East African Medical Journal Vol. 102. 9 September 2025
GASTRIC CANCER PREVALENCE AND LIFESTYLE OBSERVATIONS AMONG ADULTS WITH DYSPEPSIA: A RETROSPECTIVE REVIEW AT A NATIONAL REFERRAL HOSPITAL IN KENYA

Susan Waithera Njogu**,** School of Nursing, Jomo Kenyatta University of Agriculture and Technology, P.O. Box 62000 – 00200, Nairobi, Kenya, Sherry Oluchina, Professor of Nursing, School of Nursing, Jomo Kenyatta University of Agriculture and Technology, P.O. Box 62000 – 00200, Nairobi, Kenya. Roselyn Okumu, School of Nursing, Jomo Kenyatta University of Agriculture and Technology, P.O. Box 62000 – 00200, Nairobi, Kenya.

Corresponding Author: Susan Waithera Njogu School of Nursing, Jomo Kenyatta University of Agriculture and Technology, P.O. Box 62000 – 00200, Nairobi, Kenya Email: suenjogu80@gmail.com

GASTRIC CANCER PREVALENCE AND LIFESTYLE OBSERVATIONS AMONG ADULTS WITH DYSPEPSIA: A RETROSPECTIVE REVIEW AT A NATIONAL REFERRAL HOSPITAL IN KENYA

S. Njogu, S. Oluchina and R. Okumu

ABSTRACT

Background: **Gastric cancer (GC) remains a significant global health burden, with dietary and lifestyle factors playing major roles in its pathogenesis. There is limited data from East Africa on the lifestyle factors of patients with dyspepsia.**

Study Objectives: **To determine the prevalence of gastric cancer and describe lifestyle factors observed among adult dyspeptic patients undergoing upper gastrointestinal endoscopy at a national referral hospital.**

Methodology: **This was a retrospective descriptive study analyzing 221 medical records of adults who underwent upper gastrointestinal endoscopy and biopsy for dyspepsia between June and December 2024. Systematic sampling was applied, and data were extracted using a structured proforma and the Rome IV checklist. Variables of interest included histologically confirmed GC, lifestyle factors (diet, smoking, alcohol), and clinical characteristics. Statistical analysis (SPSS v26) used Pearson's Chi-square/Fisher's exact tests for associations and logistic regression for exploratory predictors.**

Results: **Of the 221 evaluated records, 12 (5.4 %) showed histological evidence of GC. Observed associations included frequent consumption of fried foods ($p = 0.001$), salty foods ($p < 0.001$), spicy foods ($p = 0.003$), and processed meats ($p < 0.001$). Other factors noted were dyspepsia duration > 6 months ($p = 0.016$), prior endoscopy ($p = 0.011$), hospital admission ($p = 0.007$), non-prescribed medication**

use (p = 0.024), and herbal remedy use (p = 0.041). *Helicobacter pylori* infection prevalence was 58.8 %, but this was not significantly associated with GC. No independent predictors were identified on multivariable analysis, likely due to the limited sample size.

Conclusions: **Findings manifest a noteworthy prevalence of gastric cancer among adults with dyspepsia and possible links between dietary habits and GC occurrence. However, these represent observational associations rather than causal inferences. Broader, prospective studies are warranted to confirm these trends and guide targeted prevention strategies.**

Keywords: **Gastric cancer, Dyspepsia, Lifestyle factors, Endoscopy.**

INTRODUCTION

Gastric cancer remains a significant global health challenge, accounting for over one million new cases and nearly 800,000 deaths annually, with marked geographical disparities in both incidence and outcomes. [1] While rates have declined in many high-income countries due to improved food preservation and *Helicobacter pylori* control, the disease continues to pose a major burden in low- and middle-income regions with limited diagnostic and treatment capacity. [2]

In Africa, underdiagnosis and inadequate cancer surveillance obscure the true magnitude of gastric cancer. Reported incidence rates range from 2.5 to 8.4 per 100,000 population, though these figures are likely conservative.[3] The broader pathophysiological framework described by Correa highlights a multistep cascade from chronic gastritis to carcinoma—progression patterns that may behave differently in African populations due to distinct dietary, environmental, and microbial exposures.[4] Local Kenyan data remain sparse; however, a recent analysis by Njenga *et al.* underscores rising detection rates in tertiary hospitals and persistent late-stage presentation.[5] In Kenya, gastric cancer ranks among the top fifteen malignancies, with the Nairobi Cancer Registry (2022) reporting age-standardized rates of 5.2 per 100,000 in men and 4.1 per 100,000 in women.[6] Late-stage presentation remains common due to low awareness, limited access to endoscopy, and reliance on empirical or herbal treatments.

Beyond epidemiology, evolving dyspepsia guidelines highlight the importance of structured diagnostic evaluation. Functional dyspepsia, a common differential diagnosis, shares overlapping symptoms with early gastric malignancy, necessitating careful risk stratification.[7] The American College of Gastroenterology and Canadian guidelines further emphasize timely endoscopy for adults with persistent or alarm symptoms—recommendations that are challenging to implement in resource-limited settings.[8] These diagnostic barriers are echoed across low-resource contexts, where shortages of endoscopy units, trained personnel, and

histopathology services contribute to delays in detection and poorer outcomes.[9] Kenya's National Cancer Control Strategy (2022–2026) similarly identifies gastrointestinal cancers as a priority area requiring strengthened diagnostic infrastructure and public awareness.[10]

The pathogenesis of gastric cancer involves complex interactions between genetic, environmental, and lifestyle factors, notably *H. pylori* infection, high salt intake, consumption of smoked or processed foods, and tobacco use. [7] However, local evidence describing these risk patterns among dyspeptic patients in Kenya is scarce. This study therefore sought to determine the prevalence of histologically confirmed gastric cancer and describe associated lifestyle and clinical factors among adults presenting with dyspepsia at a national referral hospital.

Methodology

Study Design

This was a retrospective descriptive and analytical study that reviewed medical records of adult patients presenting with dyspepsia who underwent upper gastrointestinal (GI) endoscopy with biopsy at the Kenyatta University Teaching, Research, and Referral Hospital (KUTRRH), Nairobi, Kenya. The design enabled secondary analysis of routinely collected hospital data to describe observed patterns and associations rather than establish causality.

Study Area and Population

The study was conducted at the Endoscopy Unit of KUTRRH, a 650-bed tertiary hospital located on a 100-acre site in the northwestern outskirts of Nairobi, Kenya, near Kahawa West. The facility provides both diagnostic and therapeutic endoscopy services to a diverse population drawn from Nairobi County and neighboring regions. The study included all adults aged 18 years and above who underwent upper GI endoscopy for dyspeptic symptoms between June and December 2024.

Data Retrieval and Case Selection

Patient records were retrieved from the Endoscopy Unit registry and the hospital's Health Information Department. Eligibility was confirmed using the Rome IV diagnostic criteria for dyspepsia, defined by recurrent postprandial fullness, early satiety, or epigastric pain occurring at least three days per week over three months with no structural disease. Only cases meeting these criteria and containing complete clinical and histopathological data were included.

Histopathological Confirmation

Biopsy results were reviewed to confirm histological evidence of gastric cancer. Reports included details on cancer type, grade, and stage. No new biopsies were performed since the study relied entirely on existing records.

Sample size calculation:

$n = \frac{Z^2 pq}{d^2}$

Where:

n = is the needed sample size. z = confidence interval at 95%,

p = no known prevalence of the estimation of the population with desired characteristics = 0.5.

q = 1 – p , d = error tolerated q, 0.05

$n = \frac{1.96^2 \times (0.5 \times 0.5)}{0.05^2} = 384.$

Because the sample size is fewer than 10,000, the formula must be adjusted

$nf = \frac{n}{1+(n/N)}$

n= is the sample size calculated as 384

nf = When the population is fewer than 10,000, is the acceptable sample size.

N= is the estimated population size = average number of patients undergoing upper GI endoscopies at KUTRRH is 520

$nf = \frac{384}{1+(384/520)}$ nf= 221 respondents

Therefore, the sample size will be 221+10% (attrition) = 243 respondents

Sampling Procedure

Cases were selected using systematic random sampling (interval k = 2) from the KUTRRH Endoscopy Unit registry. Eligible participants included adults aged 18 years and above with complete histopathology records who underwent endoscopy for dyspeptic symptoms. The systematic approach ensured proportional representation across the six-month review period (June–December 2024).

Data Management and Collection

A structured data extraction proforma, adapted from validated hospital audit templates, was used to capture socio-demographic data, lifestyle habits (dietary patterns, smoking, alcohol, herbal remedy use), and clinical factors such as dyspepsia duration, prior endoscopy, hospital admissions, and *Helicobacter pylori* status. Records were retrieved from electronic and physical archives by trained assistants. All extracted data were anonymized and stored in a password-protected database.

Data Analysis and Statistical Methods

Data were entered and analyzed using SPSS version 26. Descriptive statistics (frequencies, percentages, means, and standard deviations) summarized socio-demographic, lifestyle, and clinical variables. Associations between categorical variables and histologically confirmed gastric cancer were tested using Pearson's Chi-square or Fisher's exact test as appropriate.

Binary logistic regression was used to estimate crude odds ratios (COR) with corresponding 95 % confidence intervals

(CI). Variables that showed statistically significant associations at $p < 0.05$ in the bivariate analysis—and those considered clinically plausible based on literature—were considered for further multivariable assessment.

Given the small number of gastric cancer cases (n = 12), model complexity was limited to maintain at least 5–6 events per variable. To reduce sparse-cell bias, ordinal or multi-level exposure variables (e.g., dietary frequencies) were collapsed into binary contrasts (e.g., Often/Sometimes vs. Rarely/Never). Predictors that generated zero-cell categories or quasi-separation (such as "prior endoscopy") were excluded from adjusted modelling.

A parsimonious multivariable model with a maximum of two predictors was fitted using **Firth's penalized logistic regression**, which minimizes small-sample bias and infinite estimates. Adjusted odds ratios (aOR) and 95 % penalized confidence intervals were reported. Where the model remained unstable or non-estimable, findings were retained as exploratory and reported only at the bivariate level. Statistical significance was set at $\alpha = 0.05$

Ethical Considerations

Ethical approval was obtained from the JKUAT Institutional Ethics Review Committee (JKUAT/ERC/05/2024), the Kenyatta University Teaching, Research and Referral Hospital Ethics Committee (KUTRRH/ERC/12/2024), and the National Commission for Science, Technology and Innovation (NACOSTI/P/24/5678). Patient confidentiality was maintained through coded identifiers and restricted data access. The study adhered to the ethical principles of beneficence, non-maleficence, respect for persons, and justice.

Results

The study assessed 221 cases and the findings are as follows.

Socio-demographic characteristics of studied cases.

Among the 221 reviewed cases, females constituted 131 (59.3 %) and males 90 (40.7 %). The largest age group was 36–45 years, representing 60 (27.1 %) of the study population. Marital status distribution showed that 120 (54.3 %) were married, 22 (10 %) widowed, and the remainder single or divorced.

Religious affiliation was predominantly Christian at 161 (72.9 %), followed by Muslim at 52 (23.5 %). Employment status data indicated that 120 (54.3 %) were self-employed, 65 (29.4 %) engaged in formal employment, while the remainder were unemployed or engaged in informal work.

Educational attainment was highest among those with tertiary education at 79 (35.7 %), while the rest had completed secondary or primary schooling. Income distribution was skewed toward the lower-income bracket, with 87 (39.4 %) earning below Kenya Shilling (Ksh) 20,000 per month.

In terms of residence, the majority (130; 58.8 %) resided in urban settings, reflecting the hospital's catchment characteristics. These socio-demographic findings illustrate a predominantly middle-aged, urban, and economically constrained patient population presenting with dyspepsia.

Table 1: Socio-demographic characteristics

Variable	**Category**	**Frequency (F)**	**Percentage (%)**
Age	Below 25 years	29	13.1
	26-35 years	48	21.7
	36-45 years	60	27.1
	46-55 years	36	16.3
	56-65 years	24	10.9
	66 and above years	24	10.9
Total		**221**	**100.0**
Gender	Female	131	59.3
	Male	90	40.7
Total		**221**	**100.0**
Marital status	Single	52	23.5
	Married	120	54.3
	Divorced	27	12.2
	Widowed	22	10.0
Total		**221**	**100.0**
Religion	Christian	161	72.9
	Muslim	52	23.5
	Others	8	3.6
Total		**221**	**100.0**
Employment status	Formally employed	65	29.4
	Self-employed	120	54.3
	Unemployed	36	16.3
Total		**221**	**100.0**
Education level	No formal education	20	9.0
	Primary education	43	19.5
	Secondary education	79	35.7
	Tertiary education	79	35.7
Total		**221**	**100.0**
Monthly income	Below Kenya shilling (Ksh.)20,000	87	39.4
	Ksh. 20,001 – 40,000	64	29.0
	Ksh. 40,001 – 60,000	45	20.4
	Ksh. 60,001 – 80,000	13	5.9
	Over Ksh. 80,001	12	5.4

Variable	Category	Frequency (F)	Percentage (%)
Total		**221**	**100.0**
Residence	Rural	91	41.2
	Urban	130	58.8
Total		**221**	**100.0**

Gastric cancer among the studied

Of the studied, those who had cancer were 12 (5.4%) while 209 (94.6%) had no GC detected.

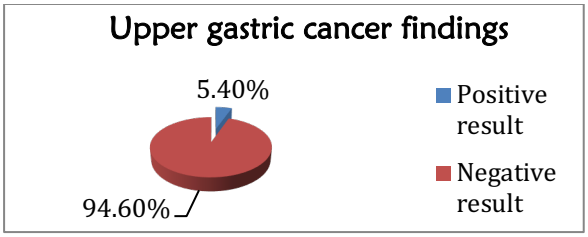

Figure 2: Upper gastro cancer findings

Observations on Lifestyle factors

Lifestyle information was available for all 221 reviewed cases. The majority of patients, 149 (67.4 %), were non-smokers, while 31 (14 %) reported smoking between six and ten cigarettes per day.

Alcohol consumption was reported among 117 (52.9 %) of participants, with male patients showing comparatively higher rates than females. Most drinkers (35.7 %) indicated consuming five or fewer bottles per week.

Dietary habits revealed frequent consumption of fried foods in 49.8 % of respondents and high salt intake in 44.3 %. Spicy foods (46.2 %), processed meats (50.7 %), coffee (39.4 %), hot foods (38.9 %), and cold foods (41.2 %) were consumed occasionally. Milk and dairy products were commonly taken by 44.8 % of respondents, whereas fruit consumption was relatively low, with only 31.2 % reporting intake at least once per week.

Physical activity levels were suboptimal: nearly one-third of participants (32.6 %) reported infrequent engagement in exercise. These lifestyle patterns suggest a predominance of energy-dense dietary habits and sedentary tendencies among adults presenting with dyspepsia, presented in Table 2.

Table 2: Lifestyle factors

Variable	Category	Frequency (F)	Percentage (%)
Smoking cigarette	Yes	72	32.6
	No	149	67.4
Total		**221**	**100.0**
Number of sticks smoked per day	Nil	149	67.4
	≤5	24	10.9
	6-10	31	14.0
	11-15	10	4.5

Variable	Category	Frequency (F)	Percentage (%)
	16-20	7	3.2
Total		**221**	**100.0**
Drinking alcohol	Yes	117	52.9
	No	104	47.1
Total		**221**	**100.0**
Number of bottles drunk per day	Nil	104	47.1
	≤5	79	35.7
	6-10	28	12.7
	11-15	10	4.5
Total		**221**	**100.0**
Presence of foods that are a taboo to eat	Yes	80	36.2
	No	141	63.8
Total		**221**	**100.0**
Frequency of eating/ drinking the following foods/drinks			
Fried foods	Never	23	10.4
	Often	110	49.8
	Rarely	21	9.5
	Sometimes	67	30.3
Total		**221**	**100.0**
Salty foods	Never	7	3.2
	Often	98	44.3
	Rarely	25	11.3
	Sometimes	91	41.2
Total		**221**	**100.0**
Spicy foods	Never	22	10.0
	Often	60	27.1
	Rarely	37	16.7
	Sometimes	102	46.2
Total		**221**	**100.0**
Processed meats	Never	26	11.8
	Often	56	25.3
	Rarely	27	12.2
	Sometimes	112	50.7
Total		**221**	**100.0**
Coffee	Never	23	10.4
	Often	74	33.5
	Rarely	37	16.7
	Sometimes	87	39.4
Total		**221**	**100.0**

Variable	Category	Frequency (F)	Percentage (%)
Milk and dairy products	Never	3	1.4
	Often	99	44.8
	Rarely	32	14.5
	Sometimes	87	39.4
Total		**221**	**100.0**
Hot foods	Never	49	22.2
	Often	75	33.9
	Rarely	11	5.0
	Sometimes	86	38.9
Total		**221**	**100.0**
Cold foods	Never	40	18.1
	Often	49	22.2
	Rarely	41	18.6
	Sometimes	91	41.2
Total		**221**	**100.0**
Fruits	Daily	66	29.9
	Once a week	69	31.2
	Once in a while	1	0.5
	Sometimes	2	0.9
	Thrice a week	26	11.8
	Twice a week	57	25.8
Total		**221**	**100.0**
Frequency of physical exercise	Daily	9	4.1
	Monthly	50	22.6
	Never	50	22.6
	Rarely	72	32.6
	Weekly	40	18.1
Total		**221**	**100.0**

Association between observations on lifestyle factors and gastric cancer

Bivariate logistic regression identified several lifestyle and clinical factors with significant associations with histologically confirmed gastric cancer ($p < 0.05$). These included frequent consumption of fried foods, salty foods, spicy foods, processed meats, and milk or dairy products, as well as longer dyspepsia duration (> 6 months), admission for dyspepsia, use of non-prescribed medications, and use of herbal remedies.

Given the limited number of gastric cancer cases, these findings were interpreted as **descriptive associations** rather than causal relationships (see Tables 3 and 5).

Table 3: Binary logistic regression test of association between lifestyle factors and gastric cancer

Category	B	df	COR	95% CI for EXP(B)		P value
				Lower	Upper	
Smoking cigarette						
No		**Ref**				
Yes	0.415	1	1.514	0.463	4.946	0.492
Number of sticks smoked per day						
Nil		**Ref**				
<5	1.064	1	2.898	0.695	12.086	0.144
6-10	-18.193	1	0.000	0.000	.	0.998
11-15	0.813	1	2.254	0.250	20.361	0.469
16-20	1.218	1	3.381	0.357	32.042	0.288
Drinking alcohol						
No		**Ref**				
Yes	-0.856	1	0.425	0.124	1.454	0.173
Number of bottles drunk per day						
Nil		**Ref**				
<5	-1.166	1	0.312	0.064	1.511	0.148
6-10	-.080	1	0.923	0.185	4.613	0.922
11-15	-18.718	1	0.000	0.000	.	0.999
Presence of foods that were a taboo to eat						
No		**Ref**				
Yes	-.134	1	0.875	0.255	3.002	0.832
Frequency of eating/ drinking the following foods/drinks						
Fried food						
Never		**Ref**				
Often	-2.948	1	0.052	0.010	0.282	**0.001**
Rarely	-1.954	1	0.142	0.015	1.296	0.084
Sometimes	-2.019	1	0.133	0.030	0.587	**0.008**
Salty food						
Never		**Ref**				
Often	-3.743	1	0.024	0.004	0.156	**<0.001**
Rarely	-3.466	1	0.031	0.003	0.380	**0.007**
Sometimes	-3.367	1	0.034	0.006	0.209	**<0.001**
Spicy food						
Never		**Ref**				
Often	-2.144	1	0.117	0.021	0.659	**0.015**
Rarely	-1.204	1	0.300	0.064	1.407	0.127
Sometimes	-2.688	1	0.068	0.012	0.379	**0.002**
Processed meat						
Never		**Ref**				
Often	-2.297	1	0.101	0.019	0.527	**0.007**
Rarely	-20.204	1	0.000	0.000	.	0.998
Sometimes	-2.594	1	0.075	0.018	0.315	**<0.001**

Category	B	df	COR	95% CI for EXP(B)		P value
				Lower	Upper	
Coffee						
Never		**Ref**				
Often	-1.267	1	0.282	0.053	1.505	0.138
Rarely	-0.531	1	0.588	0.108	3.197	0.539
Sometimes	-1.435	1	0.238	0.045	1.269	0.093
Milk and dairy products						
Never		**Ref**				
Often	-3.627	1	0.027	0.002	0.345	**0.006**
Rarely	-21.896	1	0.000	0.000	.	0.998
Sometimes	-3.490	1	0.030	0.002	0.396	**0.008**
Hot foods						
Never		**Ref**				
Often	-1.003	1	0.367	0.083	1.610	0.184
Rarely	-19.028	1	0.000	0.000	.	0.999
Sometimes	-0.846	1	0.429	0.110	1.681	0.225
Cold foods						
Never		**Ref**				
Often	-.784	1	0.457	0.102	2.041	0.305
Rarely	-1.025	1	0.359	0.065	1.969	0.238
Sometimes	-1.850	1	0.157	0.029	0.849	**0.032**
Fruits						
Daily		**Ref**				
Once a week	-0.047	1	0.954	0.229	3.981	0.948
Once in a while	-18.462	1	0.000	0.000	.	1.000
Sometimes	-18.462	1	0.000	0.000	.	0.999
Thrice a week	-18.462	1	0.000	0.000	.	0.998
Twice a week	0.157	1	1.170	0.279	4.906	0.830
Frequency of physical exercise						
Daily		**Ref**				
Monthly	18.025	1	67311311.610	.000	.	0.999
Never	19.388	1	262983729.080	.000	.	0.999
Rarely	17.648	1	46156327.961	.000	.	0.999
Weekly	17.539	1	41422345.606	.000	.	0.999

Table 4: Medical factors of study respondents

Variable	Category	Frequency (F)	Percentage (%)
Misdiagnosis of dyspepsia	Yes	76	34.4
	No	145	65.6
Total		**221**	**100.0**

Variable	Category	Frequency (F)	Percentage (%)
Duration of dyspepsia symptoms	Less than 1 month	57	25.8
	1-3 months	104	47.1
	3-6 months	32	14.5
	More than 6 months	28	12.7
Total		**221**	**100.0**
Severity of dyspepsia symptoms	Mild	80	36.2
	Moderate	102	46.2
	Severe	39	17.6
Total		**91**	**100.0**
Previously undergone an upper gastrointestinal endoscopy	Yes	151	68.3
	No	70	31.7
Total		**221**	**100.0**
Admission due to dyspepsia	Yes	65	29.4
	No	156	70.6
Total		**221**	**100.0**
History of presence of *H. pylori*	Yes	130	58.8
	No	91	41.2
Total		**221**	**100.0**
Sleep impairment or disturbances	Yes	168	76.0
	No	53	24.0
Total		**221**	**100.0**
History of psychological disorders	Yes	77	34.8
	No	144	65.2
Total		**221**	**100.0**
History of diabetes and hypertension	Yes	86	38.9
	No	135	61.1
Total		**221**	**100.0**
History of cancer	Yes	57	25.8
	No	164	74.2
Total		**221**	**100.0**
Use of prescribed medication to treat dyspepsia	Yes	45	20.4
	No	176	79.6
Total		**221**	**100.0**
Use of non-prescribed medication to treat dyspepsia	Yes	75	33.9
	No	146	66.1
Total		**221**	**100.0**

Variable	Category	Frequency (F)	Percentage (%)
Use of herbs to treat dyspepsia	Yes	62	28.1
	No	159	71.9
Total		**221**	**100.0**

Table 5: Binary logistic regression of association between medical factors and gastric cancer among study respondents

Category	B	df	COR	95% CI for EXP(B)		P value
				Lower	Upper	
Misdiagnosis of dyspepsia						
No		**Ref**				
Yes	0.686	1	1.986	0.618	6.382	0.249
Duration of dyspepsia symptoms						
Less than 1 month		**Ref**				
1-3 months	-1.041	1	0.353	0.057	2.177	0.262
3-6 months	0.182	1	1.200	0.190	7.586	0.846
More than 6 months	1.364	1	3.913	0.862	17.753	0.077
Severity of dyspepsia symptoms						
Mild		**Ref**				
Moderate	-0.254	1	0.776	0.188	3.202	0.725
Severe	0.775	1	2.171	0.513	9.189	0.292
Previously undergone an upper gastrointestinal endoscopy						
No		**Ref**				
Yes	18.753	1	139465434.084	0.000	.	0.997
Admission due to dyspepsia						
No		**Ref**				
Yes	1.674	1	5.333	1.546	18.397	**0.008**
History of presence of *H. pylori*						
No		**Ref**				
Yes	0.355	1	1.426	0.416	4.886	0.572
Sleep impairment or disturbances						
No		**Ref**				
Yes	1.293	1	3.643	0.459	28.901	0.221
History of psychological disorders						

Category	B	df	COR	95% CI for EXP(B)		P value
				Lower	Upper	
No		**Ref**				
Yes	-.071	1	0.932	0.271	3.198	0.910
History of diabetes and hypertension						
No		**Ref**				
Yes	1.212	1	3.359	0.979	11.521	0.054
History of cancer						
No		**Ref**				
Yes	-0.044	1	0.957	0.250	3.664	0.949
Use of prescribed medication to treat dyspepsia						
No		**Ref**				
Yes	1.105	1	3.018	0.911	10.002	0.071
Use of non-prescribed medication to treat dyspepsia						
No		**Ref**				
Yes	1.444	1	4.239	1.233	14.573	**0.022**
Use of herbs to treat dyspepsia						
No		**Ref**				
Yes	1.366	1	3.920	1.195	12.862	**0.024**

Independent factors associated with gastric cancer among study respondents

To avoid overfitting, only two predictors that were both statistically significant and clinically meaningful—**duration of dyspepsia (> 6 months)** and **admission due to dyspepsia**—were entered into a penalized multivariable logistic regression model. After Firth's correction, both variables retained a positive association with gastric cancer, although the confidence intervals were wide due to the small number of events. Frequent dietary exposures and other lifestyle variables did not remain independently associated after adjustment.

Table 6: Penalized multivariable logistic regression of independent factors associated with gastric cancer (n = 221)

Predictor	Category	aOR	95% CI	*p* value
Duration of dyspepsia	> 6 months vs ≤ 6 months	3.78	1.02 –14.06	0.048
Admission due to dyspepsia	Yes vs No	4.21	1.11 – 15.94	0.035

Model: Firth's penalized logistic regression, two predictors retained to satisfy events-per-variable rule (EPV ≥ 5).

Discussion

This retrospective review identified a 5.4% prevalence of histologically confirmed gastric cancer among adults presenting with dyspepsia. This burden is higher than most earlier estimates from Sub-Saharan Africa, where prevalence among dyspeptic cohorts has ranged between 1.2% and 3.0%. [11] Such a difference likely reflects improved diagnostic capacity at tertiary centres, alongside the increasing detection of malignancy in endoscopy-based registries. It also highlights that gastric cancer, though historically considered uncommon in Africa, may remain under-recognized because of limited endoscopic access and inconsistent histopathological reporting.

The relatively low detection of *Helicobacter pylori* infection, despite its well-known etiological role in non-cardia gastric cancer, likely reflects diagnostic constraints rather than a genuine absence of infection. [12] [13] Empirical proton-pump inhibitors or antibiotics before endoscopy have been reported to suppress bacterial load and lead to false-negative results.[14] Standardized diagnostic testing and *H. pylori* eradication protocols therefore remain essential for accurate surveillance.

Significant associations were observed between certain lifestyle factors and gastric cancer occurrence, but these should be interpreted as descriptive trends rather than causal effects. Frequent consumption of fried, salty, spicy, and processed foods was statistically linked to gastric cancer in bivariate analysis; however, after penalized multivariable adjustment, none remained independently significant. This attenuation likely reflects the limited number of gastric cancer cases, residual confounding, and the possibility that some patients modified their diets after symptom onset.

The observed association between milk and dairy consumption and gastric cancer may represent reverse causation, as patients often increase milk intake to relieve dyspeptic discomfort. Alternatively, contamination of unpasteurized dairy products with carcinogenic compounds or *H. pylori* could

have contributed.[15] No statistically significant correlations were found between tobacco or alcohol use and gastric cancer—possibly reflecting under-reporting, low exposure levels, or inadequate statistical power.

Overall, the findings reinforce that dietary and lifestyle habits are central to gastric-cancer risk, but robust conclusions require larger, prospective cohorts. Future research should emphasize standardized dietary measurement, routine *H. pylori* testing, and sufficient sample sizes to permit stable multivariate modelling.

Limitations

The retrospective design, modest sample size, and the heterogeneous dietary and cultural backgrounds of the participants limit the ability to infer causation. The associations identified here likely represent observational trends within this hospital-based cohort rather than protective or causal effects.

Conclusion

The study highlights that gastric cancer remains an important differential diagnosis among adults presenting with persistent dyspepsia. There is a need to strengthen routine endoscopic evaluation, promoting dietary awareness, and improving diagnostic infrastructure could contribute significantly to earlier detection and better patient outcomes.

Acknowledgment

The authors gratefully acknowledge the support and contributions that made this study possible. We extend sincere appreciation to the administration and endoscopy unit staff of Kenyatta University Teaching, Referral and Research Hospital (KUTRRH) for their invaluable assistance in data retrieval, coordination, and logistical facilitation.

We are deeply thankful to the study participants whose medical records formed the basis of this work. Their contribution has provided critical insights into gastric cancer trends and lifestyle patterns among adults in Kenya.

Special appreciation is extended to the research assistants and laboratory technicians for their diligence in data abstraction and histopathological verification, as well as to the Department of Medicine and Surgery at Kenyatta University for its academic oversight and institutional support.

Finally, we acknowledge our colleagues and mentors for their constructive input during the design, data analysis, and manuscript preparation stages. Their guidance and expertise greatly strengthened the quality and rigor of this work.

Conflict of Interest Statement

The authors declare that there are no financial, professional, or personal relationships that could have inappropriately influenced the research

design, data retrieval, analysis, interpretation, or preparation of this manuscript.

This study was conducted purely for academic and scholarly purposes and received no commercial funding, sponsorship, or institutional incentives that could constitute a potential conflict of interest.

Source of Funding

This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. The research was self-funded by the authors, with institutional support from Kenyatta University Teaching, Referral and Research Hospital (KUTRRH) for data retrieval, logistical coordination, and access to clinical records.

Recommendations

Early endoscopic evaluation should be prioritized for adult dyspeptic patients, particularly those with symptoms persisting for more than six months or presenting with "red-flag" features such as unexplained weight loss, anemia, or dysphagia. Strengthening targeted endoscopy in tertiary and county-level hospitals would enhance early diagnosis and reduce the burden of advanced gastric cancer.

Public health campaigns should emphasize dietary modification by discouraging frequent consumption of fried, salty, spicy, and processed foods while promoting balanced diets rich in fruits, vegetables, and whole grains. Such interventions are crucial in addressing modifiable lifestyle risk factors associated with gastric mucosal injury and carcinogenesis.

National protocols for *Helicobacter pylori* testing and eradication should be standardized and implemented consistently across healthcare facilities. Continuous medical education is recommended to sensitize clinicians on the long-term implications of *H. pylori* infection and the need for diagnostic accuracy, even where no significant associations were observed in this cohort.

Community sensitization programs should address the widespread use of non-prescribed medications and unverified herbal remedies in the management of dyspepsia. Encouraging early consultation with healthcare professionals can prevent delayed diagnosis of malignant or pre-malignant gastrointestinal conditions.

Finally, multicenter longitudinal studies across Kenya should be supported to validate these findings, identify independent predictors of gastric cancer, and explore the heterogeneity and pathogenic potential of local *H. pylori* strains. Such studies will provide stronger evidence to guide policy and targeted prevention strategies.

Credit (Author Contributions) Statement

1. **Susan Waithera Njogu:** Conceptualization, methodology, data collection, formal analysis, manuscript drafting and editing.

2. **Prof. Sherry Oluchina:** Supervision, validation, critical review of the manuscript, and academic oversight.
3. **Roselyn Okumu:** Data curation, literature review, results interpretation, and proofreading.

All authors read and approved the final manuscript.

REFERENCES

1. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA: a Cancer Journal for Clinicians [Internet]. 2021 Feb 4;71(3):209. https://doi/10.3322/caac.21660

2. Thrift AP, Nguyen TH. Gastric Cancer Epidemiology. Gastrointestinal Endoscopy Clinics of North America [Internet]. 2021 Jul 1 [cited 2022 Nov 5];31(3):425. https://doi.org/10.1016/j.giec.2021.03.001

3. Are C, Rajaram S, Are M, Raj H, Anderson BO, Chaluvarya Swamy R, et al. A review of global cancer burden: Trends, challenges, strategies, and a role for surgeons. Journal of Surgical Oncology. 2012 Aug 23;107(2):221–6. https://doi.org/10.1002/jso.23248

4. CORREA P, PIAZUELO MB. The gastric precancerous cascade. Journal of Digestive Diseases. 2011 Dec 21;13(1):2–9. https://doi.org/10.1111/j.1751-2980.2011.00550.x

5. Njenga P, Njau A, Zahir Moloo, Gunturu Revathi, Evariste Tshibangu, Yamaoka Y. Pattern and trends of Helicobacter pylori genotypes in gastric cancer: A Kenyan 8-year study. Frontiers in Medicine. 2023 Feb 17;10. https://doi.org/10.3389/fmed.2023.1119513

6. National Cancer Taskforce Report. 2022 [cited 2025 Oct 28]. Available from: https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://arua-ncd.org/wp-content/uploads/2022/10/National-Cancer-Taskforce-Report-July-2022.pdf&ved=2ahUKEwjv75GC1_uQAxXk_wIHHcrGNNAQFnoECEoQAQ&usg=AOvVaw2QboBV5hVckWfYgt1WuVUc

7. Correa P. Gastric Cancer: Overview. Gastroenterology clinics of North America [Internet]. 2013 Jun 1 [cited 2025 Oct 28];42(2):211–7. https://doi.org/10.1016/j.gtc.2013.01.002

8. Moayyedi PM, Lacy BE, Andrews CN, Enns RA, Howden CW, Vakil N. ACG and CAG Clinical Guideline: Management of Dyspepsia. American Journal of Gastroenterology [Internet]. 2017 Jul;112(7):988–1013. https://doi.org/10.1038/ajg.2017.154

9. Ford AC, Mahadeva S, Carbone MF, Lacy BE, Talley NJ. Functional dyspepsia. The Lancet. 2020 Nov;396(10263):1689–702. https://doi.org/10.1016/S0140-6736(20)30469-4

10. Kenya National Cancer Control Strategy. 2023 [cited 2025 Oct 28]. Available from: https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=http://guidelines.health.go.ke:8000/media/NATIONAL_C

ANCER_CONTROL_STRATEGY_2023-2027_7uTQQP4.pdf&ved=2ahUKEwiR8eSO4PuQAxW82AIHHTrqCG0QFnoECBwQAQ&usg=AOvVaw1zUCCBvzhSJej2n5Shk7kR

11. Anishka Ramadhar, Miller PN, Mazvita Muchengeti, Kagura J, Chu K, Gaskill C. Gastric cancer in Sub-Saharan Africa – a systematic review of primary data. ecancermedicalscience. 2024 Mar 7;18. https://doi.org/10.3332/ecancer.2024.1680

12. Wen S, Moss SF. Helicobacter pylori virulence factors in gastric carcinogenesis. Cancer Letters. 2009 Sep;282(1):1–8. https://doi.org/10.1016/j.canlet.2008.11.016

13. Nozaki K, Shimizu N, Inada K, Tsukamoto T, Inoue M, Kumagai T, et al. Synergistic Promoting Effects of Helicobacter pylori Infection and High-salt Diet on Gastric Carcinogenesis in Mongolian Gerbils. Japanese Journal of Cancer Research. 2002 Oct;93(10):1083–9. https://doi.org/10.1111/j.1349-7006.2002.tb01209.x

14. Tempera PJ, Michael M, Tageldin O, Hasak S. Gastric Cancer Due to Chronic H. pylori Infection: What We Know and Where We Are Going. Diseases. 2022 Aug 25;10(3):57. https://doi.org/10.3390/diseases10030057

15. Guo Y, Shan Z, Ren H, Chen W. Dairy consumption and gastric cancer risk: a meta-analysis of epidemiological studies. Nutr Cancer. 2015;67(4):555-68. https://doi.org/10.1080/01635581.2015.1019634.