DETERMINANT OF HELICOBACTER PYLORI INFECTION MONG ADULTS ATTENDING THE GENERAL OUTPATIENT CLINICS, FEDERAL MEDICAL CENTRE, ASABA, DELTA STATE, NIGERIA

IKWU, AUGUSTINE C.
MATRIC NUMBER 195426

SEPTEMBER, 2018

DETERMINANT OF HELICOBACTER PYLORI INFECTION MONG ADULTS ATTENDING THE GENERAL OUTPATIENT CLINICS, FEDERAL MEDICAL CENTRE, ASABA, DELTA STATE, NIGERIA

BY

IKWU, AUGUSTINE C.
MATRIC NUMBER 195426

A DISSERTATION SUBMITTED TO THE DEPARTMENT OF EPIDEMIOLOGY AND MEDICAL STATISTICS, FACULTY OF PUBLIC HEALTH, COLLEGE OF MEDICINE, UNIVERSITY OF IBADAN, IBADAN, NIGERIA

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER IN PUBLIC HEALTH IN FIELD EPIDEMIOLOGY PRACTICE

SEPTEMBER, 2018

Abstract

Introduction: *Helicobacter pylori (H. pylori)* is the major aetiologic agent for Gastritis, Peptic Ulcer Disease (PUD), Gastric Cancer and Primary Gastric B-cell Lymphoma. Eradication of *H. pylori* has been shown to significantly improve the clinical conditions of patients with Gastritis and Peptic Ulcer Disease and lower the risk of recurrent peptic ulcer bleeding as well as Gastric Cancer. A review of the records at the Medical Records Unit at the Federal Medical Centre (FMC), Asaba, in January 2017 revealed that many patients attending the General Outpatient Clinic (GOPC) present with one or more symptoms suggestive of Gastritis or PUD but their *H. pylori* status is not known. This study was conducted to determine the sero-prevalence of *H. pylori* infection among patient attending the GOPC, FMC Asaba, identify the risk factors associated with *H. pylori* infection and the proportion of *H. pylori* seropositive patients who were symptomatic.

Methods: This was a cross sectional study conducted among 232 patients presenting at the GOPC of the FMC, Asaba, Delta State. A structured interviewer administered questionnaire was used to obtain information on socio demographics, medical history, risk factors such as overcrowding, source of drinking water and personal hygiene, and results of *H. pylori* test. A one step serological method was used to test for *H pylori* status. Data were summarized using frequency tables and charts. Chi square test was used to determine risk factors that are significantly associated with the infection while logistic regression analysis was employed to obtain independent risk factors. All analysis was carried out at 5% level of significance.

Results: The mean age of respondents was of 36.8 (± 9.7) with range between 18 and 56years. One hundred and fifty-six (67.2%) were married and 163 (70.3%) had university education. The symptom distribution among the respondents include epigastric pain (53%), bloating (29.7%), easy satiety (34.5%) and heart burn (32.7%). One hundred and thirty-two (56.9%) tested positive to *H. pylori*. The risk factors independently associated with *H pylori* infection include overcrowding - (AOR 3.3; 95% CI: 1.3 – 8.4), drinking water considered dirty or untreated in the past (AOR 35.3; 95% CI: 8.1 - 151), living in an overcrowded house after attaining 10 years of age (AOR 3.9; 95% CI: 1.6 – 9.6), sharing of cutlery with sibling as a child (AOR 17.5; 95% CI: 2.1 – 141) and a positive family history of Gastric Cancers (AOR 2.5; 95% CI: 1.9 – 7.0).

Conclusion: More than half of the participants were *H pylori* positive and this is of public health concern. The risk factors are modifiable; hence intensified efforts should be given to health education of the populace. Opportunistic health education at the health facilities emphasising good hygiene, better living condition and provision of potable water as well as screening for Gastric Cancer are recommended.

Key words: *Helicobacter pylori*, Risk factors, Peptic Ulcer, Prevalence, Public Health

Word Count: 459

Declaration

I hereby declare that this study is my original work. It has neither been presented to any college or school for the award of degree, Diploma or Fellowship nor has it been submitted elsewhere for publication.

DR. IKWU AUGUSTINE C.

Signature.....

Date.....

Declaration

I hereby declare that this study is my original work. It has neither been presented to any college or school for the award of degree, Diploma or Fellowship nor has it been submitted elsewhere for publication.

DR. IKWU AUGUSTINE C.

Signature.....

Date.....

Declaration

I hereby declare that this study is my original work. It has neither been presented to any college or school for the award of degree, Diploma or Fellowship nor has it been submitted elsewhere for publication.

DR. IKWU AUGUSTINE C.

Signature.....

Date.....

Declaration

I hereby declare that this study is my original work. It has neither been presented to any college or school for the award of degree, Diploma or Fellowship nor has it been submitted elsewhere for publication.

DR. IKWU AUGUSTINE C.

Signature.....

Date.....

Certification

I certify that this work titled 'Determinants of Helicobacter Pylori Infection Among Adults Attending the General Outpatient Department, Federal Medical Center, Asaba, Delta State' was carried out by Dr Ikwu Augustine C. in the Department of Epidemiology and Medical Statistics, University of Ibadan

..... Date: 09/07/2018

Supervisor

Professor IkeOluwapo O Ajayi

MBBS, M.Cl.Sc (Fam Med), MPH, PhD (Epid), FMCGP, FWACP (Fam Med)

Department of Epidemiology and Medical Statistics, Faculty of Public Health,

College of Medicine,

University of Ibadan, Nigeria.

Acknowledgements

I give God Almighty all the glory for life, health and strength and for a dream come true.

My sincere appreciation goes to my amiable academic supervisors, Professor IkeOluwapo O Ajayi, who channelled her wealth of academic expertise and resources from the conception to the completion of this work. I sincerely appreciate her for her patience, guidance and commitment.

I appreciate my lecturers Prof Fumilayo Fawole, Prof Yusuf, Dr Dairo, Dr Adebowale and others.

I also want to thank the entire staff of the Nigeria Field Epidemiology and Laboratory Training Program (NFELTP) especially Dr Patrick Nguku; the best teacher I have ever had and for laying the foundation.

I wish to also express my gratitude to the Chief Medical Director, Federal Medical Centre (FMC), Asaba, Delta State, Dr Osiatuma Victor and to the HOD and Staff of the General Outpatient Department of FMC, Asaba for their support and cooperation.

Finally, my profound gratitude goes to my beautiful wife, Mrs Omoleegho Ikwu and my lovely children (Daniel, Joy and David) for their sacrifice, support and prayers.

Table of Content

List of tables

List of Figures

List of Abbreviations

CI	Confidence interval
DU	Duodenal Ulcer
FMOH	Federal Ministry of Health
FMC	Federal Medical centre
GOPD	General Outpatient Department
GU	Gastric Ulcer
H P	*Helicobacter pylori (H. pylori)*
IEC	Information Education and Communication
IgM	Immunoglobulin M
IPC	Infection prevention and control
LGA	Local Government Area
MNCH	Maternal Neonatal and Child Health
MPH	Masters of Public Health
NFELTP	Nigeria Field Epidemiology and Laboratory Training Program
NSAID	Non Steroidal Anti-inflammatory Drug
PHC	Primary Health Centre
PUD	Peptic Ulcer Disease
USD	United States Dollars
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Helicobacter pylori is a ubiquitous carcinogenic bacterium, present in about 50% of the world's population. It is the major aetiologic agent for gastritis, peptic ulcer disease, gastric cancer and primary gastric B-cell lymphoma (Luigi, 2017). Each of these diseases entity connotes a serious health implication and burden for the affected patients, with its attendant morbidity, financial consequence, and mortality. Eradication of *H. pylori* has been shown to significantly improve the clinical conditions of patients with gastritis and Peptic ulcer disease (PUD) and lower the risk of recurrent peptic ulcer bleeding as well as gastric cancer. It was classified as class 1 carcinogenic agent by World Health Organization in 1994 based on its role in gastric carcinogenesis (Ruihna, et al., 2008).

Since its discovery in 1983 by Warren and Marshall, *H. pylori* has been a subject of extensive research. It is a slowly growing spiral shaped gram negative bacterium. It is a flagellated, motile, microaerophilic organism, known to colonize the human gastric mucosa. It possesses several acid resistant properties including the expression of urease enzyme which enables it to hydrolyze urea to ammonia; creating a friendlier alkaline environment there by guaranteeing its survival in the acidic stomach. Tissue damage and disease caused by the organism is attributed to its numerous virulent properties and proteins such as VacA (a vacoulating agent), CagA (a cytotoxic agent), BabA (for attachment to epithelial cells) and PicB (a cytokine inducer). (Anthony, et al., 2008).

The human stomach is the principal reservoir for *H. pylori*. Upon acquisition, the organism, with the aid of the flagella burrows down to the deep portions of the mucus layer of the gastric mucosal where it attaches itself to the epithelial cells there by establishing residence in the mucosal, provoking inflammation and causing disease.

It is usually acquired in childhood, through facco-oral or oro-oral route of transmission. Once acquired, the infection persists for many decades unless treated. Evidence show that it can also be acquired among adults (Anthony, et al., 2008).

1.2 Statement of Problem

Nearly all peptic ulcers are caused by *H. pylori* or Non-Steroidal Anti-inflammatory Drugs (NSAID) use. Regular NSAID use accounts for about 15 – 30% of endoscopy-documented peptic ulceration, while majority of the remaining proportion are attributed to *H. pylori* infection. The prevalence of *H. pylori* in patients with duodenal ulcer is 75 – 90% and 30 – 60% in patients with gastric ulcer (Mario and Steven, 2014). The annual incidence of PUD in *H. pylori* infected individuals is about 6 – 10 fold higher than the uninfected. The financial impact of these disorders is substantial with an estimated burden on direct and indirect health care cost of approximately 10 billion USD per year in the USA (Anthony et al., 2008).

In addition, PUD accounts for about >50% of upper GI bleeding with an overall mortality rate of 6 - 10%. In North America, the incidence of Upper GI bleeding is decreasing due to the increased eradication of *H. pylori* (Robin, 2014)

Furthermore, chronic gastritis is a strong precursor for gastric cancer, which is the 3rd leading cause of death globally. *H. pylori* Infected persons are three to six times more likely to develop gastric Ca. Globally, death from gastric cancer is enormous accounting for about 738,000 deaths annually with a poor overall survival rate which is less than 5yrs (Marino, 2014).

The duo (PUD and gastric cancer) account for over a million death per year globally.

In regions, with high incidence of gastric cancer or in individuals with a positive family history of Gastric cancer, screening for *H. pylori* and provision of eradication regimen have been recommended as a way of prevention of gastric cancer even in asymptomatic adults (Robin, 2014).

In these regions, testing and treatment of *H. pylori* is considered cost effective in young patients (<55years) with uncomplicated dyspepsia, as identification and eradication of *H. pylori* decreases the risk of PUD and gastric cancer. Eradication of this organism also provides cure to some cases of MALT lymphoma (Robert and Justin, 2011).

1.3 Justification for the Study

H. pylori is a carcinogenic ubiquitous organism which carries a significant level of health hazard. It is known to be the major aetiologic agent for gastritis, PUD, gastric cancer and gastric B cell Lymphoma. These disease conditions represent a significant proportion of conditions seen at most primary care centers for initial evaluation, management and referral (where applicable). In places where the Primary Health Centers (PHC) are not functioning at optimal level as it is in some parts of Delta State then tertiary centers such as the Federal Medical Centres (FMC) often serve the role of the PHC. At the Federal Medical Center Asaba, a review of the records at the Medical Record department revealed that about 39.7% of patients who visited the General Out Patient Department (GOPD) of the hospital presented with at least one upper Gastrointestinal symptom such as epigastric pain, bloating, easy satiety or heart burn. A few who could afford endoscopy get tested endoscopically. The rest majority are treated empirically for dyspepsia. Considering the possible dearth of knowledge concerning this carcinogenic agent, in terms of prevalence (in Delta State) and risk factors in this part of the country; there is a need for studies of this kind to be done especially in this part of the country in order to fill up this knowledge gap.

In the end, this study was aimed at adding to the body of knowledge with respect to *H. pylori* infection acquisition and prevention. It was also hoped to provide information for risk assessment of patients (with dyspepsia) at the clinics and for the education of patients, families and the community, in order to prevent the further spread of this organism. Mothers at the Under Five Clinics can also be educated on the role of personal hygiene and better feeding practices based on evidence from this study.

It also sought to provide basis for policy formulation and advocacy for the prevention of this carcinogenic infection.

1.4 Research Questions

This study attempted to answer these questions:-

i. What is the seroprevalence of *H. pylori* among adults attending the the GOPD of FMC, Asaba, Delta State ?

ii. What are the predominant risk factors (ie the determinants) associated with the acquisition of *H. pylori* ?

iii. What proportions of the infected individuals are symptomatic?

1.5 Aims And Objectives

1.5.1 General Objective

The aim of this study was to determine the prevalence of *H. pylori* infection and the risk factors in adults attending the GOPD of FMC, Asaba, Delta State in order to provide a guide for the prevention and control of the infection.

1.5.2 Specific Objectives

1. To determine the scro-prevalence of *H. pylori* infection in adults attending the GOPD, FMC, Asaba, Delta State.
2. To identify the risk factors associated with *H. pylori* infection in adults attending the GOPD, FMC, Asaba, Delta State.
3. To determine the proportion of *H. pylori* scropositive patients who are symptomatic

1.6 Definition of Terms

i. ***Helicobacter pylori*** (HP, *H. pylori*):- This is a spiral gram-negative flagellate urease-producing bacterium which plays a major role in gastritis and peptic ulcer disease.

ii. **Dyspepsia**:- this is a non-specific term used to describe upper abdominal symptoms such as heartburn, acidity, pain or discomfort, nausea, wind, fullness or belching.

iii. Peptic Ulcer Disease (PUD) :- this is the presence of an ulcer (disruption of the mucosal integrity) in the stomach and/or duodenum leading to a local defect or excavation due to active inflammation, which is usually associated with burning epigastric pain exacerbated by fasting and improved with meals.

iv. **Socioeconomic status (SES):** This is a measure of an individual's or family's economic and social position in relation to others based on education, occupation and income. Low socioeconomic status implies low or no education as well as no or low level employment, as opposed to high socioeconomic status.

v. **Overcrowding**; which is a situation in which there are more than 2 persons (of age >10years) living together per standard room of 11square meters (9 ceilings). Infants (<1year) are not counted and children aged 1-10years are counted as half. (WHO 2000)

CHAPTER TWO

LITERATURE REVIEW

2.1 Anatomy and Physiology of the Stomach

2.1.0 Gross Anatomy

The stomach is that part of the alimentary tract that lies between the esophagus and the small intestine. It is a reservoir for *H. pylori.* (Miendje et al, 2018). It is situated in the upper abdomen, extending from the left upper quadrant downwards and to the right, occupying the left hypochondriac, epigastric and umbilical areas. It is the widest part of the digestive tract. It is about 1500 ml in size in adults. The stomach has two openings; the cardiac orifice (the opening from the oesophagus into the stomach) and the pyloric orifice (the opening of the stomach into the duodenum). At the cardiac orifice factors that prevent gastro-oesophageal reflux include; the folds of gastric mucosa at the gastro-oesophageal junction, the mucosal rosette, and the formation of a fluid-and gas-tight seal by these anatomical structures. (OpenStax, 2013) At the pyloric orifice the pyloric sphincter serves to control the exit of content out the stomach.

The stomach is divided into four parts; comprising the Cardia, Fundus, Body and the Pylorus. The cardia is the part surrounding the cardiac orifice, around the gastro-cosophageal junction. The fundus is the dilated superior part that lies inferior to the left dome of the diaphragm. The superior part of the fundus usually approaches the level of the left 5th intercostal space. (Lumen, 2014) The fundus is normally filled by gas, fluid, food, or any combination of these. The body is the main part of the stomach. It lies between the fundus and the pyloric antrum. The pyloric part is the funnel-shaped outflow region of the stomach; it leads into the pyloric canal. The pylorus is the distal sphincteric region of the pyloric part and is marked by thickened circular layer of smooth muscle, which controls the release of the stomach contents from the stomach to the duodenum through the pyloric orifice. (Susan S et al 2016)

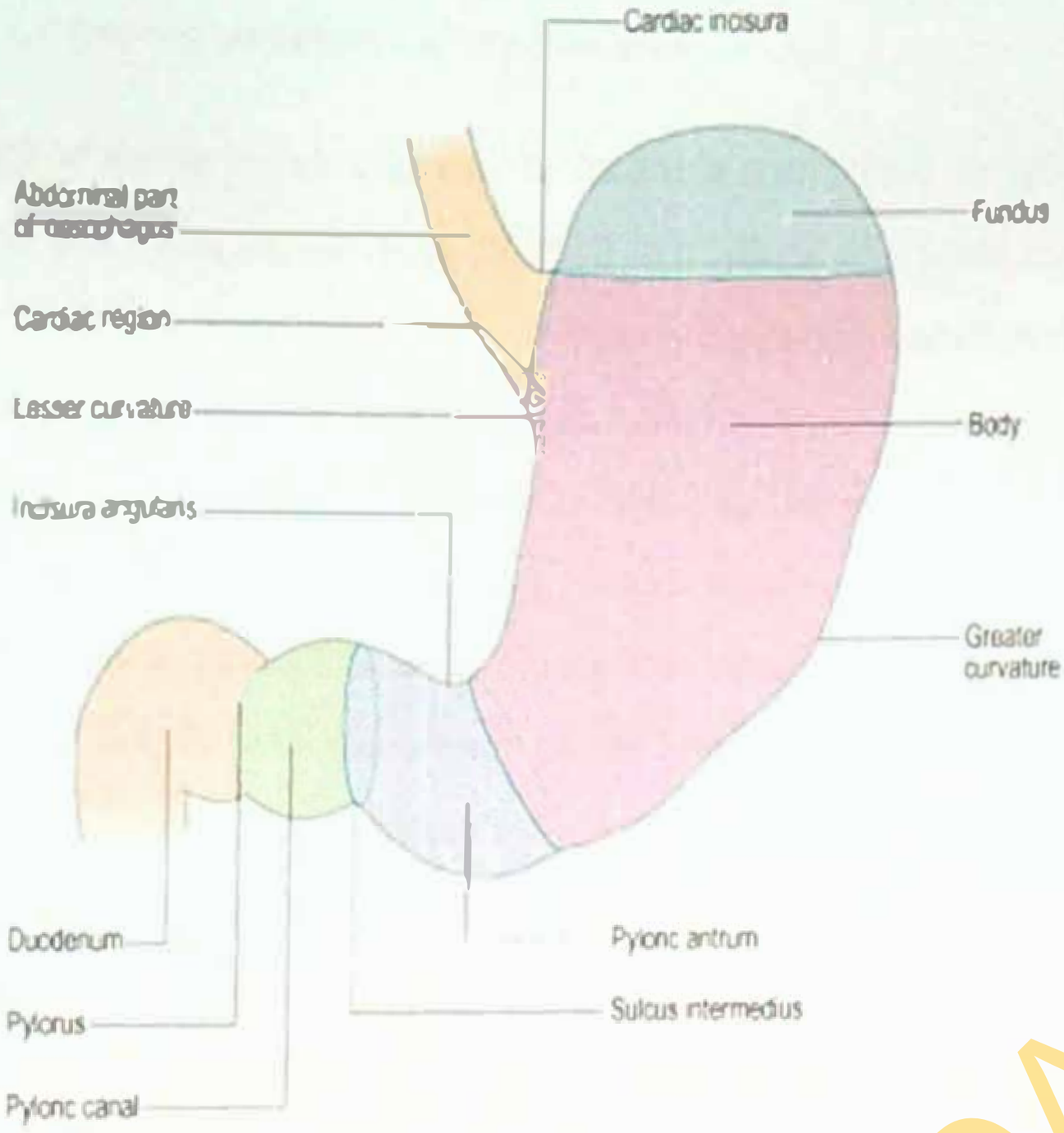

Figure 2.1: Parts of the Stomach. Source: Susan S et al, 2016.Grey's Anatomy, 41th edition available at https://www.elsevier.com

2.1.1 Internal structures of the Stomach

The stomach as an expandable muscular sac which is made up of different layers of structures. The layers in the stomach from inside to outside include the mucosa, submucosa, muscularis externa and serosa, together with gastric vessels and nerves. The mucosa consists of an epithelium, the lamina propria underneath, and a thin bit of smooth muscle called the muscularis mucosae The mucosa's epithelial lining consists mostly of surface mucus cells, which secrete a protective coat of alkaline mucus. ((Susan S et al 2016)). The lamina propria comprises a connective tissue framework between the glands and contains lymphoid tissue that collects in small masses and gastric lymphatic follicles. The muscularis mucosae is a thin layer of smooth muscle fibres lying external to the layer of glands. Its fibres are arranged as inner circular and outer longitudinal layers, and there is also a discontinuous external circular layer. The submucosa lies under this and consists of fibrous connective tissue that separate the mucosa from the next layer, the muscularis externa. (Lumen, 2014). The muscularis externa is a thick muscle coat immediately under the serosa, with which it is closely connected by subserous loose connective tissue. From innermost outwards it has oblique, circular and longitudinal layers of smooth muscle fibres, although the separation between layers may be indistinct in places. (OpenStax, 2013)

A vast number of gastric pits dot the surface of the epithelium and mark the entry to each gastric gland, which secretes digestive fluid. Although the walls of the gastric pits are made up primarily of mucus cells, the gastric glands are made up of different types of cells. The glands of the cardia and pylorus are composed primarily of mucus-secreting cells. Cells that make up the pyloric antrum secrete mucus and a number of hormones, including the majority of the stimulatory hormone, gastrin. The much larger glands of the fundus and body of the stomach, the site of most chemical digestion, produce most of the gastric secretions. These glands are made up of a variety of secretory cells. These include parietal cells, chief cells, mucous neck cells, and enteroendocrine cells.

Parietal cells are located primarily in the middle region of the gastric glands, which are among the most highly differentiated of the body's epithelial cells. These relatively large cells produce both hydrochloric acid (HCl) and intrinsic factor. HCl is responsible for the high acidity (pH 1.5 to 3.5) of the stomach contents and is needed to activate the protein-digesting enzyme, pepsin.

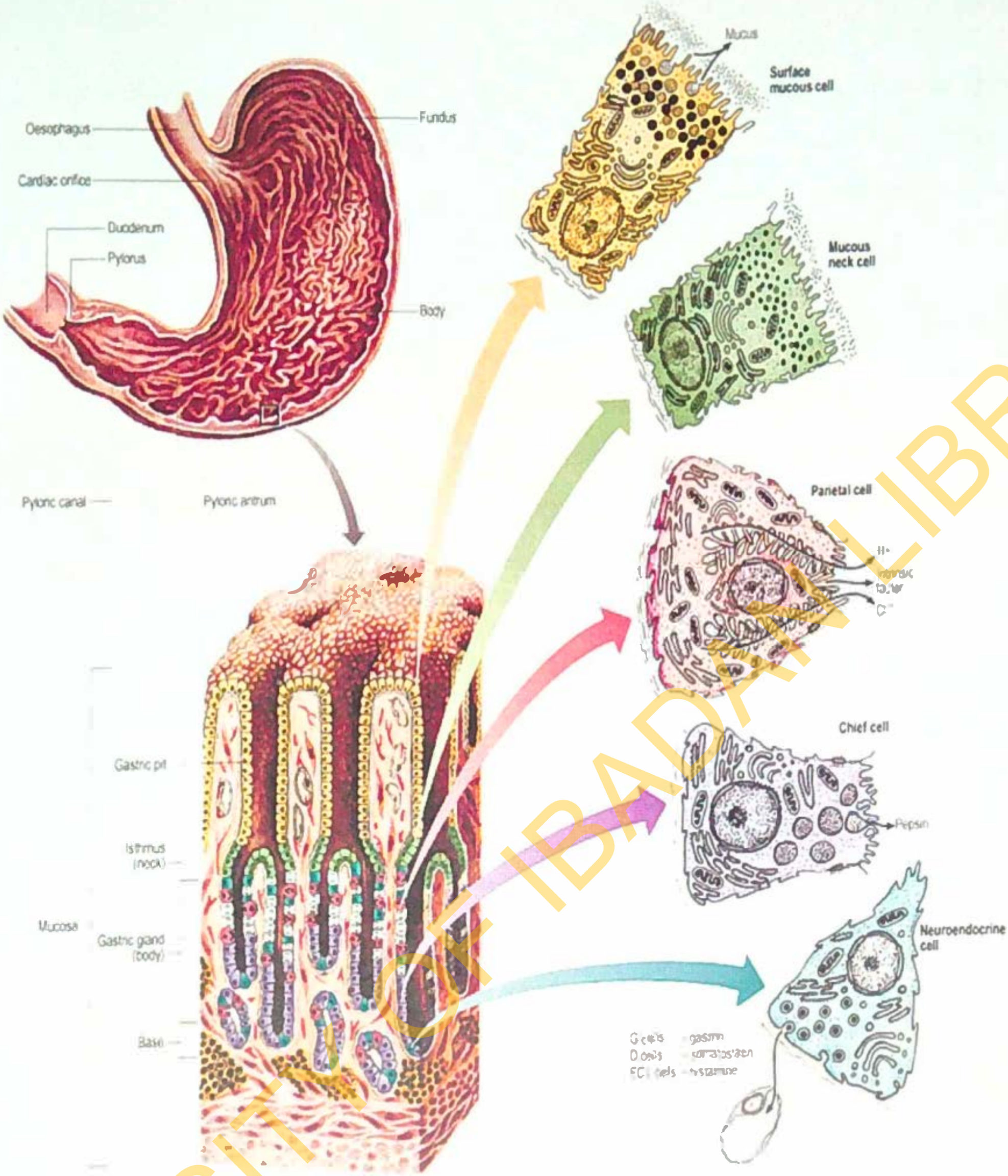

Figure2 2: Internal Structure of the Stomach showing the epithelial lining, gastric pits and glands. Source: Susan S et al, 2016. Grey's Anatomy, 41th edition available at https://www.elsevier.com

The acidity also kills much of the bacteria ingested with food and helps to denature proteins, making them more available for enzymatic digestion. Intrinsic factor is a glycoprotein necessary for the absorption of vitamin B12 in the small intestine. Chief cells are located primarily in the basal regions of gastric glands, which secrete pepsinogen, the inactive proenzyme form of pepsin. HCl is necessary for the conversion of pepsinogen to pepsin. Gastric glands in the upper part of the stomach contain mucous neck cells that secrete thin, acidic mucus that is much different from the mucus secreted by the goblet cells of the surface epithelium. The role of this mucus is not currently known. Finally, enteroendocrine cells found in the gastric glands secrete various homones into the interstitial fluid of the lamina propria. These include gastrin, which is released mainly by enteroendocrine G cells. (OpenStax, 2013)

2.1.2 Physiology of the Stomach

The major functions of the stomach include food storage, emulsification of fats and mixing of gastric contents, secretion of intrinsic factor and some minimal absorption.

The mucosal cells of the Stomach line the entire surface of the Stomach. They secrete large amount of viscid mucus that coats the stomach mucosa with a gel layer of mucus often more than 1 millimeter thick, thus providing a major coat of protection for the stomach wall. One major characteristic of this mucus is that it is alkaline. Hence, the normal underlying stomach wall is not directly exposed to the highly acidic, proteolytic stomach secretion. Even the slightest contact with food or any irritation of the mucosa also stimulates the mucous cells to secrete more quantities of this thick, alkaline, viscid mucus. (John, 2015) This mucosal barrier protects the stomach from self-digestion.

Hydrochloric acid and digestive enzymes are the main principal gastric secretory products capable of inducing mucosal injury. Despite the constant attack on the gastroduodenal mucosa by these noxious agents, the stomach integrity is maintained by a complex system that provides mucosal defence and repair. (Anthony et al, 2008) The mucosal defence system can be viewed as a three-level barrier, comprising pre-epithelial, epithelial, and subepithelial elements. The first line of defence is a mucus-bicarbonate layer, which serves as a physicochemical barrier to multiple molecules, including hydrogen ions. Mucus is secreted in a regulated fashion by gastroduodenal surface epithelial cells. It consists primarily of water (95%), bicarbonate and a mixture of lipids and glycoproteins (mucin). The mucous gel functions as a non-stirred water layer impeding diffusion of ions and molecules such as

gastroduodenal mucosa into the mucous gel, forms a pH gradient ranging from 1 to 2 at the gastric luminal surface and reaching 6 to 7 along the epithelial cell surface. (Anthony et al, 2008)

Surface epithelial cells provide the next line of defence through several factors, including mucus production, epithelial cell ionic transporters that maintain intracellular pH and bicarbonate production, and intracellular tight junctions. Finally, stem cells located at the junction where gastric glands join the gastric pits quickly replace damaged epithelial mucosal cells, when the epithelial cells are shed. The elaborate microvascular system within the gastric submucosal layer also contributes to the subepithelial defence system. (Lumen 2014)

Within a few moments after food after enters the stomach, mixing waves begin to occur at intervals of approximately 20 seconds. A mixing wave is a unique type of peristalsis that mixes and softens the food with gastric juices to create chyme. The initial mixing waves are relatively gentle, but these are followed by more intense waves, starting at the body of the stomach and increasing in force as they reach the pylorus.

The pylorus, which holds around 30 mL (1 fluid ounce) of chyme, acts as a filter, permitting only liquids and small food particles to pass through the mostly, but not fully, closed pyloric sphincter. In a process called gastric emptying, rhythmic mixing waves force about 3 mL of chyme at a time through the pyloric sphincter and into the duodenum. Release of a greater amount of chyme at one time would overwhelm the capacity of the small intestine to handle it. The rest of the chyme is pushed back into the body of the stomach, where it continues mixing. This process is repeated when the next mixing waves force more chyme into the duodenum. (John, 2015)

Gastric emptying is regulated by both the stomach and the duodenum. The presence of chyme in the duodenum activates receptors that inhibit gastric secretion. This prevents additional chyme from being released by the stomach before the duodenum is ready to process it (OpenStax, 2013)

The fundus plays a major role, because it stores both undigested food and gases that are released during the process of chemical digestion. Food may sit in the fundus of the stomach for a while before being mixed with the chyme. While the food is in the fundus, the digestive activities of salivary amylase continue until the food begins mixing with the acidic chyme. Ultimately, mixing waves incorporate this food with the chyme, the acidity of which

inactivates salivary amylase and activates lingual lipase. Lingual lipase then begins breaking down triglycerides into free fatty acids, and mono- and diglycerides. (Lumen 2014)

The breakdown of protein begins in the stomach through the actions of HCl and the enzyme pepsin. During infancy, gastric glands also produce rennin, an enzyme that helps digest milk protein. (John, 2015)

Its numerous digestive functions notwithstanding, there is only one stomach function necessary to life: the production of intrinsic factor. The intestinal absorption of vitamin B12, which is necessary for both the production of mature red blood cells and normal neurological functioning, cannot occur without intrinsic factor. People who undergo total gastrectomy (stomach removal)—for life-threatening stomach cancer, for example—can survive with minimal digestive dysfunction if they receive vitamin B12 injections.

The contents of the stomach are completely emptied into the duodenum within 2 to 4 hours after a meal. Different types of food take different amounts of time to process. Foods heavy in carbohydrates empty fastest, followed by high-protein foods. Meals with a high triglyceride content remain in the stomach the longest. Since enzymes in the small intestine digest fats slowly, food can stay in the stomach for 6 hours or longer when the duodenum is processing fatty chyme. However, note that this is still a fraction of the 24 to 72 hours that full digestion typically takes from start to finish. (Lumen, 2014)

The stomach can taste sodium glutamate using glutamate receptors. This information is passed to the lateral hypothalamus and limbic system in the brain as a palatability signal through the vagus nerve. The stomach can also sense, independently from the tongue and oral taste receptors, glucose. carbohydrates, proteins. and fats. This allows the brain to link the nutritional value of foods to their tastes. (Lumen, 2014)

2.2 *Helicobacter pylori*

This is a gram negative bacillus that colonizes the human stomach in 50% of the world's population. It is a slowly growing, micro-acrophilic, spiral shaped flagellated non-invasive organism that live in the gastric mucosal.

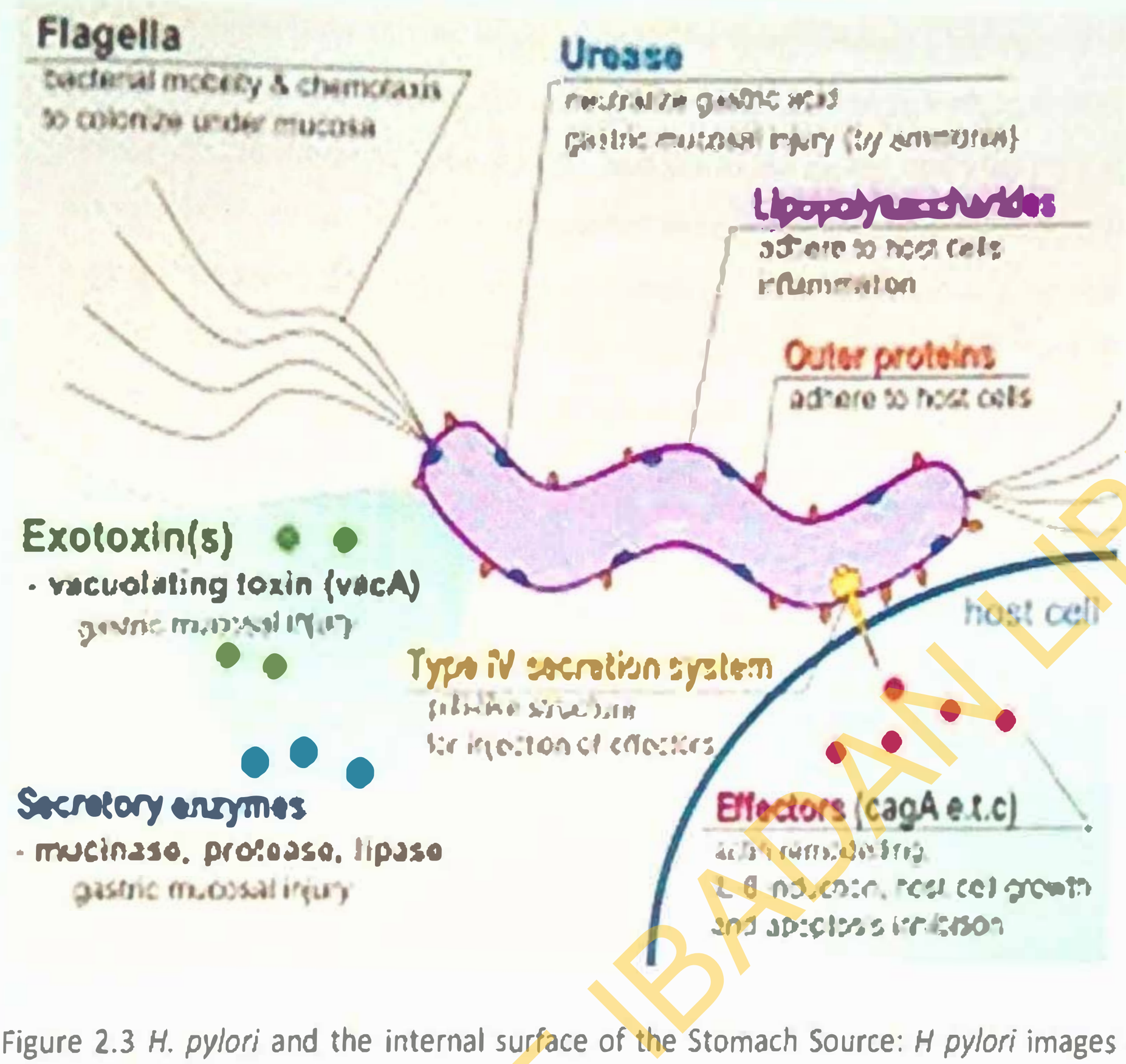

Figure 2.3 *H. pylori* and the internal surface of the Stomach Source: *H pylori* images from google web download

It has the capacity to survive in the stomach for many decades (Anthony, et al, 2008). It colonizes the mucous layer of the gastric antrum. It is found in highest number under the mucus layer in the gastric pits where it adheres to the gastric epithelial cells (Clarke and Kumar, 2009). At this position it is protected by the juxtamucosal mucous layer which traps bicarbonates secreted by antral cell. It also has many other acid resistant properties including the expression of urease enzyme that catalyzes urea to produce ammonia. Ammonia helps to neutralize the acid in the stomach thereby producing a conducive environment for survival.

2.3 Transmission and Pathogenesis of *H. pylori* Infection

Infection is acquired via oro –oral or faeco –oral routes usually by ingestion of contaminated water or food. Once acquired the infection persists for life unless treated (Clarke and Kumar, 2009). *H. pylori* adheres to Lewis antigen on the surface of the gastric mucosa. This action induces responses in the stomach which includes infiltration of the mucosa by both mononuclear and polymononuclear cells leading to chronic superficial gastritis. *H. pylori* strains which express CagA (cytotoxic associated protein) and VacA (vacuolating toxin) genes commonly produce ulcers. The eventual result of the infection include gastritis, peptic ulcers and gastric cancer (Clarke and Kumar, 2009). However, most of the persons do not develop clinical sequelae. The host deteminants of the disease are genetic polymorphisms leading to enhanced *H. pylori* stimulated secretion of proinflammatory cytokines such as interleukin 1β. *H. pylori* positive persons with this host characteristics are at increased risk of hypochlorhydria and gastric adenocarcinoma. (Anthony et al, 2008) While this is note worthy, it is important to state that this is not the thrust of this study.

2.4 Risk Factors of *H pylori* Infection

In both developing and developed countries, high prevalence of *H. pylori* is apparently related to poor socioeconomic conditions, drinking contaminated water, overcrowded housing, poor personal and environmental hygiene (Anthony et al, 2008). Other risk factors include low standard of living, low family income level, *H. pylori* positive family member and increasing age (Tijani and Umar, 2008).

Socioeconomic status (SES) is the most important risk factor for *H pylori* infection in any group (Leonard, 2014). Higher SES has been associated with lower prevalence of the infection (Clarke and Kumar, 2009).

Evidence shows that *H pylori* infection is associated with the consumption of *H pylori* contaminated water. Among many other studies from around the world, studies from

Southern Nigeria, reported that acquisition of *H. pylori* was also attributed to poor sanitation and low standards of living which predisposed people to drinking untreated or contaminated water. (Olokoba et al., 2013).

In a similar study in Uganda, Lawrence Tsongo et al, reported that overcrowding, poor personal and environmental hygiene, food contamination and animal faecal matter, were among the predominant risk factors for *H. pylori* infection (Lawrence et al, 2015)

In Japan, Urital et al reported that mother to child transmission was an important mechanism for intra-familial spread of the infection. It was noted that mothers could spread the infection through mouth secretion, sharing spoons, tasting the children's food or premastication of the children's food during feeding. Gender and lifestyle habits such as tobacco smoking and alcohol ingestion do not seem to have any association with *H. pylori* acquisition (Urita et al., 2013).

2.5 Epidemiology of *H. pylori*

The overall prevalence of *H. pylori* is higher in developing countries, found in about 70 – 90% of the population and much lower in developed countries, found in 20 – 50% of the population (Olokoba et al., 2013). This may be attributed to higher SES found in the developed country. The prevalence in these developed countries is also on the decrease as a result of better living condition and improved sanitation while the prevalence in developing countries is still very high. The incidence rate in the developed countries is about 0.5%, while that of the developing countries is about 3 – 10%. Hence, the need for more studies to be done in developing countries and in our environment in order to increase information about this silent carcinogenic organism, so as to mitigate its high occurrence.

Studies from Netherlands, United States of America, and Canada revealed a prevalence rate of about 32%, 35%, and 40% respectively. These are developed countries with very high living standard and with a near-perfect environmental sanitary condition. Majority of the citizens of these countries are well educated with high socioeconomic status (Leonard, 2014).

In Asia, where socioeconomic status may not be as high as the above mentioned countries, studies from the countries in this part of the world show higher prevalence of about 54 – 76%. In a survey carried out in China, between 2013 and 2014, in a group of 5417 healthy individuals aged 30 – 69years, tested for H pylori infection, a prevalence rate of 63.4% was

recorded. Similar high prevalence rates were also recorded in Bhutan, Kazakhan, and India, with prevalence rates of 73.4%, 76.5% and 80% respectively (Leonard, 2014).

In Africa, the prevalence of H pylori is much higher. The prevalence of infection varies from country to country and within different tribal groups present within the same country. Generally, more than 50% of children are infected by the age of 10 years; with a prevalence of more than 80% in adults. Publications from Ethiopia, Morocco, and South Africa reported prevalence rates as high as 93%, 75.5%, and 84% respectively (Tanih et al., 2008). This maybe a reflection of poor living conditions in these part of the world. In Nigeria, several studies from different parts of the country show a prevalence rate of 73 – 94.5%. This is about the highest in Africa. Clearly more information (and awareness) about this organism is required both for policy formulation and for the institution of preventive measures to stem this tide.

In a hospital based study, at the University of Maiduguri Teaching Hospital, UMTH, reported a seroprevalence rate of 93.6% among adult patients, of which 80% had peptic ulcer disease on endoscopy. (Olokoba et al., 2013).Some of these alarming figures are not surprising considering the low socioeconomic status of the majority of those living in these parts of the world.

However, in contrast to the above, Ruihua, et al. found that there was no association between the prevalence of *H. pylori* infection and socioeconomic factors in rural Zambia. In this study, a group of rural *H. pylori* positive Zambian students were studied to ascertain the association between SES and *H. pylori* infection. After which, the researchers concluded that there were no significant correlations between SES and *H. pylori* infection. (Ruihua, et al., 2008). This is one of the very few studies in which no significant associations were found between SES and H pylori infection.

2.6 Clinical Features of H pylori Infection

Majority of the persons infected with *H. pylori* are asymptomatic. Only about 20% of infected subjects develop severe gastric pathologies (Mario and Steven, 2014). Hence the study shall not only focus on symptomatic or dyspeptic patients (with upper abdominal symptoms eg epigastric pain, bloating, easy satiety, and heartburn) but also on asymptomatic (non dyspeptic) patients, in order to determine the true prevalence of *H. pylori* infection among the study population. Proportions of infected subjects (seropositive) who are dyspeptic

(symptomatic) will also be determined. Beyond this study there is also a need for surveillance to be mounted on this carcinogenic organism to ensure early detection and treatment in order to mitigate it's attendant sequelae.

2.7 Laboratory Diagnosis of *H pylori*

Laboratory test is mandatory for the diagnosis of *H. pylori*, because no clinical feature is pathognomic of the infection. Laboratory tests for *H. pylori* are broadly divided into non-invasive and invasive The non-invasive tests include serology test, ^{13}C Urea Breath test, and the stool antigen test. The invasive tests include biopsy for Urease test, culture and histology (Robert and Justin 2011).

Serology tests have been considered most suitable for the initial documentation of *H. pylori* infection and for epidemiological studies (such as this). Antibodies (IgG) to the organism become detectable in the blood from within few weeks of infection and remains positive for many years and upto three years after the eradication of the organism (Kumar and Clarke, 2009). In this study, subjects who have been infected by this organism shall be identified using this test (and the seroprevalence estimated thereafter).

The advantages of this test method are numerous. It's available, simple, quick and inexpensive with sensitivity and specificity >90%. Results from serology test are as accurate as other test and are available as rapid test kit, making it convenient in the primary care setting and for this study.

It is based on the above reasons, that the serology test has been chosen for the identification subjects who are infected with *H. pylori*. The Urea breath test and the stool antigen tests are more cumbersome and may not be suitable for this study.

There is possibly some paucity of data in this part of the country with regards to this organism. Hence, the researcher hoped to ascertain the prevalence of this infection in this environment and by extension in this part of the country as well as determine the risk factors associated with the acquisition of this infection.

2.8 Treatment

Standard eradication therapies are effective in 90% of cases. There are several treatment regimen including a 10 day course of Omeprazole, amoxicillin and clarithromycin. This is the commonest treatment regimen. *H. pylori* should be eradicated in documented cases of peptic ulceration, gastric B cell lymphoma in all patients after treatment symptoms suggestive of

(symptomatic) will also be determined. Beyond this study there is also a need for surveillance to be mounted on this carcinogenic organism to ensure early detection and treatment in order to mitigate it's attendant sequelae.

2.7 Laboratory Diagnosis of *H pylori*

Laboratory test is mandatory for the diagnosis of *H. pylori*, because no clinical feature is pathognomic of the infection. Laboratory tests for *H. pylori* are broadly divided into non-invasive and invasive The non-invasive tests include serology test, ^{13}C Urea Breath test, and the stool antigen test. The invasive tests include biopsy for Urease test, culture and histology (Robert and Justin 2011).

Serology tests have been considered most suitable for the initial documentation of *H. pylori* infection and for epidemiological studies (such as this). Antibodies (IgG) to the organism become detectable in the blood from within few weeks of infection and remains positive for many years and upto three years after the eradication of the organism (Kumar and Clarke, 2009). In this study, subjects who have been infected by this organism shall be identified using this test (and the seroprevalence estimated thereafter).

The advantages of this test method are numerous. It's available, simple, quick and inexpensive with sensitivity and specificity >90%. Results from serology test are as accurate as other test and are available as rapid test kit, making it convenient in the primary care setting and for this study.

It is based on the above reasons, that the serology test has been chosen for the identification subjects who are infected with *H. pylori*. The Urea breath test and the stool antigen tests are more cumbersome and may not be suitable for this study.

There is possibly some paucity of data in this part of the country with regards to this organism. Hence, the researcher hoped to ascertain the prevalence of this infection in this environment and by extension in this part of the country as well as determine the risk factors associated with the acquisition of this infection.

2.8 Treatment

Standard eradication therapies are effective in 90% of cases. There are several treatment regimen including a 10 day course of Omeprazole, amoxicillin and clarithromycin. This is the commonest treatment regimen. *H. pylori* should be eradicated in documented cases of peptic ulceration, gastric B cell lymphoma or in patients with recurrent symptoms suggestive of

(symptomatic) will also be determined. Beyond this study there is also a need for surveillance to be mounted on this carcinogenic organism to ensure early detection and treatment in order to mitigate it's attendant sequelae.

2.7 Laboratory Diagnosis of *H pylori*

Laboratory test is mandatory for the diagnosis of *H. pylori*, because no clinical feature is pathognomic of the infection. Laboratory tests for *H. pylori* are broadly divided into non-invasive and invasive The non-invasive tests include serology test, ^{13}C Urea Breath test, and the stool antigen test. The invasive tests include biopsy for Urease test, culture and histology (Robert and Justin 2011).

Serology tests have been considered most suitable for the initial documentation of *H. pylori* infection and for epidemiological studies (such as this). Antibodies (IgG) to the organism become detectable in the blood from within few weeks of infection and remains positive for many years and upto three years after the eradication of the organism (Kumar and Clarke, 2009). In this study, subjects who have been infected by this organism shall be identified using this test (and the seroprevalence estimated thereafter).

The advantages of this test method are numerous. It's available, simple, quick and inexpensive with sensitivity and specificity >90%. Results from serology test are as accurate as other test and are available as rapid test kit, making it convenient in the primary care setting and for this study.

It is based on the above reasons, that the serology test has been chosen for the identification subjects who are infected with *H. pylori*. The Urea breath test and the stool antigen tests are more cumbersome and may not be suitable for this study.

There is possibly some paucity of data in this part of the country with regards to this organism. Hence, the researcher hoped to ascertain the prevalence of this infection in this environment and by extension in this part of the country as well as determine the risk factors associated with the acquisition of this infection.

2.8 Treatment

Standard eradication therapies are effective in 90% of cases. There are several treatment regimen including a 10 day course of Omeprazole, amoxicillin and clarithromycin. This is the commonest treatment regimen. *H pylori* should be eradicated in documented cases of peptic ulceration, gastric B cell lymphoma, in patients with recurrent symptoms suggestive of

peptic ulcers for which endoscopy is not available (Anthony, et al., 2008). Whether asymptomatic patients should be treated in the hope of preventing Gastric cancer in the future is still controversial. However, in places where the prevalence of *H. pylori* and gastric cancer is high, health policy in those areas should include screening and treated of positive cases as primary prevention for Gastric cancer.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Description of Study Area

This study was conducted at the General Out Patient Department (GOPD) of the Federal Medical Center (FMC), Asaba, Delta State. The hospital is a 450 bedded tertiary institution located in Asaba, the State Capital, situated in Oshimili South LGA of the State and in the Delta North Senatorial zone. It provides services to the residents of Asaba, Onitsha (in Anambra State) and all the other neighbouring towns and villages. The categories of patients that visit the GOPD include urban and rural dwellers, senior and junior civil servants, teachers, business people, bankers, farmers, unemployed etc. It serves as a referral center for most primary, secondary and private health institutions in the State and from the neighboring Anambra State. The hospital also provides specialist training in Internal Medicine, Family Medicine, Surgery, Paediatrics, Obstetrics and Gynaecology, Ophthalmology, Anaesthesia and Pathology.

The GOPD is a very busy Clinic that runs every working day of the week, from 8am to 4pm. Statistics from the Medical Records Unit of the department shows that an average of 160 patients are seen per day. This implies that an average of 41,600 (including both old and new clients) is seen yearly. This is excluding the geriatric population who are seen at the Geriatric clinic which also runs separately at the GOPD on Tuesdays and Thursdays between 10 am to 2pm.

The GOPD serves as one of the main entry point into the hospital for many categories of patients including the educated and uneducated, urban and rural dwellers, those with varied Socioeconomic Status and hence provides an ample opportunity for the examination of this research topic at various levels.

3.2 Study Design

This is was a cross sectional study

3.3 Study Population

The study population consisted of adult patients between the ages of 18 – 60 years, who presented at the GOPD of FMC, Asaba, Delta State

3.4 Selection Criteria

Subject recruitment was as follow:

Inclusion Criteria:

- Consented adults between the ages of 18 – 60years

Exclusion Criteria

- Critically ill patients who may not be able to participate

3.5 Sample Size Determination

The sample size was determined using;

$n=Z^2pq/d^2$ where

n= estimated minimum sample size

Z = standard normal deviate corresponding to a confidence level of 95% (1.96)

p= prevalence of H pylori infection in Nigeria. The prevalence of 83.8% was adopted for this study since most study in Nigeria report a prevalence of 73 – 94.5%. (Olokoba, et al, 2013)

q= 1 – p = 1 – 0.838 = 0.162

d= degree of accuracy desired, set at 5% (0.05)

$N= [(1.96)^2 \times 0.838 \times 0.162] / (0.05)^2 = 209$

Nonresponse: a response rate of 90% was anticipated and so the sample size for the study (n_s) was calculated by dividing the originally calculated sample size (n=209) by the anticipated response rate (90%) as follow: $n_s = n/0.9 = 209/0.9 = 232$. Hence, minimum sample size required for this study was 232.

3.6 Sampling Technique

Eligible subjects were recruited using systematic random sampling technique. The duration of the study was 4months. The sampling interval (k), which is the interval at which subjects were selected, was calculated thus

K=Total number of adults seen by a doctor over 4months ÷ Total sample size

An average of 12 patients (adults) were seen daily per doctor which means an average of 60 and 240 patients were seen weekly and monthly per doctor respectively. Hence in 4months about 960 patients were seen by a doctor at the GOPD. As such

K=960/232= 4

Based on this every 4th adult who met the selection criteria were recruited for the study. The 1st subject was selected by simple balloting, between the first 1 and 4 patients listed to be seen and subsequently every 4th patient was recruited. In the event that those who were recruited return for another visit; such individuals were not recounted, as the case folders of those who have been recruited were marked to prevent double counting. If the 4th client declined participation, he or she was obliged and the consultation proceeded normally. However, the next patient was counted as the 1st until the 4th is counted again and offered the opportunity to join in and if he or she consented the study continued as explained above.

3.7 Data Collection

The study instruments for data collection were:

i. An interviewer administered questionnaire
ii. H pylori test Kit (Skytec Test Kit)

(I) Instrument I: A structured five-sectioned interviewer administered questionnaire (appendix 3) partially drawn and adapted from the Nigerian Demographic Health Survey (NDHS) questionnaire and the UNICEF Household Sanitation, Quality of water and Personal Hygiene questionnaire, was face validated by researcher's supervisors and used to obtain information from the respondents. This questionnaire was pretested at the GOPD, General Hospital, Okwe, using 10 subjects of similar characteristics to check for comprehension, flow of questions and to minimize error. The pretested questionnaire was used to collect the data for the study

The five sections of the questionnaire were:

A – Socio demographic Section

B – Risk factor Section

C – Medical history Section

D – Physical Examination Section

E – Results from H pylori Test Section.

Section A - Socio demographics. This Section was used to collect data regarding subjects' socio – demographic features such as age, sex, religion, ethnicity, and place of residence and Socio Economic Status (SES). Their Socioeconomic status was classified using the Oyedeji's classification system (Appendix 3), based on their educational level and occupation. Individuals were classified based on a scale of 1 to 5; into high, medium and low socioeconomic status. A score of 1 to 2 was classified as high class, 2.1 to 3 middle and 3.1 to 5 as low socioeconomic class (Appendix 3).

Section B – Risk factor Section. This part of the questionnaire was partially drawn from the Nigerian Demographic Health Survey (NDHS) questionnaire and the UNICEF Household Sanitation, Quality of water and Personal Hygiene questionnaire, to assess the possible risk factors associated with *H. pylori* infection in the subjects. It was further subdivided into four subsections:

(a) House size / overcrowding: questions from this subsection included type of house setting, size of bedroom, and how many persons sleep in the same room with the subject at night in the last five years. This subsection was to assess whether the subjects lived in an overcrowded house or not. It was designed with reference to the WHO's definition of overcrowding, which is a situation in which there are more than 2 persons (of age >10years, of opposite sex) living together per standard room of 11square meters (9 ceilings). Infants (<1year) are not counted and children aged 1-10years are counted as half.

(b) Family source and quality of drinking water: questions from this subsection included subjects family's predominant source of drinking water in the last five years, is the drinking water treated, if yes by what means and how often was it water treated. (c) Personal Hygiene: this subsection was used to retrieve information about the participants' personal hygiene level. Questions here included how often subjects washed their hands after defecation and when do they wash their hands

(d) Childhood Risk of *H. pylori* infection: questions addressed; the history of ingestion of pre – masticated food from the mother during childhood, sharing of cups and cutleries with siblings and or adults during childhood, overcrowded living condition during childhood, parent's education, occupation and SES. Whether these factors are associated with *H. pylori* infection or not were determined.

Section C – Medical History. This section was used to assess and record the any history of dyspepsia (epigastric pain, bloating, easy satiety and heartburn), and family history of gastric cancer. This section will also help to rule out any association between *H. pylori* in and dyspepsia and family history of Gastric cancer among the study group. The researcher also planned to ascertain the proportion of those who have dyspepsia among subjects who tested positive to *H. pylori*.

Section D Physical Examination. This section recorded physical examination findings including weight (kg), height (cm) and the BMI (kg/m^2). This was not done due to faulty persistent machines.

Abdominal examination findings were got and recorded following this sequence; Inspection, Palpation, Percussion, and Auscultation. The researcher was hoping to find any abnormal physical findings eg epigastric tenderness in *H. pylori* seropositive subjects.

Section E – *H pylori* Results. This section was used to record subjects *H. pylori* tests results. Test for *H. pylori* was done using a rapid serological diagnostic test kit – the Skytec Test Kit. (Procedure is shown below)

II. Study Instrument II: - H pylori test Kit (Skytec Test Kit)

This is a rapid serological diagnostic test kit. It is a one step anti-*H pylori* immunochromatographic diagnostic test kit. It detects the presence of antibodies to *H. pylori* in the blood by forming an Antigen - Antibody complex upon exposure to the drop of blood of an infected individual. This complex is observed as 2 bands on the test kit cassette indicating a positive result. 1 band or no bands indicates a negative or invalid result respectively. The expiry date of this test kit was checked to avoid compromising the quality of the results.

Procedure - The test was done as follows:

Subjects were counselled on the procedure. Under aseptic precautionary conditions, the respondent's left thumb was cleaned with methylated spirit swab and then gently pricked with a non-reusable sterile lancet to produce a drop of blood which was placed on the cassette of the test kit. Each result was read in 10mins after adding a drop of buffer to the cassette. A positive result showed 2 bands on the test kit, while 1 band or no bands indicated a negative or invalid result respectively.

3.8 Data Analysis

All data collected were entered into a computer and analyzed using the Excel worksheet (2007) and Epi Info 7.2.

(A) Descriptive Statistics (Univariate table) :-

(i.) The categorical variables from this study were summarized using frequency tables and charts. These variables were data from (a) the socio-demographic features – Sex, Marital Status, Ethnicity, Place of Residence, Educational Status, Occupation, Socioeconomic Status and (b) Risk factors – source of drinking water, drinking treated/ untreated water, house size variables, personal hygiene variables, and childhood risks of infection variables (c) Medical history data –such as symptoms were also summarized using frequency table and charts.

(ii) Quantitative variables were summarized using mean and standard deviation. The participants' ages were grouped and the proportion of those who were *H. pylori* positive by age group were compared to each other.

(B) Bivariate analysis: - This was done using EPI Info 7.2 after importing the data from the excel sheet. The dependent (outcome) variable (*H. pylori* status) was compared between the independent variables such as the (a) Demographic features and socioeconomic status and (b) the risk factors such as overcrowding, source and quality of drinking water, house size, personal hygiene variables, childhood risk factors.

Odds ratios and Chi square values were obtained and 95% Confidence interval computed.

(C.) Multivariate logistic regression was used to control for confounders and effect modifiers. Variables with significant odds ratio (or P value < 0.05 from the bivariate analysis) were considered for logistic regression. 95% confidence interval were also computed.

3.9 Expected Duration of the Study

The study was intended to last for 4months with an average of 3 persons recruited per day. However because of the cluster 3 program that lasted from September to November, this study lasted about 8 months (August 2017 – March 2018).

3.10 Ethical Considerations

Ethical approval for this study was granted by the Ethical Committee of the Federal Medical Center, Asaba (Appendix 4) and informed written consent (appendix 1) was obtained from the participants prior to the commencement of the recruitment of subjects. Details of this research (including the procedure and benefits) were explained to the participants in a language they can understand prior to recruitment.

Participation was voluntary and no inducement was given to the participants. The information given by the respondents were kept strictly confidential. Only ID numbers were used to identify the subjects' records. Soft copies were stored in a pass worded zipped folded on the laptop while hard copies were stored in a locker with restricted access. Subjects were allowed to withdraw from the research at any time they wish. All of these were duly explained to the respondents at the point of recruitment.

CHAPTER FOUR

RESULTS

4.1 Socio-Demographic characteristics of Respondents

Two hundred and thirty-two (232) respondents participated in the study. The socio-demographic characteristics of the respondents are shown in Table 4.1. There were 122 (52.6%) females, 156 (67.2%) were married and 163 (70.3%) had university education. The age range of the respondents was between 18 – 56 years with a mean of 36.8 (± 9.7) years. Majority of the respondents were residents of Asaba (74.6%) and Ibo by tribe (72.4%). Intermediate grade level workers constituted the highest proportion (43.1%) of the occupation of the respondents with majority (58.2%) of the respondents in the middle socioeconomic status.

Table 4.1: Socio demographic characteristics of respondents attending the GOPD, FMC, Asaba, Delta State.

Characteristics	n	%
Age group (years)		
<20	5	2.2
20-29	47	20.3
30-39	88	37.9
40-49	58	25
≥ 50	34	14.7
Gender		
Male	110	47.4
Female	122	52.6
Marital Status		
Married	156	67.2
Separated	6	2.6
Single	70	30.2
Tribe		
Ibo	169	72.9
Urhobo	34	14.7
Others	29	12.6
Residence		
Asaba	173	74.6
Agbor	12	5.2
Ibusa	12	5.2
Onitsha – Anambra	10	4.3
Ogwashi	10	4.3
Others	15	6.5
Educational Status		
University	163	70.3
SSCE with Diploma training eg OND	46	19.8
SSCE or Grade II	17	7.3
No Formal Education	6	2.6
Occupation		
Intermediate Grade level Public Servants	100	43.1
Junior Staff/ Artisans / Drivers	46	19.8
Professionals / Senior level Staff	45	19.4
Unemployed	23	9.9
Petty Traders/ Farmers/ Labourers	18	7.8
Socioeconomic Status		
High	45	19.4
Middle	135	58.2
Low	52	22.4

4.2 Past and Current exposure to risk factors of *H pylori*

Majority (70.3%)) of the respondents lived in standard 11 square meter room. Thirty four (14.7%) respondents lived in overcrowded room (comprising those who share their room with more than 1 adult in a standard room (11%) or in less than 11 square meter room (3.4%). The predominant source of drinking water was sachet (and bottled) water (68.1%), while collected rain water/ well is the least mentioned (2.6%). Eighty-three respondents (35.8%) wash their hands always after defaecation while 88 (37.9%) and 61 (26.3%) wash their hands almost always and occasionally. (Table 4.2).

In the past 187 (80.6%) have lived in overcrowded rooms and 185 (79.7%) had drank water they considered unclean. Types of water drank by the respondent which they considered unclean include covered well (28.9%), uncovered well (22.9%) and stream (28.0%) (Table 4.2).

During the respondents' childhood 150 (64.7%) reported that their mother fed them food chewed by the mother while 41 (17.7%) could not remember whether or not their mother fed them as such. Ninety-two percent (92%) reported sharing cutlery with siblings during their childhood, 139 (60%) living in overcrowded room during their childhood and about 109 (46.9%) had parents with intermediate socio- economic level. (Table 4.2)

Table 4.2a: Current and past risk factors exposure of *H. pylori* infection among respondents attending the GOPD, FMC, Asaba

	n	%
A. Current exposure to risk factors		
1. House Setting		
Overcrowded	34	14.7
Not Overcrowded	198	85.3
2. Predominant Source of Drinking Water		
Bottled / Satchet water	158	68.1
Bore hole Water (Private)	68	29.3
Well / Collected Rain Water	6	2.6
3. How often do you wash your hands after defecation		
Almost Always	88	37.9
Always	83	35.8
Occasionally	61	26.3
B. Past exposure to risk factors		
1. Overcrowding in the past		
Yes	187	80.6
No	45	19.4
2. Have you ever drank water you considered unclean in the past / type of water drank		
Yes	185	79.7
No	47	20.3
C. Childhood exposures to risk factors		
1. Has your mother ever fed you with food she chewed		
Yes	150	64.7
No	41	17.7
Can't Remember	41	17.7
2. Did you share cutlery with your siblings and others as a child		
Yes	214	92.2
No	18	7.8
3. After you were 10years old how many persons shared your room with you		
0 – 1	29	12.5
2 – 3	139	59.9
>3	64	27.6
4. Parents Social Economic Status		
High	28	12.1
Middle	163	70.2
Low	41	17.7

Table 4.2b: Distribution of current and past risk factors of *H pylori* infection among respondents attending the GOPD, FMC, Asaba by *H pylori* Status

	Positive		Negative		Total	
	n	%	n	%	n	%
A. Current exposure to risk factors						
1. No of Persons Sharing Room with Respondent Currently						
a. In a Less Than 9-ceiling room(< 11 square meter)						
1 person	15	6.5	20	8.6	35	15.1
≥ 2 persons (Overcrowding)	12	5.1	4	1.7	16	6.8
b. In a 9-ceiling room (11 square meters)						
1 person	82	35.3	63	27.2	145	62.5
≥ 2 persons (Overcrowding)	16	6.8	2	0.9	18	7.8
c. > 9 ceiling room (11 square meter)						
1 person	7	3.0	11	4.7	18	7.8
≥ 2 persons (Overcrowding)	0	0	0	0	0	0
2. Predominant Source of Drinking Water Currently						
Bottled / Satchet water	84	36.2	74	31.9	158	68.1
Bore hole Water (Private)	43	18.5	25	10.8	68	29.3
Well / Collected Rain Water	5	2.2	1	0.4	6	2.6
3. How often do you wash your hands after defecation Currently						
Almost Always	52	22.4	36	15.5	88	37.9
Always	44	19.0	39	16.8	83	35.8
Occasionally	36	15.5	25	10.8	61	26.3
B. Past exposure to risk factors						
1. Overcrowding in the past (Shared a room with more than One person for > 3 months)						
Yes	109	47.0	78	33.6	187	80.6
No	23	9.9	22	9.5	45	19.4
2. Have you ever drank water you considered unclean in the past / type of water drank						
Yes	130	56.0	55	23.7	185	79.7
Covered Well	47	20.3	20	18.6	67	28.9
Uncovered Well	36	15.5	17	7.3	53	22.9
Streams/ Rivers	47	20.3	18	7.8	65	28.0
No	2	0.9	45	19.4	47	20.3

Table 4.2c: Distribution of childhood exposure to risk factors of *H. pylori* infection among respondents attending the GOPD, FMC, Asaba by *H. pylori* Status

	Positive		Negative		Total	
	n	%	n	%	n	%
Childhood exposures to risk factors						
1. Has your mother ever fed you with food she chewed						
Yes	101	43.5	49	21.2	150	64.7
No	12	5.2	29	12.5	41	17.7
Cant Remember	19	8.2	22	9.5	41	17.7
2. Did you share cutlery with your siblings and others as a child						
Yes	131	56.5	83	35.8	214	92.2
No	1	0.4	17	7.3	18	7.8
3, After you were 10years old how many persons shared your room with you						
0 – 1	8	3.5	21	9.1	29	12.5
2 – 3	85	36.6	54	23.3	139	59.9
>3	39	16.8	25	10.8	64	27.6
4. Parents Social Economic Status						
0-1.4	11	4.7	17	7.3	28	12.1
1.5-2.9	53	22.8	56	24.1	109	46.9
3.0-4.4	37	15.9	17	7.3	54	23.3
≥ 4.5	31	13.4	10	4.3	41	17.7

4.3 Prevalence of H. pylori infection

One hundred and thirty two (56.9%) tested positive to H. pylori infection using the Skytec rapid serological test kit.

4.4 Medical History

One hundred and eighty five respondents (79.7%) had at least one of the following upper gastrointestinal (GI) symptoms such as epigastric pain, bloating, easy satiety, heart burn and about 11 (4.7%) had a family history of gastric cancer. (Table4.3). The symptom distribution among the respondents includes epigastric pain (53%), bloating (20.7%), easy satiety (34.5%) and heart burn (32.7%). There was a high *H. pylori* positivity rate among those aged 40 – 49years (70%) and among those with positive family history of gastric cancer (90%).

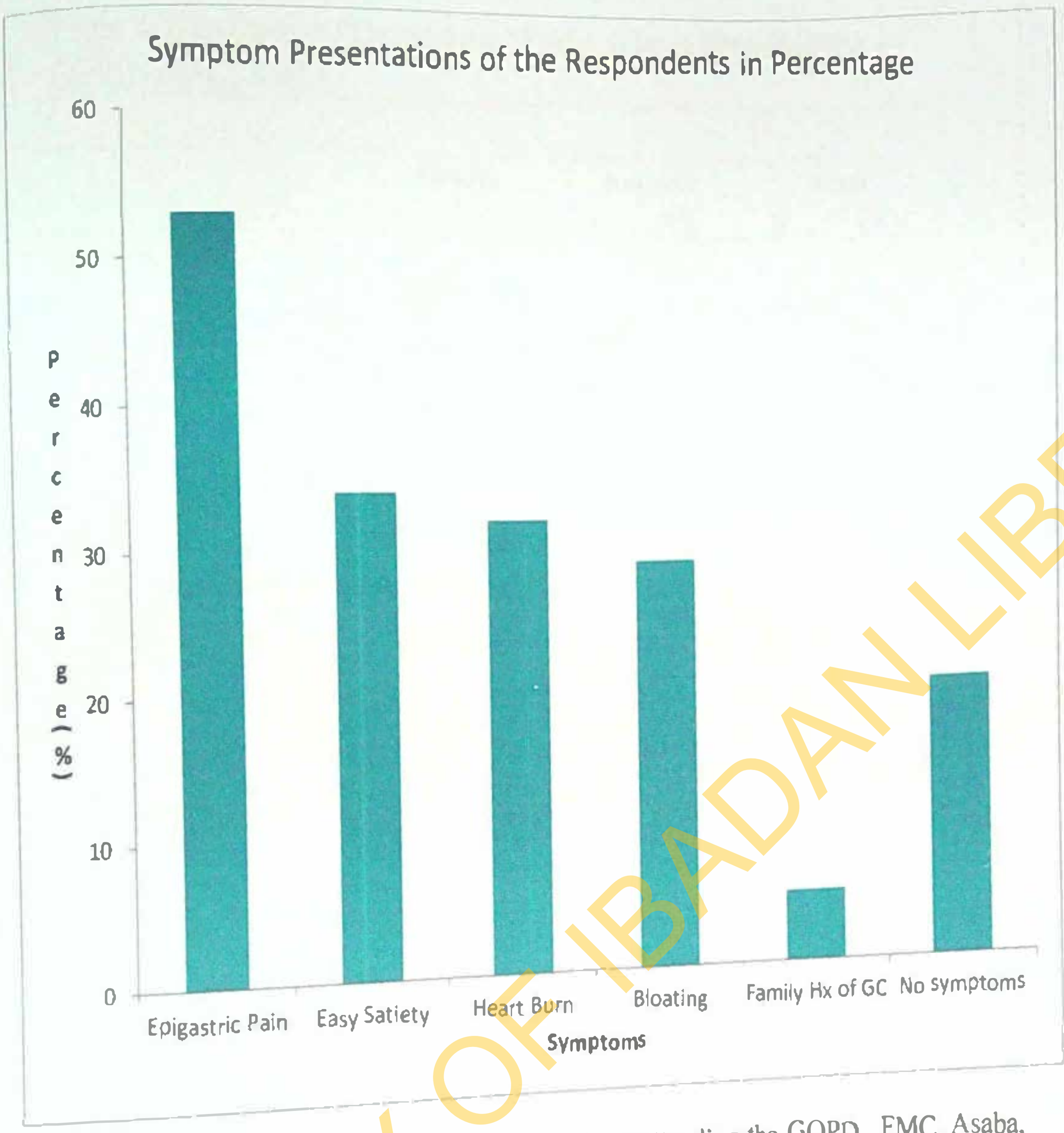

Figure 4.1: Symptom Presentation of all Respondents attending the GOPD, FMC, Asaba,

Table 4.3: Symptom Presentation of respondents attending the GOPD, FMC, Asaba

	Positive		Negative		Total	
	n	(%)	n	(%)	N	(%)
Epigastric Pain						
Yes	75	32.3	48	20.7	123	53.0
Bloating						
Yes	39	16.8	30	12.9	69	29.7
Easy Satiety						
Yes	52	22.4	28	12.1	80	34.5
Heart Burn						
Yes	46	19.8	30	12.9	76	32.7
Family History of Gastric Cancer						
Yes	10	4.3	1	0.43	11	4.7

Table 4.3: Symptom Presentation of respondents attending the GOPD, FMC, Asaba

	Positive		Negative		Total	
	n	(%)	n	(%)	N	(%)
Epigastric Pain						
Yes	75	32.3	48	20.7	123	53.0
Bloating						
Yes	39	16.8	30	12.9	69	29.7
Easy Satiety						
Yes	52	22.4	28	12.1	80	34.5
Heart Burn						
Yes	46	19.8	30	12.9	76	32.7
Family History of Gastric Cancer						
Yes	10	4.3	1	0.43	11	4.7

Table 4.4: Number of respondents with more than one symptom frequency among the *H. pylori* positive respondents attending the GOPD, FMC, Asaba,

Number of Respondents with more than one symptom	No with Epigastric Pain	No of Bloating	Noof Easy Satiety	No of Heart Burn	No of Positive Family History of Gastric Ca
Plus No with Epigastric Pain	25	46	52	65	11
Plus No with Bloating	46	14	39	35	11
Plus No with Easy Satiety	52	39	17	29	5
Plus No with Heart Burn	65	35	29	5	5
Plus No with Positive Family History of Gastric Ca	11	11	5	5	*
* 5 persons had all the symptoms above and all 5 were positive					

4.5 Bivariate Analysis of the association of risk factors and *H. pylori* infection

More females (60.7%) than males tested positive for *H. pylori* and being a female was protective (OR=0.7), however, the difference was not statistically significant (95% CI: 0.4 – 1.2). There was a higher prevalence of *H. pylori* positivity among those who were above age 40 years (61.3%) as compared to those less than 40years though not statistically significant (P value 0.3) also. (Table4.5). Living in a non-crowded house setting (OR=0.2; 95% CI: 0.1 – 0.6), drinking treated or clean water (OR=0.4; 95% CI: 0.2 – 0.9), not eating food pre-chewed by one's mother (OR=0.2; 95% CI: 0.1 – 0.4), not living in an overcrowded house setting during childhood (OR=0.2; 95% CI: 0.1 – 0.6) and a negative family history of Gastric cancer (OR=0.12; 95% CI: 0.02 – 0.9) were protective for having this infection and were all statistically significant. Drinking unclean water in the past (OR=41.6; 95% CI: 9.7 – 177.7), and sharing cutlery with siblings during childhood (OR=26.8; 95% CI: 3.5 – 205.4) were significantly associated with having the infection. (Table4.5). Having a high educational level (OR=0.3; 95%CI: 0.1 – 0.9) and good hand washing practice after defaecation (OR=0.9; 95% CI: 0.5 – 1.6), were protective of the infection, however, hand washing practice after defaecation was not statistically significant.

Table 4.5 Association between Risk Factors and *H. pylori* status among respondents attending the FMC, Asaba, GOPD.

	Positive		Negative		Odd Ratio	CI	p value
	n	(%)	n	(%)			
A. Socio-demographic features							
Age							
≤ 40	85	54.1	72	45.9	1.4	0.8 - 2.4	0.3
> 40	46	61.3	29	38.7			
Sex							
Male	58	52.7	52	47.3	0.7	0.4 - 1.2	0.2
Female	74	60.7	48	39.3			
Education							
Low (or No) Educational Level	18	78.3	5	21.3	0.3	0.1 - 0.9	0.03*
High Educational Level	114	54.6	95	45.6			
Socioeconomic status							
Low	44	68.8	20	31.3	2	1.1 - 3.6	0.04
High	88	52.4	80	47.6			
B. Current exposure to risk Factors							
1. Number persons sharing room with respondent							
Overcrowded	28	82.4	6	17.7	0.2	0.1 - 0.6	0.002
Not Overcrowded	104	52.5	94	47.5			
2. Source of drinking water							
Untreated	30	73.2	11	26.8	0.4	0.2 - 0.9	0.03
Treated	102	53.4	89	46.6			
3. Hand washing practice after defecation							
Poor	36	59	25	41	0.9	0.5 - 1.6	0.8
Good	96	56.1	75	43.9			

Table 4.6 Association between the Risk Factors in the Past and as children and *H pylori* status among respondents attending the FMC, Asaba, GOPD, August 2017 – March 2018

	Positive		Negative		Odds Ratio	CI	p value
	n	%	n	%			
A. Exposure to risk factors in the Past							
1. Overcrowding in the Past							
Yes	109	58.3	78	41.7	1.3	0.7 - 2.6	0.5
No	23	51.1	22	49			
2. Did you drink water you considered unclean/ untreated in the past for up to 3 months							
Yes	130	68.1	61	31.9	41.6	9.7 - 177.7	< 0.001
No	2	4.9	39	95.1			
B. Risk Factor exposure in Childhood							
1. Has your mother ever feed you (or siblings) with food she chewed							
Yes	101	67.3	49	32.7	0.2	0.1 - 0.4	< 0.001
No	12	29.3	29	70.7			
2. Did you share cutlery with you siblings or others							
Yes	131	61.2	83	38.8	26.8	3.5 - 205.4	< 0.001
No	1	5.6	17	94.4			
3. After age 10 how many people did you share room with while growing up							
≥ 2	124	61.1	79	38.9	0.2	0.1 - 0.6	< 0.001
< 2	8	27.6	21	72.4			
4. Parents Socio Economic Status							
>2 (Low)	71	60.2	47	39.8	1.3	0.8 - 2.2	0.3
≤ 2 (High)	61	53.5	53	46.5			
C. Family History of Gastric Ca							
Yes	10	90.9	1	9.1	0.12	0.02 - 0.9	0.02
No	122	55.2	99	44.8			

4.6 Predictors of *H. pylori* among the respondents(Logistic Regression)

After controlling for confounders and effect modifiers using the multiple logistic regression model overcrowding - sharing a room with 2 or more persons - (AOR 3.3, 95% CI 1.3 – 8.4), drinking water you considered dirty or untreated in the past (AOR 35.3, 95% CI 8.1 -151), sharing a room with 2 or more persons after you were 10 years of age (AOR 3.9, 95% CI 1.6 – 9.6), sharing of cutlery with sibling as a child (AOR 17.5, 95% CI 2.1 - 141) and a positive family history of Gastric cancers (AOR 2.5, 95% CI 1.9 – 7.0) were significant independent predictors of having the *H. pylori* infection. (Table 4.6)

Table 4.7: Predictors of *H. pylori* among the respondents at the GOPD, FMC, Asaba

Risk Factors	Adjusted OR	95% C.I.	P value
Socio-economic status (Low SES/High SES)	0.6	0.3 -1.3	0.2
Currently sharing a room with 2 or more persons	3.3	1.3 – 8.4	0.01*
Drinking water you considered unclean or untreated in the past	35.3	8.1 - 151	0.0001*
Educational level (high/ low)	2.5	0.9 - 7.1	0.1
Sharing a room with 2 or more persons after you were 10 years of age	3.9	1.6 - 9.6	0.002*
Sharing of cutlery with sibling as a child	17.5	2.1 - 141	0.007*
Has your mother ever fed you with food she pre-chewed	1.2	0.6 - 2.5	0.6
Parents socio – economic status (. Low / high)	0.7	0.4 - 1.2	0.2
Family history of Gastric Ca	2.5	1.9 - 7.0	0.005*

- Indcpendent Risk factors/ Predictors significant at $p < 0.05$

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion

This study was carried out to know how many people could have been infected with *H. pylori* among adults attending the GOPD of FMC, Asaba. In addition, the risk factors associated with the infection among this group of people as well as the symptoms of those who tested positive were explored to see if there is a pattern that could help predict the presence of this disease either by looking at the risk factors or presenting complaints (symptom pattern).

It is possible for *H. pylori* to be acquired at any time between childhood and adulthood Thereafter, infection persists for many decades after acquisition and even after eradication of the organism. Hence, the possible risk factors examined in this study were categorized into current, past and childhood risk factors. This was to help identify which category of risk factors play more roles in the acquisition of this infection than the others and consequently, form the basis for health educational messages for the prevention of this infection and preventive policy making.

This study revealed that 56.9% of those attending the GOPD were positive for *H. pylori* infection. Serological (antibody) test was used for this study which means that those who tested positive had acquired the infection earlier in life during their childhood, while growing up or during adulthood and have developed the antibody to the organism that was picked by the test Some may not necessarily have a current active infection. This is because even though the individuals have the antibody, the antigen (or the organism) may have been cleared by earlier antibiotics usage either prescribed for *H. pylori* eradication or for other infective illnesses. To identify those with active current infection would have required an antigen test such as stool antigen test or Urea breath test. However, an antigen test would have missed those who have (or had) the infection and were treated with antibiotics either for the eradication of *H. pylori* or for other infective illnesses Hence, the serology test was ideal for a prevalence study such as this, while antigen test is better to identify new cases (incidence) and to follow up on cases who have been treated with antibiotics for the eradication of *H. pylori*.

The prevalence from this study, though above 50%, seems lower than the known county prevalence of about 73 – 94.5% (Olokoba, et al, 2013) This lower prevalence may be related the geographical location of the study Most of the respondents lived in Asaba (75%), which is the capital city of Delta State Majority of the respondents had University education (70%).

lived in a non-crowded house (92.2%), drank good quality water (68.1%), practiced good personal hygiene as measured by how often the respondents washed their hands after defaecation for which majority reported almost always (37.9%). These factors were found to be protective for *H. pylori* infection. This prevalence is however, also lower than those found in other parts of the country such as Keffi 64% (Victor, et al, 2017), Awka 76% (Ezugwu and Chukwubike, 2014) and Maiduguri 93.6% (Olokoba, et al, 2013). In addition, high educational status was protective for this infection and this has been a known precursor for good knowledge and practice of basic personal hygiene.

It was observed that higher educational status was protective for this infection. This is usually attributed to good knowledge or practice of basic personal hygiene borne from having education.

Most studies in the past showed that there is no sex predilection with *H. pylori* infection. (Leonardo H, 2014). This is similar to the findings of this study which revealed that even though more females than males tested positive this was not statistically significant. However, this is different from the findings by Ezugwu et al in Awka, eastern Nigeria, who found significant difference in the rate of acquisition of the infection between males and females in favour of females. This maybe one of the few of such finding. (Ezugwu, et al, 2014)

There was a higher positivity among those who were above 40 years as compared to those who were less than 40. This was however, not statistically significant. This finding was also not different from other studies which found that *H. pylori* infection was significantly associated with increasing age. This is similar to the findings by Victor et al at FMC, Keffi where majority of the patients were above 40 years of age (Victor, et al, 2017). In a study in Netherlands out of 1550 blood donors tested for antibodies to *H. pylori* 48% were from age group born 1935 – 1977 while 16% were from 1977 – 1987 age group (Leonardo, 2014).

H. pylori can be isolated from faeces and saliva as well as contaminated environmental samples such as water (Leonardo H, 2014). Exposure to any of these significantly poses a risk to the individual. Ezugwu et al, observed that the source of drinking water for individuals also affected transmission of the infection. This, they noted could have been from faecal contamination as they reported that those who drank stream water had the highest number of *H. pylori* isolated from their faeces as compared to those who use tap water. Similarly, drinking untreated (unclean) water was also significantly associated with this

infection in this study. Hand washing after defaecation, however, was not significantly associated with this infection in this study.

High Inter personal contacts as found in an over-crowded setting also helps to fuel transmission. In this study, overcrowding (in the past) was significantly associated with this infection. This is also supported by findings by Ezugwu et al who also reported that living in over crowded house setting was significantly associated with the infection.

Socioeconomic factors have been associated with *H. pylori* infection. Low SES was significantly associated with this infection. Similarly, parents'SES was also found to be associated with this infection. This is worthy of note, even though, at multivariate logistic regression analysis this was not statistically significant.

Acquiring this infection in childhood or within the family is a well established fact. In a study, to investigate the intra-family transmission of *H. pylori*, 838 children and their family members were tested for *H. pylori*. Findings showed that the infection was transmitted from the mother to children and from grandmother to the children. (Urita, 2014). There was evidence that infection from mother to child occurred through the saliva probably when they tasted the children's food or shared spoons with the children.

Intra-familial transmission of *H. pylori* played a role in the transmission of this infection in this study, whereby, familial factors that were significantly associated with the infection included living in overcrowded house as a child, sharing cutlery with siblings and a positive family history of Gastric cancer. Clearly, spread from mother to child and or between siblings took place among the respondents. In a similar study, multi-locus study in China, sequence typing DNA analysis was done using the stools of parents belonging to 3 families with a child positive for *H. pylori*. Findings from this study showed that the *H. pylori* strains acquired by the children originated from the parents buttressing intra-familial transmission as well as mother to child transmission (Osaki, 2013). Furthermore, in this study also, majority of respondents who tested positive to *H. pylori* ate food chewed by their mother during childhood. And this was statistically significant. Sadly, this is still a part of our culture and child upbringing practises in this part of the country.

Further examination of the individual risk factors explored reveals that drinking unclean water in the past was the most statistically significant risk factors (OR 41 6 p< 0 001). For the groups of risk factors, it appears the childhood group of risk factors were the most significant risk factor compared with the other groups in relation to the acquisition of this infection

Evidence shows that majority of persons infected with *H. pylori* are usually asymptomatic. About 20% had symptoms traceable to gastric pathologies due to *H. pylori*. However, no symptom pattern is pathognomic of *H. pylori*. This study attempted to find out if there were symptom patterns that can be attributable to *H. pylori*. The symptom pattern gotten from the respondents in this study did not show any specific pattern that is attributable to *H. pylori* infection. However, the symptom spectrum for respondents positive for *H. pylori* infection were epigastric pain, easy satiety, bloating and heart burn. These are collectively also regarded as dyspepsia and constitute part of the upper Gastrointestinal symptoms. In this study, 79.7% had one or more symptom(s). Among the positives, epigastric pain was the commonest presenting symptom, followed by easy satiety and then heart burn. This pattern of symptomatology does not look different from other causes of pepic ulcer disease (PUD).

This study had a few limitations to be considered when interpreting the results. With regards to the question on room size and overcrowding. The researcher would have wished to conduct home visits for all the respondents in order to collect the data about the house setting eg room size. However, this could not be achieved as conducting home visits for 232 people would have been quite cumbersome, herculean and may not have been realistic in the set period of the study. However, respondents were adequately counselled on the need to provide the true information with regards their house setting. In addition, the consulting room was a standard 11square meters (9 ceilings) room, hence the respondents were asked to say if the consulting room was same (or less or more than) with their sleeping room in terms of size.

The researcher tried to assess the participants' childhood risk of infection in the questionnaire, however recall bias may have been a militating factor.

5.2 Conclusion

The prevalence of *H. pylori* among adults attending the GOPD of FMC, Asaba was 56.9%. This is slightly lower than the prevalence found in other parts of the country. This may be related to the geographical location of this study as most of the respondents resided in Asaba, which is the capital city of Delta State, an oil producing State in the country. Additionally, this prevalence may also be explained by the fact that majority of the respondents had University education, lived in a non-crowded house setting, drank good quality water and practiced good personal hygiene.

However, drinking unclean water in the past, sharing cutlery with siblings during childhood and a positive family history of Gastric cancer were among the risk factors that were significantly associated with having *H. pylori* infection.

There was no special or unique symptom pattern among the respondents who tested positive

5.3 Recommendations

Based on the findings of this study, the following recommendation is being made;

1. Health education at GOPD, Maternal, Neonatal and Child Health Clinic and at other hospital settings on the risk factors for H pylori infection is recommended.
2. Mothers at the Under Five Clinics should also be educated on the role of personal hygiene and better feeding practices that excludes chewing food for the children. Instead, food could be mashed before giving it to the child instead of chewing the food for the child.
3. Clinicians should be encouraged to screen at-risk patients and those with a positive family history of Gastric cancer.

REFERENCES

Abiodun C, Otagbayo J, Lawal T , Oluwasola O, Odiabo G, Okado C, et al. 2012. Prevalence of H. pylori infection among dyspeptic patients in Ibadan, South west, Nigeria. *Afr J Microbiol Research*. 6(14):339.

Anthony S F, Dennis K, Dan L, Braunwald E, Hauser S, Larry J et al. 2008. *Helicobacter pylori* and acid peptic disorders. *Harrison's principles of Internal Medicine*. 17th Ed. McGraw-Hill Companies; Chapt144.

Clark M, Kumar P. 2009. Stomach and Doudenum; *Helicobacter pylori* infection. *Kumar and Clarks Clinical Medicine*. 7thEd, Saunder Elsevier; 241

Ezugwu, R.I and Chukwubike, C.2014. Epidemiology of *Helicobacter pylori* infection among dyspepsia patients in South-East, Nigeria. *IOSR Journal of Pharmacy and Biological Sciences*. 9 (6): 53 – 56

John Hall, 2015 Guyton and Hall Textbook of Physiology, 13th , edition, Saunders, Amsterdam.795 – 797 available at https://www.amazon.com/Guyton-Hall-Textbook-Medical-Physiology/dp/

Lawrence T, Jessica N, Claire M, and Edwin K. 2015. *Helicobacter pylori* among patients with symptoms of gastroduodenal ulcer disease in rural Uganda. *Infection Ecology and Epidemiology*. 5: 26785

Leonard E. 2014. Epidemiology of *Helicobacter pylori* infection. *Helicobacter*. 19 (1): 1– 5.

Luigi S *Helicobacter Pylori* Infection. http//www.medscape.com. Updated Dec 2017. Accessed Feb 21, 2018

Lumen 2014. Boundless Anatomy and Physiology, 3rd Edition available online at https://courses.lumenlearning.com/boundless-ap/chapter/the-stomach/ Accessed 2 August 2018

Mario MD and Steven J 2014 Immunity, inflammation, and vaccines for *Helicobacter pylori*. *Helicobacter*. 19 (Suppl 1): 19–26.

Marino V. 2014. Gastric cancer epidemiology and clinical aspects. *Helicobacter*. 19(Suppl 1): 32– 37.

Miendjie D, 2018, Helicobacter pylori infection, Guide To Infection Control In The Hospital ,. 5:

Nigeria Demographic and Health Survey 2013 Questionnaire. Available at www.population.gov.ng/2013_ndhs_final_report. Accessed March, 2017.

Olokoba AB, Gashau W, Bwala S, Adamu A, Salawu F K. 2013. *Helicobacter pylori* infection in Nigerians with dyspepsia. Ghana Med Journal. 47:79-81

OpenStax, 2013. Open Anatomy and Physiology, 4th edition available online at https://opentextbc.ca/anatomyandphysiology/chapter/23-4-the-stomach/. Accessed 3 August 2018

Osaki T, Okudu :n and Uen J. 2013. Multilocus sequence typing of DNA from faecal specimen for the analysis of intrafamilial transmission of *H pylori*. *J Med microbiology*. 62; 761-5

Oyedeji G A. 1985. Socio – economic and cultural background of hospitalized children in Ile*s. Nig J Paediatrics*.12: 111 – 117

Rahul S, Izurieta R, Aziza A, Rajaran L, Bapaul A, Welujkar S et al. 2013. Assessment of risk factors of *H pylori* infection and peptic ulcer disease. *Journal of Global Infectious Disease*. 5(2): 60 – 67.

Robert P and Justin LK. 2011. Gastritis and peptic ulcer disease. *Merck Manual Of Diagnosis and Therapy*. 19th Ed. Gary Zelko. Chapt 13.

Robin K. 2014. *Alimentary tract cancer. Current Medical Diagnosis and Treatment*. 53rd Ed. McGraw Hill, 1561. 563 – 571.

Ruihua S, Shunfu X, Yanbing D, Guiqian S, Xiayue H, Hongjie Z et al. 2008. Prevalence and risk factors for *Helicobacter pylori* infection in Chinese populations. *Helicobacter*. 13(2):157-165.

Sugamo K, Tack I, Kuipers E, 2015, Kyoto Global Consensus Report on Helicobacter pylori infection. GUT, 64:1353 - 1357

Susan S et al, 2016.Grey's Anatomy, 41th edition. Elsevier, Philadelphia. 850 – 872, Available at https://www.elsevier.com

Tanih NF, Clarke AM, Mkwetshana N, Green E, Ndip L, and Ndip RN. 2008. *Helicobacter pylori* infection in Africa: Pathology and microbiological diagnosis. *African Journal of Biotechnology*.7 (25): 4653-4662.

Tijani B, and Umar A. 2008. Peptic ulcer disease and *helicobacter pylori* infection at Kano, Nigeria. *Internet Journal of Gastroenterology*. 8(1).

Urita Y, Watanbe T, and Kanage N. 2013. Role of infected grandmothers in transmission of H pylori to children in Japanese rural town. *J Paediatrics Child* Health. 49, 394-8

Victor B O, Grace R P, Ochiche D, Abimiku SA, Moses P A. 2017. Prevalence and predictors of Helicobacter pylori infection among patients attending a healthcare facility in North-Central Nigeria. *Asian Pacific Journal of Tropical Disease*. 7(6): 352-355

Water, Sanitation and Hygiene, Household Survey, Gaza, 2010. Available at cbn www.unicef.org/wash/final_wash_ report. Last accessed March 2017.

WHO Standards for overcrowding available at www.who.int/water_sanitation-healthemergencies. Last accessed 4/4/17.

Yangchun Z, Xiaoying Z, Junhei W, Jing S and Guoxin Z. 2014. Risk factors and prevalence of H pylori in persistently high incidence area of gastric cancer in Yangzhoug City. *Gastroenterology Research and Practice* (214) 10

APPENDIX 1

INFORMED CONSENT FORM

HREC Research approval number.....

Title of the research:DETERMINANTS OF HELICOBACTER PYLORI INFECTION AMONG ADULTS ATTENDING THE GOPD OF FMC, ASABA, DELTA STATE

Name and affliation of the Researcher: DR Ikwu Augustine Chukuka;

NFELTP RESIDENT

Sponsor of research: Self Sponsored

Procedure of the research, what shall be required of each participant and appropriate total number of participants that would be involved in the research: Each participant will fill a structured questionnaire. Subjects' weight, height and BMI will be measured. The abdomen shall also be examined and Test for *H pylori* infection shall be conducted on the participants. A drop of blood is all that is needed for the test. This will be drawn by applying a gentle needle prick on the the subjects thumb, under aseptic condition. Subjects will be told their results and those who test positive shall be counseled and provided with treatment for the the eradication of H pylori. A total of 232 participants will be recruited.

Expected duration of research and participants involvement: The research will last for 4months. Each participant will only be involved for about 15minutes required for history and examination and collection of sample for *H pylori* test. Also during this time the questionnaires will be filled by the researcher.

Risk(s): This study poses minimal risk to the subjects. A drop of blood is required for the test as such subjects will experience some pain or discomfort at the point of pricking the thumb. However, care will be taken to minimize excessive trauma to the area and aseptic precaution shall be taken to forestall the spread of infection.

Costs to Participants: There will be no cost to the participants.

Benefits:

1. Provision of knowledge about the Risk factors for *H pylori* infection.
2. Provision of basis for counseling for the prevention of the infection
3. Reduction in the number diseases caused by this infection eg stomach ulcer.
4. Subjects who test positive to *H pylori* will be provided with treatment for the eradication of H pylori

Confidentiality: The information given will be kept strictly confidential. Soft copies shall be stored in a pass worded zipped folded on the laptop while hard copy shall be stored in a locker with restricted access.

Voluntariness: Participation is voluntary

Alternative to participation: Clients are free not to participate.

Due inducement: None

Consequences of participants' decision to withdraw from research and procedure for orderly termination of participation: There is no consequence to any participant withdrawing from the research. The procedure for withdrawing from the research is by writing a letter of withdrawal from the research to the researcher.

Adverse event: No adverse event is anticipated.

What happen to research participants and community when the research is over: There will be recommendations towards the prevention of this infection

Any apparent conflict of interest: None

STATEMENT OF PERSON OBTAINING INFORMED CONSENT:

I have fully explained this research to ..... and have given sufficient information, including about risks and benefits, to make an informed decision.

DATE: ..... SIGNATURE: .....

NAME: Drlkwu Augustine Chukuka

STATEMENT OF PERSON GIVING CONSENT:

I have read the description of the research or have had it translated into language I understand. I have also talked it over with the doctor to my satisfaction. I understand that my participation is voluntary. I know enough about the purpose, methods, risk and benefits of the research study to judge that i want to take part in it. I understand that i may freely stop being part of this study at any time. I have received a copy of this consent form and additional information sheet to keep for myself.

DATE: ..... SIGNATURE: .....

NAME: .....

WITNESS' SIGNATURE (IF APPLICABLE): .....

WITNESS NAME (IF APPLICABLE): .....

Detailed contact information including contact address, telephone, e-mail and any other contact information of researcher, institution HREC and Head of the Institution:

Dr Ikwu Augustine C,

NFELTP

E-mail address: austineikwu@gmail.coin

Phone number: 08063316254

APPENDIX 2

QUESTIONNAIRE

Title: Determinants of *Helicobacter pylori* infection in adults attending GOPD, FMC, Asaba, Delta state.

Serial number: Hospital number: Date:

A. SOCIODEMOGRAPHIC DATA/ SOCIOECONOMIC STATUS

1. AGE AT THE LAST BIRTHDAY .....
2. SEX :
   (a) Male [ ]
   (b) Female [ ]
3. MARITAL STATUS :
   (a) Single [ ]
   (b) Married [ ]
   (c) Divorced [ ]
   (d) Separated [ ]
   (e) Widowed [ ]
4. ETHNICITY :
   (a) Delta Ibo [ ]
   (b) Anambra Igbo [ ]
   (c) Aniocha [ ]
   (d) Urhobo [ ]
   (d) Please Specify Others .....
5. PLACE OF RESIDENCE :
   (a) Asaba
   (b) Onitsha
   (c) Ibusa
   (d) Please Specify Others .....
6. EDUCATIONAL STATUS :
   (a) University graduate [ ]
   (b) Secondary School Certificate with professional Training [ ]
   (c) Secondary School Certificate only or Grade II Teacher's Certificate [ ]
   (d) Primary School Education [ ]
   (e) No Formal Education [ ]
7. OCCUPATION:
   (a) Professional / Businessmaneg engineer, lawyer [ ]
   (b) Intermediate Public Servant eg Admin Staff, Senior Sch Teachers [ ]

(c) Artisans, Drivers, Junior Sch Teachers etc [ ]

(d) Petty trader / Labourer [ ]

(e) Unemployed [ ]

8. SOCIOECONOMIC STATUS.....

9. INCOME LEVEL PER MONTH:

(a) 0 – 50 thousand naira [ ]

(b) 50 – 150 thousand naira [ ]

(c) 150 – 300 thousand naira [ ]

(d) > 300 thousand naira [ ]

B. ADDITIONAL RISK FACTORS FOR H PYLORI

I. FAMILY SIZE / OVERCROWDING

10. TYPES OF HOUSE SETTING:

(a) A Single Room [ ]

(b) A Room and Parlour [ ]

(c) 2 – 3 Bedroom Flat

(d) > 3 Bedroom House

(e) Others Specify .....

11. SIZE OF BEDROOM:

(a) Standard 11square meter (9 ceiling) [ ]

(b) < 11 square meter (<9 ceiling) [ ]

(c) > 11 square meters (>9 ceiling) [ ]

(d) Others Specify .....

12. HOW MANY PERSONS SLEEP IN THE SAME ROOM WITH YOU AT NIGHT IN THE LAST FIVE YEARS?

(a) ≤ 2 [ ]

(b) > 2 [ ]

* infants (< 1yr) are not counted and children < 10yrs are counted as half.

(c) Artisans, Drivers, Junior Sch Teachers etc [ ]

(d) Petty trader / Labourer [ ]

(e) Unemployed [ ]

8. SOCIOECONOMIC STATUS.....

9. INCOME LEVEL PER MONTH:

(a) 0 – 50 thousand naira [ ]

(b) 50 – 150 thousand naira [ ]

(c) 150 – 300 thousand naira [ ]

(d) > 300 thousand naira [ ]

B. ADDITIONAL RISK FACTORS FOR H PYLORI

I. FAMILY SIZE / OVERCROWDING

10. TYPES OF HOUSE SETTING:

(a) A Single Room [ ]

(b) A Room and Parlour [ ]

(c) 2 – 3 Bedroom Flat

(d) > 3 Bedroom House

(e) Others Specify .....

11. SIZE OF BEDROOM:

(a) Standard 11square meter (9 ceiling) [ ]

(b) < 11 square meter (<9 ceiling) [ ]

(c) > 11 square meters (>9 ceiling) [ ]

(d) Others Specify .....

12. HOW MANY PERSONS SLEEP IN THE SAME ROOM WITH YOU AT NIGHT IN THE LAST FIVE YEARS?

(a) ≤ 2 [ ]

(b) > 2 [ ]

• infants (< 1yr) are not counted and children < 10yrs are counted as half.

II. FAMILY SOURCE AND QUALITY OF DRINKING WATER

13. WHAT IS YOUR FAMILY PREDOMINANT SOURCE OF DRINKING WATER IN THE LAST FIVE YEARS?

(a) Government Provided Pipe Borne Water [ ]

(b)Bore Hole Water [ ]

(c) Bottled Water [ ]

(d) Satchet Water [ ]

(e) RainWater

(f) Well water [ ]

(g) Streams and Rivers [ ]

(h) Please Specify Others .....

14. IS YOUR DRINKING WATER TREATED TO MAKE IT SAFE?:

(a) Yes [ ]

(b) No [ ]

15. BY WHAT MEANS DO YOU TREAT YOUR WATER? :

(a) Boiling [ ]

(b) Chloride/ Bleach e.g. Water Guard [ ]

(c) Filter With Cloth [ ]

(d) Others (Specify) .....

16. HOW OFTEN DO YOU TREAT YOUR WATER?:

(a) Always [ ]

(b) Occasionally [ ]

(c) Never [ ]

III. PERSONAL HYGEINE

(17) HOW OFTEN DO YOU WASH YOUR HANDS WITH SOAP ?

(a) Almost Never [ ]

(b) Once Per Week [ ]

(c) Once Every 2 – 3 days [ ]

(d) Once Per Day [ ]

(e) 2 – 3 x Per Day [ ]

(f) > 3x Per Day [ ]

(18) WHEN DO YOU WASH YOUR HANDS WITH SOAP?

(a) Never [ ]

(b) Before Meal Times [ ]

(c) After Meal Times [ ]

(d) Before Bed [ ]

(e) Before Cooking [ ]

(f) After Using The Toilet [ ]

(g) Only When They Appear Dirty [ ]

IV CHILDHOOD RISK OF H PYLORI INFECTION

(19) HAS YOUR MOTHER EVER FED YOU FOOD PRE – CHEWED BY HER WHEN YOU WERE A CHILD?

(a) Yes [ ]

(b) No [ ]

(c) I cant remember [ ]

(20) DURING YOUR CHILDHOOD DID YOU EVER SHARE SPOONS AND CUPS WITH YOUR SIBLINGS / ADULTS?

(a) Yes [ ]

(b) No [ ]

(21) DURING YOUR CHILDHOOD HOW MANY PEOPLE SLEPT IN THE SAME ROOM WITH YOU AFTER YOU WERE 10 YEARS?:

(a) < 2

(b) > 2

(22) WHAT WERE YOUR PARENTS OCCUPATION? .....

(23) WHAT WERE YOUR PARENTS EDUCATIONAL LEVEL? .....

(24) PARENTS SOCIOECONOMIC STATUS? .....

C. MEDICAL HISTORY

25. EPIGASTRIC PAIN:

(a) Yes [ ]

(b) No [ ]

26. BLOATING:

(a) Yes [ ]

(b) No [ ]

27. EASY SATIETY:

(a) Yes [ ]

(b) No [ ]

28. HEARTBURN:

(a) Yes [ ]

(b) No [ ]

29. FAMILY HISTORY OF GASTRIC CANCER ?:

(a) Yes [ ]

(b) No [ ]

D. EXAMINATION FINDINGS

30. WEIGHT (kg) .....

31. HEIGHT (cm).....

32. BMI (kg/m^2) .....

ABDOMINAL EXAMINATION FINDINGS

33. INSPECTION

(a) Normal [ ]

(b) Specific Abnormal findings .....

34. PALPATION

(a) Normal [ ]

(b) Epigastric Tenderness [ ]

(c) Organomegally [ ]

(d) Any Other Specific Abnormal findings .....

35. PERCUSSION

(a) Normal [ ]

(b) Specific Abnormal findings .....

36. AUSCULTATION

(a) Normal [ ]

(b)Specific Abnormal findings .....

37. DIGITAL RECTAL EXAMINATION

(a) Normal [ ]

(b) Specific Abnormal findings .....

E. TEST FOR H. PYLORI

38. TEST FOR H PYLORI

(a) Positive [ ]

(b) Negative [ ]

APPENDIX 3

OYEDEJI CLASSIFICATION OF SOCIAL CLASS

Points	Occupation	Educational Level
1	Senior Public Servants, Professionals, Managers, large Scale Traders and Businessmen, Contractor	University Graduate and equivalent
2	Intermediate Grade level Public Servants, Senior School Teachers	Secondary School Certificate with Professional Training
3	Junior School Teachers, Driver, Artisan	Secondary School Certificate or Grade II Teachers Certificate
4	Petty Traders, Labourers, Messengers, Cleaners etc	Primary School Education
5	Unemployed	Illiterate

The sum of the Father's occupation and education scores plus mother's occupation and education scores divide by 4 (or by 2 for a single parent or an individual) gives the Social Class.

Scores 1 – 2 → High Socioeconomic Class

2 – 3 → Middle Socioeconomic Class

3 – 5 → Low Socioeconomic Class

Appendix 4

Ethical Approval

Our Ref: FMC/ASB/A81Vol.VII/159 Date: 27th March, 2017

Dr. A.C. Ikwu
Epidemiology Unit.
State Ministry of Health.
Asaba. Delta State.

RE: APPLICATION FOR ETHICAL CLEARANCE: DETERMINANTS OF HELICOBACTER PYLORI INFECTION AMONG ADULT ATTENDING THE GENERAL OUTPATIENT DEPARTMENT. FEDERAL MEDICAL CENTRE, ASABA. DELTA STATE.

With reference to your application dated 4th February. 2017. on the above subject matter, I write to inform you that the research and ethical committee wishes to convey her approval for you to collect your data in our institution. However we seek that no data concerning any of the subjects will be published in part or in full in such a way that may breach the confidentiality of the respondent(s) involved.

However the committee or the participant reserved the right to terminate the approval at any time during the course of the data collection if any undisclosed information/data is made available or if the research is found to have unforeseen ethical issues.

Please do not hesitate to seek more clarification or assistance if you so desire.

Wishing you the best of luck.

28/3/17

Dr. N.L. Orhue. MBBS. FMCPH (member). FWACP
Chairman.
for: Ag. MEDICAL DIRECTOR