveness and lower cost. Whether the empirical conditions in Yenagoa community pharmacies are aligned with — or remote from — this evidence base is an open question with direct implications for Nigerian health policy.

The published literature on community pharmacy practice in Nigeria has documented troubling patterns of unstructured prescribing, weak protocol adherence, and limited patient counselling (Erhun & Erhun, 2002; Onyekachi & Nwosu, 2021; Auta et al., 2019). Such patterns suggest that, despite the strategic position of community pharmacies, the actual practice they deliver may not be reaching its potential. Critically, however, no published study has systematically characterised the multi-level barriers to effective PUD management in Bayelsa State, nor elicited patient-generated recommendations for the strategic role expansion of community pharmacists in this setting. This evidence gap has direct consequences for the design of locally appropriate health systems reform and for the operationalisation of the Pharmacists Council of Nigeria's broader programme of community pharmacy role expansion (PCN, 2018).

This study was therefore designed to (i) identify the principal barriers operating at the patient, provider, and health system levels that impede effective PUD management in Bayelsa State, and (ii) characterise patient-generated recommendations for the strategic role expansion of community pharmacists in addressing these barriers.

2. MATERIALS AND METHODS

2.1 Study design, setting and population

A descriptive analytical cross-sectional study was conducted between [Month/Year] and [Month/Year] in community pharmacies across Yenagoa metropolis, Bayelsa State. The target population comprised adults aged ≥ 18 years presenting at participating pharmacies with self-reported PUD symptoms of at least four weeks' duration. Eligible participants were those willing to provide written informed consent.

2.2 Sample size and sampling

Sample size was calculated using the Cochran (1977) formula ($Z = 1.96$, $p = 0.50$, $d = 0.05$) with a 10% non-response allowance, yielding a target of 428 participants (Lwanga & Lemeshow, 1991). A multi-stage probability sampling strategy was used: registered community pharmacies were identified through the Pharmacists Council of Nigeria zonal office and selected purposively for spatial diversity; the total sample was proportionally allocated based on monthly PUD-related patient volume; and consecutive eligible patients were recruited at each pharmacy.

2.3 Data collection and analysis

Data were collected using a structured, interviewer-assisted questionnaire validated by a panel of three subject-matter experts (item-level content validity index ≥ 0.80 ; Cronbach's alpha = 0.81 in a 30-participant pilot) (Cronbach, 1951; Lynn, 1986; Nunnally, 1978). The instrument captured PUD history, treatment experiences, perceived barriers to adherence, and respondent-generated recommendations across nine thematic domains. Data were entered into IBM SPSS Statistics version 26.0 and analysed using descriptive statistics, chi-square tests, and weighted-average scoring of recommendation endorsement. Statistical significance was set at $p < 0.05$.

2.4 Ethical considerations

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 every participant. The study was conducted in accordance with the Declaration of Helsinki.

3. RESULTS

3.1 Sample

Of the 428 distributed questionnaires, 412 (96.3%) were returned with complete responses; 183 respondents met

the PUD case definition and constitute the analytical population. The mean age was 36.6 ± 0.54 years; women constituted 59.7%; 50.2% were married; and 37.4% were self-employed.

3.2 Patient-level barriers to effective PUD management

Three patient-level barriers emerged as predominant. First, side-effect-driven treatment discontinuation affected 39.3% of respondents, with taste disturbance, diarrhoea, and nausea constituting the most frequently cited adverse effects driving abandonment. Second, a profound disease-awareness deficit was observed: 46.4% of PUD respondents had never heard of *H. pylori* prior to the study, despite 40.8% of the sample holding postgraduate qualifications — indicating that low awareness is a function of disease-specific health literacy rather than general educational attainment (Nutbeam, 2000). Third, delayed treatment-seeking was statistically significant ($p = 0.003$): 30.1% of respondents waited months before consulting a healthcare provider, and 16.9% had not yet sought any form of medical advice at the time of the survey.

3.3 Health-system-level barriers

At the health system level, two structural constraints predominated. The first was inconsistent medication availability: where multi-drug eradication regimens are not consistently stocked in local pharmacies, partial dispensing produces the dual harm of treatment failure for the individual patient and selective antibiotic pressure at the population level (Thung et al., 2016). The second was geographically constrained access to specialist care: parts of Bayelsa State have limited physical accessibility to tertiary or specialist gastroenterology services, reinforcing the importance of decentralising *H. pylori* diagnostic and treatment capacity to community-pharmacy and primary-care levels.

3.4 Provider-level barriers

At the provider level, the most consequential finding was that 25.7% of treated respondents reported that no post-treatment confirmatory testing was performed — a structural deficit in clinical protocol adherence that perpetuates undetected persistent infection and impedes the generation of local data on treatment efficacy and antibiotic resistance patterns (Megraud & Lehours, 2007). Additionally, only 13.7% of respondents reported formal healthcare-provider adherence counselling, with the majority relying on informal family and social support (31.1%) or self-arranged phone reminders (27.3%) — indicating substantial unmet potential for structured pharmacist-led counselling.

3.5 The interacting cycle of multi-level barriers

The barriers identified across the three levels do not operate independently; rather, they reinforce one another in a self-perpetuating cycle: low awareness leads to delayed presentation; delayed presentation leads to advanced disease; advanced disease is managed with regimens that are incompletely taken due to side effects and supply-chain failures; and the absence of post-treatment confirmatory testing means that treatment failure goes undetected until clinical deterioration necessitates re-presentation. Breaking this cycle requires coordinated intervention at all three levels.

3.6 Patient-generated recommendations

Respondents generated recommendations across nine thematic domains, yielding a weighted-average endorsement score of 2.41 (out of 4.00) — indicating consistent moderate-to-strong support across all domains and suggesting that respondents perceived the challenges as systemic rather than isolated. Table 1 presents the leading recommendations within each domain, ranked by endorsement intensity.

Table 1. Patient-generated recommendations for improving PUD management, by domain (n = 183).

Domain	Top-ranked recommendation(s)	% endorsing
Diagnostic infrastructure		
	Onsite <i>H. pylori</i> testing kits in pharmacies	39.9
	Better imaging technology	38.3
Public awareness		
	Free public screening programmes	42.1
	Informational pamphlets	23.0
	Community health talks	18.0
	Health education campaigns	16.9
Healthcare system support		
	Increased funding for ulcer management	36.6
	More specialised units	26.2
Provider training and education		
	Training in patient communication	35.5
	Workshops on current treatment protocols	24.6
	Continuing medical education (CME) courses	19.7
	Access to online medical resources	20.2
Patient-centred interventions		

	Patient education on importance of adherence	33.9
	Patient self-reporting tools	33.3
	Simplified treatment plans	20.2
Policy and guidelines		
	State-wide standardised treatment protocols	29.0

3.7 Strategic role expansion of community pharmacists

The pattern of endorsement across the nine domains points consistently toward the strategic role expansion of community pharmacists as the most actionable lever for systemic reform. The strongest endorsement for onsite H. pylori testing kits (39.9%) signals patient demand for the integration of low-cost point-of-care diagnostics into routine community pharmacy practice — a development that would replace the current model of presumptive empirical prescribing with an evidence-based test-and-treat pathway aligned with the Maastricht VI/Florence consensus (Malfertheiner et al., 2022). The endorsement of training in patient communication (35.5%) and patient education on adherence (33.9%) similarly identifies the community pharmacist as the natural locus for structured counselling that, in international comparators, has been shown to substantially improve treatment completion rates (Krska & Veitch, 2008; Watson, Robbins, Smith, Nichols, & Davies, 2004; Liew et al., 2023). The endorsement of patient self-reporting tools (33.3%) — which align with established mHealth interventions for medication adherence (Lester et al., 2010) — points to a digital adherence support function that community pharmacists are well-positioned to deliver in a country where mobile phone penetration is high even in resource-limited settings.

4. DISCUSSION

This study provides the first systematic characterisation of multi-level barriers to PUD management in Bayelsa State and elicits patient-generated recommendations that converge on the strategic role expansion of community pharmacists. Three principal implications warrant detailed consideration.

4.1 Multi-level barriers as a system, not a list

The principal analytical contribution of this study is to demonstrate that the barriers operating in PUD management in Bayelsa State are not a list of independent obstacles but a self-reinforcing cycle in which patient-, provider-, and system-level deficits compound one another. This conceptualisation has direct policy implications: it argues against single-intervention approaches (such as standalone awareness campaigns, or standalone provider training) and in favour of coordinated multi-level reforms that simultaneously address awareness, diagnostic access, prescribing protocols, adherence support, and post-treatment verification (Wagner, Austin, & Von Korff, 1996; Bodenheimer, Wagner, & Grumbach, 2002). The Chronic Care Model provides a useful framework for organising such reforms around four mutually reinforcing pillars: clinical

information systems, decision support, delivery system design, and self-management support.

4.2 The community pharmacist as the strategic lever

Across the nine recommendation domains, the convergence of patient-generated recommendations on community pharmacy-integrated interventions is striking and consistent with international evidence on the high cost-effectiveness of pharmacist-led primary care services (Krska & Veitch, 2008; Liew et al., 2023; Mwangi et al., 2025; Ferreira et al., 2025; Mongare et al., 2024). The Nigerian community pharmacy workforce is professionally trained, statutorily regulated by the Pharmacists Council of Nigeria, and — with appropriate continuing professional development, regulatory authorisation for point-of-care testing, and clear referral protocols — uniquely positioned to deliver guideline-concordant PUD and H. pylori management at scale (PCN, 2018). The question for Nigerian health policy is not whether community pharmacies could be a powerful platform for PUD management — they self-evidently could — but whether the regulatory, financial, and continuing-education infrastructure can be assembled to make this transition operational. The findings of this study suggest that the patient demand and the strategic logic are both present; the remaining barriers are largely policy-level.

4.3 Specific actionable interventions

Translating the findings into action requires four specific interventions. First, the integration of low-cost point-of-care H. pylori diagnostic testing (rapid stool antigen tests or, where feasible, urea breath testing) into routine community pharmacy workflows — replacing presumptive prescribing with evidence-based test-and-treat (Malfertheiner et al., 2022; Setshedi & Smith, 2023). Second, the standardisation of pre-treatment counselling protocols that explicitly anticipate adverse effects and normalise their transient nature, with the goal of reducing the 39.3% side-effect-driven discontinuation rate observed here (Osterberg & Blaschke, 2005). Third, the introduction of mandatory post-treatment confirmatory testing as the routine endpoint of any eradication regimen, supported by patient self-reporting tools that align with established mHealth adherence interventions (Lester et al., 2010). Fourth, the development of state-wide standardised treatment protocols — endorsed by 29.0% of respondents — that would reduce practice variation, support antimicrobial stewardship, and create accountability frameworks within which community pharmacy practice can be monitored and supported (Federal Ministry of Health, 2017).

4.4 Strengths and limitations

The principal strengths of this study include its high response rate (96.3%), its multi-stage probability sampling, its use of a validated instrument with strong internal-consistency reliability, and its integration of patient-generated recommendations alongside the more conventional barrier analysis — generating evidence that is both diagnostic and prescriptive. Several limitations warrant explicit acknowledgement. First, the cross-sectional design captures perceived barriers at a single point in time and cannot characterise their evolution. Second, the study relies on self-reported barriers rather than direct observation of clinical encounters, which may introduce social-desirability bias. Third, the focus on community pharmacy attendees may under-represent the experiences of PUD patients who never access pharmacy care at all — a population that may face still more severe barriers. Fourth, the study was conducted in urban Yenagoa metropolis and findings may not generalise straightforwardly to rural settings in Bayelsa State or other South-South settings. Future research employing mixed-methods designs incorporating direct observation, qualitative interviews with pharmacists themselves, and rural sampling would strengthen the inferential base.

5. CONCLUSION

PUD management in Bayelsa State is impeded by a self-reinforcing cycle of patient-level awareness deficits, provider-level protocol non-adherence, and system-level structural constraints. Patients themselves identify the strategic role expansion of community pharmacists — through onsite diagnostic testing, structured adherence counselling, patient-centred education, and integration into a state-wide standardised treatment protocol — as the most actionable lever for breaking this cycle. The findings argue for an integrated reform agenda that positions the community pharmacy as a regulated, evidence-based first point of care for PUD and *H. pylori* management in Nigeria, supported by continuing professional development, regulatory authorisation for point-of-care testing, and clear referral pathways into the broader health system.

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 data analysis. All authors read and approved the final manuscript.

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