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Helicobacter pylori Prevalence and Its Associated Risk Factors among Consulting Patients at the Laquintinie Hospital, Douala, Cameroon

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Abstract

Helicobacter pylori (*H. pylori*) is a significant human pathogen associated with various gastrointestinal diseases. In Cameroon, *H. pylori* prevalence remains high, with limited localized studies in Douala. The objective of this study is to determine the prevalence and risk factors associated with *H. pylori* infection among consulting patients at Laquintinie Hospital Douala. A cross-sectional study was conducted from May 6th to June 20th, 2024, involving 375 patients consulting for stomach disorders. Participants' blood samples were tested using Rapid Diagnostic Test (RDT) strips, and socio-demographic and behavioral data were collected via questionnaires. Statistical analysis was done using SPSS version 23.0. The overall prevalence of *H. pylori* infection was 64.0%. Infection was significantly associated with drinking tap water ($p < 0.001$), poor hand hygiene before and after meals ($p < 0.001$), and alcohol consumption ($p = 0.036$). Logistic regression revealed that lower income (≤50,000 FCFA) (OR = 0.397) and religious affiliation; Christianity (OR = 0.184) and Islam (OR = 0.151) were significant predictors of infection. Conclusion: *H. pylori* infection remains prevalent among patients in Douala, with modifiable lifestyle factors contributing significantly. Public health strategies focusing on hygiene practices and safe water consumption are urgently needed.

Keywords

Helicobacter pylori, Prevalence, Risk Factor, Lacantinie Hospital, Douala

1. Introduction

Helicobacter pylori (*H. pylori*) is a spiral-shaped, microaerophilic, gram-negative bacterium that has been recognized as a significant human pathogen since its discovery by Warren and Marshall in 1983. This organism colonizes the gastric mucosa and is known for its role in the development of chronic gastritis, peptic ulcer disease, and gastric malignancies, including mucosa-associated lymphoid tissue (MALT) lymphoma and gastric adenocarcinoma (Warren & Marshall, 1983; Fitz-Gerald et al., 2021). The bacterium's pathogenicity is facilitated by several virulence factors, including urease enzyme production, flagella-mediated motility, and the ability to adhere to gastric epithelial cells. These mechanisms enable the bacterium to survive in the harsh acidic environment of the stomach and initiate inflammation that can progress to more serious gastric conditions if untreated (Hooi et al., 2017).

The diagnosis of *Helicobacter pylori* infection can be achieved through non-invasive and invasive methods. Non-invasive tests include the Urea Breath Test (UBT) and Stool Antigen Test, both of which are highly accurate for initial diagnosis and post-treatment confirmation, while serological tests detect antibodies but cannot distinguish between current and past infections (Chey & Wong, 2007; Vaira et al., 1999). Invasive methods, typically used during endoscopy, include the Rapid Urease Test (RUT), histological examination, culture, and PCR testing. RUT provides quick results by detecting urease activity, histology allows direct visualization of the bacteria and associated gastric pathology, culture enables antibiotic susceptibility testing, and PCR detects bacterial DNA with high sensitivity and specificity (Genta & Graham, 1994; Dixon et al., 1996; Mégraud, 1997; Mapstone et al., 1993). The choice of test depends on clinical context, availability, and prior treatment history.

Globally, the prevalence of *H. pylori* infection is estimated to affect over half of the population, although rates vary significantly depending on geographic location, socioeconomic status, and public health infrastructure. Developed countries tend to have lower prevalence rates due to better sanitation, clean water access, and healthcare availability, whereas developing regions, particularly in Africa, Asia, and South America, report much higher prevalence (Hooi et al., 2017). In Africa, infection rates often exceed 70%, influenced by factors such as poor hygiene, inadequate sanitation, and densely populated living conditions. For instance, Nigeria has reported prevalence as high as 81.7% (Khalifegholi et al., 2013), while Tanzania reported 39.1% (Jakah et al., 2016).

In Cameroon, data show regional variation in *H. pylori* prevalence, ranging from 47.4% in Bafoussam (Agbor et al., 2018) to 63.4% in Bonamousadi, Douala (Kpossou et al., 2021). A study conducted in Buea and Limbe found a prevalence of 52.3% (Laure Brigitte et al., 2021). These figures underscore the widespread nature of the infection and the importance of targeted research in local healthcare settings to guide public health policies and interventions.

Transmission of *H. pylori* typically occurs through oral-oral or fecal-oral routes, often during childhood. Inadequate sanitation, consumption of contaminated food

or water, and close contact in overcrowded households are recognized risk factors for transmission (Hooi et al., 2017; Torres et al., 1998). Despite the availability of effective antibiotics and diagnostic tests, challenges persist in managing *H. pylori* infections, particularly due to antibiotic resistance and high rates of reinfection in low-resource settings (McColl, 2010).

Understanding the prevalence and associated risk factors of *H. pylori* is essential for informing clinical practice and developing appropriate public health strategies. This study seeks to fill this gap by examining the prevalence and key risk factors of *H. pylori* infection among individuals consulting at the Laquintinie Hospital in Douala, Cameroon. Although there is epidemiological evidence of *H. pylori* in many African settings, most patients neglect its morbidity and the possible risk factors. The findings from this research can provide a foundation for better diagnostic, preventive, and treatment strategies tailored to the Cameroonian context.

2. Materials and Methods

2.1. Study Area

This research was carried out at the Laquintinie Hospital located at Akwa II, Douala in the Littoral Region of Cameroon. Douala is the economic capital of Cameroon with a surface area of about 210 km^2 with more than 4million inhabitants and it's. Douala has the largest international airport in Central African and the city sits on the estuary of river Wouri. Douala has a heterogenous population made of business people from all over the country, Africa and other parts of the world. Laquintinie Hospital Douala, established in 1931 during the French colonial period, is one of the oldest and most prominent healthcare institutions in Cameroon. Initially created as the "Hôpital Indigène de Douala" to serve the indigenous population excluded from colonial medical facilities, it was later renamed in honor of Dr. Jean Auguste Laquintinie, a French military doctor (MINSANTE, 2025). Located in the Akwa district of Douala's 1st arrondissement, the hospital spans approximately 9 hectares and features a blend of colonial era and modern infrastructure, including low-cost, medium-cost, and VIP wards such as the Samuel Eto'o Pavilion (Hôpital Laquintinie de Douala, 2025). It houses advanced facilities such as a hemodialysis center with 22 generators, a mini oxygen plant, an incinerator, six pharmacies, 10 backup power generators, a sewing unit, a recreational multisport complex, and interfaith prayer spaces (Hôpital Laquintinie de Douala, 2025; Medicoor Listing, 2025). The hospital provides a wide array of services including general and specialized consultations, emergency care, surgical operations, cardiology, gastroenterology, medical imaging, and assisted reproductive technologies. Its hemodialysis unit, launched in 2023, is staffed by a multidisciplinary team and operates under modern medical protocols (Medicoor Listing, 2025). As of 2024, Laquintinie Hospital employs over 1,500 personnel including 130 specialists and 40 general practitioners, and it recorded over 185,000 consultations that year (Laquintinie Official Website,

2025). Serving also as a teaching hospital, it collaborates with the University of Douala's Faculty of Medicine and trains thousands of healthcare professionals annually (Ebongue et al., 2022). The hospital upholds strong social responsibility values, allocating over 75 million FCFA in 2021 for the care of indigent patients, making it a key contributor to public health services in the Littoral region (Medicoor Listing, 2025). In 2024, Dr. Marie Solange Ndom was appointed as the hospital's director, becoming the first woman to hold the position, following the tenure of Professor Noël Emmanuel Essomba (Laquintinie Official Website, 2025). Overall, Laquintinie Hospital remains a cornerstone of the Cameroonian health system, balancing historical legacy with innovation and inclusivity.

2.2. Design

This study was a cross-sectional descriptive design that span from the 6th of May to 20th of June 2024. This study made emphasis on individuals who came for consultation for stomach aches at the Laquintinie Hospital Douala. This study employed a non-probability purposeful sampling method in which the principal investigator used his judgement to decide on which participant to enroll into the study.

2.3. Study Population

The study involved patients who came for consultation because of one or two stomach disorder at the Laquintinie Hospital Douala.

2.3.1. Sample Size

The sample size was determined using the Fisher's formula as shown below:

$$n = \frac{Z^2 P(1-P)}{d^2}$$

where:

Z =1.96 at 95% confidence interval

P = 63.4% = 0.635 (Prevalence of *H. pylori* at in Bonamousadi, Douala) (Kpossou et al., 2021)

D = 5% = 0.05% (error margin)

1 − P = 1 − 0.635 = 0.365

$$n = \frac{1.96^2 \times 0.635 \times 0.365}{0.0025} = 356.154 \approx 357 \text{ participants}$$

2.3.2. Inclusion Criteria

Patients who were consultation for stomach disorder.

Patients who gave their consent.

2.3.3. Exclusion Criteria

Patients who were not consultation for stomach disorder.

Patients who did not give their consent.

2.4. Data Collection

A semi-structured questionnaire was used to collect data from the patients who consented to take part in the study. The questionnaire sought to collect information on the patient's socio-demographic characteristics (sex, age, marital status, monthly income (Fcfa) level of education, number of house occupants, study setting and occupation). The second part of the questionnaire was meant to deduce the knowledge of some signs and symptoms of *H. pylori* by the patients and hygienic conditions of the participant's environment.

2.5. Sample Collection and Processing

The rapid diagnostic test (RDT) antibody strips for *H. pylori* was used to determine whether the participant was positive or negative. About 1 ml of venous blood was collected using aseptic procedures and laced in a dry tube. The blood in the tube was centrifuged at 20000 rpm for 2 minutes for the blood to be separated into serum and plasma. According to the manufacturer's procedure, 50 ul of serum was aspirated using a micropipette and placed in the specimen zone of the test strip. *Helicobacter pylori* Antibody Test Strip is a qualitative test for the dictation of specific IgG antibodies to *H. pylori* in human serum and plasma, to aid in the diagnosis of *H. pylori* infection. It is intended for professional in-vitro diagnostic use only. Interpretation of test results are: positive (two red lines) a negative (one line), invalid (no line or no control line). The specimen reacts with the particles coasted with anti-*H. pylori* antibodies. The mixture migrates upward on the membrane by capillary action to react with anti-*H. pylori* antibodies on the membrane and generates a colored line. The presence of this colored line in the test region indicates a positive result, while its absence indicates a negative result. To serve a procedural control, a colored line will always appear in the control line region indicating that proper volume of specimen has been added and membrane wicking has occurred.

2.6. Ethical Considerations

Ethical clearance was obtained from the Institutional Review Board (IRB) of the Faculty of Health Sciences at the University of Buea (Ref No: 2016/0351/UB/FHS/IRB) (Appendix) and administrative authorization obtained from the Regional Delegation of Public Health, South West Region (Appendix). Authorizations were also obtained from the director of Laquintinie Hospital. Authorization carried out this research was obtained from the Administration of Cornerstone University and Theological Seminary, Cameroon. Informed consent forms were collected from all participants before he or she was enrolled and participation was not mandatory. Participants had to right to opt out of the study at any point if he or she felt uncomfortable.

2.7. Data Management and Analysis

The data collected was entered, cleaned and analyzed using the statistical package

of social Sciences (SPSS) version 23.0 (IBM SPSS, Chicago, IL, USA). Descriptive statistics was used to determine proportions while the Pearson's chi-square test was used to determine the differences between groups. Logistic regression analysis was used to determine associations while the risk of infection was measured as adjusted odds ratios (AOR). Statistical analysis was done at 95% confidence interval and statistical significance was set at $p < 0.05$.

3. Results

3.1. Socio-Demographic Characterization of the Study Population

This study involved 375 participants who consented with mean ± standard age of 39.93 ± 17.644 years (range: 13 - 77 years). The majority of the study participants were within the age group of ≥ 47 years (34.1%). Also, most of the study participants were females (65.9%) and Christians (60.8%). More so, most of the participants had secondary education (34.7%) and had < 5 occupants in the house (57.1%). Furthermore, of them earned ≤ 50000 Fcfa per month, did business (40%) and were living more in the urban settings (72.5%) in Douala (Table 1).

Table 1. Socio-demographic characteristics of the study population.

Factor	Variable	Frequency (n)	Percentage (%)
Age-group	<15 years	29	7.7
	15 - 25 years	75	20.0
	26 - 36 years	70	18.7
	37 - 47 years	73	19.5
	≥47 years	128	34.1
Sex	Female	247	65.9
	Male	128	34.1
Religion	Christian	228	60.8
	Muslim	84	22.4
	Others	63	16.8
Level of education	Primary	89	23.7
	Secondary	130	34.7
	University	66	17.6
	No formal education	90	24.0
Number of house occupants	≥5	161	42.9
	<5	214	57.1
Income level (Fcfa)	≤50,000	289	77.1
	>50,000	86	22.9
Occupation	Business	150	40.0
	Civil servant	20	5.3
	Farming	96	25.6
	Student	29	7.7
	Others	80	21.3
Study setting	Urban	272	72.5
	Semi-urban	103	27.5

3.2. Prevalence of *Helicobacter pylori* Infection and Its Association with Non-Demographic Characteristics within the Study Participants

This study was meant to determine the prevalence of *H. pylori* among participants who consented to take part in this study. The overall prevalence was 64.0% (240/375) (Figure 1). The prevalence of *H. pylori* was significantly associated with source of drinking water ($p < 0.001$). Statistical analysis revealed that participants who drank tap water (77.0), had a higher prevalence of *H. pylori* compared to those who drank water from other sources (33.0). Also, there was a significant association between washing of hands before and after meals ($p < 0.001$). From Pearson's chi-square test, it was revealed that all the participants who did not wash their hands (100%) before and after meals were diagnosed positive for *H. pylori* infection. More so, participants who drank alcohol (69.1%) were significantly ($p = 0.036$) associated with *H. pylori* infection compared to those who did not drink alcohol (58.7%) (Table 2). Smoking was not significantly associated with *H. pylori* infection in this study (Table 2).

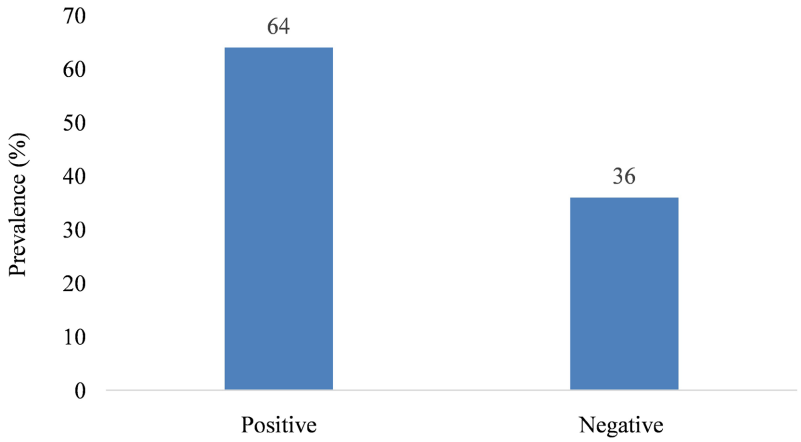

Figure 1. Prevalence of *H. pylori* at Lacanthinie hospital Douala.

Table 2. Association of non-sociodemographic characteristics and *H. pylori* prevalence.

Factor	Variable	*H. pylori* %(n)		Chi-square; p-value
		Positive	Negative	
Source of drinking water	Tap water	77.0 (164)	23.0 (49)	55.014, < 0.001
	Mineral water	66.2 (45)	33.8 (23)	
	Other water source (lakes, streams, springs)	33.0 (31)	67.0 (63)	
Washing hands before and after eating	Yes	60.2 (204)	39.8 (135)	22.400; < 0.001
	No	100.0 (36)	0.0 (0)	
Smoking	Yes	58.8 (20)	41.2 (14)	0.435; 0.510
	No	64.5 (220)	35.5 (121)	
Drinking of alcohol	Yes	69.1 (132)	30.9 (132)	4.412; 0.036
	No	58.7 (108)	41.3 (76)	

3.3. Risk Factors Associated with *Helicobacter pylori* Infection within the Study Population

This current study was also meant to determine the possible risk factors associated with *H. pylori* infection within the study population. From multinomial analysis, it was revealed that, participants with low income (≤50000 Fcfa) had a lower odds of association with *H. pylori* infection (OR = 0.397, p = 0.019) compared to those with higher income level (<50000 Fcfa). Furthermore, *H. pylori* had higher odds of occurring among Christians (OR: 0.184, p < 0.001) and Muslims (OR = 0.151, p < 0.001) compared to participants who had other religious beliefs. Age-group, sex, level of education, number of household occupants, occupation and study setting were not significant risk factors of *H. pylori* infection (Table 3).

Table 3. Risk factors associated with *H. pylori* infection with the study population.

Factor	Variable	Odds ratio (OR)	95% Confidence Interval	P-value
Age-group	<15 years	0.652	0.267 - 1.593	0.348
	15 - 25 years	1.169	0.598 - 2.286	0.648
	26 - 36 years	0.966	0.492 - 1.898	0.920
	37 - 47 years	1.428	0.725 - 2.813	0.303
	≥47 years	Reference		
Sex	Female	1.308	0.780 - 2.191	0.308
	Male	Reference		
Religion	Christian	0.184	0.078 - 0.433	<0.001
	Muslim	0.151	0.059 - 0.382	<0.001
	others	Reference		
Level of education	Primary	0.596	0.265 - 1.338	0.210
	Secondary	1.221	0.551 - 2.705	0.622
	University	0.604	0.306 - 1.194	0.147
	No formal education	Reference		
Income level (Fcfa)	≤50,000	0.397	0.183 - 0.860	0.019
	>50,000	Reference		
Number of house occupants	≥5	0.957	0.442 - 2.076	0.912
	<5	Reference		
Occupation	Business	0.556	0.176 - 1.762	0.319
	Civil servant	4.157	0.574 - 30.128	0.159
	Farming	0.530	0.134 - 2.099	0.366
	Student	0.641	0.169 - 2.430	0.513
	Others	Reference		
Study setting	Urban	0.718	0.413 - 1.248	0.241
	Semi-urban	Reference		

4. Discussion

This study was to determine the prevalence of *Helicobacter pylori* infection and its associated risk factors among consulting patients at the Lacantinie Hospital Douala.

This study revealed a high prevalence of *Helicobacter pylori* (*H. pylori*) infection (64.0%) among consulting patients at Laquintinie Hospital, Douala. This finding is consistent with previous studies in Cameroon and other parts of Africa, where infection rates remain high due to persistent environmental and socioeconomic risk factors (Agbor et al., 2018; Hooi et al., 2017).

Globally, *H. pylori* prevalence is notably higher in developing regions due to limited access to clean water, poor sanitation, and crowded living conditions (Eusebi et al., 2014; Zamani et al., 2018). The significant association between the source of drinking water and *H. pylori* infection in this study reinforces the role of waterborne transmission, particularly when public water supplies are inadequately treated. Participants who drank tap water had markedly higher infection rates compared to those consuming bottled or treated water. This aligns with findings from studies in Nigeria and Ethiopia, where untreated water consumption was a major predictor of infection (Omar et al., 2014). Nonetheless in Cameroon, a study from the West region of Cameroon revealed a contrary view that, individuals drinking spring water had a higher prevalence of *H. pylori* (50%) compared to those who drank tap water (43.8%) (Agbor et al., 2018). This may suggest that source of drinking water may not be the only risk factor of being infected with *H. pylori*. As a result of limited drinking water sources in Douala, some tap water sources may have been constructed from boreholes or nearby streams which are not properly treated and tested for contamination and therefore can harbor *H. pylori*.

Another critical observation was the strong association between poor hand hygiene practices and *H. pylori* infection. Participants who did not wash their hands before and after meals were universally infected, underscoring the fecal-oral route as a major transmission pathway (Brown, 2000). This finding highlights the importance of promoting basic hygiene interventions as cost-effective measures to prevent infection. Alcohol consumption was also significantly associated with *H. pylori* infection. Though some studies suggest that moderate alcohol intake might have a protective effect by inhibiting bacterial colonization due to its antimicrobial properties (Zhang et al., 2015), heavy or irregular drinking may disrupt gastric mucosal defenses and promote infection, which could explain the increased prevalence among alcohol consumers in this cohort. Also, alcohol drinking is always associated with other lifestyle habits like smoking, poor diets and stress which may indirectly affect *H. pylori* risk.

Unexpectedly, lower income was found to be protective against *H. pylori* infection compared to higher income levels. While poverty is traditionally linked to higher *H. pylori* infection rates (Khalifegholi et al., 2013), this result might reflect behavioral differences, such as the tendency of lower-income households to use

boiled water or be more cautious with food hygiene, possibly due to a heightened awareness of disease risks. Also, this study found out that, 77.1% of the individuals were individuals with low income level (≤5000 fr), so this may have undermined the findings of this study and making low income protective. Nonetheless, low income is known to be associated with poor hygiene and sanitation which is a predictor of *H. pylori* infection. Religious affiliation was another significant predictor, with Christians and Muslims showing higher odds compared to other groups. Although religion itself is unlikely to be a direct risk factor, associated cultural practices (such as communal eating, ablution practices, and dietary habits) could influence exposure levels (Abebaw et al., 2014). Although there is no direct link between Christian fasting an *H. pylori* infection, Christians are known to practice fasting which entails eating once a day or going several days without eating. This practice may promote gastric juice production which may cause irritation of the stomach mucosa and weakening of the gastric mucosal barrier, making the stomach lining more susceptible to *H. pylori* colonization. Meanwhile in Muslims, the practice of ablution before prayers can be a major source fecal-oral contamination with *H pylori*.

Other demographic factors, such as age, sex, education level, household occupancy, and urban vs semi-urban residence, were not significantly associated with infection, consistent with some studies in Sub-Saharan Africa (Miftahussurur et al., 2017). This suggests that environmental exposures and individual hygiene practices may play more critical roles than socio-demographic variables in determining infection risk. This study confirmed that despite improvements in healthcare accessibility, behavioral and environmental factors remain primary drivers of infection transmission in Douala. This is consistent with calls from the World Gastroenterology Organization for integrated strategies focusing on sanitation, public education, and screening to control *H. pylori* infections in developing countries (WGO Global Guidelines, 2022).

5. Conclusions

This study demonstrated a high prevalence of *Helicobacter pylori* infection (64.0%) among consulting patients at Laquintinie Hospital Douala, with significant associations to modifiable environmental and behavioral factors, particularly the source of drinking water, poor hand hygiene, and alcohol consumption. Socio-demographic factors such as religion and income level also showed associations, although traditional predictors like age, sex, and education level were not significant in this cohort. These findings emphasize that despite advances in healthcare services, infection control remains challenged by inadequate sanitation and personal hygiene practices. Targeted public health interventions, enhanced sanitation infrastructure, and behavior change communication campaigns are urgently required to reduce the burden of *H. pylori* and its associated morbidities in Cameroon.

Recommendations

- The government should critically prioritize the investment in water treat-

ment infrastructure to ensure that tap water is safe for drinking.

- Disseminating public advisories to encourage boiling or filtering tap water may reduce transmission.
- Launching of health education campaigns emphasizing the critical importance of handwashing before and after meals is essential.
- Incorporating guidance on the effects of alcohol on gastrointestinal health into public health messaging is important.
- Introducing routine rapid diagnostic screening for *H. pylori* for patients presenting with gastrointestinal complaints will be helpful.
- Healthcare workers should advise patients on hygiene, safe drinking water practices, and dietary behaviors that reduce infection risk.
- The Government should ensure clean drinking water availability and promote proper sanitation within hospitals.
- Developing standardized national guidelines for *H. pylori* screening, treatment, and prevention is of the utmost importance.
- Integrating infection prevention education into primary and secondary school curricula can help in improving awareness.

Author Contributions

HFM conceived, designed, supervised the study and major contributions, performed statistical analysis and drafted manuscript, NNA participated in designing the project and carried out data collection in the field. AWC, TBF, WDS and ALB contributed in the revision of the manuscript. All authors read and approved the final manuscript.

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Availability of Data and Materials

All datasets generated and analyzed during the study are presented in the paper.

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Conflicts of Interest

The authors declare that they have no competing interests.

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