

Sero-Prevalence and Factors Associated with *Helicobacter pylori* Infection in a Rural Population in Eastern Uganda: A Community Cross-sectional Study

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Abstract

Background: Globally, 50% or more of the world's population is infected with *Helicobacter pylori* making it the most widely spread bacteria across the world. The low developed countries are more overburdened by *Helicobacter pylori* infection than the developed countries. *H. pylori* infection is associated with duodenal ulcer, chronic atrophic gastritis (CAG), lymphomas, and adenocarcinoma. This study reports the prevalence of *H. pylori* and its associated factors in Eastern Uganda.

Materials and methods: A cross-sectional study involving 275 participants was carried out in eastern Uganda. *H. pylori* serology was done and face to face interviewer-administered questionnaire were used for data collection. Data were entered in Microsoft Excel and imported to Stata version 14 for analysis and a P value of <0.05 was considered statistically significant.

Results: The seroprevalence of *H. pylori* was 27.3% (75/275) with 28.4% (50/176) of the females being positive compared to 25.3% (25/99) of the males. Consumption of animal products (meat, milk, and eggs) was the only statistically significant factor associated with *H. pylori* seropositivity (P <0.001, 95% CI =1.934-4.209, AOR=2.85).

Conclusion: The *H. pylori* seroprevalence is high in eastern Uganda. Consumption of animal products was a positive predictor of infectivity.

Keywords: *Helicobacter pylori* • Animal products • Seroprevalence • Kibuku • Eastern Uganda

Introduction

The initial isolation of *Helicobacter pylori* by Marshal and Warren [1] in 1982 marked not only a critical point in understanding the gastrointestinal tract microbial ecology but also it being a pathogen in a variety of diseases including lymphomas and carcinomas [2] and extra gastrointestinal systemic diseases such as idiopathic urticaria and autoimmune thyroid disease [3]. The fact that half or more of the World's population is infected with *Helicobacter pylori* makes it not only the most widely spread bacteria across the World [4] but also a public health concern. Previous studies have reported this gram-negative bacteria as a cause of chronic gastric inflammation in all infected individuals and have been associated with gastric or duodenal ulcers in 10-55%, low-grade B-cell mucosa-associated lymphoid tissue lymphoma of the stomach (MALToma) [5] in approximately 1% [6], gastric adenocarcinoma

[7], and colorectal cancer [8]. Gastric adenocarcinoma is the third leading cause of cancer deaths Worldwide [2]. Worse still, the global burden of non-cardia gastric cancer attributable to *H. pylori* has increased from 5.2% to 6.2% of all cancers [9].

Although the transmission pathways of *H. pylori* to humans and its reservoirs is still an enigma, current literature suggests that the transmission of *H. pylori* occurs from person to person via the oral-oral, fecal-oral, and gastric-oral routes [10]. Moreover, sexual transmission has also been documented [11]. The survival of *H. pylori* in gastric juices is thought to be facilitated by its motility and four to six unipolar-sheathed flagella it possesses and the urease activity. Whatever the case, close contact plays a major role in transmission. Moreover, although the prevalence of *H. pylori* exceeds 70% in many low and medium income countries, only a small proportion of the population may develop severe symptoms [12]. In many developed countries, the prevalence of *H. pylori* has been declining due to improved standards of living [13]. In developing countries, a lot needs to be done to realize a decline in the prevalence of *H. pylori* and its complications due to low economic status.

Early and frequent screening and detection of *H. pylori* infection may be useful to prevent the development of severe symptoms in a population with a low socioeconomic status.

There is a dearth of literature from eastern Uganda regarding the prevalence of *H. pylori* and its associated factors. The objective of this study was to determine the prevalence of *H. pylori* and its associated factors in Kibuku district, Eastern Uganda.

Materials and Methods

Study design, area of the study and sampling

A cross-sectional study was carried out from May to July 2019 in Kibuku district. Kibuku District is one of the Community Based Education and Research Services (COBERS) sites of Busitema University (Appendix 1). Kibuku District is about 200km on the east of the capital city Kampala in Uganda and is bordered by districts; Pallisa in the north, Budaka to the east, Butaleja to the South, and Namutumba to the west with an estimated population of 202,033 [14]. Kibuku has an adult illiteracy rate of 41.9%, only 29% of the population is within 5km of a public health facility, 1.8% have access to piped water and only 38.7% have proper disposal of solid wastes and 99% of the population live in indecent dwellings [14]. It is envisaged that inaccessibility to safe water and improper disposal of waste are enabling factors for colonization of the gastrointestinal tract by *Helicobacter pylori*.

Data collection

We used the two community outreaches that had been organized to provide outreach services amongst the residents of Kibuku district. Kibuku has two counties; Kibuku and Kabweri. By raffle draw, Kibuku was chosen. Of the six subcounties (Kirika, Kadama, Kabweri, Kagumu, Bulangira and Kibuku) in Kibuku, Kadama subcounty was randomly selected. We mapped out two centres that residents normally go to for outreaches and using village Health teams, outreaches were called on the same day at those different locations. We estimated these camps to attract about 800 in total. 275 participants were systematically selected (138 participants from one site and 137 from the other) to take part in this study. The residents come to these outreach centres to seek various services including HIV testing and counseling,

blood pressure measurements, random blood sugar measurement and treatment of other ailments, and deworming of the children. Using the systematic random sampling, we recruited 275 attendants that had come for the outreach projects. These participants were approached and explained to about the research and for those who were 18years of age and above, written informed consent was sought while for those below informed written assent in addition to written informed consent from their adult care takers. Interviewer administered pretested face-to-face questionnaire, developed by the researchers for this study(supplementary material) was used to collect data.

Detection of *H. pylori*

A volume of 2ml of venous blood was collected into plain vacutainers and the serum was separated by centrifugation and used for detection of *H. pylori* using Healgen immunochromatographic test cards (Xiamen Biotech Co., Ltd, China) [15].

Data processing and analysis

Data collected was double entered and cleaned using Microsoft Excel and imported to Stata version 14 for analysis. Frequency distribution and two-way tables were used to summarise the data. Chi-square (2X2) was applied for the P-value derivation for socio-demographic and risk factors to determine those factors that were significantly associated with *H. pylori* infection. After the univariate descriptive analysis, bivariate analysis was done, and factors that were significant and or had P-value <0.05 were considered for multivariate logistic regression to further examine the association between each the dependent variable and independent variables while controlling for the confounders.

Ethical consideration

The ethical clearance letter was obtained from Busitema University Faculty of Health Sciences Community Based Education, Research and Services Committee and administrative clearance was obtained from Kibuku district. Finally, informed written consent was requested from each participant. Participants below 18 years provided written assent as per the guidelines from Uganda National Council of Science and Technology (UNCST).

Results and Discussion

The seroprevalence of *H.pylori* was 27.3% (75/275) (Figure 1) with 28.4% (50/176) of the females being positive compared to 25.3% (25/99) of the males.

Regarding sociodemographic characteristics, the majority were females at 64% while males made up 36%. The majority were married 73.3%, while 5.1% had divorced and 6.2% lost a spouse. Education level was generally low with 54.5% having gone to primary while 9.3% were illiterate. Furthermore, the parents were lowly educated with 84.6% and 94.1% of the mothers and fathers respectively being either illiterate or ended in primary school. Moreover, 64.5% reported a history of gastrointestinal (GIT) disease in the family while 62% reported GIT disease in themselves. Further, still, 57.1% reported the use of antibiotics in relation to ulcers in the last one month. On bivariate analysis, no factor was significantly associated with *H. pylori* infection. (Table 1).

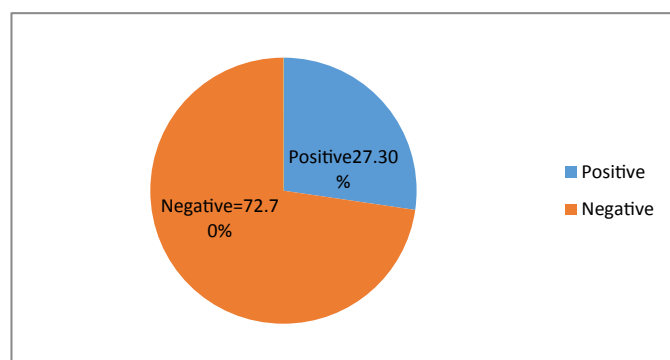


Figure 1: Sero-prevalence of *H. pylori* in Kibuku district.

Table 1: Relationship between demographic characteristics of the 275 participants and *H. pylori* iseroprevalence in Kibuku district.

Demographic characteristics	Frequency (%)	<i>H. Pylori</i> infection		P-value
		Negative N (%)	Positive N (%)	
Sex				0.573
Female	176 (64)	126 (63)	50 (66.7)	
Male	99 (36)	74 (37)	25 (33.3)	
Total	275 (100)	200 (100)	75 (100)	
Age group				0.128
13-24years	42 (15.3)	35 (17.5)	7 (9.3)	
25-36	79 (28.7)	51 (25.5)	28 (37.3)	
37-48	75 (27.3)	55 (27.5)	20 (26.7)	
49-60	50 (18.2)	40 (20)	10 (13.3)	
Above 60 years	29 (10.5)	19 (9.5)	10 (13.3)	
Total	275 (100)	200 (100)	75 (100)	
Marital Status				0.361
Divorced	14 (5.1)	12 (6)	2 (2.7)	
Loss of Spouse	17 (6.2)	11 (5.5)	6 (8.1)	
Married	202 (73.7)	144 (72)	58 (78.4)	
Unmarried	41 (15)	33 (16.5)	8 (10.8)	
Total	274 (100)	200 (100)	74 (100)	
Education level				0.578
A-level	5 (1.8)	4 (2)	1 (1.3)	
Illiterates	26 (9.5)	21 (10.5)	5 (6.7)	
O-level	83 (30.2)	61 (30.5)	22 (29.3)	
Primary	150 (54.5)	108 (54)	42 (56)	
Tertiary	11 (4)	6 (3)	5 (6.7)	
Total	275 (100)	200 (100)	75 (100)	
The education level of Father				0.777
Illiterates	26 (10.2)	20 (10.7)	6 (9)	
O-level	24 (9.4)	18 (9.6)	6 (9)	
Primary	196 (77.2)	142 (75.9)	54 (80.6)	
Tertiary	8 (3.1)	7 (3.7)	1 (1.5)	
Total	254 (100)	187 (100)	67 (100)	
Education of Mother				0.39
Illiterates	38 (15)	30 (16.1)	8 (11.9)	
O-level	10 (4)	8 (4.3)	2 (3)	
Primary	200 (79.1)	143 (76.9)	57 (85.1)	
Tertiary	5 (2)	5 (2.7)	0 (0)	
Total	253 (100)	186 (100)	67 (100)	
Annual income (Uganda shillings)				0.679
≤ 500,000	159 (60.2)	117 (60.9)	42 (58.3)	
500,000-1million	57 (21.6)	38 (19.8)	19 (26.4)	
2m-3million	40 (15.2)	30 (15.6)	10 (13.9)	
4m-5million	6 (2.3)	5 (2.6)	1 (1.4)	
5-6million	2 (0.8)	2 (1)	0 (0)	
Total	264 (100)	192 (100)	72 (100)	
History of gastrointestinal disease in the family				0.713
No	97 (35.5)	72 (36.2)	25 (33.8)	
Yes	176 (64.5)	127 (63.8)	49 (66.2)	
Total	273 (100)	199 (100)	74 (100)	
History of gastrointestinal disease in the individual				0.208
No	103(38.0)	79(40.3)	24(32.0)	
Yes	168(62.0)	117(59.7)	51(68.0)	
Total	271(100)			
Use of antibiotics in relation to ulcers in the last one month				0.757
No	66(42.9)	106 (58.9)	36 (54.5)	
Yes	88(57.1)	74 (41.1)	30 (45.5)	
Total	154 (100)	110 (100)	44 (100)	

Regarding hygiene practices, 99.6 % reported washing hands before a meal of whom 80.1% reported using soap and water. Furthermore, 98.1% reported washing hands after visiting a latrine. Whereas only 5.6% used cutlery during eating, 65.2% shared it. Further, still, 96% of the study participants reported not washing fruits and vegetables before eating them. The majority, 93% did not share housing with animals or poultry. On bivariate analysis, what one washed hands with was significantly associated with *H.pylori* infection (P=0.029) (Table 2).

We further explored the association between history of smoking, drinking alcohol, and *H. pylori* infection. Significantly only 2.7% smoked tobacco and of those that smoked only 20% smoked more than 15 sticks of cigarettes per day. Moreover, only 50% had smoked for 10-15 years. As regards alcohol intake only 7% consumed alcohol. However, in bivariate analysis, no factor was significantly associated with alcohol smoking or alcohol intake (Table 3).

Regarding dietary intake and *H. pylori* infection, 28.3% and 27.8% ate greens and fruits every day. Moreover, only 12% ate animal products every day. Furthermore, 1.8% reported not eating beans while 98.2% that eat, 71.3% did not eat them daily. The participants reported that their main source of water was borehole, 92.4% while only 0.7% accessed piped water. Significantly only 18.2% boiled water for drinking while a further 33.3% reported treating it using water guard. On bivariate analysis, the only significant factor associated with *H. pylori* infection was feeding on animal

(meat, eggs, and milk) products (P=0.045)(Table 4).

On logistic regression, the only statistically significant factor associated with *H. pylori* was the frequency with which one fed on animal (meat, milk, and eggs) products (P <0.001 95%CI 1.934-4.209, AOR=2.85). Consumption of these products more than once every day was more protective than not taking them every day with the later 2.85 times more likely to have *H. pylori* infection compared to the former.

Although what one washed their hands with was not statistically significant in relation to *H. pylori* infection (P=0.236, 95%CI 0.701-4.217 AOR=1.72), washing with water and soap was protective compared to using only water with the later having odds of 1.72 (Table 5).

The overall *H. pylori* seroprevalence was 27.3% with females more affected at 66.7% compared to 33.3% for males. This was lower than the seroprevalence of 31.6% in Mbarara (Phoebe Aitila, 2019) and 37.4% in Kasese [16]. The difference can be attributed differences in the study participants, the geographical region, and the economic activities. Western Uganda is awash with cattle keeping whereas in the Eastern region people majorly cultivate land. *H. pylori* has been shown to survive better in animal products below room temperature [17].

Furthermore, the prevalence in the current study was lower than those reported in other studies elsewhere in Sub-Saharan Africa such as 39.1% in

Table 2: Relationship between hygiene practices of the 275 participants and *H. pylori* seroprevalence in Kibuku district.

Hygiene applications	Frequency (%)	<i>H. Pylori</i> infection		P-value
		Negative	Positive	
Share materials such as forks, spoons, and knife with others		N (%)	N (%)	0.154
No	93 (34.8)	63 (32.3)	30 (41.7)	
Yes	174 (65.2)	132 (67.7)	42 (58.3)	
Total	267 (100)	195 (100)	72 (100)	
Wash hands before a meal				0.102
No	1 (0.4)	0 (0)	1 (1.3)	
Yes	274 (99.6)	200 (100)	74 (98.7)	
Total	275 (100)	200 (100)	75 (100)	
Wash hands with				0.029
None	2 (1)	0 (0)	2 (3.8)	
Soap & Water	165 (80.1)	122 (79.2)	43 (82.7)	
Water	39 (18.9)	32 (20.8)	7 (13.5)	
Total	206 (100)	154 (100)	52 (100)	
Wash hands after using a latrine/toilet				0.532
No	5 (1.9)	3 (1.5)	2 (2.7)	
Yes	263 (98.1)	191 (98.5)	72 (97.3)	
Total	268 (100)	194 (100)	74 (100)	
The cutlery used to eat food				0.721
Fork	14 (5.2)	11 (5.6)	3 (4.1)	
Hands	255 (94.4)	184 (93.9)	71 (95.9)	
Spoon	1 (0.4)	1 (0.5)	0 (0)	
Total	270 (100)	196 (100)	74 (100)	
Wash vegetables and fruits before eating them				0.361
No	10 (4)	6 (3.3)	4 (5.8)	
Yes	242 (96)	177 (96.7)	65 (94.2)	
Total	252 (100)	183 (100)	69 (100)	
Share housing with animals/poultry				0.333
No	252 (93)	185 (93.9)	67 (90.5)	
Yes	19 (7)	12 (6.1)	7 (9.5)	
Total	271 (100)	197 (100)	74 (100)	

Table 3: Relationship between history of smoking, drinking alcohol consumption of the study participants and *H. pylori* seroprevalence in Kibuku district.

History of smoking and drinking	Frequency (%)	Helicobacter Pylori infection		P-value
		Negative	Positive	
Smoking of cigarettes				0.934
No	265 (97.4)	193 (97.5)	72 (97.3)	
Yes	7 (2.6)	5 (2.5)	2 (2.7)	
Total	272 (100)	198 (100)	74 (100)	
Number of cigarettes per day				0.659
1 to 5	3 (60)	2 (50)	1 (100)	
6 to 10	1 (20)	1 (25)	0 (0)	
>15	1 (20)	1 (25)	0 (0)	
Total	5 (100)	4 (100)	1 (100)	
Duration of smoking				0.513
1 to 5	1 (25)	1 (33.3)	0 (0)	
11 to 15	2 (50)	1 (33.3)	1 (100)	
>15	1 (25)	1 (33.3)	0 (0)	
Total	4 (100)	3 (100)	1 (100)	
Drinking of alcohol				0.941
No	251 (93)	183 (92.9)	68 (93.2)	
Yes	19 (7)	14 (7.1)	5 (6.8)	
Total	270 (100)	197 (100)	73 (100)	
Quantity of alcohol consumed per day				0.641
0-200	10 (55.6)	7 (50)	3 (75)	
201-500	7 (38.9)	6 (42.9)	1 (25)	
3 Bottles	1 (5.6)	1 (7.1)	0 (0)	
Total	18 (100)	14 (100)	4 (100)	
Type of alcohol taken				0.258
Beer & Waragi (local liquor)	7 (41.2)	6 (46.2)	1 (25)	
Local	7 (41.2)	4 (30.8)	3 (75)	
Malwa	3 (17.6)	3 (23.1)	0 (0)	
Total	17 (100)	13 (100)	4 (100)	
Duration of drinking alcohol				0.737
1 to 5	5 (29.4)	3 (23.1)	2 (50)	
11 to 15	1 (5.9)	1 (7.7)	0 (0)	
16-20	3 (17.6)	2 (15.4)	1 (25)	
6 to 10	2 (11.8)	2 (15.4)	0 (0)	
>20	6 (35.3)	5 (38.5)	1 (25)	
Total	17 (100)	13 (100)	4 (100)	

Tanzania [18], 36.8% in Ethiopia [19], and at 51.5- 64.39% in Cameroon [20]. In Cameroon, Laure et al. [21] found a prevalence of 64.39% from a largely urban population in the country's capital and commercial city. This could largely be due to the inherent nature of the poor sanitation and pollution that characterizes most urban centers in comparison to the rural setting village. Studies by Abera et al. [19] in Ethiopia in 2019 and Hyasinta et al. [18] in Tanzania in 2016 recruited patients from specialized clinics in hospitals who are likely to have higher seroprevalence compared to those in the current study.

A related study conducted in Asia amongst children, the seroprevalence was 49.8% [22]. In Riyadh Saudi Arabia, the prevalence was lower at 10.2% [23] while it was 11.5% in Tanzania [24]. The difference could be attributed to the differences in the study population, geographical location, the methodology and nutrition.

In this study, the seroprevalence appears to increase with age though this was not statistically significant. In agreement with our study, a studies in Ethiopia [19] and Tanzania [24] showed that age was not statistically

significant predictor of *H. pylori* seroprevalence. In contrast to findings in this study, a studies in Saudi Arabia [22] and in Augsburg, Germany [25], found age as a statistically significant predictor of *H. pylori* infection.

In this study, the only statistically significant factor associated with *H. pylori* seroprevalence was the frequency with which one fed on animal (meat, milk, and eggs) products ($P < 0.001$, 95%CI 1.934-4.209, AOR= 2.85). The fact that consumption of animal foods was significant can be explained by *H. pylori*'s intrinsic ability to survive in artificially contaminated milk stored at 4°C for several days (from 5 to 9 days in pasteurized milk and from approximately 6 to 12 d in sterile milk) for approximately 7 days in ground beef at 4°C, up to 3 days at -18°C [17]. Moreover *H. pylori* has been found in chicken products [26].

Eating greens was not found significantly affecting seropositivity. Moreover, survival time in vegetables is shorter than in animal foods; 3 days in sanitized lettuce and carrot stored at 8°C, 4 days in sterilized carrot and 5 days in carrot packaged in a modified atmosphere [27] probably due to exposure of this none-robust bacteria to oxygen and desiccation on the

Table 4: Relationship between dietary intake demographic characteristics of the study participants and *H. pylori* seroprevalence in Kibuku district.

Dietary intake	Frequency (%)	Helicobacter Pylori infection		P-value
		Negative	Positive	
How often do you eat greens				0.85
Every Day once a day	53 (19.5)	37 (18.7)	16 (21.6)	
More than once everyday	24 (8.8)	18 (9.1)	6 (8.1)	
Not Everyday	195 (71.7)	143 (72.2)	52 (70.3)	
Total	272 (100)	198 (100)	74 (100)	
How frequently do you eat fruits				0.446
Everyday once a day	61 (22.3)	41 (20.6)	20 (26.7)	
More than once everyday	15 (5.5)	10 (5)	5 (6.7)	
Not Every Day	198 (72.3)	148 (74.4)	50 (66.7)	
Total	274 (100)	199 (100)	75 (100)	
How frequently do you take milk, meat, and eggs				0.045
Everyday once a day	31 (11.3)	22 (11)	9 (12.2)	
More than once everyday	2 (0.7)	0 (0)	2 (2.7)	
Neither of the above	7 (2.6)	7 (3.5)	0 (0)	
Not Every Day	234 (85.4)	171 (85.5)	63 (85.1)	
Total	274 (100)	200 (100)	74 (100)	
How frequently do you eat beans				0.724
Does not eat	5 (1.8)	4 (2)	1 (1.4)	
Everyday once a day	61 (22.4)	41 (20.7)	20 (27)	
More than once everyday	12 (4.4)	9 (4.5)	3 (4.1)	
Not everyday	194 (71.3)	144 (72.7)	50 (67.6)	
Total	272 (100)	198 (100)	74 (100)	
What do you use to eat your food				0.721
Fork	14 (5.2)	11 (5.6)	3 (4.1)	
Hands	255 (94.4)	184 (93.9)	71 (95.9)	
Spoon	1 (0.4)	1 (0.5)	0 (0)	
Total	270 (100)	196 (100)	74 (100)	
How frequently do you eat fried foods				0.476
Does not eat	2 (0.7)	2 (1)	0 (0)	
Everyday once a day	51 (18.8)	38 (19.2)	13 (17.6)	
More than once everyday	72 (26.5)	48 (24.2)	24 (32.4)	
Not everyday	147 (54)	110 (55.6)	37 (50)	
Total	272 (100)	198 (100)	74 (100)	
How frequently do you eat hot food				0.361
Everyday once a day	47 (17.3)	37 (18.9)	10 (13.3)	
More than once a day	86 (31.7)	58 (29.6)	28 (37.3)	
Not everyday	138 (50.9)	101 (51.5)	37 (49.3)	
Total	271 (100)	196 (100)	75 (100)	
Drinking water source				
What is your source of drinking water				0.634
Borehole	254 (92.4)	186 (93)	68 (90.7)	
Piped Water	2 (0.7)	1 (0.5)	1 (1.3)	
Shadoof	6 (2.2)	5 (2.5)	1 (1.3)	
Spring	13 (4.7)	8 (4)	5 (6.7)	
Total	275 (100)	200 (100)	75 (100)	
How do you handle drinking water				0.264
Boiling	41 (18.2)	28 (17.1)	13 (21.3)	
None/unboiled/untreated	109 (48.4)	86 (52.4)	23 (37.7)	
Treatment(Water Guard)	75 (33.3)	50 (30.5)	25 (41)	
Total	225 (100)	164 (100)	61 (100)	

surface of vegetables in contrast to what happens in liquid food in which a high bacteria load is favoured [28]. However this does not mean that vegetables are not inhabited due to the potential of the bacteria to form a biofilm [29] Carrots and lettuce are rarely a delicacy in this study area.

The level of education was not a significant factor in positivity. This was in agreement with a study in Ethiopia that showed that although no formal education and having completed the tertiary level increased the odds, there were not statistically significant [30]. This finding was further in agreement with a study in Tanzania [18]. However in contrast to findings in this

study, other studies have found education statistically significant in *H. pylori* seroprevalence [19,24,31].

As regards alcohol intake, our study showed no statistical significance in contrast to a study in Ethiopia [30] while in the Western World studies, alcohol intake was found protective [32] and especially so if taken in moderate amounts [33]. Alcohol is thought to eliminate *H. pylori*.

This study found no association between treatment of quality of drinking water and *H. pylori* seropositivity in contrast to a study in Tanzania that found

Table 5: Multivariate analysis of the predictive factors of study participants and *H. pylori* seroprevalence in Kibuku district.

Predictor factors	Adjusted odds Ratio	P>z	[95% Conf.	Interval]
Wash hands wash with:				
Water and soap	1			
Water	1.72	0.236	0.701	4.217
How frequently do you take milk, meat, and eggs				
More than once every day	1			
Not Every Day	2.85	0.001	1.934	4.209

it an independent predictor of infectivity. The study in Tanzania found that participants that used untreated drinking water had 2.33 times the risk of getting *H. pylori* infection compared to those used treated water [18]. These differences would be due to differences in the geographical region and people's economic activity [34].

In this study seroprevalence in females was higher than in males but with no statistical significance. This trend of higher positivity in the female population was in agreement with a study in Mbarara Western Uganda [35] and in Kasese [17], but in contrast to ones in Cameroon [21] Canada [32] and Northern California [36]. However, a study in South Korea showed that being male was statistically associated with *H. pylori* positivity [31]. Females are reported to have a high tendency to clear the *H. pylori* due to more frequent use of antibiotics than male [37]. Moreover the population of participants in Canada and Korea were different from those that participated in this study.

Conclusions

The seroprevalence of *H. pylori* infection in Eastern Uganda was high. Feeding on animal products was one of the predisposing factors.

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