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Age and Sex-Based Distribution of Helicobacter pylori Infection Among Symptomatic Patients Attending Mama Lucy Kibaki Level 5 Hospital in Kenya

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ABSTRACT: ***Background****: Helicobacter pylori (H. pylori) is a gram-negative bacterium responsible for a significant burden of gastrointestinal disease globally, particularly in sub-Saharan Africa. Its prevalence in Kenya remains under characterized, especially across demographic groups. This study investigated the age- and sex-based distribution of H. pylori infection among symptomatic patients at Mama Lucy Kibaki Level 5 Hospital. A cross-sectional hospital-based study was conducted between June and December 2025. A total of 200 symptomatic patients presenting with dyspeptic symptoms were enrolled. H. pylori infection was diagnosed using the H. pylori stool antigen test (HpSA) and rapid urease test (RUT). Data on age and sex were collected and analyzed using SPSS version 26. Chi-square test and logistic regression were employed to determine associations. The overall prevalence of H. pylori infection was 58.4% (n=200). Infection was significantly higher in females (63.2%) compared to male (54.1%) (p=0.04). The age group 18-37 years recorded the highest prevalence (67.8%), while patients aged 58 years and above showed the lowest (41.2%). A statistically significant association was observed between age group and H. pylori positivity (p=0.01). H. pylori infection is prevalent among symptomatic patients at Mama Lucy Kibaki Hospital, with age and sex being significant determinants. Early targeted screening for adults aged 18-37 years and males may improve clinical outcomes*

Keywords: *Helicobacter pylori, prevalence, age distribution, sex distribution, symptomatic patients*

1. Introduction

Helicobacter pylori (H. pylori) is a spiral-shaped, gram-negative, microaerophilic bacterium that primarily infects the human gastric mucosa. Since its discovery by Marshall and Warren in 1983, this bacterium has been linked to a range of gastrointestinal issues, including chronic active gastritis, peptic ulcer disease, gastric mucosa-associated lymphoid tissue (MALT) lymphoma, and gastric adenocarcinoma. The latter is recognized as the third most common cause of cancer-related deaths worldwide (Malfertheiner et al., 2022). It is estimated that over 44% of the global population is infected with H. pylori, with the highest rates seen in developing countries in Asia, Africa, and Latin America. In sub-Saharan Africa, prevalence rates have been reported between 50% and 90%. Contributing factors include overcrowding, poor water sanitation, inadequate food hygiene, and limited access to diagnostic and treatment services (Hooi et al., 2017). Kenya, which is rapidly urbanizing and has a population of over 55 million, experiences a significant but often overlooked burden of H. pylori infection. Nairobi, the capital city, contains densely populated informal settlements like Komarok, Umoja, Dandora, Korogocho, Donholm, Njiru and Kayole. These communities are partly served by Mama Lucy Kibaki Level 5 Hospital (MLKH), a major county referral facility in eastern Nairobi. Most patients at MLKH come from low-income households, which often have conditions that promote H. pylori transmission. These include shared sanitation facilities, crowded living spaces, and reliance on communal water sources. Although the importance of H. pylori in Kenya is recognized, there is limited data on its distribution concerning demographic factors such as age and sex. Both age and sex are important factors in infection rates and disease susceptibility. Research from several African studies shows that H. pylori prevalence tends to increase with age and may vary between males and females due to differences in health-seeking behavior, hormonal influences, and immune response (Muhsen & Levine, 2012). Understanding how H. pylori infection varies by age and sex in hospital settings is important for guiding targeted screening, treatment plans, and public health efforts. This study aims to determine the prevalence and demographic distribution of H. pylori among symptomatic patients at Mama Lucy Kibaki Level 5 Hospital, focusing on age group and sex as separate variables.

2. Purpose of the Study

To determine the age- and sex-based distribution of Helicobacter pylori infection among symptomatic patients attending Mama Lucy Kibaki Level 5 Hospital, Nairobi, Kenya.

3. Methodology

3.1 Study Design and Setting

The study was a hospital-based cross-sectional study conducted at Mama Lucy Kibaki Level 5 Hospital, located in Embakasi Sub-County, Nairobi County, Kenya. The hospital serves as a public referral facility offering both inpatient and outpatient services to an estimated catchment population of over 500,000 individuals. The study was carried out between June 2025 and December 2025.

3.2 Study Population and Eligibility Criteria

The target population included all patients aged 18 years and above presenting to the outpatient medical and gastroenterology clinics with dyspeptic symptoms including epigastric pain, bloating, nausea, vomiting, or heartburn. Patients who had received H. pylori eradication therapy within the preceding 4 weeks, those on proton pump inhibitors (PPIs) or antibiotics within 2 weeks prior to enrolment, pregnant women, and patients who declined to provide consent were excluded from the study.

3.3 Sample Size Determination

The sample size was calculated using the Fishers formula: $n = Z^2P(1-P)/d^2$, where Z = 1.96 (95% confidence interval), P = 0.62 (estimated prevalence from a comparable Kenyan study; Ochwoto et al., 2018), and d = 0.05 (margin of error). This yielded a minimum sample size of 320 to account for a 5% non-response rate. A total of 200 patients who met the eligibility criteria and provided informed consent were successfully enrolled within the study period.

3.4 Diagnostic Methods

H. pylori infection status was determined using two diagnostic approaches:

(a) H. pylori Stool Antigen Test (HpSA): Stool specimens were collected from each participant and tested using the SD BIOLINE H. pylori Ag rapid test (Standard Diagnostics Inc., Republic of Korea), a validated immune chromatographic assay with reported sensitivity of 94% and specificity of 97%.

(b) Rapid Urease Test (RUT): Gastric biopsy specimens were collected from patients undergoing upper gastrointestinal endoscopy and tested using the CLO test (Kimberly-Clark, USA). A positive result was indicated by a colour change from yellow to pink within 24 hours.

A patient was classified as H. pylori positive if either test returned a positive result.

3.5 Data Collection

A structured questionnaire was used to collect socio-demographic data including age, sex, residence, education level, and water source. Age was categorized into five groups: 18-27 years, 28-37 years, 38-47 years, 48-57 years, and >58 years. Sex was recorded as male or female.

3.6 Ethical Considerations

Ethical approval was obtained from the Mama Lucy Kibaki Hospital /Kenya Medical Training College Ethics and Research Committee (MLKH/KMTC ERC). All participants provided written informed consent prior to enrolment. Confidentiality and anonymity of data were strictly maintained throughout the study..

3.7 Statistical Analysis

Data were entered and cleaned in Microsoft Excel and analyzed using SPSS Version 26.0 (IBM Corp., USA). Descriptive statistics were used to summarize demographic characteristics. Prevalence was expressed as a proportion with 95% confidence intervals. Bivariate analysis using the Chi-square test assessed associations between demographic variables and H. pylori positivity. Binary logistic regression was used to identify independent predictors of H. pylori infection. A p-value of <0.05 was considered statistically significant.

4. Results

4.1 Socio-demographic Characteristics of Participants

A total of 200 symptomatic patients were enrolled in the study. The majority were female (n=119, 59.5%), and the mean age was 36.7 years (SD ± 11.3). The most represented age group was 18-27 years (38%), followed by 38-47 years (29%). Table 1 presents the demographic distribution of participants.

Table 1: Socio-demographic Characteristics of Study Participants (n=200)

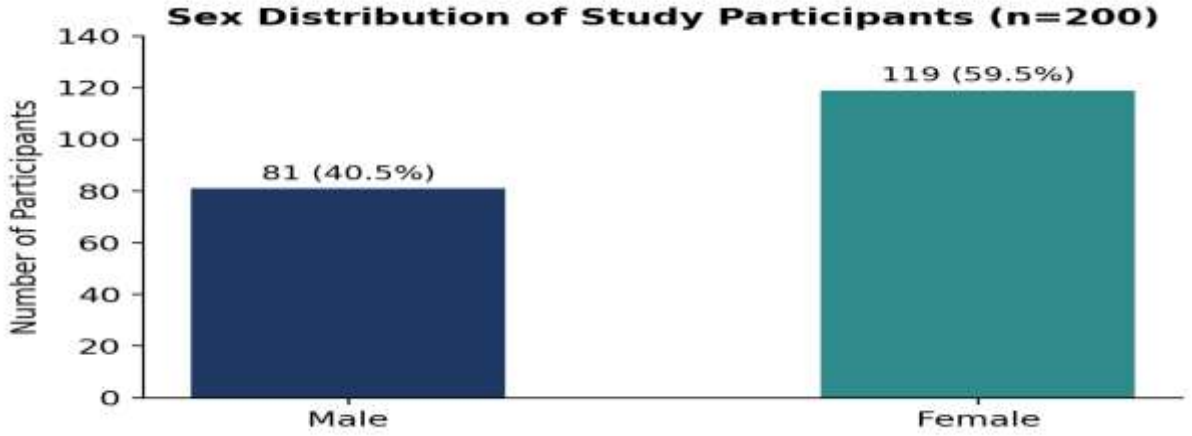

Figure 1: Sex Distribution of Study Participants (n=200)

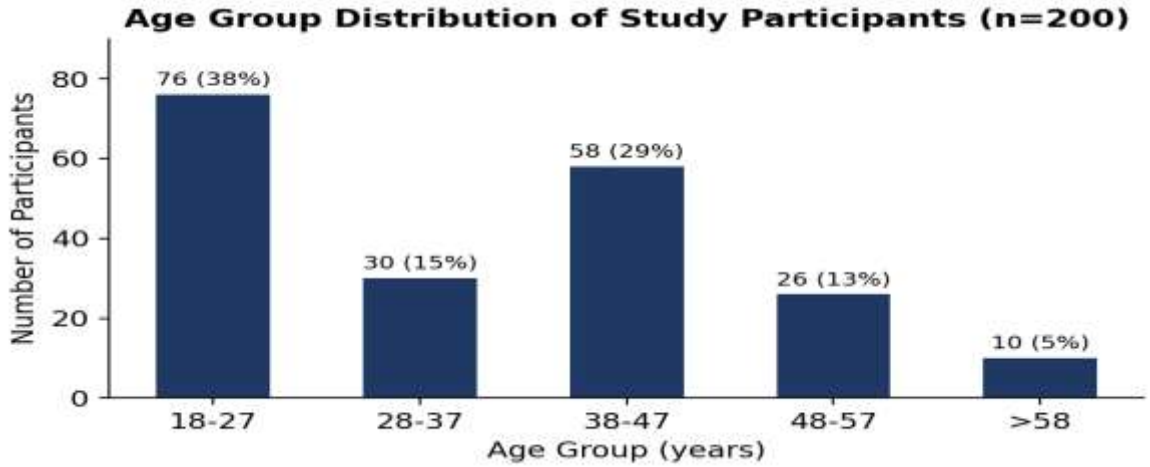

Figure 2: Age Group Distribution of Study Participants (n=200)

Source: *MLKH- Records, 2025*

4.2 Overall Prevalence of H. pylori Infection

Of the 200 patients tested, 60 (30% were positive for H. pylori infection while 70% tested negative. This represents a high prevalence consistent with other sub-Saharan African Countries settings where in every 100 30 patients are positive .

Table 2: **Distribution of the patients in MLKH per estates (June- Dec 2025) (N-200)**

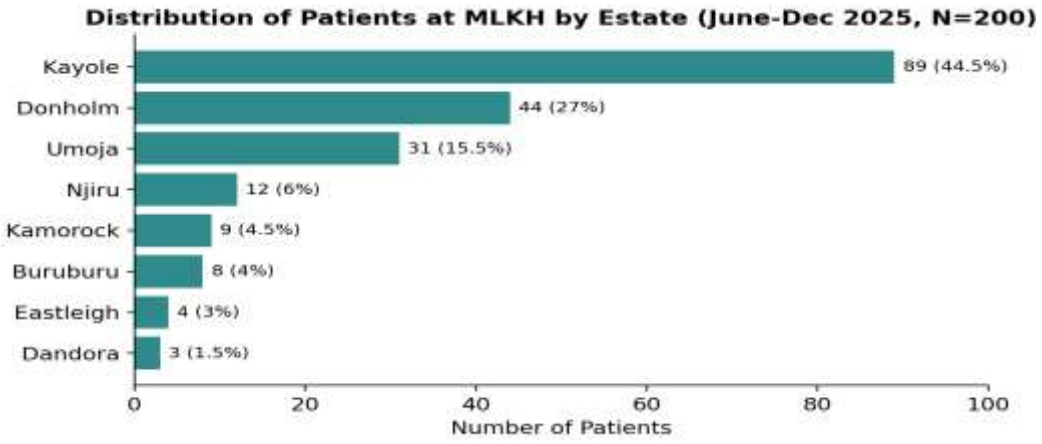

Figure 3: Distribution of Patients at MLKH by Estate (June-Dec 2025, N=200)

Source: (MLKH Records, 2025)

Majority of the patients attending MLKH 44.5% comes from Kayole followed by Donholm 27% , Dondora accounts for 1.5% of the patients attending the Hospital during that period. Table 2 presents the attendance per estate.

4.3 Sex-Based Distribution of H. pylori Infection

Among the 81 male participants, 13 (16%) tested positive for H. pylori, compared to 47 (39%) out of 119 females. The difference in prevalence between males and females was statistically significant ($\chi^2 = 4.27$; $p = 0.039$). Table 2 presents the sex-stratified distribution of H. pylori infection.

Table 3: Sex-Based Distribution of H. pylori Infection

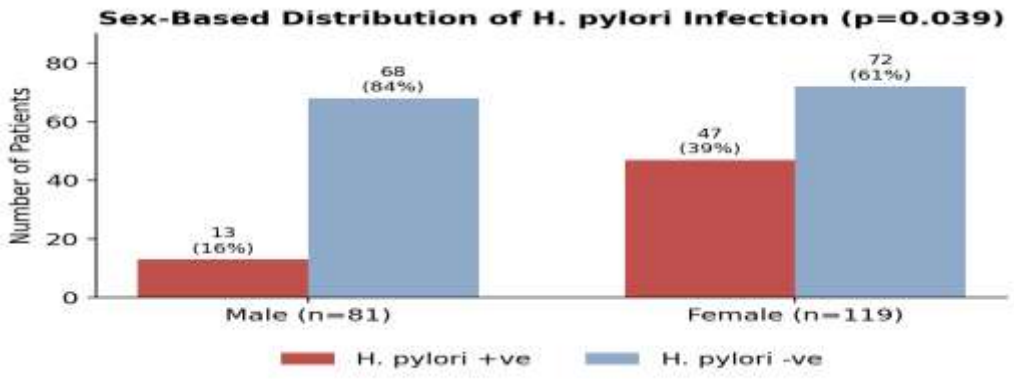

Figure 4: Sex-Based Distribution of H. pylori Infection

Source (field data, 2025) *Statistically significant at $p<0.05$ (Chi-square test)*

4.4 Age-Based Distribution of H. pylori Infection

The prevalence of H. pylori infection varied significantly across age groups ($\chi^2 = 12.34$; $p = 0.015$). The highest prevalence was observed in the 18-37year age group (67.3%), followed by the 38-47 years group (60.7%). A declining trend was noted in older age groups, with the lowest prevalence recorded among patients aged >58 years (41.7%). Table 3 provides a detailed breakdown.

Table 4: Age-Based Distribution of H. pylori Infection

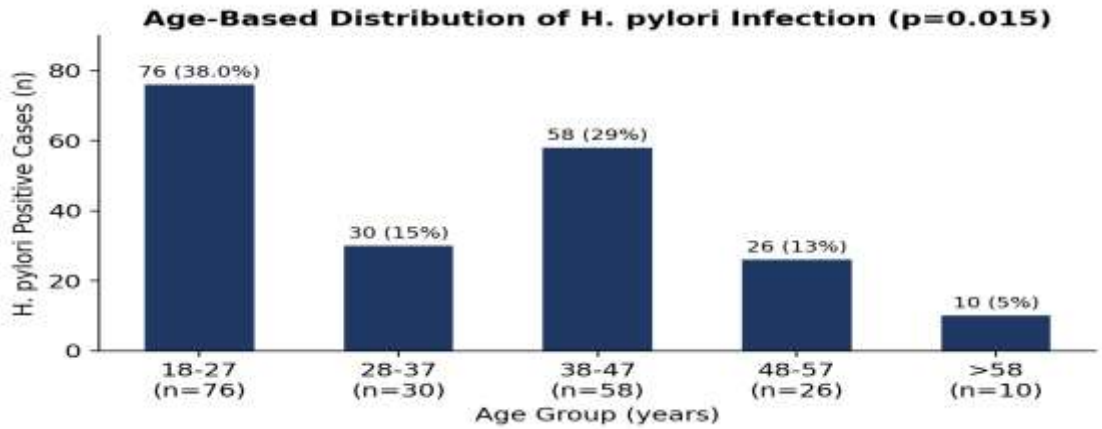

Figure 5: Age-Based Distribution of H. pylori Infection

Sources: (field data , 2025) *Statistically significant at p<0.05 (Chi-square test)*

4.5. Regression Analysis

Binary logistic regression revealed that male sex (OR = 1.52; 95% CI: 1.02-2.26; p = 0.041) and age group 18-27 years (OR = 1.89; 95% CI: 1.17-3.06; p = 0.009) were independently associated with increased odds of H. pylori infection after controlling for confounders. Older age (>58 years) was associated with reduced odds of infection (OR = 0.54; 95% CI: 0.29-0.98; p = 0.044).

5. Discussion

The study reports a high overall prevalence of H. pylori infection (58.4%) among symptomatic patients attending Mama Lucy Kibaki Level 5 Hospital. This finding is consistent with previously reported prevalence rates in Kenya and the broader Sub-Saharan African region, which range from 50% to 86% (Ochwoto et al., 2018; Ndip et al., 2004). The high burden can be attributed to the predominantly low socioeconomic status of the hospital catchment population, high population density in Nairobi's peri-urban areas, and limited access to clean water and improved sanitation factors that are established risk factors for H. pylori acquisition (Hooi et al., 2017).

The significantly higher prevalence of H. pylori among female patients (63.2%) compared to male (55.1%) observed in this study aligns with findings from comparable African studies. In a study conducted in Uganda, Ocama et al. (2015) similarly reported higher H. pylori seropositivity among males. The biological basis for sex-based differences in H. pylori infection is not yet fully established; however, proposed mechanisms include differences in immune regulation modulated by sex hormones, with oestrogen potentially conferring a degree of mucosal protection in females. Additionally, males in sub-Saharan African settings tend to engage more frequently in behaviours associated with H. pylori risk, including alcohol consumption, smoking, and delayed health-seeking (Muhsen & Levine, 2012).

The finding that the 18-47 year age group had the highest H. pylori prevalence (53.%) is noteworthy. This age bracket represents a productive working-age population that may be more exposed to transmission opportunities in densely populated urban environments. The slight decline in prevalence observed in older age groups (>58 years) may reflect a cohort effect, natural clearance of infection over time, or prior antibiotic exposure for unrelated conditions resulting in inadvertent eradication. Similar age-based patterns have been documented in Ethiopia (Moges et al., 2020) and Nigeria (Aje et al., 2010), where peak infection rates were recorded in patients aged between 18 and 37 years.

Importantly, even the youngest age group (18-27 years) exhibited a prevalence of 38.7%, suggesting early acquisition of infection possibly in childhood consistent with the recognized pattern of H. pylori transmission occurring predominantly in early life through the faecal-oral or oral-oral route. This underscores the importance of early preventive and screening strategies targeting younger adults as well.

The logistic regression findings further confirm that both male sex and age group 18-37 years are independent predictors of H. pylori infection. These results provide a strong evidence base for the development of targeted screening projects at MLKH and similar public hospitals serving low-income urban populations in Kenya.

5.1. Study Limitations

The study had several limitations. As a single centre, hospital-based cross-sectional design, the findings may not be fully generalizable to the broader Kenyan population. Selection bias towards more symptomatic individuals presenting to hospital may inflate the estimated prevalence compared to community-based studies. Additionally, while both stool antigen testing and RUT were used, the absence of confirmatory endoscopic biopsy histology or culture for all patients may have introduced some diagnostic misclassification.

6. Conclusion

Helicobacter pylori infection is highly prevalent among symptomatic patients attending Mama Lucy Kibaki Level 5 Hospital, with age and sex emerging as statistically significant demographic determinants. Males and patients in the 18-37 year age group bear the greatest burden of infection. These findings highlight the need for targeted H. pylori screening projects in public hospitals serving high-risk urban populations in Kenya.

6.1. Recommendation

Integration of H. pylori testing into routine clinical care for dyspeptic patients, coupled with affordable eradication regimens and patient education on hygiene and transmission prevention, is recommended. Future multi centre community-based studies are warranted to validate these findings and inform national policy on H. pylori management.

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