AMERICAN UNIVERSITY OF NIGERIA
DEPARTMENT OF NATURAL AND ENVIRONMENTAL SCIENCES

Thesis

CHARACTERIZATION OF PATIENTS WITH PEPTIC ULCER DISEASE IN NORTHEASTERN NIGERIA: INFLUENCE OF LIFESTYLE, WEALTH, AND ENVIRONMENTAL FACTORS

by

JOHNPAUL IZUCHUKWU OFFOR

Submitted in partial fulfillment of the Requirements for the degree of Bachelor of Science 2015
CHARACTERIZATION OF PATIENTS WITH PEPTIC ULCER DISEASE IN NORTHEASTERN NIGERIA: INFLUENCE OF LIFESTYLE, WEALTH, AND ENVIRONMENTAL FACTORS

This thesis represents my original work in accordance with the American University of Nigeria regulations. I am solely responsible for its content.

JOHNPAUL IZUCHUKWU OFFOR

______________________________  ________________
Signature  Date

I further authorize the American University of Nigeria to reproduce this thesis by photocopying or by any other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research.

JOHNPAUL IZUCHUKWU OFFOR

______________________________  ________________
Signature  Date
CHARACTERIZATION OF PATIENTS WITH PEPTIC ULCER DISEASE IN NORTHEASTERN NIGERIA: INFLUENCE OF LIFESTYLE, WEALTH, AND ENVIRONMENTAL FACTORS

JOHNPAPAUL IZUCHUKWU OFFOR

Approved by

Research Supervisor: Jennifer Tyndall, Ph.D.
Associate Professor of Natural and Environmental Sciences

______________________________  ________________
Signature                      Date

Second Reader: Hayatu Raji, Ph.D.
Assistant Professor of Natural and Environmental Sciences

______________________________  ________________
Signature                      Date
DEDICATION

This research project is dedicated to the Almighty God, who made it possible for me to successfully conduct this study. I’m also dedicating it to my beloved family (Offor family), and to the family of Mr. & Mrs. Christian Okwuogu. In a special way, I also dedicate this research project to my beloved brother, Rev. Fr. Cyriacus Anayo Offor, MSP (Odommiri Bethsaida), and to my godson, Master Godwin Chigozie Okwuogu.
ACKNOWLEDGEMENTS

I thank the God Almighty, who made it possible for me to successfully conduct this very inspiring and important project. I also thank my beloved family (Offor family), and the family of Mr. & Mrs. Christian Okwuogu for their love, support, and encouragement throughout the duration of this project. In a very special way, I thank my beloved brother, Rev. Fr. Cyriacus Anayo Offor, MSP (Odommiri Bethsaida), and my other siblings for their unending love, financial support, encouragement, and burning desire towards my education, which have made my dreams come true. I am very grateful to you all, and God will continue to shower his blessings upon you all.

I also thank my supervisor, Professor Jennifer Tyndall, who devoted her time, energy, and expertise to making sure that I achieved my greatest potential through this project. I appreciate all the support and guidance Professor Lynne Baker gave to me when the going seemed so impossible. At the same time, I thank my second reader, Professor Hayatu Raji, the Chair of Natural and Environmental Science Department, for his support and expertise to this project. Also, I thank Professor Agatha Ukata for standing by me throughout the course of this project. My thanks also goes to Professor Brian Reed for the tremendous help he rendered to me throughout the course of this project.

I am grateful to Dr. Fatai Salawu (Head of Clinicals, Federal Medical Center (FMC), Yola), Dr. David Wadinga (Surgeon at the FMC), and other FMC doctors that contributed to the successful completion of this project. I wish to also extend my gratitude to Dr. Nasir Umar (London School of Hygiene and Tropical Medicine) for his guidance, expertise, and time he committed in making sure that this project went
well. Thanks to my translators, Sara Paul and Aisha Soro, for the wonderful help they rendered to me. My God will surely reward you all.

Finally, I thank my colleagues and friends (Paul Owoicho, Justin Adda, Hephzber Obiorah, Ebenezer Dariye, Immaculata Onuigbo, Charles Uwagwu, Victory Inyang, Conrad Bukenya, Emmanuel Hakizimana, Ime Ukong, Timothy Iyela, and others), who have been the source of my encouragement and inspiration. May God bless you all.
CHARACTERIZATION OF PATIENTS WITH PEPTIC ULCER DISEASE IN NORTHEASTERN NIGERIA: INFLUENCE OF LIFESTYLE, WEALTH, AND ENVIRONMENTAL FACTORS

JOHNPAUL IZUCHUKWU OFFOR

American University of Nigeria, 2015

Major Professor: Jennifer Tyndall, Ph.D., Associate Professor of Natural and Environmental Sciences

ABSTRACT

Peptic ulcer disease is a disorder in the gastrointestinal tract. It is caused by an increase in stomach acid. There are only a few studies on peptic ulcer disease in Africa. This study was conducted to characterize the lifestyle, wealth, and environmental factors of peptic ulcer patients in the Northeastern Nigeria. The lifestyle factors that were examined were cigarette smoking and alcohol consumption. A targeted sampling method was used to sample 52 PUD (n=52) patients at Federal Medical Center, Yola. I used mixed methods (quantitative and qualitative techniques) approaches for data collection. Structured questionnaires were administered to PUD patients, and questions on the lifestyle, wealth, and environmental factors of typical PUD patients were asked.

The result showed that cigarette smoking and alcohol consumption are not characteristics of typical PUD patients. More than 70% of the subjects stated they neither smoked cigarettes nor drank alcohol. Based on the assessment of participants’ income status, most were in the lower sector. The result indicated that the major
characteristic of PUD patients in North Eastern Nigeria is low wealth. The age range of my respondents was 10 to 50 years with an average age of 32 years and a standard deviation of 10.67. Gender was also found to be a characteristic of PUD patients because females had more PUD than males.

The results from this research clearly demonstrate that gender and income status are major characteristics of PUD. Cigarette smoking and alcohol drinking may be among the characteristics of PUD patients in northern Nigeria. The void in the literature on PUD indicates that sponsored research is vital by International Nongovernmental agencies and governments in Africa.

**Key words:** peptic ulcer disease, epidemiology, prevalence, diagnosed patients, wealth, alcohol consumption, cigarette smoking, Nigeria, Africa
TABLE OF CONTENTS

TITLE PAGE..............................................................................................................................i
CERTIFICATION PAGE ........................................................................................................... ii
APPROVAL PAGE .................................................................................................................. iii
DEDICATION .............................................................................................................................. iv
ACKNOWLEDGEMENTS.......................................................................................................... v
ABSTRACT .............................................................................................................................. vii
TABLE OF CONTENTS .......................................................................................................... ix
LIST OF TABLES .................................................................................................................. xii
LIST OF FIGURES ................................................................................................................ xiii
LIST OF ABBREVIATIONS .................................................................................................... xiv
CHAPTER 1 ................................................................................................................................ 1
1.0 INTRODUCTION ................................................................................................................ 1
  1.1 Overview of Peptic Ulcer ................................................................................................. 1
  1.2 Aetiology of Peptic Ulcer ............................................................................................. 2
  1.3 Signs and Symptoms of Peptic Ulcer Disease .............................................................. 4
  1.4 Factors that Influence Development of Peptic Ulcer .................................................... 5
  1.5 Lifestyle Practices and Peptic Ulcer Disease ............................................................... 8
  1.6 Aims: ............................................................................................................................ 11
  1.7 Research Question: .................................................................................................... 12
  1.8 Null Hypothesis (H₀): ............................................................................................... 12
APPENDIX II ......................................................................................................................... 41
  Diagnosis of Peptic Ulcer ................................................................................................. 41

APPENDIX III ....................................................................................................................... 42
  Human Subject Online Training Certificate ................................................................. 42

APPENDIX IV ......................................................................................................................... 43

APPENDIX V ......................................................................................................................... 44

REFERENCES ......................................................................................................................... 49
LIST OF TABLES

Table 1: Showing the income groups of the respondents

Table 2: Showing the income levels and gender of the PUD patients at FMC

Table 3: Showing the socioeconomic status PUD patients respondents

Table 4: Showing the different sources of drinking water for respondents

Table 5: Showing the number and percentage of the respondents that smoke cigarettes and don’t smoke cigarettes

Table 6: Showing the frequency of smoking among the PUD patients

Table 7: Showing the number and percentage of the respondents that drink alcohol and do not drink alcohol

Table 8. Showing the frequency of alcohol intake among the PUD patients that drink alcohol

Table 9: Comparing the various characteristics of PUD patients with five studies from different countries
LIST OF FIGURES

Figure 1: Showing the peptic ulcer disease
Figure 2: Showing the defensive and aggressive factors peptic ulcer disease
Figure 3: Showing the development of peptic ulcer disease
Figure 4: Showing map of Adamawa State showing local governments and ethnic groups
Figure 5: Showing the proximity of Federal Medical Center from the American University of Nigeria
Figure 6: Showing aerial view of the Federal Medical Center, Yola
Figure 7: Showing all the local governments in which the respondents live
Figure 8: Showing the income groups of the respondents
Figure 9: Showing the toilet facilities of the respondents
Figure 10: Comparing my result on cigarette smoking with other studies around the world.
Figure 11: Comparing my result on alcohol consumption with other studies around the world.
Figure 12: Comparing my result on gender with other studies around the world.
Figure 13: Comparing my result on wealth other studies around the world.
Figure 14: Anatomy of the stomach
Figure 15: The Anatomy of the stomach and duodenum
LIST OF ABBREVIATIONS

FMC – Federal Medical Center

PUD – Peptic Ulcer Disease

OH – Hydroxyl

O_2^- – Oxide ion

H_2O_2 – Hydrogen peroxide

NSAIDs - Nonsteroidal anti-inflammatory drugs

NGOs – Nongovernmental Organizations
CHAPTER 1

1.0 INTRODUCTION

1.1 Overview of Peptic Ulcer

Peptic ulcer disease (PUD) is a gastrointestinal disorder that occurs as a result of developing a hole or sore within the lining of stomach, or duodenum, which forms the first part of the ileum (small intestine) (Lin et al., 2015). This is caused by high increase in the gastric acid found in the stomach. PUD poses a serious medical problem to humans, and it affects millions of people in their everyday lives. It increases the morbidity and mortality rates throughout the world’s population (Siddique, 2014). For example, approximately 4 million people have peptic ulcer disease in the United States, and about 350,000 new cases of PUD are diagnosed each year (Siddique, 2014).

Peptic ulcer disease has been identified as the most common disorder of the gastrointestinal tract.

The incidence of this disease is constantly increasing in developing countries, while it has decreased in developed countries (Al-Zubeer et al., 2012). PUD has continued to be a serious socio-medical challenge in the world (Konturek et al., 2003). The reasons behind the decrease of peptic ulcer incidence in developed countries have been attributed to the early detection and treatment of the disease (Al-Zubeer et al., 2012). Other factors that have led to the decline in the PUD in developed countries include increase in hygiene and sanitation in the food services sector; as well as increase in health awareness in developed countries. However, the reasons for the increase in PUD among developing countries are not yet clear. PUD poses life-threatening problems,
such as ulcer perforations and bleeding in the gastrointestinal tracts (Konturek et al., 2003).

In the last decades of the 20th Century, the morbidity and mortality rates of peptic ulcer disease were very high worldwide, but remarkable developments in the field of epidemiology reduced the prevalence and the incidence of peptic ulcer in the world’s population (Malfertheiner, Chan, & McColl, 2009). These epidemiological developments, including tracking of diseases and outbreaks, are used to determine the mode of transmission of diseases. The development in epidemiology also determines whether a disease is zoonotic, chronic, or pathogenic (Malfertheiner et al., 2009). The epidemiological development further involves the identification of health indicators, determinants of diseases, and demographic information, which are quantifiable evidence used by epidemiologists and other health researchers in describing the health situation of a particular population (World Health Organization, 2000).

1.2 Aetiology of Peptic Ulcer

Peptic Ulcer Disease (PUD) is among the major gastrointestinal tract disorders and is partially caused by the increase in secretion of gastric acid. It occurs in the stomach and duodenum (for the anatomy of both structures, see Appendices I & II). The other contributing factors of peptic ulcer development include cigarette smoking (Ali, Ullah, Akhtar, Ali Shah, & Junaid, 2013; Andersen, Jørgensen, Bonnevie, Grønbæk, & Sørensen, 2000a; Maity, Biswas, Roy, Banerjee, & Bandyopadhyay, 2003), use of analgesics, stress (Levenstein, 1998), social conditions (Al-Zubeer et al., 2012), *Helicobacter pylori*, inheritance (blood group), personal traits, diet, and psychological factors (Johnsen, Førde, Straume, & Burhol, 1994).
Peptic ulcer mainly occurs in the proximal duodenum (duodenal ulcer) or stomach (gastric ulcer) (Fig. 1). PUD forms a strong defensive mechanism against the gastrointestinal mucosa, such that bicarbonate and mucus secretion are overpowered by the detrimental effects of pepsin and gastric acid (Sung, Kuipers, & El-Serag, 2009). The study by Al-Zubeer et al. reveals that the cause of peptic ulcer can be attributed to stomach cells that secrete digestive juices (acid), which cause corrosion and huge damage in the lining of esophagus, duodenum, or stomach (Al-Zubeer et al., 2012).

Peptic ulcer disease also occurs due to disorder in the balance between hostile factors such as nonsteroidal anti-inflammatory drugs (NSAIDs), gastric acid, pepsin, and Helicobacter pylori, and protective factors such as bicarbonate, prostaglandins, blood flow to the mucosa, and mucus in the stomach and duodenum (Lin et al., 2015). It is characterized by high intensity of pain in the right hypochondrium (upper part of the
abdomen) during food intake. Epigastric pain is also a characteristic of peptic ulcer (Ali et al., 2013).

Loss of balance between some defensive and aggressive (gastroprotective) factors also leads to the development of peptic ulcer (Fig. 2). The factors that are considered to be aggressive factors can be either exogenous or endogenous in nature, and they both cause imbalance between defensive and aggressive in the stomach, thereby causing PUD. Endogenous factors include leukotrienes, pepsin, hydrochloric acid, and refluxed bile, intermediates of reactive oxygen such as OH, O$_2^-$, and H$_2$O$_2$. The exogenous factors that cause peptic ulcer include chronic alcohol consumption, *Helicobacter pylori* infection, smoking, alcohol consumption, and intake of nonsteroidal anti-inflammatory drugs (NSAIDs) (Maity et al., 2003).

![Fig. 2. A, Defensive factors; B, aggressive factors. Source: gi.jhsps.org](image)

1.3 Signs and Symptoms of Peptic Ulcer Disease

The signs and symptoms of peptic ulcer include tenderness in the epigastric area, gnawing pain, and burning discomfort. PUD may be asymptomatic in some individuals
while the symptoms can show with heavy complications in some patients. PUD patients may show different symptoms such as bleeding, serious perforations in the intestinal lining, mild abdominal discomfort, hematemesis (vomiting blood), weight loss, heart burn, and itching between umbilicus and xiphoid (Ali et al., 2013; Malfertheiner et al., 2009). Other symptoms include abdominal pain, vomiting, and nausea. Infected people may experience pain in the epigastrium and the pain is usually not radiated to other parts of the body. The pain begins to radiate to the back when peptic ulcer penetrates posteriorly and may also occur in the origin of the pancreas (Malfertheiner et al., 2009). Peptic ulcer causes a serious and dangerous breaking in the duodenal and gastric mucosa. Duodenal and gastric ulcers are related to the corrosive action of hydrochloric acid and pepsin along the upper gastrointestinal tract. Three millimeters is the range of most ulcers and a number of centimeters in diameter (Malfertheiner et al., 2009).

1.4 Factors that Influence Development of Peptic Ulcer

In the 1980’s, excessive eating, alcohol consumption, rich food with spices, eating much of fatty foods, and stress were identified as major factors leading to peptic ulcer development (Levenstein, 1998). Later, other factors that are responsible for peptic ulcer disease were discovered to be *Helicobacter pylori*, smoking, co-administration of corticosteroids, NSAIDs, heredity, co-administration of warfarin, and other uncommon factors such as tuberculosis and Crohn’s disease, which may be idiopathic at times (Ali et al., 2013). Socioeconomic status is also a contributing factor to the development of peptic ulcer because individuals with low economic status are mostly exposed to *H. pylori* infection, and this leads to development of PUD (Mhaskar et al., 2013).
However, the major factor that causes peptic ulcer disease has been identified to be *Helicobacter pylori*, which is found in the intestinal walls of humans. *H. pylori* is a flagellated, spiral-shaped bacilli and a Gram-negative bacterium that is found mostly in the epithelial lining of the stomach and in the gastric mucous layer (Salih, 2009). *H. pylori* can be detected through the clinical analysis of stool from the infected individuals by monoclonal antigen detection (Mhaskar et al., 2013).

The prevalence of *H. pylori* has been revealed by a wide range of studies around the world. Residential overcrowdings, use of pit toilet/latrines, and low wealth are heavily linked with the prevalence of *H. pylori* infection (Goodman & Cockburn, 2001).

Further, migrations between rural and urban settlements, and low wealth are other important factors that contributes to *H. pylori* infections (Mbengue et al., 1997). The possible risk factors of *H. pylori* infections are drinking of non-boiled water or non-filtered water, fish consumption, eating of restaurant food, low socioeconomic status, meat consumption, and smoking. This is because *H. pylori*, which is also a causative pathogen for PUD, can easily be transmitted through drinking water, meat consumption, and meals that are prepared in a dirty environment.

Approximately 50 percent of the world population is infected with *H. pylori*, and this is more than 3 billion people worldwide. People in developing countries are mostly affected by this bacterium. Because of *H. pylori* infection, a high number of people around the world develop peptic ulcer disease during their lifetimes and the majority of these people that are infected with peptic ulcer disease might develop gastric cancer in their lifetime (Salih, 2009). *H. pylori* is responsible for over 80% of gastric ulcers and about 90% of duodenal ulcers. This bacterium is very common and it affects over
two-thirds of the total world population (Center for Disease Control and Prevention, 1998). Children are less affected by *H. pylori* infection in developing countries, but more than 60% the population of older people are most affected (Salih, 2009). *H. pylori* causes peptic ulcer by breaking down of the mucosa found on the lining of the gastrointestinal tract (Fig. 3). This creates room for the digestive acids in the digestive tracts to affect the wall of the intestine and stomach (Al-Zubeer et al., 2012b).

![Development of peptic ulcer disease](gi.jhsps.org)

**Fig. 3 Development of peptic ulcer disease.** Source: gi.jhsps.org

In addition, genetic factors are highly linked with the development of peptic ulcer disease, which might have strong clinical and public health implications (Suadicani, Hein, & Gyntelberg, 1999). These factors contribute to the lifetime prevalence of peptic ulcer disease among the people with non-secretors of ABH antigen and Lewis phenotype Le(a+b-). PUD is also prevalent in individuals with O and A phenotypes among the blood groups ABO. Lewis blood group phenotype Le(a+b-) or non-secretors, blood groups A and O are highly attributed with the PUD (Hein, Suadicani, & Gyntelberg, 1997; Suadicani et al., 1999).
1.5 Lifestyle Practices and Peptic Ulcer Disease

Various lifestyle practices contribute to the development of peptic ulcer. Cigarette smoking is a factor that influences the development of peptic ulcer. It heavily contributes to the complications, incidence, reoccurrences, and mortality, and causes serious delays in the healing process of peptic ulcer disease. Cigarette smoking is a co-factor to *H. pylori*, and they both create room for the development of peptic ulcer disease (Andersen et al., 2000). The rate of peptic ulcer disease in people who smoke is twice that of people who do not smoke, and cigarette smoking has a dose-dependent effect on the development and incidence of peptic ulcer disease (Ma, Chow, & Cho, 1998).

Peptic ulcer disease is highly associated with the inhalation of cigarette smoke by the smokers and non-smokers. This increases the rate of development of peptic ulcer disease in people with the longer years of smoking. Both light and heavy smokers are at greater risk of developing peptic ulcer than non-smokers, and the risk of developing PUD increases as the number of smoking pack-years increases. It has been understood that one of the major causes of peptic ulcer is correlated to cigarette smoking more than to other behavioral attitudes (Ma et al., 1998). Cigarette smoking promotes the susceptibility of defensive factors and reduces the gastric mucosal protective factors and also creates room for *H. pylori* infection. Nicotine and smoking increase the stimulation of basal acid output that delays the healing process of peptic ulcer, and this is more evident in cigarette smokers suffering from peptic ulcer disease. They have the tendency to cause increase in the secretion of the gastric acid that is facilitated when the H₂-receptors are stimulated by histamine that is released after mast cell degranulation (Maity et al., 2003).
Alcohol intake is another risk factor for peptic ulcer disease. It facilitates development of peptic ulcer and causes delay in healing of ulcer perforation in peptic ulcer patients. Dangerous effects of alcohol on peptic ulcer is highly dependent on the dose intake. High consumption of alcoholic drinks has negative effects in the management of peptic ulcer as well as its development (Andersen et al., 2000). It increases the concentration of the basal acid, thereby enabling *H. pylori* to attack the stomach and duodenal walls. Consumption of over fourteen bottles of alcoholic drinks in a week increases the risk of developing peptic ulcer (Andersen, Jørgensen, Bonnevie, Grønbæk, & Sørensen, 2000).

According to Levenstein (1998), physiological stress contributes to the development of peptic ulcers and it delays the healing process of the disease. Physiological distress is highly connected with the output of gastric acid in patients with peptic ulcer disease. The quantity of acid that get to the duodenum during stressful period might cause a large escalation in the amount of gastric acid. This is a result of missing of meals or a result of change in gastric motility. Individuals that are under stress are likely to sleep less, drink alcohol, and/or smoke cigarettes, and these are risk factors that contribute to the development of peptic ulcer (Levenstein, 1998). The evolution of *Helicobacter pylori* infection could be facilitated into ulcer by stress through the production of gastric hyperchlorhydria (when the gastric acid in the stomach is higher than the reference range). Through the psychoneuroimmunological (interaction between immune systems, nervous system and psychological processes in the human body) mechanism, the equilibrium balance between *Helicobacter pylori* can be disrupted by stress. Cigarette smoking is one of the behavioral mediators which create room for
stress to reduce mucosal defensive mechanisms and allow *H. pylori* to invade the intestine (Levenstein, 1998).

Finally, wealth of individuals contributes to the risk of developing peptic ulcer. Individuals with lower income status can easily be infected with *H. pylori*. Further, lower income class and use of pit toilets are correlated with *H. pylori* infection because low income earners live mainly in crowded environments and are prone to different types of infection (Mbengue et al., 1997). It has been suspected that the *H. pylori* infection is highly linked with drinking of impure water, food, and through oral contact, and individuals with low wealth status are highly affected with the infection. Most individuals with low income earners have no access to clean water and they live mostly in dirty and crowded environments. Wealth has a very important role to play in peptic ulcer development as it creates room for *H. pylori* infections. It has a very strong association with peptic ulcer disease (Levenstein & Kaplan, 1998).

In this study, I characterized the lifestyle, wealth, and environmental factors (source of drinking water and toilet facilities) of typical PUD patients in Yola, northeastern Nigeria. The study of these characteristics is very important in the field of public health, to determine the epidemiology, management, and prevention of peptic ulcer disease. Furthermore, this research project tends to explore and provide an in-depth understanding of the possible lifestyle (cigarette smoking and alcohol consumption) and socioeconomic factors that define typical PUD patients.

Moreover, there are quite a low number of publications on this topic from Nigeria and Africa, which shows that characteristics of typical peptic ulcer patients have not been
thoroughly identified and studied in Nigeria and Africa. Based on all the literature reviewed, the effects of alcohol consumption, cigarette smoking, and socioeconomic status on peptic ulcer development has not been well studied in Nigeria, as well as in Africa. Most of the works on peptic ulcer disease were done by the Western countries and that is why the study of the characteristics of lifestyle and socioeconomic factors that influence the development of peptic ulcer disease is very important.

The characteristics of typical PUD patients were examined between alcohol consumption, cigarette smoking, and socioeconomic status in the development of PUD in diagnosed patients at FMC. The low intake of alcoholic drinks, cigarette smoking, and low exposure to stress was predicted to lower the rate of development of peptic ulcer disease. Even though the study did not focus on physiological causes of peptic ulcer, the work is very crucial in reducing the incidence and prevalence of peptic ulcer disease in Nigeria. This is because the identification of the characteristics and risk factors of PUD patients is a strong tool to stopping PUD infections. The work ended with some suggestions on how to avoid risk factors of peptic ulcer that are associated with lifestyle practices and the importance of visiting a hospital during illnesses.

1.6 Aims:

1. To characterize peptic ulcer patients by demographics, lifestyle, wealth, and environmental factors in Yola, northeastern Nigeria.

2. To explore how lifestyle, wealth, and environmental factors compare to those recorded for peptic ulcer patients in other parts of the world.
1.7 Research Question:

What lifestyle behaviors, wealth, and environmental factors characterize peptic ulcer patients in northeastern Nigeria?

1.8 Null Hypothesis (H₀):

Lifestyle, wealth, and environmental factors do not help characterize peptic ulcer patients in Yola, northeastern Nigeria.

1.9 Hypothesis (H₁):

Lifestyle, wealth, and environmental factors help characterize peptic ulcer patients in Yola, northeastern Nigeria.

1.9.1 Objectives

- To determine the number of patients who smoke cigarettes and how much they smoke.
- To determine the number of patients who consume alcohol and how much they consume.
- To determine monthly income of patients.
- To identify environmental factors that may affect patients.
- To collect data on patients with peptic ulcer disease in other parts of the world.
CHAPTER 2

2.0 MATERIALS AND METHODS

This section discusses all the important elements in methodology that include the study area, the design used for data collection, the population of the participants in this study, the type of sampling used in selecting these participants, the size of the population and data analysis.

2.1 The Study Area

![Map of Adamawa State showing local governments and ethnic groups](https://www.google.com.ng/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0ahUKEwjb7I_2oarJAhXIWRoKHZgiBb0QjB0IBg&url=http%3A%2F%2Fnigeriandatamall.c)

_Source: Nigerian Data Mall_

**Fig. 4** Map of Adamawa State showing local governments and ethnic groups
Adamawa is a state in the northeastern part of Nigeria, and its capital city is Yola. It is made of 21 local governments, namely Demsa, Fufore, Ganye, Girei, Gombi, Guyuk, Hong, Jada, Lamurde, Madagali, Maiha, Mayo-Belwa, Michika, Mubi North, Mubi South, Numan, Shelleng, Song, Toungo, Yola North, and Yola South (Fig 4). The most frequently spoken languages in Adamawa are Hausa and Fulfulde. Residents of this state are mostly Muslims and the minority of them are Christians. The population of Adamawa State is approximately 250,000 people. Many people in different communities in Adamawa State engage mainly in farming and rearing of animals. Some of the residents are involved in petty businesses. They make most of their living through agriculture, which includes cultivation of crops such as guinea corn, maize, rice, etc. They practice both subsistence and commercial systems of agriculture.

**Fig. 5** Showing the proximity of Federal Medical Center from the American University of Nigeria

Source: Retrieved from Google Earth
I conducted this study at the Federal Medical Center (FMC), Yola (Fig. 5 and 6). It is located at number 2 Lamido Zubairu Road, Yola Bye-Pass, Yola. It is the only Federal Government Hospital in Adamawa State. It is regarded as the best hospital in Adamawa State with a great lead in rendering high quality, effective, efficient, and reliable healthcare services for the patients within and outside Yola. The FMC has many qualified and experienced doctors, nurses, and administrative staff that ensure that patients get good medical attention as required. It has standard medical equipment with a computerized, radiological, and other laboratory services. The FMC official operating hours are between 8:00 am and 5:00 pm daily, but the Emergency Care Unit and other departments operate 24 hours daily. There are about four different departments at FMC, which include Pediatrics, Surgery, General Medicine, and Obstetrics and Gynecology. Peptic ulcer patients are treated under the general medicine department.
The Federal Medical Center (FMC) is the study site for this research because of its proximity to the American University of Nigeria (AUN) (Fig. 5). The hospital is owned and managed by the Federal Government of Nigeria under the supervision of the Federal Ministry of Health. The FMC Yola is open to everyone from within and outside of Adamawa State. The doctors at FMC attested that PUD patients visit FMC for diagnosis and treatment. They come during clinic days (every Monday), which last from 8:00am to 1:00pm. Aside the clinic days, PUD patients also visit the FMC from Tuesday to Sunday. There were enough samples of peptic ulcer patients at the FMC. This study was conducted at the General Out-Patient Department (GOPD) at the FMC. I was given a consulting room, where my translators and I administered my questionnaires to the PUD patients. The questionnaires were administered together with my translators to diagnosed PUD patients seen at the GOPD of the hospital. I trained two interviewers on the necessary interview techniques and also familiarized them with the questions in my semi-structured interview guide and questionnaires. The translators were very fluent in both Hausa and Fulfulde languages. The translators were familiar and knowledgeable about my study. They both understood and agreed on common Hausa and Fulani translations of all the wordings in my questionnaire. They were conversant with the purpose of the study as well. I went to the hospital with my translators on a daily basis for data collection until I finished collecting my data. The translators helped in the administration of the questionnaires to PUD patients at FMC. I selected the translators from experienced interviewers that work with the Natural and Environmental Sciences Department at AUN. The translators were trained for three days in order to get more familiar with the questions.
The participants in this study were diagnosed peptic ulcer patients that visit FMC from any part of Adamawa State for treatment. The method of sampling that I used in this study was non-probability sampling where the chance of selecting any diagnosed peptic ulcer patients at FMC was not known. I also used a targeted sampling method to sample the participants because the study focused on only individuals with PUD. I used the aforementioned sampling because the time frame for this study was limited, since it wasn’t possible to bring all the diagnosed peptic ulcer patients at FMC together and sample them in one day.

2.2 Data Collection and Analysis

I used mixed methods to collect my data in this study, which included qualitative and quantitative approaches. The type of qualitative approach that I used was qualitative interviews (semi-structured). The prepared semi-structured interview with an interview guide contained only open questions (Appendix IV). I administered a semi-structured interview guide with questions to five doctors at the General Medicine Department at FMC to get more information about their view on peptic ulcer disease and its risk factors. I administered the qualitative interview (semi-structured) to the doctors on the 15th of October, 2015. This helped me in getting their general knowledge about factors that are associated with the development of peptic ulcer disease. The answers obtained from the semi-structured interview helped me in developing the questionnaires that I used for the main data collection. All the risk factors that the doctors mentioned during semi-structured interviews were incorporated in my interview note. I used the information that was gotten from the doctors during the semi-structured interviews to develop the questionnaires that were used for data collection.
The questions that were included in the questionnaires focused on demographics, lifestyles, and socioeconomic status of the subjects.

After developing the questionnaires, I pilot-tested them with the PUD patients in the GOPD at the FMC, Yola. I administered 10 questionnaires to PUD patients (n=10) in the GOPD at the FMC on the October 20, 2015. After I piloted my questionnaires, I added more important questions and removed confusing and unnecessary questions from the questionnaires. Some of my questions were restructured and reworded for easy understanding by the patients. My questionnaires contained mainly close ended questions, which were coded before data analysis (Appendix V). The actual data collection took place from 22\textsuperscript{nd} October to 13\textsuperscript{th} November, 2015, at the Federal Medical Center, Yola. My total sample size was 52 (n=52). I focused the analysis of questionnaires on the dependent variable, which is peptic ulcer disease, and three independent variables (wealth, cigarette smoking and alcohol drinking). The statistical test I did included descriptive statistics.

I used the Statistical Package for the Social Sciences (SPSS) software to analyze the data that were obtained from this study. This made the data analysis more professional and accurate. My data were stored in Microsoft Excel and the package was used for other mathematical analysis where necessary.

At the beginning of the semi-structured and structured interviews, I sought verbal consent from all the respondents of this study. I clearly stated to the respondents in the beginning of the interview that all their information will be kept confidential and they have the right to participate or not. I informed them that they can stop the interview at
any point they choose to. Research clearance was obtained on the 9th of October, 2015, from the chair of the Health Research Ethics Committee at FMC to conduct this study in their hospital. Before proceeding with this study, I took and successfully passed an online training titled *Protecting Human Research Participants,* organized and administered by the National Institutes of Health Office of Extramural Research (Certification: 1894708) (Appendix III).
CHAPTER 3

3.0 RESULTS AND ANALYSIS

3.1 Demographic Information

From the results I obtained, the sample size was 52 (n=52) and the 28.8% of the respondents were males while 71.2% were females. The females spent more time in the hospital than the males, which may indicate the willingness of females is greater than that of males to visit hospitals when they are sick. The data on religion showed that 26.9% of the respondents were Christians and 73.1% of them were Muslims. The mean age of the respondents in this study was 32 years (Standard deviation -SD) = 10.67; range 10 to 50 years; sample size (n= 52). The 34.6% of the respondents were single, 61.5% of the respondents were married, and the 3.8% of the respondents were widows.

All my respondents came from six different local governments in Adamawa State. The percentages of the different respondents from the six local governments are as follows; 76.9% from Yola South, 15.4% from Yola North, 1.9% from Ganye, 1.9% from Song, 2.2% from Michika, and 2.2% from Toungo (Fig. 7).
The result indicated that 86.6% of the respondents had received formal education while 13.4% had not received formal education. Many of the respondents had completed their primary education, secondary education, and tertiary education with the percentages of 21.3%, 36.5%, and 28.8%, respectively. The majority of the respondents’ highest level of education was secondary education followed by tertiary education and others. This showed more educated people visit hospital than the uneducated. This result also showed an 86.6% literacy rate among the subjects that were used in the study.

The occupations of the respondents include farming, crafting, trading, civil service, work, teaching, and others. Most of the respondents were traders and they made up 40.4% of the respondents. Other occupations and their percentages were civil service 15.4%, workers 19.2%, Teaching 11.5%, and other 13.5%. Most of the traders are doing small scale businesses, which influence the rate of their monthly income.
3.2 Wealth

More than 50% of the subjects earn N10,000 or less monthly (Table 1). More than 40% of them earn more than N10,000 in a month. Most of the PUD patients are poor because they make low income monthly (Fig 8). Nearly 90% of the PUD patients were low income earners because they earn less than N75,000 per month. This is because most of the people in the society (in this region) are poor. This result also showed that male subjects have higher income than the female subjects in the study. The result also showed that income is highly correlated with the PUD development within subjects in the study.

Table 1. Showing the income groups of the respondents

<table>
<thead>
<tr>
<th>Income groups</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>N0 - N10,000</td>
<td>30</td>
<td>57.7</td>
</tr>
<tr>
<td>N11,000 - N20,000</td>
<td>7</td>
<td>13.5</td>
</tr>
<tr>
<td>N21,000 - N30,000</td>
<td>7</td>
<td>13.5</td>
</tr>
<tr>
<td>N31,000 - N40,000</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>N41,000 - N50,000</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td>N51,000 and above</td>
<td>5</td>
<td>9.6</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Fig 8. Showing the income groups of the respondents.

Table 2. Showing the income levels and gender of the PUD patients at FMC.

<table>
<thead>
<tr>
<th>Income Groups</th>
<th>Gender</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>N0 - N10,000</td>
<td>4</td>
<td>26</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>N11,000 - N20,000</td>
<td>2</td>
<td>5</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>N21,000 - N30,000</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>N31,000 - N40,000</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>N41,000 - N50,000</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>&gt;N50,000</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>37</td>
<td>52</td>
<td></td>
</tr>
</tbody>
</table>

Income classes of the subjects were low. About 65.4% of the respondents were low income earners (with monthly income of N18,500 or less). The percentage of the respondents who were middle income earners (with monthly income of N85,000 or
less) was 25%. Few of the respondents were high income earners (with monthly income more than N85,000) and they made up 9.6% of all my subjects (Table 3). Socioeconomic status was identified as a characteristic of PUD patients in this region.

**Table 3. Showing the wealth PUD patient respondents**

<table>
<thead>
<tr>
<th>Income classes</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>5</td>
<td>9.6</td>
</tr>
<tr>
<td>Middle</td>
<td>13</td>
<td>25</td>
</tr>
<tr>
<td>Low</td>
<td>34</td>
<td>65.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>52</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

3.3 Environmental Factors

The results show that most of the respondents get their drinking water from common taps (Table 4). From the results, 71% of the subjects use pit toilets/latrines in their homes (Fig 9).

**Table 4. Showing the different sources of drinking water for respondents**

<table>
<thead>
<tr>
<th>Sources of Drinking Water</th>
<th>No. of patients</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taps at home</td>
<td>10</td>
<td>19.2</td>
</tr>
<tr>
<td>Common taps/hand pump</td>
<td>25</td>
<td>48.1</td>
</tr>
<tr>
<td>Well/river</td>
<td>9</td>
<td>17.3</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>15.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>52</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
3.4 Lifestyles

The result indicated that 17.8% of the PUD patients smoke cigarettes while 82.2% do not smoke cigarettes, which showed that cigarette smoking has little influence over the development of PUD (Tables 5 and 6). I also found out that the PUD patients that smoke also have smoker friends. Most of them also live with smokers in their homes. This result indicated that cigarette smoking is not correlated with the PUD development among the respondents of this study.
**Table 5.** Showing the number and percentage of the respondents that smoke cigarettes and don’t smoke cigarettes

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUD patients that smoke cigarettes</td>
<td>8</td>
<td>15.4</td>
</tr>
<tr>
<td>PUD patients that don’t smoke cigarettes</td>
<td>44</td>
<td>84.6</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 6.** Showing the frequency of smoking among the PUD patients

<table>
<thead>
<tr>
<th>Number Cigarettes Smoked (in 7days)</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 2 Cigarettes</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>5 - 6 Cigarettes</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>7 - 8 Cigarettes</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>&gt; 1 Packet</td>
<td>5</td>
<td>9.6</td>
</tr>
<tr>
<td>None</td>
<td>44</td>
<td>84.6</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The result from this study showed that alcohol intake does not play a major role in the development of peptic ulcer disease among the patients at FMC (Tables 7 and 8).
**Table 7.** Showing the PUD patients’ response to alcohol intake

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUD patients that drink alcohol</td>
<td>12</td>
<td>23.1</td>
</tr>
<tr>
<td>PUD patients that don’t drink alcohol</td>
<td>40</td>
<td>76.9</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 8.** Showing the frequency of alcohol intake among the PUD patients that drink alcohol

<table>
<thead>
<tr>
<th>Frequency of Alcohol intake</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>40</td>
<td>76.9</td>
</tr>
<tr>
<td>1 - 2 bottles</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>3 - 4 bottles</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td>5 - 6 bottles</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>9 - 10 bottles</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>11 bottles and above</td>
<td>7</td>
<td>13.5</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>100.0</td>
</tr>
</tbody>
</table>
CHAPTER 4

4.0 DISCUSSION

The results I obtained from this study showed that alcohol consumption and cigarette smoking were not among the characteristics of PUD patients in Northeast Nigeria (Fig 10 and 11). Low wealth was a characteristic variable that was found in PUD patients that participated in this study. Gender also appeared as one of the characteristics of PUD patients in northern Nigeria as the majority of my subjects were females. The age range of my subjects was between 10 and 50 years. I also found that male patients had higher incomes than the female PUD patients in the study. My findings on cigarette smoking and alcohol consumption were closely related to the similar studies that were done in Taiwan, Brazil, England, and Germany (Table 9) (Brenner, Rothenbacher, Bode, & Adler, 1997; Chen, Chiou, Wu, & Wu, 2000; Moayyedi et al., 2002; Rodrigues et al., 2005). The results from similar studies by Anderson et al., Maity et al., and Alzubeer et al. show that PUD development is highly correlated with alcohol consumption and cigarette smoking among the patients from Iraq, Denmark, and India (Al-Zubeer et al., 2012; Andersen et al., 2000a; Maity et al., 2003).
Table 9. Comparing the various characteristics of PUD patients with 5 studies from different countries.

<table>
<thead>
<tr>
<th>Characteristics of the Respondents</th>
<th>Nigeria (Yola)</th>
<th>Taiwan</th>
<th>Brazil</th>
<th>England</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>15</td>
<td>101</td>
<td>38</td>
<td>26</td>
<td>164</td>
</tr>
<tr>
<td>Female</td>
<td>37</td>
<td>51</td>
<td>127</td>
<td>29</td>
<td>238</td>
</tr>
<tr>
<td><strong>Cigarette smoking</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12</td>
<td>89</td>
<td>40</td>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>No</td>
<td>40</td>
<td>63</td>
<td>125</td>
<td>26</td>
<td>53</td>
</tr>
<tr>
<td><strong>Alcohol intake</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8</td>
<td>55</td>
<td>29</td>
<td>27</td>
<td>35</td>
</tr>
<tr>
<td>No</td>
<td>44</td>
<td>97</td>
<td>136</td>
<td>37</td>
<td>59</td>
</tr>
<tr>
<td><strong>Socioeconomic status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>5</td>
<td>45</td>
<td>N/A</td>
<td>38</td>
<td>N/A</td>
</tr>
<tr>
<td>Medium</td>
<td>13</td>
<td>77</td>
<td>N/A</td>
<td>29</td>
<td>N/A</td>
</tr>
<tr>
<td>Low</td>
<td>34</td>
<td>30</td>
<td>N/A</td>
<td>22</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Fig 10. Comparing my result on cigarette smoking with other studies around the world.

Fig 11. Comparing my result on alcohol consumption with other studies around the world.
Cigarette smoking and alcohol consumption were not seen as major characteristics of PUD patients in Yola because the majority of my respondents were not cigarette smokers and did not drink alcohol as well. Religion might have influenced their answers because most of my subjects were Muslims. In Islam, alcoholic consumption is considered to be a sin (or prohibited). This might have prejudiced my subjects to say that they don’t drink alcohol due to their religion. Also, the issue of cigarette smoking in Islam has been the issue of debate. Some Islamic scholars teach that smoking is a sin (or prohibited) while some say it’s a dislike. However, some Muslims smoke cigarettes in open places and in secret, but the Islamic prohibition of any substance that can cause harm to the body may have greatly influenced them to answer negatively in order to protect their religious image. The translators that worked with me in the project are Muslims and this might have been another reason they answered “No” to the questions on smoking and alcohol drinking. The subjects may have believed that my translators might have negative impressions about them if they had agreed that they drink alcohol and cigarette smoking. Doctors at the hospital attested that most of the patients smoke cigarettes and/or drink alcohol in secret but do not accept that they smoke and/or drink alcohol in public places because of their religion. Most the Christians that were among the subjects accepted that they smoke cigarettes or drink alcoholic drinks. Culture might have influenced the responses of my subjects to alcohol drinking and/or cigarette smoking. Cigarette smoking and alcohol drinking are seen as bad habits in many ethnic groups in Nigeria, mostly in the North.

In addition to religion, gender may be another reason more than 70% of my respondents don’t smoke cigarettes nor drink alcohol. Culturally, women that have smoking and/or alcohol drinking habits are often seen to be irresponsible in some parts
of the country. Many women in this region are Muslims, and sometimes do not have control over their lives. They may face restrictions to certain events and behaviors that will expose them to drinking or smoking due to their marriage. The northern societies see smoking as a behavior that shouldn’t be adopted by a mother because children spend more time with their mother than they do with their father, and they can easily pick the habit of smoking or drinking from their mother. The above reasons may have influenced the answers of the subjects in the study.

Furthermore, gender was another variable that came out to be a characteristic associated with the PUD patients. The percentages of PUD were high in female patients compared to male patients. The studies conducted by Rodrigues et al., Brenner et al., and Chen et al. also showed that PUD occurs more in female patients than male patients (Fig 12) (Brenner et al., 1997; Chen et al., 2000; Rodrigues et al., 2005). However, not all the results I obtained in this study are consistent with some studies that were conducted in the Western countries because of small sample size and other differences in geographical location and development. The high prevalence of PUD in females may be a result of socioeconomic status because monthly incomes for females were very low in this study compared to that of males. Males are likely to eat outside their homes compared to females, while females might be hungry at home.
The inconsistency of my findings with some studies from the Western countries may be a result of differences in geographical locations and variations, diets, studied subjects, culture, education, infrastructure, religion, lifestyle, etc., which vary around the world. This is because most of the literature reviewed for this study was from several Western countries with none from Nigeria and Africa. Studies from Nigeria and Africa would have been more suitable for comparisons because this study was conducted in Nigeria and people from other African countries are more similar to Nigerians in various ways.

Although the socioeconomic status of the westerners is higher and different from that of Nigeria, Levenstein et al. also found out that socioeconomic status was a characteristic of the PUD patients from the United States of America (Levenstein & Kaplan, 1998). This result is similar to other studies done in the Western countries (Fig 13). Most of my subjects were low income earners and this is strongly linked to the *Helicobacter pylori* infection because most of subjects live in crowded areas and more are prone to *H. pylori* infection. The low economic status of my subjects can be
attributed to the fact that the majority of people in northeastern Nigeria are poor. However, the measurement and grouping of different socioeconomic status was made based on the socioeconomic measurement scale used by Chukwuonye et al. in their study in Abia State, Nigeria. There is no standard data on the socioeconomic status of different citizens across the six geopolitical zones in Nigeria. Nigerian society is not properly structured and this contributed to unavailability of income classes of Nigerian citizens (Chukwuonye et al., 2013). I could not find any statistics on the different socioeconomic status across Nigeria from the National Bureau for Statistics’ website. There are no guidelines and formulas for assessments of socioeconomic status in Nigeria. However, my assessment on the socioeconomic status is also related to studies done in Abia State, Nigeria, and in Korea (Chukwuonye et al., 2013; Yoon, Oh, & Park, 2006). In this study, monthly income and educational level of all the subjects were the major variables that were used to determine the socioeconomic status of the respondents.

![Wealth of PUD Patients in 3 Countries](image)

**Fig 13.** Comparing my result on gender with other studies around the world.
4.1 Limitations of Study

The major limitation of this study was time. Due to the limited amount of time given to complete this research, there was no control group for this research project. A control group would have helped to identify the characteristics that are the major cause of PUD in northeastern Nigeria. The unavailability of a control group restricted my data analysis to the use of descriptive statistics, which did not show the significant difference of my study. I tried many statistical analyses but none worked out for this study.

The sample size for this study was very small, which affected the result I obtained in this study. Larger sample size would have been good to make standard statistical analyses, and to draw more conclusions and make inferences to the larger population. There were many variables in the study that were not determined in this study due to small sample size. This limited my study to few variables that the small sample size could determine.

4.2 Challenges

Language was the major challenge faced in this study. Inability to speak Hausa or Fulfulde languages prevented me from asking my subjects questions directly. Although I trained my translators I couldn’t have noticed any error in the interview process due to my inability to communicate in Hausa and Fulfulde languages. This challenge was overcome by constantly reminding my translators on proper interview techniques and maintaining good relationships with them.

Another challenge I faced in this study was that the subjects did not open up to questions that were related to cigarette smoking and alcohol drinking. I triangulated
(within-subject triangulation) the questions in different ways but ended up getting few answers on that. Culture and religion were also challenges I encountered because my subjects were all conscious of their culture and religion. The result of this study might have been influenced by these challenges.

4.3 Recommendations

There is need for researchers to conduct more studies on peptic ulcer in Nigeria and in Africa. During literature search and review, I found that few or no studies have been done on peptic ulcer in Nigeria and Africa. International health agencies and governments of different countries in Africa should fund more research works on peptic ulcer disease.

I would also recommend for more studies to be done on the factors that influence the development of peptic ulcer disease in Nigeria and Africa. Both experimental and control groups should be used in order to obtain a statistically significant result that can be inferred to the general population. Diets and other lifestyle factors should also be further examined to identify the actual cause and characteristics of peptic ulcer disease in Nigeria. Alcohol and cigarette smoking may not be actual characteristics of peptic ulcer disease patients but further studies in this field will reveal the actual factors and characteristics of typical PUD patients in this region. More studies on other characteristics and risk factors of PUD will be very useful in Nigeria and other African countries. I think an association study would be more apt.

It is very necessary for countries to develop a standard for calculator for determining the socioeconomic status of its citizens. The Nigerian Bureau of Statistics should
identify the socioeconomic status of different states in Nigeria to enable researchers to easily make comparisons and draw conclusions on the particular group of people that is being studied. Nigeria should be more socially structured in order to have more accurate information on her citizen’s welfare.
CHAPTER 5

5.0 CONCLUSION

PUD poses a very serious challenge to human health. Further identification of the characteristics of PUD patients will help in making a lasting solution to contamination and spreading of PUD among the human population. Alcohol drinking and cigarette smoking did not support my hypothesis while socioeconomic status and gender showed strong support for my hypothesis. The null hypothesis was supported by these two variables. However, one of my variables, which is socioeconomic status, supported my hypothesis. Conducting more studies on PUD patients’ characteristics will help in creating awareness on the preventive measures of PUD. My study shows that alcohol consumption and cigarette smoking are not characteristics of typical PUD patients. The research further indicates that gender and socioeconomic status are strong characteristics of PUD patients. In curbing the development of PUD in Africa, more studies should be conducted on PUD patients to determine their lifestyle, socioeconomic status, and other characteristics that influence the development of peptic ulcer.
APPENDIX I

Anatomy of the Stomach

The stomach is the largest part of the alimentary canal. It is an organ that is found in the upper abdominal region, and it lies below the diaphragm (Fig. 14) (Mahadevan, 2014). It is almost a J-shaped organ that is subdivided into fundus, body, cardiac orifice, pylorus and pyloric antrum (Ellis, 2011) (Fig 15). The shape, position, and size of the stomach may differ with content and posture because it is a distensible organ that is suspended on free mesentery. The size of an empty stomach may be like that of an open hand and when filled with food, it can extend to the upper part of the abdomen and may also extend into the pelvis or lower abdomen while the person is standing. The duodenum is a sharp curve that is close to that of a circle, which outspreads from the pylorus to the ligament of Treitz. The duodenum is about 25cm or 12 fingers in breadth. It has a fairly fixed position and it is mainly retroperitoneal. The duodenum and stomach maintain a great relationship in function, and also in the manifestation and development of a disease (Mahadevan, 2014).
Source: webMD, LLC (www.webmd.com)

**Fig 14. Anatomy of the Stomach**

Source: www.jhmicall.org

**Fig 15. The Anatomy of the Stomach and Duodenum; B to D, shows endoscopic images of the different parts of the stomach.**
APPENDIX II

Diagnosis of Peptic Ulcer

The diagnosis of peptic ulcer perforation needs an extraordinary suspicion index that is based on clinical examination and history (Saverio et al., 2014). This clinical examination of peptic ulcer is done by checking for all the possible signs and symptoms associated with peptic ulcer in patients (Saverio et al., 2014). Clinical features of peptic ulcer are also examined, which include burning epigastric pain or episodic gnawing; nocturnal pain relieved by food intake; pain occurring two to five hours after meals or on an empty stomach; secretory agents; or antacids. The most specific findings for signs and symptoms that help in the diagnosis of peptic ulcer include night-time awakening because of pain, epigastric or episodic pain, and relief of pain after food intake. Other common features that help in the diagnosis of peptic ulcer include a positive family history, vomiting, indigestion, loss of appetite, and heartburn (Ramakrishnan & Salinas, 2007).

Endoscopy is a method of diagnosing peptic ulcer by inserting a flexible, thin tube into the mouth down to the throat. A tiny camera and light are at the end of the tube, which shows the images from inside the digestive tract onto a screen. *H. pylori* infection and gastric cancer through analysis on a small sample tissue known as biopsy (Ting-Chun Huang & Chia-Long Lee, 2014). In some cases, barium x-rays are taken after drinking of a thick substance that contains a barium. The barium will make the digestive tract appear more clearly so perforations can be seen. It is less common than endoscopy for treatment of ulcers (Saverio et al., 2014; Ting-Chun Huang & Chia-Long Lee, 2014).
APPENDIX III

Human Subject Online Training Certificate

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that JOHNPAUL OFFOR successfully completed the NIH Web-based training course “Protecting Human Research Participants”.

Date of completion: 10/17/2015
Certification Number: 1894708
APPENDIX IV

Interview Guide for Semi-Structured Interviews with the Doctor at the GOPD,
Federal Medical Center, Yola

Introduction and Informed Consent: My name is Johnpaul Offor. I am a senior student at the American University of Nigeria, Yola. I am conducting a research for my university senior research project; please, your honest opinion to my questions is most important to my research. Please note that your personal information will not be reviewed to anyone. All the answers provided in this interview will be used for the sole purpose of this research. Please, may I proceed with this interview? ☐ YES

1. Full name, title, years of experience, and area of specialization.

2. Please tell me about peptic ulcer disease.

3. Can you tell me the factors that influence the development of peptic ulcer disease?

4. Please talk about the general characteristics of typical peptic ulcer disease patients.

5. Please tell me the characteristics (environmental factors) of peptic ulcer disease patients in Yola.

6. Please tell me about lifestyle characteristics of typical peptic ulcer disease patients in Yola.

7. Please also talk about the wealth characteristics of peptic ulcer patients in Yola.

8. Is there anything else you would like to add?

Many thanks for your time today.
APPENDIX V

INTRODUCTION AND INFORMED CONSENT

My name is Johnpaul Offor. I am a student of the American University of Nigeria (AUN), Yola, formerly known as ABTI. This study aims at understanding and identifying different risk factors associated with the development of peptic ulcer disease in diagnosed patients at Federal Medical Center (FMC), Yola. All the information gotten from this survey will be rightfully used for the partial fulfillment of my degree requirements.

You can stop this interview at any point you feel like not continuing. You also have the right not to participate if you choose to. There is no right or wrong answer, but your honest opinion will be highly appreciated. Note that all your answers will be confidential and will be used for the sole purpose of this research.

Please, can I proceed with this interview? ☐ YES

Interview date……………………………………
Translator ………………………………………..
Interview start time…………………………….. End time……………………………..

DEMOGRAPHIC INFORMATION

1. Gender; [TICK ONLY ONE]

☐ Male (1) ☐ Female (2)

2. What is your religion? [TICK ONLY ONE]

☐ Christianity (1) ☐ Islam (2) ☐ Other (3)………………………………………..

3. How old are you? ………………………………………………………………..

4. Marital status: [TICK ONLY ONE]

☐ Single (1) ☐ Married (2) ☐ Widowed (3) ☐ Divorced (4)

☐ Separated(5)

5. Where do you live? [ TICK ONLY ONE]

☐ Demsa (1) ☐ Fufore (2) ☐ Ganye (3) ☐ Girei (4) ☐ Gombi (5) ☐ Guyuk (6)

☐ Hong (7) ☐ Jada (8) ☐ Lamurde (9) ☐ Madagali (10) ☐ Maiha (11) ☐ Mayo-

6. What is the highest level of your education? [**TICK ONLY ONE**]  
☐ No formal education/ Islamiyah (1) ☐ Elementary education (2) ☐ Primary education (3) ☐ Secondary education (4) ☐ Tertiary education (5)

7. What is your occupation? [**TICK ONLY ONE**]  
☐ Farmer (1) ☐ Livestock breeder (2) ☐ Retired (3) ☐ Craftsman (4)  
☐ Trader (5) ☐ Civil Servant (6) ☐ Worker (7) ☐ Teacher (8) ☐ Doctor (9)  
☐ Student (10) ☐ Housewife (11) ☐ Other (12) ………………………………..

**WEALTH**

8. What is the range of your monthly income? [**TICK ONLY ONE**]  
☐ N0-N10,000 (1) ☐ N11,000 - N20,000 (2) ☐ N21,000 - N30,000 (3)  
☐ N31,000- N40,000 (4) ☐ N41,000 – N50,000 (5) ☐ N51,000 and above (6)

9. What is the main material of the walls? [**TICK ONLY ONE**]  
☐ Natural materials or no walls (millet stalks/ woven thatch/mud) (1)  
☐ Bamboo/Plywood/Stone with mud (2) ☐ Cement/bricks/planks (3)  
☐ Other (4) …………………………………………………………………………..

10. What do you use for transport? [**TICK ALL THAT APPLY**]  
☐ Bicycle ☐ Motorcycle ☐ Keke n’ Pep ☐ Buses ☐ Private car ☐ None

11. What is the main floor material? [**TICK ONLY ONE**]
12. What is the main material of the roof? [TICK ONLY ONE]

☐ Iron sheets/ tiles/cement (1)  ☐ Thatch/mat/cardboard/grass (2)  ☐ Other (3)

13. What kind of toilet facilities does your household have? [TICK ONLY ONE]

☐ Flush toilet (1)  ☐ Pit toilet/latrine (2)  ☐ Bucket toilet (3)  ☐ No facility/bush (4)

14. What is the main type of fuel your household uses for cooking? [TICK ALL THAT APPLY]

☐ Electricity  ☐ Gas  ☐ Kerosene  ☐ Charcoal  ☐ Firewood/straw  ☐ Dung  ☐ Other

15. Is your house connected to electricity? [TICK ONLY ONE]

☐ Yes (1)  ☐ No (2)

16. Assets owned by your Household: [TICK ALL THAT APPLY]

☐ Radio  ☐ Television  ☐ CD Player  ☐ Electric Mixer/Grinder/Food Processor  ☐ Fan  ☐ Washing Machine  ☐ Car/jeep  ☐ Computer  ☐ Pressing Iron  ☐ Air conditioner  ☐ Refrigerator  ☐ None

17. What is the source of your drinking water for your household? [TICK ALL THAT APPLY]
☐ Tap in the House  ☐ Common Tap  ☐ Hand pump / Bore well  ☐ Well

☐ Tank/ Pond ☐ River  ☐ Others: .................................................................

LIFESTYLES

18. Do you exercise? [TICK ONLY ONE]
   ☐ Yes (1)  ☐ No (2)

19. Have you tried smoking cigarettes before? [TICK ONLY ONE]
   ☐ Yes (1)  ☐ No (2)

20. Have you smoked cigarettes for the past 14 days? [TICK ONLY ONE]
   ☐ Yes (1)  ☐ No (2)

21. How many sticks of cigarette have you smoked for the past 14 days?...............

22. Do you like tasting alcoholic juices and other alcoholic drinks? [TICK ONLY ONE]
   ☐ Yes (1)  ☐ No (2)

23. What brands of cigarette do you like smoking? [TICK ALL THAT APPLY]
   ☐ Benson  ☐ Dochester  ☐ Aspen  ☐ Oris  ☐ Don hill  ☐ St. morris  ☐ Pallmal
   ☐ None  ☐ Other: ...........................................................................

24. Do you live with a smoker? [TICK ONLY ONE]
   ☐ Yes (1)  ☐ No (2)

25. Do your friends smoke in your presence? [TICK ONLY ONE]
   ☐ Yes (1)  ☐ No (2)

26. Do you drink alcohol? [TICK ONLY ONE]

47
☐ Yes (1) ☐ No (2)

27. Which of these brands of alcohol drinks do you like taking? [TICK ALL THAT APPLY]
☐ Beer ☐ Wines ☐ Smirnoff ☐ Spirits ☐ Hot drinks ☐ Not at all

28. How many of above alcoholic drinks have you consumed in the past 14 days?

.....................

29. How many bottles of alcoholic drinks do you normally take at your free times?.................................

Thank you very much for taking out time to answer these questions.
REFERENCES


Diagnosis peptic_ulcer_disease.pdf. (n.d.).


Siddique, R. (2014). Prevalence of Peptic Ulcer Disease among the Patients with Abdominal Pain Attending the Department Of Medicine in Dhaka Medical College Hospital, Bangladesh, 13(1), 2279–0861.


