

**DIETARY AND NUTRITIONAL RISK FACTORS FOR INFLAMMATORY BOWEL
DISEASE: A CASE AT KENYATTA NATIONAL HOSPITAL IN NAIROBI, KENYA**

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FULFILLMENT OF THE REQUIREMENTS FOR A DEGREE IN MASTER OF
SCIENCE IN HUMAN NUTRITION OF KENYA METHODIST UNIVERSITY**

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DECLARATION

This thesis is my original work and has not been presented for a degree or any other award at any other university.

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DEDICATION

This work is dedicated to my Parents, Siblings, Supervisors, Lecturer and loved ones for their endurance, support and understanding throughout the time of study. May the Almighty Bless you...

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ABSTRACT

The increasing incidence of Inflammatory Bowel Disease (IBD) is linked to changing diets, environmental exposures, limited diagnostic access, and treatment costs. Lacking clear guidance, many patients adopt restrictive diets that can harm their health. Nutritional interventions should therefore go beyond meeting energy and nutrient needs to support disease management. Growing evidence shows that certain foods influence inflammation, underscoring the importance of individualized, evidence-based dietary strategies for IBD care. To identify, understand and evaluate the Dietary and Nutritional Risk factors associated with Inflammatory Bowel Disease. This study used an analytical observational design with a hospital-based cross-sectional approach at Kenyatta National Hospital. Quantitative data were analyzed using SPSS version 26. Descriptive statistics were used to summarize socio-demographic, clinical, and dietary characteristics of participants. Group differences for categorical variables were assessed using χ^2 tests (with Fisher's exact test where expected cell counts were <5). All tests were two-sided with $\alpha=0.05$. Missing data were handled by pairwise exclusion for all inferential analyses; for descriptive summaries, available-case denominators are shown. Specifically, for the binary endpoints Core IBD Therapy and Adjunct Comorbidity Care, records with missing values in the outcome or any included covariate were excluded pairwise from the relevant analyses. Use of core IBD pharmacotherapy was higher in IBD than GD (100% vs 75.3%; $p<0.001$). IBD patients more frequently reported therapeutic supplements (62.5% vs 39.2%; $p=0.016$) and preventive supplements (40.0% vs 15.2%; $p=0.003$). Restrictive therapeutic diets were common (47.5% IBD vs 34.2% GD; $p=0.159$). Diarrhea was more frequent in IBD (75.0% vs 50.6%; $p=0.011$); vomiting did not differ. Rates of documented nutritional deficiency (~60%) and malnutrition (~40%) were similar across groups. Diet intake patterns showed high reliance on staples and plant-based proteins, with selective avoidance of animal fats and some animal proteins. IBD patients reported greater dietary variety, consuming more fruits, vegetables, dairy, and healthy fats compared to those with gastroesophageal disorders, who tended to restrict foods to prevent reflux. This reflects IBD patients' active dietary management to control symptoms and maintain nutrition. They also relied more on supplements and therapeutic diets, such as low-residue or lactose-free plans, to ease gastrointestinal discomfort. Despite occasional food aversions and reduced diversity, most maintained adequate caloric intake, with only severe cases requiring medical nutrition support—highlighting the importance of individualized dietary care in managing IBD.

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ABBREVIATIONS AND ACRONYMS

AIEC: Adherent Invasive E Coli

BIA: Bio Impedance Analysis

CD: Crohn's disease

CDED: Crohn's Disease Exclusion Diet

CS: Celiac Sprue

DEXA: Dual Energy X-ray Absorptiometry

EEN: Early Enteral Nutrition

FODMAP: Fermented Oligosaccharides, Disaccharides, Monosaccharides & Polyols

IBD: Inflammatory Bowel Disease

IBD-AID: Inflammatory Bowel Disease Anti-inflammatory Diet

IBS: Irritable Bowel Syndrome

KNH: Kenyatta National Hospital

MNT: Medical Nutrition Therapy

PEN: Partial Enteral Nutrition

PEP: Peptides

PUFA: Polyunsaturated Fatty Acids

RCT: Randomized Control Trials

SCFAS: Short Chain Fatty Acids

SCD: Specific Carbohydrate Diet

TNF-a: Tumor Necrosis Factor-alpha

TPN: Total Parenteral Nutrition

UC: Ulcerative Colitis

CHAPTER 1: INTRODUCTION

1.0: Background of study

Inflammatory Bowel Disease (IBD) refers to a group of chronic autoimmune disorders that affect the gastrointestinal (GI) tract, primarily Crohn's disease (CD) and ulcerative colitis (UC). Once considered diseases of affluent societies, IBD cases are now rapidly increasing in newly industrialized nations, signaling a growing global health challenge (Hou et al., 2014). Despite ongoing research, there remains no definitive cure; however, combining pharmacological and dietary interventions has shown promise in inducing remission (Hou et al., 2014; Kinsey & Burden, 2016; Mehrabani et al., 2017).

Given the public health importance of IBD, current studies are increasingly focused on identifying factors that exacerbate symptoms and disease progression. Among these, diet has emerged as a critical determinant of disease activity and patient well-being. Traditional treatments primarily target inflammation control and remission maintenance using corticosteroids, aminosalicylates, immunosuppressants, and biologic agents (Kim & Bao, 2010).

The pathogenesis of Inflammatory Bowel Disease (IBD) involves a complex interplay among genetic susceptibility, environmental factors, immune system regulation, and gut microbiota composition. Over the past five decades, the prevalence of Crohn's disease (CD) and ulcerative colitis (UC) has significantly increased in Western and industrialized Asian nations (Yu et al., 2008). Although the incidence of IBD has risen globally since the 1990s, the highest prevalence remains in Western countries, reflecting substantial economic and healthcare burdens. In 2008 alone, Crohn's disease was estimated to cost Europe between €2.1 and €16.7 billion and the United States between \$10.9 and \$15.5 billion annually (Ng et al., 2017).

Current research emphasizes environmental triggers, including dietary antigens, immune dysregulation, and gut dysbiosis, as major contributors to disease onset in genetically predisposed individuals (MacFarlane et al., 2019). These factors can cause systemic inflammation, increase metabolic demands, and impair nutrient absorption, predisposing patients to malnutrition. Consequently, nutritional therapy aimed at modulating the intestinal microbiome has gained prominence in IBD management (Green et al., 2019). Patients often identify a direct relationship between diet and symptom severity (Cohen et al., 2013). However, while dietary modifications may relieve symptoms, they can also pose psychological and social challenges. Food functions not only as a biological necessity but also as a key component of cultural identity and self-expression (Rozin et al., 2005).

In recent years, diet has gained prominence as a therapeutic strategy for inducing and maintaining remission in patients with Inflammatory Bowel Disease (IBD). Many patients increasingly turn to nutritional interventions to alleviate symptoms and improve quality of life. However, despite growing evidence, dietary therapy remains underutilized by gastroenterologists, primarily due to the limited availability of randomized controlled trials (RCTs) validating its efficacy (Cohen & Suskind, 2014).

Cohen and Suskind (2014) further note that dietary restrictions can significantly affect patients' enjoyment of food and social experiences. This challenge is particularly critical for children and adolescents, for whom food is central to socialization and identity formation. Restrictions may therefore undermine self-esteem, social belonging, and psychological well-being. Understanding how dietary limitations influence quality of life is essential to developing holistic treatment approaches that address both the physical and psychosocial dimensions of IBD.

Although awareness of nutrition's role in IBD has improved, systematic evaluation of patients' nutritional status in both inpatient and outpatient settings remains inconsistent (Garg et al.,

2012; Taylor et al., 2011). Effective dietary management not only aids in symptom control and correction of nutritional deficiencies but may also reduce the need for long-term immunosuppressive therapy, such as corticosteroids, by promoting better nutritional resilience (Caprilli et al., 2006).

Malnutrition is a frequent complication in both active and remissive phases of IBD due to decreased oral intake, increased metabolic demand from systemic inflammation, and nutrient loss from diarrhea or malabsorption. These risks are particularly pronounced in Crohn's disease, where small bowel involvement often leads to extensive nutrient deficiencies (*Gastroenterology & Hepatology*, 2022). Consequently, integrating individualized dietary assessments and interventions into routine IBD management is vital for improving long-term health outcomes.

This study seeks to identify dietary triggers, protective patterns, and the relationship between medication use, diet, and disease severity among Kenyan patients with Inflammatory Bowel Disease (IBD) compared to other gastrointestinal conditions. It is expected that IBD patients will rely more on therapeutic diets and supplements while facing higher risks of diarrhea and malnutrition (Liu et al., 2022a). The findings aim to promote routine nutritional screening, enhance dietetic support, and guide Kenya-specific strategies for early diagnosis, endoscopic prioritization, and integrated nutrition management in healthcare.

1.2: Statement of Problem

Ulcerative Colitis (UC) and Crohn's Disease (CD) are the main forms of Inflammatory Bowel Disease (IBD). UC involves chronic inflammation of the colon's mucosa, while CD affects the entire gastrointestinal tract with deeper, transmural inflammation. Despite these differences, both conditions present similar symptoms such as diarrhea, abdominal pain, and malnutrition (Bernstein, 2010).

Although traditionally viewed as rare in Sub-Saharan Africa, IBD is increasingly recognized,

with underdiagnosis linked to overlapping infectious diseases, limited diagnostic capacity, and resource constraints (The Lancet Gastroenterology & Hepatology, 2022). Financial barriers and medication shortages further limit adherence to international treatment standards, though mild-to-moderate ulcerative colitis can often be managed effectively with basic therapies.

In Kenya, rising IBD cases reflect changing diets, environmental exposures, and limited access to diagnostic tools and affordable treatment. Genetic, immune, and environmental factors likely interact in the disease's pathogenesis. Nutritional and microbial imbalances also contribute by impairing gut barrier function and sustaining inflammation.

Many patients self-manage through restrictive diets, risking nutrient deficiencies due to misinformation and lack of dietary guidance. Malnutrition results from reduced intake, malabsorption, and increased nutrient loss, worsening outcomes and quality of life (Bao et al., 2017). This highlighted the urgent need for locally informed dietary guidelines and integrated care that considered the regional and socioeconomic realities of IBD management.

The research was to facilitate the formulation of appropriately scheduled and organised nutrition management guidelines for IBD. It was to aid nutritionists in understanding the importance of medical nutrition treatment to sustain optimal nutritional status and a balanced diet during clinical remission, hence reducing the occurrence of flare-ups and other dietary and nutritional risk factors.

1.3: Purpose of study

The purpose of this study was to identify and evaluate the Dietary and Nutritional Risk factors associated with IBD in patients with Ulcerative Colitis and Crohn's Disease.

1.4: General objective

To identify and evaluate the Dietary and Nutritional Risk Factors associated with

Inflammatory Bowel Disease in patients at Kenyatta National Hospital.

1.5: Specific Objectives

- i. To understand how particular foods, including fiber, fats, and processed products, influence gut inflammation and the balance of gut bacteria in individuals living with IBD.
- ii. To identify the potential dietary triggers and factors that may have a protective or mitigating effect on IBD.
- iii. To examine the side effects of medication on IBD patients quality of life.
- iv. To evaluate the role of nutritional interventions and dietary modifications in the management of IBD.

1.6: Research Questions

- i. Is there a relationship between the consumption of certain food groups like dairy or gluten, fiber, and processed foods and the incidence and severity of IBD at KNH?
- ii. Is there a correlation between the frequency and severity of IBD symptoms and the presence or absence of potential dietary triggers and protective factors?
- iii. Is there any side effects of medication in the quality of life in IBD patients at KNH?
- iv. Is there any influence of diet on the disease severity in IBD patients at KNH?

1.7: Significance/ Benefit of Study

The inquiry will provide researchers and future scholars with crucial data on the dietary and nutritional risk factors associated with IBD in patients at KNH, Nairobi. The research will facilitate the formulation of appropriately scheduled and organised nutrition management guidelines for IBD. It will aid nutritionists in understanding the causes and consequences of medical nutrition treatment to sustain optimal nutritional status and a balanced diet during clinical remission, hence reducing the occurrence of flare-ups and other dietary and nutritional risk factors.

1.8: Justification of Study

Inflammatory Bowel Disease (IBD) is increasingly recognized in developing regions, yet its dietary and nutritional determinants remain poorly understood. Since diet and nutrient intake directly affect gut microbiota, inflammation, and immune regulation, identifying these factors is vital for improving prevention and management. This study seeks to clarify how specific dietary patterns and nutritional deficiencies contribute to IBD risk and progression. The findings will guide culturally appropriate nutritional interventions and support evidence-based dietary guidelines to enhance patient care and quality of life.

1.9: Limitations of Study

Inability to attain accurate information from clients, refusal of participants to answer questions despite having consented and signed an informed consent form and accepting to participate, inability to achieve the target sample size, language barrier/illiteracy, and financial constraints.

1.10: Assumptions of the Study

This study likely assumed that the replies provided were serious, genuine, and accurate, devoid of bias, and that the procedures and tools employed for data collection were precise. The researcher presumed that the patients/respondents possessed more knowledge and comprehension of pathophysiology, aetiology, and medical nutritional therapy/management and treatment. It is presumed that the patients/respondents are undergoing the same treatment regimen, are knowledgeable about the various management and therapy procedures, and possess the literacy to comprehend and react to the questions posed.

1.11: Operation definition of terms

Celiac sprue; patients experience an immune reaction to the consumption of gluten, a protein that exists in wheat, barley, and rye.

Clinical remission; in patients with IBD characterizes a stage where the sickness is no longer active, meaning inflammation stops causing painful damage to the bowel and colon because the immune system is working efficiently, hence the patient does not exhibit any signs nor symptoms like diarrhea, pain and fatigue.

Crohn's disease; normally occurs in patients with chronic inflammatory bowel disease that is characterized by chronic inflammation of the small intestine

Diarrhea; is a symptom of IBD that is characterized by a loose watery stool that occurs more frequently than usual, possibly more frequent bowel movement.

Diet modification; usually includes the alteration of the texture or consistency of any food and also inclusion or exclusion certain food components.

Dietary risk factors; these dietary factors that are directly related to an individual's eating habits that influences an individual's health negatively leading lifestyle diseases.

Enteral feeding; is also known as tube feeding. It is a method of delivering feeds/food nutrients via a tube directly into the stomach or intestines for Inflammatory Bowel Disease patients who are unable to feed orally.

Etiology; is described as the cause(s) of Inflammatory Bowel Disease.

Exacerbation; is the worsening of Inflammatory Bowel Disease or an increase in its symptoms.

Food constituent; is any biologically active substance other than a nutrient that is naturally present in certain foodstuffs and with which health effects are associated.

Gastroenterology; this is the study of the Gastrointestinal tract, stomach, and intestines.

Immune system; these are the organs and processes of the body that provide resistance to infection and toxins

Inflammatory bowel disease; involves a long-standing (chronic) inflammation of tissues in the digestive tract

Irritable bowel syndrome; is a gastrointestinal condition that causes recurring attacks of abdominal pains or discomfort in association with bowel habits (constipation/diarrhea).

Malabsorption; in Inflammatory Bowel Disease patients occurs due to inadequate absorption of nutrients through the small intestines and may be caused by infection, medication, small intestine surgery/resection, and disorders such as coeliac disease.

Malnutrition; it refers to deficiencies and excesses in nutrient intake, imbalances of essential nutrients or impaired nutrient utilization which may be categorized as undernutrition, over-nutrition and obesity

Medical nutrition therapy; is an evidence-based, individualized nutrition process meant to help treat or manage Inflammatory Bowel Disease.

Microbiota; is a range of microorganisms that may be commensal, symbiotic, or pathogenic and found in and on all multicellular organisms

Micronutrient deficiency; is the insufficient/inadequate or lack of essential vitamins and minerals required by the body for proper growth and development.

Nutritional risk factors; present Nutritional Status and risk of impairment of present status, due to increased requirements caused by stress metabolism of inflammatory Bowel Disease.

Nutritional status; of a patient is influenced by the intake and utilization of the nutrients.

Total Parenteral Nutrition; this refers to provision of nutrients intravenously using the Central vein by-passing the digestive tract.

Pharmaconutrients; are substances which in addition to their intrinsic nutritional properties also stimulates immune favoring mediators, inhibit pro-inflammatory factors and attenuate the response to injury or aggression.

Pharmaconutrition; addition of specific nutrients as primary therapy to improve host defenses and improve the outcomes of inflammatory bowel disease patients.

Ulcerative colitis; is a type of inflammatory bowel disease that involves inflammation and sores (ulcers) along the lining of the large intestine (colon) and rectum.

CHAPTER TWO: LITERATURE REVIEW

2.0: Introduction

Inflammatory Bowel Disease (IBD) necessitates lifelong lifestyle and nutritional adaptations that significantly influence patients' and families' quality of life. Although pharmacological interventions are effective in managing flares, the role of diet remains inconclusive, prompting patients to adopt self-imposed dietary restrictions that may entail health risks. This study investigates the dietary and nutritional risk factors associated with IBD and their implications for quality of life

2.1: Role of Specific Food Constituents in Dietary Management of IBD

Diet strongly influences intestinal barrier integrity, gut microbiota, and host immunity. Consumption of certain food groups can trigger dysbiosis, impair barrier function, activate immune responses, and contribute to IBD pathogenesis. The Western diet, characterized by low fiber and high intake of red meat, refined carbohydrates, and saturated fats, is particularly associated with increased IBD risk.

Inflammatory Bowel Disease (IBD) necessitates lifelong lifestyle and nutritional adaptations that significantly influence patients' and families' quality of life. Although pharmacological interventions are effective in managing flares, the role of diet remains inconclusive, prompting patients to adopt self-imposed dietary restrictions that may entail health risks. This study investigates the dietary and nutritional risk factors associated with IBD and their implications for quality of life

2.1.1: Carbohydrates

Epidemiological studies suggest that high intake of refined sugars, simple carbohydrates, and sweetened beverages may increase IBD risk, although findings remain inconsistent (Burisch et

al., 2014; Hansen et al., 2011; Jakobsen et al., 2013; Spooren et al., 2013). Conversely, fiber-rich fruits and vegetables, fermented by saccharolytic microbiota to produce SCFAs such as butyrate, improve intestinal barrier function and exert anti-inflammatory effects (Andoh et al., 2003; Galvez et al., 2005). While some studies associate fiber with reduced risk of Crohn's disease (Ananthakrishnan et al., 2013; Scaldaferri et al., 2013), others report increased IBD risk (Amre et al., 2007; Ananthakrishnan et al., 2014). Microbiota alterations, notably shifts between *Prevotella* and *Bacteroides*, may underlie these associations (Wu et al., 2013), though further research is required.

2.1.2: Proteins and allergens

Several epidemiological studies have linked high meat consumption to an increased risk of IBD (Ananthakrishnan et al., 2014; Hou et al., 2011; Tjonneland et al., 2009), though it remains unclear whether this is due to protein, fat, or both (Hou et al., 2011). In a French cohort, animal protein intake, particularly from meat and fish, but not from eggs or dairy, was associated with higher IBD risk (Jantchou et al., 2010). Gluten-derived proteins have also been implicated: animal models demonstrated that gluten-rich diets induce ileitis and reduce occludin expression, compromising barrier integrity. Gliadin increased intestinal permeability in both celiac and non-celiac gluten-sensitive individuals, suggesting a role in immune-mediated disorders. Twin studies in Germany and epidemiological data from Japan similarly linked processed meat and dairy intake to IBD risk, while cow's milk protein allergy has been proposed as an early-life risk factor for both CD and UC (Virta et al., 2013). Moreover, *Mycobacterium avium* subspecies *paratuberculosis* (MAP), abundant in milk, meat, and water, may further enhance IBD risk through nutrient-driven invasiveness (Patel et al., 2006).

2.1.3: Fats

Different types of dietary fats exert contrasting effects on intestinal inflammation. Large epidemiological studies, including EPIC and the Nurses' Health Study, found higher risks of IBD with increased intake of meat, animal fats, and omega-6 polyunsaturated fatty acids (PUFAs), particularly linoleic acid, whereas omega-3 PUFAs such as DHA, EPA, and DPA were associated with reduced risks of UC and CD (Amre et al., 2007; Ananthakrishnan et al., 2014; Hou et al., 2011; Tjønneland et al., 2009). Diets rich in fish, nuts, olive oil, fruits, vegetables, and cereals demonstrated protective effects (Amre et al., 2007), while frequent consumption of fast food, animal fat, and refined sugars increased disease risk (Burisch et al., 2014; Gentschew & Ferguson, 2012). Mechanistically, omega-6 PUFAs appear pro-inflammatory, potentially through modulation of Toll-like receptor activity in macrophages (Lee et al., 2004), whereas omega-3 PUFAs exert anti-inflammatory, antithrombotic, and hypolipidemic effects. Overall, high dietary intake of omega-6 PUFAs may promote dysbiosis and intestinal inflammation, while omega-3 PUFAs appear protective, particularly in genetically predisposed individuals.

2.1.4: Minerals and vitamins

Retinol showed a positive correlation with risk for IBD, but magnesium, vitamin C, and fruits showed a negative correlation. Only the risk for CD indicated a negative connection between potassium intake and vegetable consumption. Since selenium is a cofactor of anti-inflammatory proteins; studies in animal models suggested a major role for selenium deficiency in the etiology of IBD, although no association with folate was found (MacFarlane et al., 2013). IBD development also depends significantly on vitamin D. The 1, 25 (OH) 2D3 or vitamin D receptor deficit generates dysbiosis, which enhances vulnerability to gastrointestinal damage, according to data collected in a mouse model of colitis (Ooi et al., 2013). On the other hand, increased vitamin D intake only prevented CD in people and an animal model of IBD (Ananthakrishnan et al., 2013; Meeker et al., 2014).

2.1.5: Food Preservatives and additives

Dietary additives have been implicated in IBD pathogenesis. The increased use of sulfur as a preservative correlates with higher UC incidence, likely due to its bacterial conversion into hydrogen sulfide, which is toxic to intestinal cells (Roediger et al., 1993; Urbano et al., 2013). Maltodextrin impairs intestinal antimicrobial defenses and may promote IBD onset (Nickerson et al., 2015). Microparticles such as titanium dioxide (E171), aluminum silicates, and talc, commonly found in food, antacids, and toothpaste, facilitate antigen transport across the mucosa and have been linked to CD (Butler et al., 2007; Han et al., 2010). In animal models, abrasives like tricalcium phosphate and quartz caused epithelial injury resembling Crohn's lesions, while carrageenan's damaged enterocytes in a manner consistent with human IBD (Choi et al., 2014). Emulsifiers and maltodextrin may further promote the growth of adherent-invasive *E. coli* (AIEC) and facilitate bacterial translocation, driving chronic intestinal inflammation.

2.1.6: Beverages

Fluid and beverage intake influences IBD risk. High fluid consumption has been negatively associated with IBD (Brennan et al., 1997). In Asian and Australian populations, green tea and coffee consumption reduced IBD risk, with tea linked to lower CD incidence and coffee to lower UC incidence. Experimental studies show that caffeine alleviates colitis symptoms in epithelial cells (Lee et al., 2014), while polyphenols in green tea and wine exert antioxidant and anti-inflammatory effects, reducing colitis severity in animal models (Nunes et al., 2013; Oz et al., 2013). However, wine also contains sulfur dioxide, a potential irritant (Biasi et al., 2014). Diet and beverages also influence the gut microbiome and serve as microbial sources; notably, infections such as *Helicobacter pylori*, transmitted through water, may provide protective effects against IBD (Boehnke et al., 2015).

2.2: Nutritional Risk Factors associated with IBD

IBD incidence has plateaued in most developed regions but continues to rise in transitioning economies, implicating lifestyle westernization as a major risk factor (Halfvarson et al., 2006). Environmental influences that impair epithelial barrier function, reduce microbiome diversity, or introduce pathogenic microbes contribute to gut dysbiosis and IBD (Bernstein et al., 2010). Key lifestyle risk factors include smoking, obesity, physical inactivity, and Western dietary patterns—characterized by high intake of saturated fats, refined carbohydrates, and processed meats, and low intake of fiber, fruits, vegetables, and fish (Dignass et al., 2015). Subgroup analyses further highlight variable associations, with smoking increasing IBD risk and folate intake showing protective effects (Dignass et al., 2015).

2.2.1: Stress

Psychological stress is thought to influence IBD pathophysiology by altering immune function, though observational studies show inconsistent results, partly due to recall bias (Lerebours et al., 2007; Mawdsley et al., 2005). Animal models, however, demonstrate that chronic stress damages the gut mucosa and weakens barrier integrity, thereby exacerbating disease (Cuzzocrea et al., 2002; Soderholm et al., 2002).

2.2.2: Smoking

Smoking has a paradoxical relationship with IBD, being protective against UC but increasing the risk of CD in a dose-dependent manner (Jones et al., 2008). Potential mechanisms include effects on mucus production, cytokine balance, and microvascular changes, though geographic variation suggests additional environmental factors influence this association (Bernstein, 2010; Ouyang et al., 2005; Pargellis et al., 2002; World Bank, 2009).

2.2.3: Hygiene and sanitation

Environmental exposures may contribute to IBD by triggering abnormal immune responses to gut microbiota (Koloski et al., 2008). The hygiene hypothesis suggests that decreased early-life exposure to pathogens raises the risk of inappropriate immune activation later, with factors like *Helicobacter pylori* infection, household size, sibling relationships, birth order, urban living, and pet exposure acting as proxies for microbial contact (Amre et al., 2007; Bernstein et al., 2006; Bernstein & Shanahan, 2008; Gent et al., 1994; Koloski et al., 2008; Lashner & Loftus, 2006).

2.3: Dietary Risk Factors Associated with IBD

2.3.1: Malnutrition

Malnutrition is highly prevalent in IBD, affecting 18–62% of UC patients and 65–75% of CD patients, and is linked to growth retardation in children (Rocha et al., 2008; Scaldaferri et al., 2017; Weisshof & Chermesh, 2015). It arises mainly from reduced food intake due to appetite loss, restrictive diets, and symptom-triggered food avoidance (Hebuterne et al., 2009). Intestinal inflammation, cytokine activity, bacterial overgrowth, and impaired bile salt absorption—particularly in CD—further compromise nutrient absorption, especially fats and fat-soluble vitamins (Ghishan & Kiela, 2014; Hwang et al., 2012; Urbano et al., 2013).

Medications such as glucocorticoids and sulfasalazine exacerbate micronutrient deficiencies, while active disease raises metabolic demand (Scaldaferri et al., 2017; Weisshof & Chermesh, 2015). Malnutrition manifests as altered body composition with reductions in fat-free mass and fat mass, the latter often regained during remission (Rocha et al., 2008). Sarcopenia, characterized by muscle wasting and weakness, results from malnutrition, inflammation, and immobility, leading to fractures, cardiovascular disease, and higher hospitalization risk (Santilli et al., 2014). Protein-energy malnutrition, typically presenting as weight loss, is

the most common type, with prevalence rates up to 30% in IBD cohorts (Amindeep et al., 2015; Hengstermann et al., 2008; Nguyen et al., 2008). Despite this, one-third of patients are obese, with similar rates in UC and CD (Bryant et al., 2013; Flores et al., 2015), and while obesity does not worsen long-term outcomes (Seminario et al., 2015), sarcopenic obesity is associated with severe morbidity and mortality (Santilli et al., 2014).

2.3.2: Micronutrient Deficiencies

Patients with inflammatory bowel disease (IBD) often struggle with vitamin and micronutrient deficiencies, which can worsen their symptoms and overall health if left unaddressed (Tawfik et al., 2014). The most common shortages include iron, calcium, zinc, magnesium, selenium, and key vitamins such as B12, folic acid, A, D, and K (Hwang et al., 2012).

Calcium and vitamin D deficiencies are especially common, affecting up to 70% of patients, and appear more frequently in ulcerative colitis (UC) than Crohn's disease (CD) (Hwang et al., 2012). Beyond their role in bone strength, vitamin D helps maintain gut lining and healing; low levels increase the risk of IBD flare-ups, while higher levels may protect against UC and CD (Ananthakrishnan et al., 2012; Kong et al., 2008).

Vitamin A deficiency, found in up to 90% of patients, can cause night blindness and poor wound healing (Tawfik et al., 2014). Vitamin K deficiency is less understood but may result from gut flora disruption, antibiotics, or malabsorption (Hwang et al., 2012).

Anemia is also widespread, affecting half of adults and most children with IBD. Iron deficiency is the leading cause, though B12 and folic acid deficiencies also play a role (Bermejo et al., 2013; Scaldaferri et al., 2017; Yakut et al., 2010). Surgeries and chronic inflammation further worsen these shortages (Alves et al., 2014).

Finally, low levels of selenium, zinc, and magnesium—often linked to poor intake and diarrhea—can contribute to fatigue, bone weakness, and delayed healing (Tawfik et al., 2014).

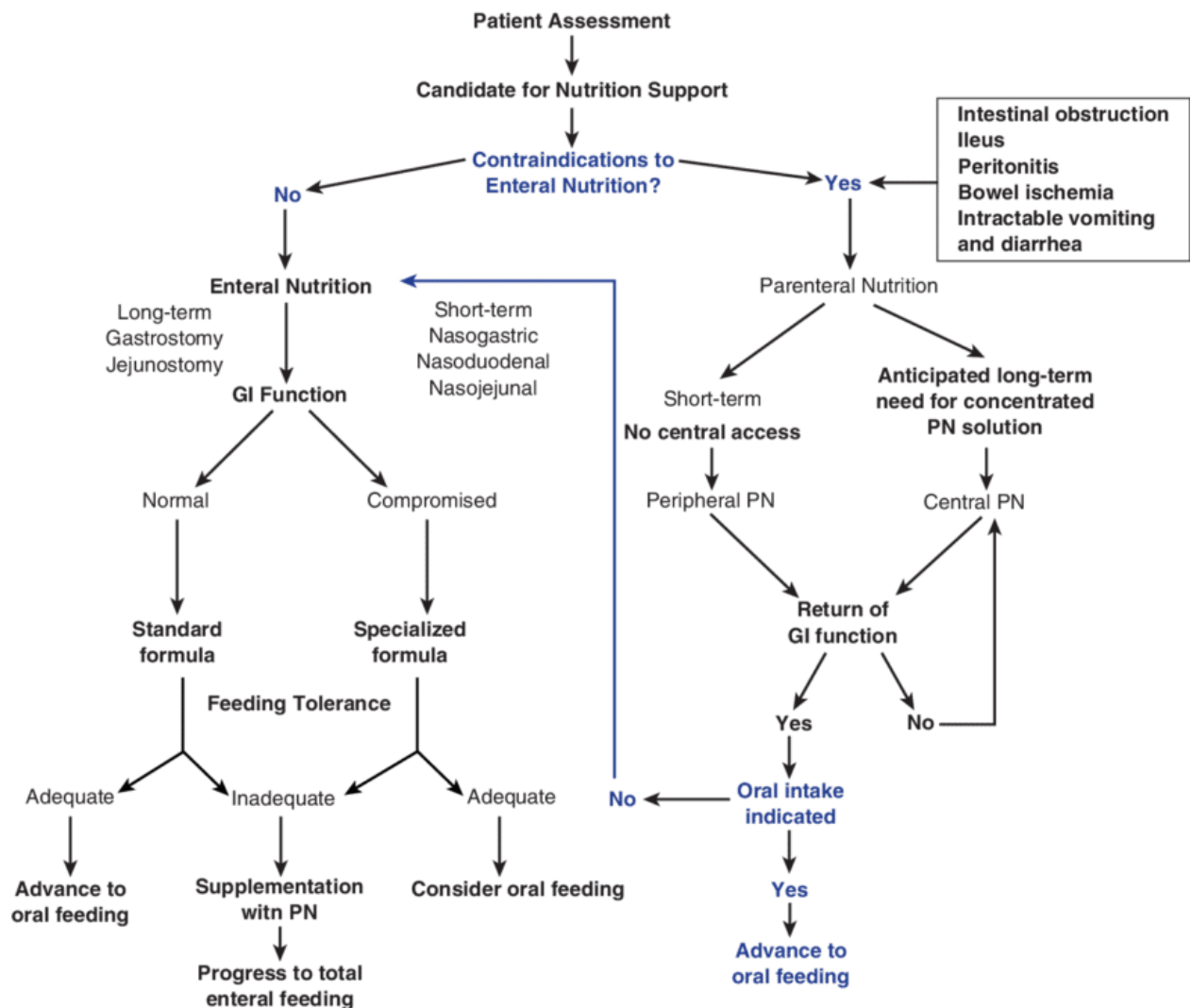
2.4: Nutrition Interventions with Dietary Modifications

Exclusive Enteral Nutrition (EEN) and corticosteroids (CS) remain key treatments for active Crohn's disease (CD). Evidence shows CS are generally more effective in adults, while EEN benefits children by inducing remission with fewer side effects (Caprilli et al., 2006).

Many patients restrict foods like dairy or vegetables due to perceived symptom triggers, increasing the risk of micronutrient deficiencies (Godala et al., 2023). Although no universal dietary guideline exists, ECCO and ESPGHAN recommend EEN as the first-line therapy for pediatric CD (Day & Lopez, 2015). Ongoing research emphasizes individualized, nutrient-balanced diets to support long-term disease control (Roncoroni et al., 2022).

Figure 2.1

Decision making tree for choice of mode of feeding for special nutrition in hospital/ flow diagram for Nutrition intervention.



Route of administration algorithm (adapted from clinical pathways) and the Rules of Nutrition Therapy dependent of the GI function (Wędrychowicz et al., 2016)

2.4.1: Exclusive and Partial Enteral Nutrition

Exclusive enteral nutrition (EEN) and corticosteroids (CS) are both used to manage active Crohn's disease (CD). Evidence shows that CS is more effective in adults, while EEN works better in children, leading ECCO and ESPGHAN to recommend EEN as first-line therapy for pediatric CD (Caprilli et al., 2006; Day & Lopez, 2015 Vidarsdottir et al., 2015).

Many patients self-restrict certain foods, which can worsen micronutrient deficiencies (Vidarsdottir et al., 2015). Since no universal IBD diet exists, personalized, evidence-based nutritional strategies remain crucial for symptom control and long-term management (Godala

et al., 2023; Roncoroni et al., 2022).

2.4.2: Total Parenteral Nutrition

In the 1980s, total parenteral nutrition (TPN) was widely used to manage Crohn's disease (CD) by providing bowel rest and correcting deficiencies (Goh & O'Morain, 2003). However, exclusive enteral nutrition (EEN) later proved equally or more effective for remission, while TPN remained costly and carried higher risks such as sepsis. Current guidelines reserve TPN for cases where enteral feeding is impossible, including gut failure (Richman & Rhodes, 2013).

Carbohydrate-based dietary strategies are now central to inflammatory bowel disease (IBD) care. Low-fiber or low-residue diets can reduce stool frequency and obstruction risk during flares, though excessive restriction limits beneficial short-chain fatty acids (Owczarek et al., 2016; Vanhauwaert et al., 2015). In remission, low-FODMAP diets may ease IBS-like symptoms but require supervision to avoid deficiencies (Prince et al., 2016). Conversely, fiber supplements like oat or wheat bran can reduce inflammation (Brotherton et al., 2015).

The specific carbohydrate diet (SCD), which eliminates complex carbohydrates and processed foods, has shown symptom improvement in small CD studies but not full mucosal healing (Cohen et al., 2014; Suskind et al., 2014). These approaches highlight the growing role of personalized, evidence-based nutrition in IBD management.

2.4.4: IBD-Anti-Inflammatory Diet

The Inflammatory Bowel Disease Anti-Inflammatory Diet (IBD-AID) was designed as an adjunct therapy for patients unresponsive to medication (Olendzki et al., 2014). It limits refined carbohydrates, promotes prebiotic and probiotic foods, encourages healthy fats, ensures nutrient balance, and modifies food textures for better digestion. The diet emphasizes lean proteins, omega-3 sources, fruits, vegetables, and fermented dairy while excluding gluten

grains and most dairy products. Studies report symptom improvement and reduced medication use among adherent patients, though larger trials are needed to confirm its effectiveness (Olendzki et al., 2014).

2.4.5: Pharmaco-nutrition

Research indicates that specific nutrients can enhance immune regulation, metabolism, and gut health in inflammatory bowel disease (IBD). Amino acids such as glutamine, arginine, and tryptophan help modulate stress and inflammation, while histidine and threonine strengthen the gut barrier (Andou et al., 2009; Bao et al., 2017; Kim et al., 2010). Omega-3 fatty acids also reduce inflammatory cytokines, showing greater benefit in Crohn's disease than in ulcerative colitis (Barbalho et al., 2016; Turner et al., 2009).

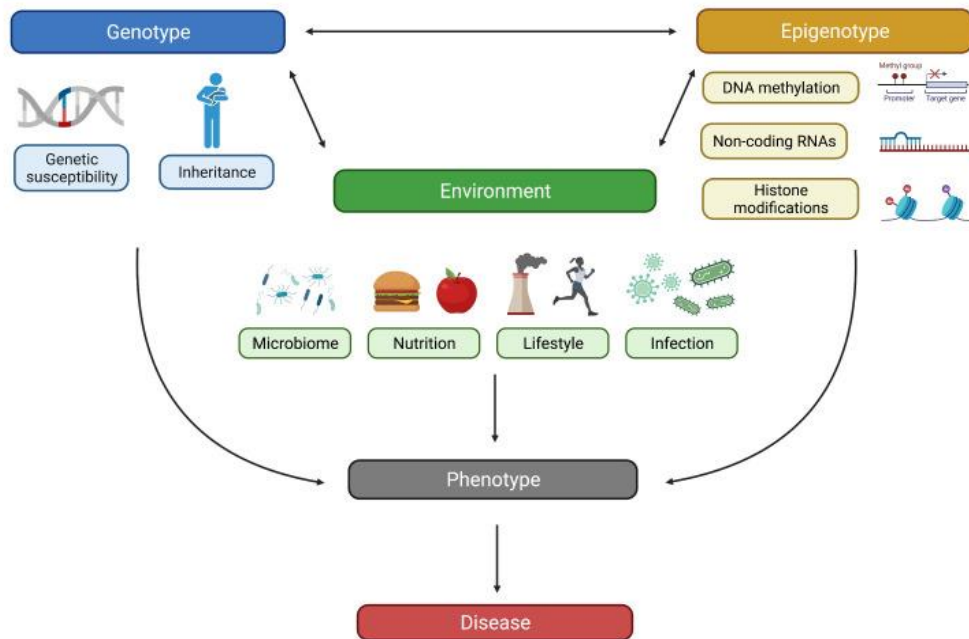
Vitamin D supports bone health and reduces intestinal inflammation and relapse risk in IBD (Jorgensen et al., 2010; Meckel et al., 2016). Similarly, curcumin—an active compound in turmeric—exhibits potent anti-inflammatory effects and enhances treatment outcomes in ulcerative colitis when combined with standard therapies (Garg et al., 2012; Vecchi et al., 2014).

Although not a substitute for medication, these nutrients and supplements complement medical therapy by improving symptom control and promoting intestinal healing.

2.6: Theoretical Framework

Figure 2.2

Schematic frontline Gastroenterology illustrating risk factors (genotype, epigenotype, and environment) contributing to IBD pathogenesis.



2.7: Conceptual Framework/Operational Framework

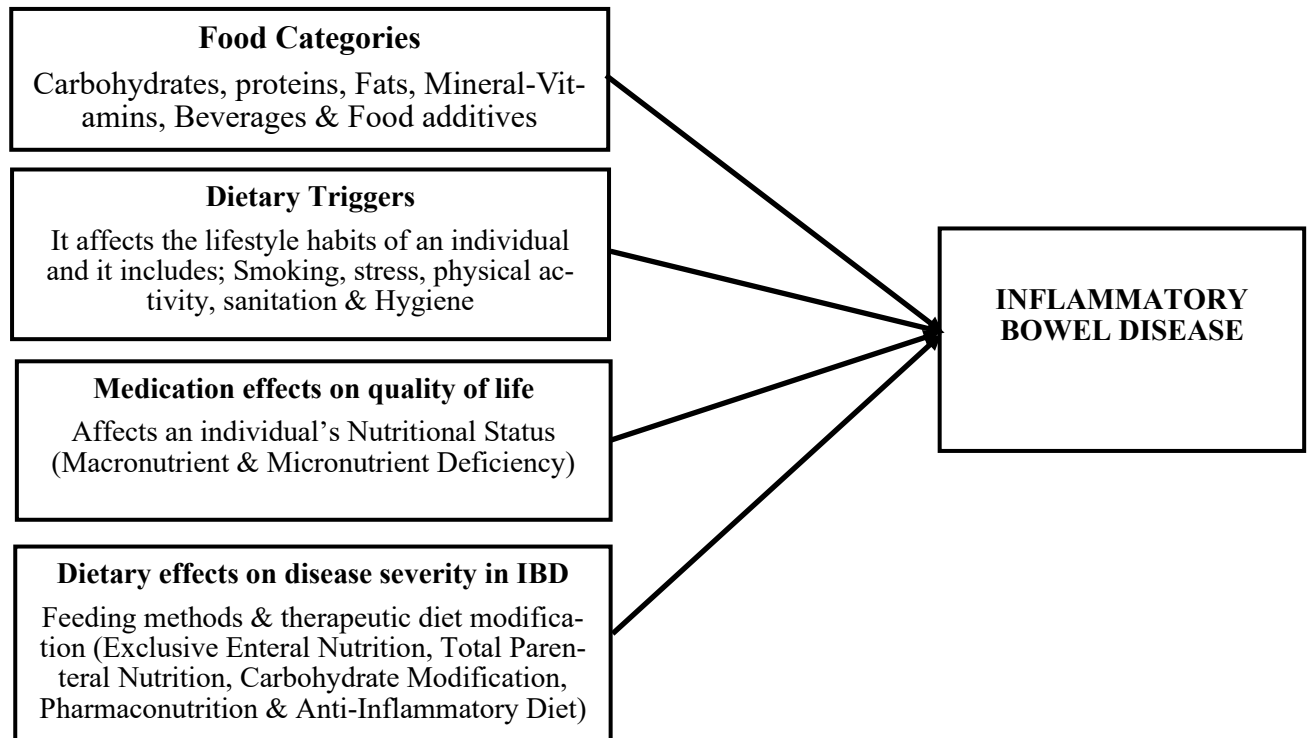
Below is a view of how the independent and dependent variables interact. Addressing the dietary and nutritional risk factors linked with IBD will aid in preventing exacerbations and flare-ups of the condition. This may be achieved by including certain nutritional food components into your diet and meticulously adhering to a medical nutritional therapy plan.

Figure 2.3

Conceptual Framework showing the relationship between the dependent and independent variables

Independent Variable

Dependent Variable



CHAPTER THREE: RESEARCH METHODOLOGY

3.0: Introduction

This chapter lays out a path through which the research objectives were to be realized. It provided an avenue through which the study hypothesis was to be tested. It discussed the study design and data collection procedure to attain the results of this study.

3.1: RESEARCH DESIGN

This was a hospital-based cross-sectional observational research conducted to identify and delineate the features of the variables of interest, utilizing a questionnaire for data collection. This study focused on a quantitative research design. In doing quantitative research, the focus was placed on a neutral environment and the perspectives of study participants. Furthermore, particular considerations had to be accorded to the researcher as an individual.

3.2: STUDY AREA

Kenyatta National Hospital, a leading tertiary referral and teaching hospital in Kenya, spans 45.7 hectares and hosts several key health institutions, including the University of Nairobi's College of Health Sciences, the Kenya Medical Training College, and the Kenya Medical Research Institute. The facility has 1,800 beds (with 202 in the private wing), 22 outpatient clinics, 24 operating theatres, and employs approximately 6,000 staff members.

KNH, as the country's largest national teaching and referral hospital, serves a broad patient base from Nairobi County and other regions of Kenya, making it an ideal site for capturing diverse cases of IBD. This study was conducted in the Gastroenterology outpatient clinic (Clinic 17), inpatient ward 6B, and the records office (Clinic 19).

3.3: STUDY POPULATION

The study involved 175 patients aged 18 years and above who were receiving medical and nutritional management for gastrointestinal tract disorders, both as inpatients and outpatients

in the Gastroenterology clinics. On average, one patient with conditions such as IBD, IBS, coeliac disease, gastritis, ulcers, or gastroenteritis was admitted every two days. The outpatient clinic reviewed about 10 IBD patients monthly, while up to 15 IBD patients were admitted each month to Ward 6B and the Private Wing medical ward.

3.3.1: Inclusion Criteria

- ❖ Both male and female patients above 18 years of age with gastrointestinal tract disorders/complications, both pre- and post-diagnosis.
- ❖ Patients who had understood, agreed and conformed/consented.
- ❖ Patients who had willingly volunteered to be part of the study.

3.3.2: Exclusion Criteria

- ❖ Patients diagnosed with gastric/stomach and oral cancers, Hiatal Hernia, Gastroesophageal Reflux Disease, Intestinal Obstruction, and Pregnant women with Gastrointestinal tract complications/ disorders.

3.4: SAMPLING AND SAMPLE SIZE DETERMINATION

The patients who had fulfilled the selection criteria and those who had consented to participating in the study were enrolled.

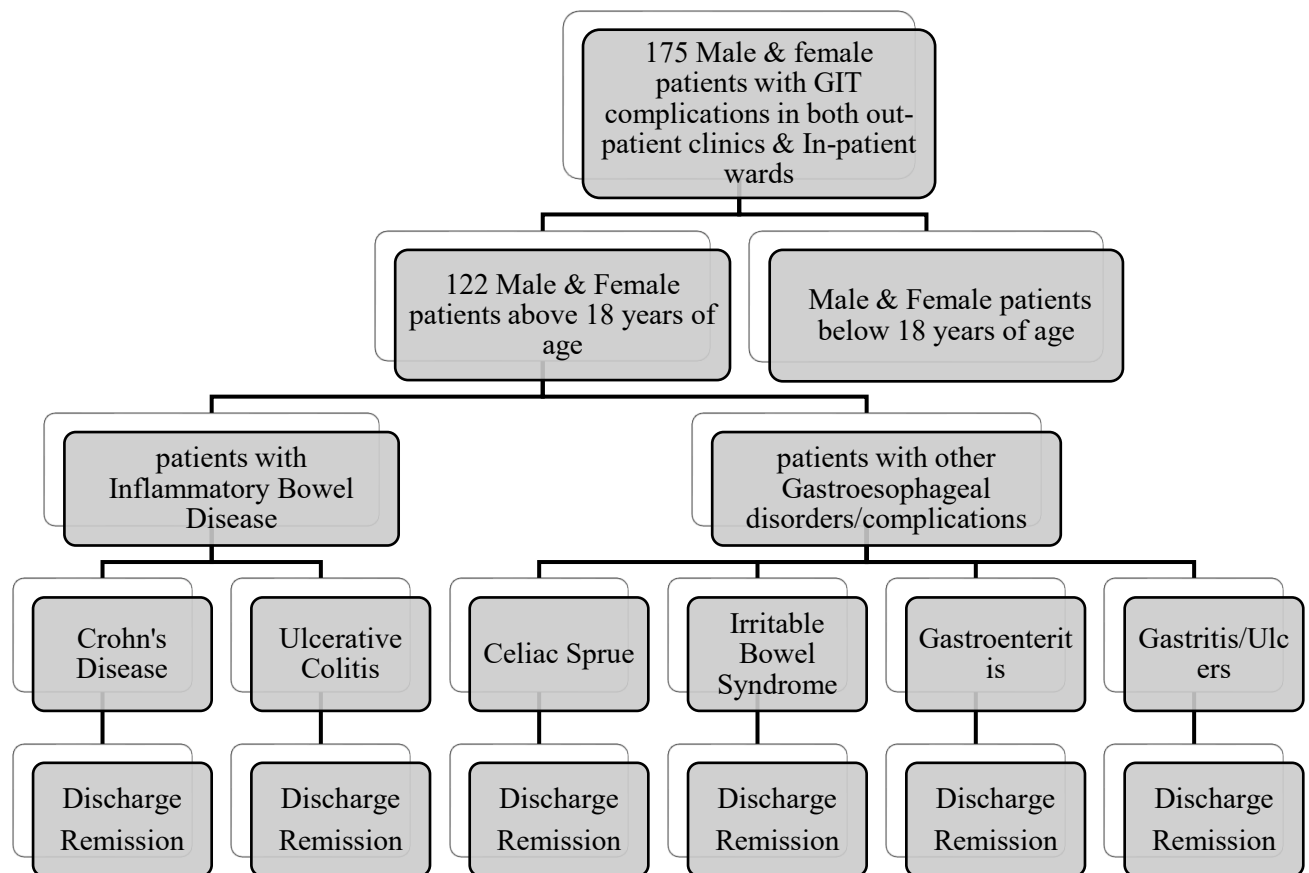
3.4.1: Sampling Procedure

All patients aged 18 years and above with confirmed Gastroesophageal Disorders—including IBD, IBS, Coeliac Disease, Gastritis or Ulcers, and Gastroenteritis—were screened and enrolled upon providing informed consent. A random sampling approach was adopted for this study, targeting all eligible patients diagnosed with Inflammatory Bowel Disease (IBD) receiving care at Kenyatta National Hospital (KNH), Nairobi, Kenya. Given the small and well-defined population size, it was feasible to include all eligible participants, eliminating the need for random sampling or statistical sample size determination. This census approach

minimized sampling error and ensured that all qualifying cases were comprehensively represented.

Figure 3.1

illustration of the process of enrollment of patients with GD disorders into the study.



3.4.2: Sample Size

The sample size comprised of individuals with confirmed IBD diagnoses (either Crohn's disease or ulcerative colitis) and other gastroesophageal disorders & infections attending gastroenterology clinics during the study period. The sample size of the study was calculated

using the Cochran formula for cross-sectional studies (1977)

$$n_0 = z^2 \times P (1 - P) / e^2$$

$$n_0 = 1.96^2 \times 0.5 (1 - 0.5) / 0.05^2$$

$$n_0 = \underline{385}$$

$$n = n_0 \div [1 + (n_0 - 1 / N)]$$

$$n = 385 \div [1 + (385 - 1 / 175)]$$

$$n = 120.52$$

$$n = \underline{121}$$

Therefore, the sample size will be 121 patients

e: desired level of precision, the margin of error

p: the fraction of the population (as percentage) that displays the attribute

z: the z-value, extracted from a z-table

n₀: Cochran's sample size computed using the formula for ideal sample size;

N: the size of the population

3.5: RESEARCH INSTRUMENTS

A combination of structured and unstructured questionnaires was used as the primary data-collecting tool to gather data on eating patterns, anthropometry, and health-seeking behavior.

To guarantee that adequate and relevant data was gathered, the proposed research's goal, objectives, and hypothesis was taken into consideration when constructing the research instrument.

3.6: DATA COLLECTION PROCEDURE

The study adopted three sets of procedures for data collection.

3.6.1: Researcher/Self-Administered Questionnaire

Data were collected using a structured, interviewer-administered questionnaire complemented by a review of patients' hospital records. The questionnaire captured information on socio-demographic characteristics, dietary triggers, medication use and related dietary modifications, and disease severity indicators. Clinical records were reviewed to confirm diagnosis, treatment history, and relevant laboratory findings. The data collection team underwent prior training to ensure standardized administration of the questionnaire and accurate extraction of clinical information. All data were collected confidentially, with participant identifiers removed to maintain privacy and comply with ethical guidelines.

3.6.2: Dietary Assessment

Dietary intake was evaluated using a 24-hour dietary recall and a Food Frequency Questionnaire (FFQ). In the 24-hour recall, participants described all foods and beverages consumed in the previous day to estimate daily nutrient intake and eating patterns. The FFQ captured the frequency and types of foods regularly consumed over time, providing insight into participants' overall dietary habits and lifestyle choices.

3.7: PRETESTING OF RESEARCH INSTRUMENTS

The pre-testing of the research tools was carried out at KNH in order to make any necessary adjustments, modifications, clarifications, propositions, and omissions, as well as to highlight any gaps in the research instruments' applicability. The questionnaires were administered to about 20 patients in medical ward level 6A: Oncology ward at KNH which ensured that the responses and ability to comprehend the information was good.

3.7.1: Validity

Using well-designed questionnaire guaranteed the validity of the tools. To verify that the results of the study were accurate, a pre-test study was conducted.

3.7.2: Reliability

The researcher collected data using structured and unstructured questionnaires given to

interview subjects. The questionnaire was used to gather information from patients who were above the age of 18.

3.8: ETHICAL CONSIDERATIONS

All participants gave their informed consent, both verbally and in writing, before any data were collected, approval for data collection was awarded by Kenyatta National Hospital-University of Nairobi Ethical Review Committee, at National Commission for Science, Technology & Innovation and Kenyatta National Hospital Research Department.

3.9: DATA ANALYSIS

Quantitative data were analyzed using SPSS version 26. Descriptive statistics were used to summarize socio-demographic, clinical, and dietary characteristics of participants. Group differences for categorical variables were assessed using χ^2 tests (with Fisher's exact test where expected cell counts were <5). All tests were two-sided with $\alpha=0.05$. Missing data were handled by pairwise exclusion for all inferential analyses; for descriptive summaries, available-case denominators are shown. Specifically, for the binary endpoints Core IBD Therapy and Adjunct Comorbidity Care, records with missing values in the outcome or any included covariate were excluded pairwise from the relevant analyses.

CHAPTER 4: RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter gives a more detailed and clear description of results and discussion based on the study objectives identified below:

4.1 Descriptive Statistics

Table 4.1

Socio-Demographics

	Categorize the Principal Diagnosis			<i>X</i> ²
	IBD	GD	Total	
N	40 (33.6%)	79 (66.4%)	119 (100.0%)	
Gender of the Patient				
Male	21 (52.5%)	38 (48.1%)	59 (49.6%)	0.650
Female	19 (47.5%)	41 (51.9%)	60 (50.4%)	
Patient's place of Admission, assessment/interview and file details Retrieval				
Clinic 17-OTP/19-Records	32 (80.0%)	21 (26.6%)	53 (44.5%)	<0.001
Ward 6B-INP	8 (20.0%)	55 (69.6%)	63 (52.9%)	
Clinic 17-OTP	0 (0.0%)	3 (3.8%)	3 (2.5%)	
Patient's Principal Diagnosis				
Pancolitis(ulcerative Colitis)	2 (5.0%)	0 (0.0%)	2 (1.7%)	<0.001
Ulcerative Colitis	35 (87.5%)	0 (0.0%)	35 (29.4%)	
Crohn's Disease	3 (7.5%)	0 (0.0%)	3 (2.5%)	
Gastritis	0 (0.0%)	58 (73.4%)	58 (48.7%)	
Gastroenteritis	0 (0.0%)	15 (19.0%)	15 (12.6%)	
Celic Sprue	0 (0.0%)	1 (1.3%)	1 (0.8%)	
Irritable Bowel Syndrome-IBS	0 (0.0%)	5 (6.3%)	5 (4.2%)	
Principal Diagnosis presentation/extremity/duration				
Antral	0 (0.0%)	1 (2.9%)	1 (2.4%)	<0.001
Chronic	0 (0.0%)	15 (42.9%)	15 (35.7%)	
Acute	0 (0.0%)	13 (37.1%)	13 (31.0%)	

Corrosive	0 (0.0%)	2 (5.7%)	2 (4.8%)	0.727
Ischemic	1 (14.3%)	0 (0.0%)	1 (2.4%)	
Exacerbation	2 (28.6%)	0 (0.0%)	2 (4.8%)	
Flare-up	2 (28.6%)	0 (0.0%)	2 (4.8%)	
Clinical Remission	1 (14.3%)	0 (0.0%)	1 (2.4%)	
Severe	1 (14.3%)	2 (5.7%)	3 (7.1%)	
Uremic	0 (0.0%)	1 (2.9%)	1 (2.4%)	
multiple	0 (0.0%)	1 (2.9%)	1 (2.4%)	
Age Bracket of patients				
<20 years	5 (12.5%)	6 (7.6%)	11 (9.2%)	0.727
21 - 30 years	5 (12.5%)	8 (10.1%)	13 (10.9%)	
31 - 40 years	9 (22.5%)	23 (29.1%)	32 (26.9%)	
41 - 50 years	12 (30.0%)	17 (21.5%)	29 (24.4%)	
51 - 60 years	4 (10.0%)	11 (13.9%)	15 (12.6%)	
>60 years	5 (12.5%)	14 (17.7%)	19 (16.0%)	
The Time IBD was Diagnosed Categorized in 6 years				
2009- 2014	3 (8.3%)	0 (0.0%)	3 (7.0%)	0.627
2015- 2020	13 (36.1%)	2 (28.6%)	15 (34.9%)	
2021-2025	20 (55.6%)	5 (71.4%)	25 (58.1%)	
Marital Status				
Married	21 (52.5%)	42 (53.2%)	63 (52.9%)	0.912
Single	18 (45.0%)	34 (43.0%)	52 (43.7%)	
Separated/Divorced	1 (2.5%)	2 (2.5%)	3 (2.5%)	
widowed	0 (0.0%)	1 (1.3%)	1 (0.8%)	
Education Level				
Primary	8 (20.0%)	4 (5.1%)	12 (10.1%)	0.061
Secondary	8 (20.0%)	19 (24.1%)	27 (22.7%)	
Tertiary/College/University	1 (2.5%)	6 (7.6%)	7 (5.9%)	
Informal Education	23 (57.5%)	50 (63.3%)	73 (61.3%)	
Source of Income				
Employed	5 (12.5%)	10 (12.7%)	15 (12.6%)	0.899

Unemployed	19 (47.5%)	43 (54.4%)	62 (52.1%)	
Self Employed	9 (22.5%)	16 (20.3%)	25 (21.0%)	
Casual Laborer	4 (10.0%)	7 (8.9%)	11 (9.2%)	
Retired	3 (7.5%)	3 (3.8%)	6 (5.0%)	
Family Income in (ksh)				
<5,000	28 (70.0%)	60 (75.9%)	88 (73.9%)	
5,000-10,000	1 (2.5%)	9 (11.4%)	10 (8.4%)	
10,000-15,000	3 (7.5%)	4 (5.1%)	7 (5.9%)	0.001
15,000-20,000	1 (2.5%)	6 (7.6%)	7 (5.9%)	
>20,000	7 (17.5%)	0 (0.0%)	7 (5.9%)	

Results

Table 4.1 indicates that out 119 participants, 33.6% had Inflammatory Bowel Disease (IBD) and 66.4% had Gastroesophageal Disorders (GD). Most IBD patients (80.0%) were managed as outpatients, while the majority of GD patients (69.6%) were hospitalized ($p < 0.001$). Ulcerative colitis was the dominant IBD type (87.5%), whereas gastritis (73.4%) and gastroenteritis (19.0%) prevailed in GD cases ($p < 0.001$). Flare-ups occurred only in IBD, while acute and chronic presentations were more frequent in GD ($p < 0.001$). Socioeconomic differences were notable, with higher-income patients (above Ksh 20,000) found exclusively in the IBD group (17.5%), and most GD patients earning below Ksh 5,000 (75.9%) ($p = 0.001$). These findings highlight clear clinical and socioeconomic distinctions between the two groups.

4.2 To examine the relationship between the occurrence and severity of IBD in the patient

Table 4.2*Carbohydrates*

	DISEASE_CATEGORY (Categorize the Principal Diagnosis)			X²
	IBD	GASTROESOPHAGEAL	Total	
N	40 (33.6%)	79 (66.4%)	119 (100.0%)	
FIBER				
Always	35 (87.5%)	37 (46.8%)	72 (60.5%)	<0.001
Occasionally	1 (2.5%)	23 (29.1%)	24 (20.2%)	
Sometimes	2 (5.0%)	8 (10.1%)	10 (8.4%)	
Rarely	2 (5.0%)	9 (11.4%)	11 (9.2%)	
Never	0 (0.0%)	2 (2.5%)	2 (1.7%)	
GRAINS				
Always	37 (92.5%)	40 (50.6%)	77 (64.7%)	<0.001
Occasionally	2 (5.0%)	26 (32.9%)	28 (23.5%)	
Sometimes	0 (0.0%)	7 (8.9%)	7 (5.9%)	
Rarely	1 (2.5%)	6 (7.6%)	7 (5.9%)	
CEREALS				
Always	36 (90.0%)	27 (34.2%)	63 (52.9%)	<0.001
Occasionally	1 (2.5%)	19 (24.1%)	20 (16.8%)	
Sometimes	1 (2.5%)	14 (17.7%)	15 (12.6%)	
Rarely	0 (0.0%)	9 (11.4%)	9 (7.6%)	
Never	2 (5.0%)	10 (12.7%)	12 (10.1%)	
TUBERS				
Always	36 (90.0%)	42 (53.2%)	78 (65.5%)	0.002
Occasionally	1 (2.5%)	21 (26.6%)	22 (18.5%)	
Sometimes	2 (5.0%)	7 (8.9%)	9 (7.6%)	
Rarely	1 (2.5%)	7 (8.9%)	8 (6.7%)	
Never	0 (0.0%)	2 (2.5%)	2 (1.7%)	
ROOTS				
Always	36 (90.0%)	43 (54.4%)	79 (66.4%)	0.001

Occasionally	1 (2.5%)	22 (27.8%)	23 (19.3%)
Sometimes	2 (5.0%)	7 (8.9%)	9 (7.6%)
Rarely	1 (2.5%)	7 (8.9%)	8 (6.7%)

Results

Table 4.2 indicates that of the 119 patients, 66.4% had gastroesophageal diseases and 33.6% had IBD. Compared to individuals with gastroesophageal disorders, IBD patients consistently reported higher "always" consumption of fiber (87.5% vs. 46.8%), grains (92.5% vs. 50.6%), cereals (90.0% vs. 34.2%), tubers (90.0% vs. 53.2%), and roots (90.0% vs. 54.4%). All of these differences were statistically significant ($p < 0.001$ – 0.002). Higher percentages of participants with GERD problems reported consuming these food groups "sometimes" or "sometimes," indicating more diversified consumption patterns.

Discussion

The results reveal distinct dietary patterns between patients with Inflammatory Bowel Disease (IBD) and those with gastroesophageal disorders (GD). IBD patients demonstrated more consistent and frequent consumption of fiber, grains, cereals, tubers, and roots, reflecting structured dietary management aimed at supporting gut health and sustaining remission (Kabisch et al., 2025). Conversely, GD patients tended to limit or vary their intake of high-fiber foods, likely due to symptom sensitivity and reflux-related discomfort

Table 4.3

Animal Proteins

	DISEASE_CATEGORY (Categorize the Principal Diagnosis)			X ²
	IBD	GASTROESOPHAGEAL	Total	
N	40 (33.6%)	79 (66.4%)	119 (100.0%)	
BEEF				
Always	32 (80.0%)	33 (41.8%)	65 (54.6%)	<0.001
Occasionally	1 (2.5%)	23 (29.1%)	24 (20.2%)	

Sometimes	2 (5.0%)	15 (19.0%)	17 (14.3%)	
Rarely	2 (5.0%)	8 (10.1%)	10 (8.4%)	
Never	3 (7.5%)	0 (0.0%)	3 (2.5%)	
MUTTON				
Always	5 (12.5%)	3 (3.8%)	8 (6.7%)	0.125
Occasionally	2 (5.0%)	6 (7.6%)	8 (6.7%)	
Sometimes	16 (40.0%)	21 (26.6%)	37 (31.1%)	
Rarely	11 (27.5%)	26 (32.9%)	37 (31.1%)	
Never	6 (15.0%)	23 (29.1%)	29 (24.4%)	
PORK				
Always	6 (15.0%)	3 (3.8%)	9 (7.6%)	0.097
Occasionally	1 (2.5%)	6 (7.6%)	7 (5.9%)	
Sometimes	5 (12.5%)	20 (25.3%)	25 (21.0%)	
Rarely	14 (35.0%)	24 (30.4%)	38 (31.9%)	
Never	14 (35.0%)	26 (32.9%)	40 (33.6%)	
LAMB				
Always	5 (12.5%)	6 (7.6%)	11 (9.2%)	0.503
Occasionally	15 (37.5%)	20 (25.3%)	35 (29.4%)	
Sometimes	8 (20.0%)	21 (26.6%)	29 (24.4%)	
Rarely	9 (22.5%)	25 (31.6%)	34 (28.6%)	
Never	3 (7.5%)	7 (8.9%)	10 (8.4%)	
POULTRY				
Always	19 (47.5%)	10 (12.7%)	29 (24.4%)	<0.001
Occasionally	11 (27.5%)	26 (32.9%)	37 (31.1%)	
Sometimes	3 (7.5%)	26 (32.9%)	29 (24.4%)	
Rarely	5 (12.5%)	16 (20.3%)	21 (17.6%)	
Never	2 (5.0%)	1 (1.3%)	3 (2.5%)	
EGGS				
Always	28 (70.0%)	11 (13.9%)	39 (32.8%)	<0.001
Occasionally	5 (12.5%)	31 (39.2%)	36 (30.3%)	
Sometimes	4 (10.0%)	20 (25.3%)	24 (20.2%)	

Rarely	2 (5.0%)	13 (16.5%)	15 (12.6%)	
Never	1 (2.5%)	4 (5.1%)	5 (4.2%)	
FISH				
Always	20 (50.0%)	8 (10.1%)	28 (23.5%)	<0.001
Occasionally	5 (12.5%)	23 (29.1%)	28 (23.5%)	
Sometimes	8 (20.0%)	30 (38.0%)	38 (31.9%)	
Rarely	4 (10.0%)	15 (19.0%)	19 (16.0%)	
Never	3 (7.5%)	3 (3.8%)	6 (5.0%)	

Results

Table 4.3 indicates that of the 119 participants, 33.6% had IBD and 66.4% had gastroesophageal disorders. IBD patients reported more frequent (“always”) consumption of beef, poultry, eggs, and fish compared to those with gastroesophageal disorders (80.0% vs. 41.8%, 47.5% vs. 12.7%, 70.0% vs. 13.9%, and 50.0% vs. 10.1%, respectively; $p < 0.001$). Consumption of mutton, pork, and lamb showed no significant difference between groups. Overall, IBD patients exhibited a higher intake of select protein sources ($p < 0.001$).

Discussion

Dietary patterns influence the progression of both IBD and gastroesophageal disorders. IBD patients often maintain higher protein intake—particularly from beef, poultry, eggs, and fish—to support tissue repair and immune function. However, excessive red meat may worsen intestinal inflammation, whereas fish offers anti-inflammatory benefits due to omega-3 fatty acids (Campmans-Kuijpers & Dijkstra, 2021). In contrast, patients with gastroesophageal disorders tend to limit fatty meats and certain proteins to reduce reflux symptoms (Katz et al., 2013).

Table 4.4*Plant Proteins*

	DISEASE_CATEGORY (Categorize the Principal Diagnosis)			X²
	IBD	GASTROESOPHAGEAL	Total	
N	40 (33.6%)	79 (66.4%)	119 (100.0%)	
LEGUMES				
Always	35 (87.5%)	31 (39.2%)	66 (55.5%)	<0.001
Occasionally	1 (2.5%)	26 (32.9%)	27 (22.7%)	
Sometimes	0 (0.0%)	12 (15.2%)	12 (10.1%)	
Rarely	1 (2.5%)	10 (12.7%)	11 (9.2%)	
Never	3 (7.5%)	0 (0.0%)	3 (2.5%)	
LENTILS				
Always	35 (87.5%)	30 (38.0%)	65 (54.6%)	<0.001
Occasionally	2 (5.0%)	25 (31.6%)	27 (22.7%)	
Sometimes	1 (2.5%)	13 (16.5%)	14 (11.8%)	
Rarely	1 (2.5%)	11 (13.9%)	12 (10.1%)	
Never	1 (2.5%)	0 (0.0%)	1 (0.8%)	

Results

Table 4.4 indicates that of the 119 participants, 33.6% had IBD and 66.4% had gastroesophageal disorders. IBD patients reported significantly higher regular consumption of legumes (87.5%) and lentils (87.5%) compared to gastroesophageal patients (39.2% and 38.0%, respectively; $p < 0.001$). This suggests that IBD patients more consistently integrate these foods into their diets, likely as part of nutritional strategies supporting gut health and inflammation management

Discussion

The higher intake of legumes and lentils among IBD patients compared to those with gastroesophageal disorders reflects differing dietary management approaches. Legumes offer fiber, plant-based protein, and minerals beneficial for gut health and inflammation control

when tolerated (Huo et al., 2023). However, their high fiber content can aggravate symptoms during active IBD phases, necessitating individualized guidance (Di Rosa et al., 2022). In contrast, patients with gastroesophageal disorders often limit legumes to prevent reflux and bloating (Heidarzadeh-Esfahani et al., 2021). The preference for legumes among IBD patients aligns with emerging plant-based diets, such as the Crohn’s Disease Exclusion and Mediterranean diets, known to support gut microbiota balance and reduce inflammation (Bueno-Hernández et al., 2025).

Table 4.5

Milk and Milk Products

	DISEASE_CATEGORY (Categorize the Principal Diagnosis)			
	IBD	GASTROESOPHAGEAL	Total	X²
N	40 (33.6%)	79 (66.4%)	119 (100.0%)	
MILK & MILK PRODUCTS (Proteins)				
Yes	37 (92.5%)	78 (98.7%)	115 (96.6%)	0.075
No	3 (7.5%)	1 (1.3%)	4 (3.4%)	
FRESH MILK				
Always	32 (80.0%)	33 (41.8%)	65 (54.6%)	<0.001
Occasionally	2 (5.0%)	26 (32.9%)	28 (23.5%)	
Sometimes	2 (5.0%)	11 (13.9%)	13 (10.9%)	
Rarely	1 (2.5%)	7 (8.9%)	8 (6.7%)	
Never	3 (7.5%)	2 (2.5%)	5 (4.2%)	
YOGHURT				
Always	22 (55.0%)	15 (19.0%)	37 (31.1%)	<0.001
Occasionally	6 (15.0%)	18 (22.8%)	24 (20.2%)	
Sometimes	5 (12.5%)	25 (31.6%)	30 (25.2%)	
Rarely	4 (10.0%)	18 (22.8%)	22 (18.5%)	
Never	3 (7.5%)	3 (3.8%)	6 (5.0%)	
FERMENTED/SKIMMED MILK				
Always	30 (75.0%)	20 (25.3%)	50 (42.0%)	<0.001

Occasionally	1 (2.5%)	22 (27.8%)	23 (19.3%)	
Sometimes	6 (15.0%)	22 (27.8%)	28 (23.5%)	
Rarely	1 (2.5%)	12 (15.2%)	13 (10.9%)	
Never	2 (5.0%)	3 (3.8%)	5 (4.2%)	
CHEESE				
Always	6 (15.0%)	1 (1.3%)	7 (5.9%)	0.019
Occasionally	1 (2.5%)	7 (8.9%)	8 (6.7%)	
Sometimes	3 (7.5%)	7 (8.9%)	10 (8.4%)	
Rarely	3 (7.5%)	13 (16.5%)	16 (13.4%)	
Never	27 (67.5%)	51 (64.6%)	78 (65.5%)	
CREAM				
Always	6 (15.0%)	2 (2.5%)	8 (6.7%)	0.018
Occasionally	0 (0.0%)	8 (10.1%)	8 (6.7%)	
Sometimes	4 (10.0%)	9 (11.4%)	13 (10.9%)	
Rarely	4 (10.0%)	15 (19.0%)	19 (16.0%)	
Never	26 (65.0%)	45 (57.0%)	71 (59.7%)	
BUTTER				
Always	7 (17.5%)	5 (6.3%)	12 (10.1%)	0.323
Occasionally	4 (10.0%)	11 (13.9%)	15 (12.6%)	
Sometimes	10 (25.0%)	19 (24.1%)	29 (24.4%)	
Rarely	4 (10.0%)	14 (17.7%)	18 (15.1%)	
Never	15 (37.5%)	30 (38.0%)	45 (37.8%)	

Results

Table 4.5 indicates that among the 119 participants, nearly all (96.6%) consumed dairy products. IBD patients reported significantly higher intake of fresh, fermented, and skimmed milk, as well as yoghurt, compared to those with gastroesophageal disorders ($p < 0.001$). Smaller but significant differences were also noted for cheese and cream ($p < 0.05$). These findings suggest that IBD patients maintain a higher dairy intake, possibly reflecting dietary efforts to support nutrient needs during remission.

Discussions

IBD patients reported higher intake of fresh milk, yoghurt, and fermented milk compared to those with gastroesophageal disorders, likely reflecting dietary adaptations and perceived health benefits. Fermented dairy products, rich in probiotics and bioactive peptides, can help modulate gut microbiota, enhance mucosal immunity, and reduce intestinal inflammation, supporting IBD management (Hadjimbei et al., 2022). However, lactose intolerance and symptom flare-ups may still occur, requiring individualized dietary guidance (Kempinski et al., 2024).

In contrast, gastroesophageal disorder patients often reduce dairy intake, as milk and high-fat dairy products can increase gastric acid secretion and worsen reflux symptoms. Overall, these findings highlight the need for personalized nutrition strategies to balance symptom control and nutrient adequacy across gastrointestinal conditions (Mishra et al., 2022).

Table 4.6

Fruits and Vegetables

	DISEASE_CATEGORY (Categorize the Principal Diagnosis)			X²
	IBD	GASTROESOPHAGEAL	Total	
N	40 (33.6%)	79 (66.4%)	119 (100.0%)	
FRUITS & VEGETABLES (Minerals/Vitamins)				
Yes	40 (100.0%)	79 (100.0%)	119 (100.0%)	.
EDIBLE FRUITS				
Always	33 (82.5%)	26 (32.9%)	59 (49.6%)	<0.001
Occasionally	2 (5.0%)	25 (31.6%)	27 (22.7%)	
Sometimes	4 (10.0%)	15 (19.0%)	19 (16.0%)	
Rarely	1 (2.5%)	12 (15.2%)	13 (10.9%)	
Never	0 (0.0%)	1 (1.3%)	1 (0.8%)	
LEAFY GREEN VEGEZ				
Always	36 (90.0%)	35 (44.3%)	71 (59.7%)	<0.001

Occasionally	2 (5.0%)	31 (39.2%)	33 (27.7%)	
Sometimes	1 (2.5%)	7 (8.9%)	8 (6.7%)	
Rarely	1 (2.5%)	6 (7.6%)	7 (5.9%)	
DARK GREEN LEAFY VEGEZ				
Always	36 (90.0%)	35 (44.3%)	71 (59.7%)	<0.001
Occasionally	2 (5.0%)	30 (38.0%)	32 (26.9%)	
Sometimes	1 (2.5%)	7 (8.9%)	8 (6.7%)	
Rarely	1 (2.5%)	6 (7.6%)	7 (5.9%)	
Never	0 (0.0%)	1 (1.3%)	1 (0.8%)	

Results

Table 4.6 indicates that among the 119 participants, 33.6% had IBD and 66.4% had gastroesophageal disorders. IBD patients reported more frequent consumption of leafy greens and fruits (90.0% vs. 44.3% and 82.5% vs. 32.9%, respectively; $p < 0.001$), while gastroesophageal patients showed more variable intake.

Discussions

These findings suggest that IBD patients maintain more consistent fruit and vegetable consumption, particularly leafy greens, possibly reflecting dietary efforts to support gut health and manage inflammation (Khalili et al., 2020).

IBD patients tend to eat more fruits and leafy vegetables to boost fiber, antioxidants, and micronutrients that promote gut health and immune function (Yusuf et al., 2022). Such foods—especially dark leafy greens—offer anti-inflammatory and microbiota-modulating benefits that help maintain remission (Loy et al., 2024). Conversely, individuals with gastroesophageal disorders often limit these foods due to fiber and acidity, which can trigger reflux. These findings highlight the need for personalized dietary guidance balancing nutrition with symptom control.

Table 4.7*Fats and Oil*

	DISEASE_CATEGORY (Categorize the Principal Diagnosis)			X²
	IBD	GASTROESOPHAGEAL	Total	
N	40 (33.6%)	79 (66.4%)	119 (100.0%)	
FATS & OILS (Fats)				
Yes	40 (100.0%)	79 (100.0%)	119 (100.0%)	.
SEED OIL				
Always	4 (10.0%)	3 (3.8%)	7 (5.9%)	0.043
Occasionally	3 (7.5%)	8 (10.1%)	11 (9.2%)	
Sometimes	11 (27.5%)	14 (17.7%)	25 (21.0%)	
Rarely	3 (7.5%)	24 (30.4%)	27 (22.7%)	
Never	19 (47.5%)	30 (38.0%)	49 (41.2%)	
ANIMAL FAT				
Always	24 (60.0%)	7 (8.9%)	31 (26.1%)	<0.001
Occasionally	2 (5.0%)	11 (13.9%)	13 (10.9%)	
Sometimes	10 (25.0%)	23 (29.1%)	33 (27.7%)	
Rarely	2 (5.0%)	28 (35.4%)	30 (25.2%)	
Never	2 (5.0%)	10 (12.7%)	12 (10.1%)	
PLANT OIL/FAT				
Always	37 (92.5%)	24 (30.4%)	61 (51.3%)	<0.001
Occasionally	2 (5.0%)	21 (26.6%)	23 (19.3%)	
Sometimes	0 (0.0%)	15 (19.0%)	15 (12.6%)	
Rarely	1 (2.5%)	18 (22.8%)	19 (16.0%)	
Never	0 (0.0%)	1 (1.3%)	1 (0.8%)	

Results

Table 4.7 indicates that among the 119 participants, 33.6% had IBD and 66.4% had gastroesophageal disorders. All reported consuming fats and oils. IBD patients showed significantly higher “always” consumption of animal fats (60.0% vs. 8.9%) and plant oils (92.5% vs. 30.4%) compared to those with gastroesophageal diseases ($p < 0.001$). Although overall

seed oil use was low, IBD patients reported slightly higher “always” consumption (10.0% vs. 3.8%; $p = 0.043$). These findings indicate that IBD patients consume fats and oils more frequently—particularly plant-based oils—than individuals with gastroesophageal disorders.

Discussion

IBD patients showed higher consumption of both animal fats and plant oils than those with gastroesophageal disorders, likely to meet increased energy demands and support nutrient absorption (Gibson et al., 2024). While plant-based oils provide anti-inflammatory benefits, excessive animal fat intake may heighten intestinal inflammation and relapse risk (Ye et al., 2021). These findings highlight the need for tailored dietary guidance to balance fat intake, promote gut health, and manage symptoms effectively.

Table 4.8

Beverages in IBD Patients

DISEASE_CATEGORY (Categorize the Principal Diagnosis)				
	IBD	GASTROESOPHAGEAL	Total	X²
N	40 (33.6%)	79 (66.4%)	119 (100.0%)	
TEA/COFFEE/COCOA/SOYA				
Always	37 (92.5%)	33 (41.8%)	70 (58.8%)	<0.001
Occasionally	2 (5.0%)	22 (27.8%)	24 (20.2%)	
Sometimes	0 (0.0%)	11 (13.9%)	11 (9.2%)	
Rarely	1 (2.5%)	11 (13.9%)	12 (10.1%)	
Never	0 (0.0%)	2 (2.5%)	2 (1.7%)	
JUICES/SODAS/ENERGY DRINKS				
Always	28 (70.0%)	14 (17.7%)	42 (35.3%)	<0.001
Occasionally	1 (2.5%)	9 (11.4%)	10 (8.4%)	
Sometimes	4 (10.0%)	28 (35.4%)	32 (26.9%)	
Rarely	6 (15.0%)	26 (32.9%)	32 (26.9%)	
Never	1 (2.5%)	2 (2.5%)	3 (2.5%)	

Results

Table 4.8 indicates that of the 119 participants, 33.6% had IBD while 66.4% had gastroesophageal disorders. IBD patients reported significantly higher “always” consumption of tea, coffee, cocoa, or soya beverages (92.5% vs. 41.8%) compared to those with gastroesophageal disorders ($p < 0.001$). Similarly, a higher proportion of IBD patients reported “always” consuming juices, sodas, and energy drinks (70.0% vs. 17.7%) compared to gastroesophageal disorder patients ($p < 0.001$). These findings indicate that IBD patients have a notably higher frequency of consuming both hot beverages and sweetened drinks compared to patients with gastroesophageal disorders.

Discussion

Compared to patients with gastroesophageal illness, those with IBD reported higher and more frequent use of tea, coffee, chocolate, soy beverages, and sweetened drinks. This is probably due to changes in dietary habits and the desire to treat symptoms. Although these drinks may provide antioxidants and hydration, consuming too much of them can exacerbate IBD symptoms, and they are frequently avoided in gastroesophageal illnesses to avoid reflux symptoms.(Ahsan et al., 2022). These findings highlight the need for individualized dietary guidance to balance benefits and potential symptom triggers in both conditions.

Table 4.9

Sugars and IBD

	DISEASE_CATEGORY (Categorize the Principal Diagnosis)			X ²
	IBD	GASTROESOPHAGEAL	Total	
N	40 (33.6%)	79 (66.4%)	119 (100.0%)	
NATURAL SUGARS				
Always	34 (85.0%)	29 (36.7%)	63 (52.9%)	<0.001
Occasionally	3 (7.5%)	27 (34.2%)	30 (25.2%)	
Sometimes	2 (5.0%)	12 (15.2%)	14 (11.8%)	
Rarely	1 (2.5%)	9 (11.4%)	10 (8.4%)	

Never	0 (0.0%)	2 (2.5%)	2 (1.7%)	
REFINED/ARTIFICIAL SUGARS				
Always	9 (22.5%)	9 (11.4%)	18 (15.1%)	0.002
Occasionally	2 (5.0%)	12 (15.2%)	14 (11.8%)	
Sometimes	8 (20.0%)	24 (30.4%)	32 (26.9%)	
Rarely	6 (15.0%)	25 (31.6%)	31 (26.1%)	
Never	15 (37.5%)	9 (11.4%)	24 (20.2%)	

Results

Table 4.9 indicates that of the 119 participants, 33.6% had IBD while 66.4% had gastroesophageal disorders. IBD patients reported a significantly higher “always” consumption of natural sugars (85.0% vs. 36.7%) compared to gastroesophageal disorder patients ($p < 0.001$). In contrast, “always” consumption of refined/artificial sugars was low in both groups but remained significantly higher among IBD patients (22.5% vs. 11.4%; $p = 0.002$). These findings indicate that IBD patients have a higher frequency of consuming natural sugars, and a moderately higher intake of refined/artificial sugars compared to those with gastroesophageal disorders.

Discussion

IBD patients consumed more natural and refined sugars than those with gastroesophageal disorders, likely to sustain energy during disease management. While natural sugars from fruits and vegetables support nutrition, excess refined sugars may worsen intestinal inflammation and trigger flares (Levine et al., 2020). Conversely, gastroesophageal disorder patients often limit refined sugars to manage reflux, underscoring the need for personalized dietary guidance (Newberry & Lynch, 2019).

4.3 To identify the potential dietary triggers and factors that may have a protective or mitigating effect on IBD.

Table 4.10

Lifestyle and Environmental Risk Factors

	DISEASE_ CATEGORY 2(Categorize the Principal Diagnosis)			
	IBD	GASTRO	Total	X²
N	40 (33.6%)	79 (66.4%)	119 (100.0%)	
Treatment of Water For Drinking				
Yes	36 (90.0%)	67 (84.8%)	103 (86.6%)	0.433
No	4 (10.0%)	12 (15.2%)	16 (13.4%)	
Stress (as a contributing Factor to principal Diagnosis)				
Yes	24 (60.0%)	38 (48.1%)	62 (52.1%)	0.220
No	16 (40.0%)	41 (51.9%)	57 (47.9%)	
Smoking				
Yes	7 (17.5%)	10 (12.7%)	17 (14.3%)	0.476
No	33 (82.5%)	69 (87.3%)	102 (85.7%)	
Alcohol Intake				
Yes	8 (20.0%)	16 (20.3%)	24 (20.2%)	0.974
No	32 (80.0%)	63 (79.7%)	95 (79.8%)	
Patient's Physical Activity Status-Exercise				
Yes	12 (30.0%)	20 (25.3%)	32 (26.9%)	0.586
No	28 (70.0%)	59 (74.7%)	87 (73.1%)	
Patient's Activity Factor-AF				
Slightly Sedentary	29 (72.5%)	59 (74.7%)	88 (73.9%)	0.736
Slightly Active	11 (27.5%)	18 (22.8%)	29 (24.4%)	
Moderately Active	0 (0.0%)	1 (1.3%)	1 (0.8%)	
Very Active	0 (0.0%)	1 (1.3%)	1 (0.8%)	
Source of Water for Daily Usage				
Tapped, Tanker Truck,Borehole,Rain,Bottled,Vendor-provided water	28 (70.0%)	38 (48.1%)	66 (55.5%)	0.009

Vendor-provided, Tanker Truck, Bottled, Rain water	4 (10.0%)	12 (15.2%)	16 (13.4%)
Tapped, Borehole, Rainwater	2 (5.0%)	23 (29.1%)	25 (21.0%)
Borehole, Rainwater, River/Stream	6 (15.0%)	6 (7.6%)	12 (10.1%)

Results

Table 4.10 indicates that of the 119 participants, most (86.6%) treated their drinking water, with slightly higher rates among IBD patients (90.0%) than gastroesophageal controls (84.8%) ($p = 0.433$). Lifestyle factors such as stress, smoking, alcohol use, and physical inactivity were common in both groups, though none showed significant associations with diagnosis. Notably, IBD patients were more likely to use mixed water sources—including tapped, borehole, tanker, and bottled water—than controls (70.0% vs. 48.1%, $p = 0.009$), suggesting that environmental exposures through diverse water sources may play a role in disease risk.

Discussion

Although most participants treated their drinking water, IBD patients used a wider range of sources—tap, borehole, rain, bottled, and vendor-supplied—suggesting greater exposure to microbes and chemicals that may promote gut dysbiosis and inflammation (Santana et al., 2022).

Lifestyle factors such as alcohol intake, stress, smoking, and physical inactivity showed no significant associations with IBD. While excessive alcohol may increase intestinal permeability, moderate use appears to have limited effects (Piovezani Ramos & Kane, 2021). Chronic stress can worsen IBD through immune dysregulation and microbiota imbalance (Ge et al., 2022), but its impact likely interacts with genetic and environmental factors (Chhibba et al., 2025). The generally sedentary lifestyle observed may also mask physical activity's potential benefits (Chen et al., 2024).

Overall, the findings highlight water source diversity as a possible environmental determinant

in IBD onset and progression within this population.

4.4 To evaluate the effects of medication on IBD patients quality of life

Table 4.11

Medications on dietary choices on IBD patients

	DISEASE_CATEGORY			X²
	IBD	GASTRO	Total	
N	40 (33.6%)	79 (66.4%)	119 (100.0%)	
MEDICATIONS				
CORE_IBD_THERAPY (M1_Anti-Inflammatory, Immunomodulatory & pain Manage				
yes	37 (100.0%)	55 (75.3%)	92 (83.6%)	<0.001
no	0 (0.0%)	18 (24.7%)	18 (16.4%)	
ADJUNCT_COMOBIDITY_CARE (M3_Anti-Infectives, Miscellaneous systemic meds				
yes	25 (67.6%)	48 (65.8%)	73 (66.4%)	0.849
no	12 (32.4%)	25 (34.2%)	37 (33.6%)	
THERAPEUTIC_CONDITION_SPECIFIC_U (Supplements taken to treat/manage sp				
yes	25 (62.5%)	31 (39.2%)	56 (47.1%)	0.016
no	15 (37.5%)	48 (60.8%)	63 (52.9%)	
SUPPLEMENTS				
PREVENTIVE_MAINTAINANCE_USE (Supplements taken to prevent deficiencies				
yes	16 (40.0%)	12 (15.2%)	28 (23.5%)	0.003
no	24 (60.0%)	67 (84.8%)	91 (76.5%)	
PREVENTIVE_MAINTAINANCE_USE (Supplements taken to prevent deficiencies				
yes	16 (40.0%)	12 (15.2%)	28 (23.5%)	0.003
no	24 (60.0%)	67 (84.8%)	91 (76.5%)	
SUPPORTIVE_FLUIDS_IV_THERAPY (Intravenous fluids and related agents us				

yes	16 (40.0%)	32 (40.5%)	48 (40.3%)	0.958
no	24 (60.0%)	47 (59.5%)	71 (59.7%)	
Nutritional Deficiencies: Low Vitamin D, Albumin, TP, HGB, RBC, Folate, B12				
Yes	24 (60.0%)	47 (59.5%)	71 (59.7%)	0.958
No	16 (40.0%)	32 (40.5%)	48 (40.3%)	
Patient's Nutritional Status				
Malnourished	18 (45.0%)	29 (36.7%)	47 (39.5%)	0.382
Not Malnourished	22 (55.0%)	50 (63.3%)	72 (60.5%)	
Patient having Diarrhea				
Yes	30 (75.0%)	40 (50.6%)	70 (58.8%)	0.011
No	10 (25.0%)	39 (49.4%)	49 (41.2%)	
Patient Vomiting				
Yes	19 (47.5%)	46 (58.2%)	65 (54.6%)	0.267
No	21 (52.5%)	33 (41.8%)	54 (45.4%)	

Results

Table 4.11 indicates all IBD patients reported using core medications—immunomodulators, analgesics, and anti-inflammatory drugs—compared to 75.3% of GD patients ($p < 0.001$).

Both groups had similar use of adjunct therapies for comorbidities ($p = 0.849$). Supplement use was higher among IBD patients, with 62.5% taking condition-specific nutrients and 40.0% using preventive vitamins or minerals, compared to 39.2% and 15.2% in GD, respectively. Intravenous therapy use and rates of nutritional deficiencies were comparable across groups. Malnutrition affected 45.0% of IBD and 36.7% of GD patients ($p = 0.382$). Diarrhea was significantly more common in IBD (75.0%) than GD (50.6%) ($p = 0.011$), while vomiting rates were similar.

Discussion

Medication remains central to IBD management, helping control inflammation but often affecting diet through side effects like nausea and reduced tolerance to certain foods (Lamb et

al., 2019; Shafiee et al., 2021). The frequent use of supplements reflects common deficiencies in vitamin D, iron, folate, and B12 caused by inflammation and malabsorption (Balestrieri et al., 2020; Kim et al., 2019). Recurrent diarrhea and medication effects also drive food avoidance—especially high-fiber foods and dairy—reducing dietary diversity (Godala et al., 2022). Intravenous fluids mainly address dehydration and infection, with limited direct dietary impact (Baldwin et al., 2016). Persistent malnutrition in IBD often results from disease activity and restrictive eating, underscoring the need for integrated medical and nutritional care to improve outcomes.

4.5 To determine the influence of diet on disease severity in IBD patients

Table 4.12

Diet Modification and Nutritional intervention

	DISEASE_CATEGORY (Categorize the Principal Diagnosis)			X²
	IBD	GD	Total	
N	40 (33.6%)	79 (66.4%)	119 (100.0%)	
Feeding Type: Therapeutic modified diets				
Non-Restrictive Diet	21 (52.5%)	52 (65.8%)	73 (61.3%)	0.159
Restrictive Diets	19 (47.5%)	27 (34.2%)	46 (38.7%)	
Feeding Methods (hospital & at Home)				
Oral	35 (87.5%)	74 (93.7%)	109 (91.6%)	0.187
Enteral/Tube Feeding	0 (0.0%)	2 (2.5%)	2 (1.7%)	
Intravenous Feeding	0 (0.0%)	1 (1.3%)	1 (0.8%)	
Oral + Intravenous Feeding	2 (5.0%)	1 (1.3%)	3 (2.5%)	
Enteral/Tube + Intravenous Feeding	3 (7.5%)	1 (1.3%)	4 (3.4%)	
Foods Patient Prefers/Likes (eats at any given time/repeatedly)				
Yes	1 (2.5%)	1 (1.3%)	2 (1.7%)	0.621
No	39 (97.5%)	78 (98.7%)	117 (98.3%)	

Foods Patient Dislikes				
Yes	6 (15.0%)	5 (6.3%)	11 (9.2%)	0.123
No	34 (85.0%)	74 (93.7%)	108 (90.8%)	
categorization/Ranges of the total amounts of Kcals consumed per day by the patient				
<1100	1 (2.5%)	3 (3.8%)	4 (3.4%)	0.326
1200-1600	14 (35.0%)	26 (32.9%)	40 (33.6%)	
1700-2100	22 (55.0%)	49 (62.0%)	71 (59.7%)	
>2200	3 (7.5%)	1 (1.3%)	4 (3.4%)	

Results

Table 4.12 indicates nearly half of IBD patients (47.5%) followed restrictive diets—such as low-residue, lactose-free, or low-FODMAP plans—indicating that dietary modification is a common approach to symptom control. In contrast, most gastroesophageal disorder (GD) patients (65.8%) reported no restrictions, though one-third (34.2%) followed modified diets. Oral feeding was predominant in both groups, with a few IBD patients requiring enteral support due to disease severity. Food aversions, particularly to high-fiber foods, dairy, and certain vegetables, were more common in IBD (15.0%) than GD (6.3%). Most participants consumed moderate calories (1,700–2,100 kcal/day), but lower intakes in some suggested nutritional vulnerability, especially among IBD patients. These findings highlight the importance of dietary management and regular nutritional monitoring in IBD care

Discussions

Nearly half of IBD patients followed restrictive diets, such as low-residue, lactose-free, or low-FODMAP plans, to manage symptoms like bloating and diarrhea (Guida et al., 2021; P. Gibson et al., 2024). These modifications often involve avoiding high-fiber foods, dairy, and fermentable carbohydrates. Despite these restrictions, most patients maintained oral feeding, supporting gut integrity, though some required enteral or parenteral nutrition during severe

flare-ups (Barberio et al., 2025).

Food aversions in IBD patients often help manage symptoms but increase the risk of micronutrient deficiencies (Simons & Issokson, 2025). Dietitian support is vital to maintain balance, as moderate calorie intake (1,700–2,100 kcal/day) may still mask deficits in iron, vitamin D, calcium, and B vitamins, underscoring the need for regular monitoring.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter provides very detailed information on the exact summary, conclusion and recommendations based on the study.

5.1 Summary

This study examined the medical, nutritional, behavioral, and environmental factors associated with Inflammatory Bowel Disease (IBD) among patients presenting with gastrointestinal symptoms. Compared to those with other Gastroesophageal Disorders (GD), IBD patients demonstrated distinct clinical and socioeconomic characteristics, including higher rates of outpatient management and a predominance of ulcerative colitis diagnoses. While both groups practiced water purification, IBD patients reported using a wider variety of water sources, suggesting potential environmental influences on disease development.

Lifestyle factors such as stress, smoking, alcohol consumption, and physical activity were similar across groups, underscoring the complex interplay between environmental and genetic triggers in IBD. The consistent use of basic medications and disease-specific supplements among IBD patients highlights the central role of pharmacological and nutritional interventions in managing deficiencies and controlling symptoms.

Notably, IBD patients more frequently reported diarrhea and restrictive eating behaviors, which may affect nutrient intake and dietary diversity. Although most maintained moderate caloric intake, many adhered to therapeutic diets aimed at alleviating gastrointestinal discomfort. The higher prevalence of food aversions further reflects self-directed dietary adjustments to manage symptoms. Collectively, these findings emphasize the multifaceted interaction between diet, medication, lifestyle, and environmental factors in shaping IBD management and progression within the studied population.

5.2 Conclusion

5.2.1 To understand how particular foods, including fiber, fats, and processed products, influence gut inflammation and the balance of gut bacteria in individuals living with IBD.

Compared to patients with gastroesophageal problems, those with IBD consistently reported consuming more natural sweets, fruits, vegetables, dairy products, fats and oils, and different beverages regularly. While patients with gastroesophageal illnesses seemed to adjust their intake to avoid reflux and associated discomfort, these dietary patterns most likely reflect attempts to meet nutritional demands and manage symptoms in IBD. Overall, the results highlight the necessity of condition-specific, customized dietary counselling to help patients with IBD and gastroesophageal illnesses balance symptom management with nutritional sufficiency.

5.2.2 To identify the potential dietary triggers and factors that may have a protective or mitigating effect on IBD.

In all groups, water treatment procedures were often recorded; however, IBD patients used a wider variety of water sources, suggesting exposure diversity that could affect the course of the disease. Stress, smoking, alcohol use, and physical activity levels were among the lifestyle characteristics that exhibited the least amount of variation between groups; most participants led sedentary lives. IBD patients' varied water sources suggest that environmental variables may be influencing the disease's course, but lifestyle factors did not seem to be as important in this group.

5.2.3 To examine the side effects of medication on IBD patients' quality of life.

Compared to GD patients, a greater percentage of IBD patients used condition-specific and preventative maintenance supplements, and all were on core pharmacotherapy, which included immunomodulatory and anti-inflammatory medications. Due to the increased frequency of gastrointestinal symptoms like diarrhea in IBD patients and the usage of these

medications, many people adopted restrictive diets to control their symptoms. This pattern implies that dietary changes intended to control symptoms and ensure nutritional sufficiency are closely associated with the medication used to manage IBD.

5.2.4 To evaluate the role of nutritional interventions and dietary modifications in the management of IBD.

To control symptoms including bloating and diarrhea, a sizable fraction of IBD patients followed restricted therapeutic diets, such as low-residue or lactose-free diets. Although food aversions were more frequently reported, which may influence dietary diversity and micronutrient intake, the majority of IBD patients maintained moderate calorie intake ranges despite these constraints. Most feeding techniques were oral, however during severe episodes, some IBD patients needed combined enteral or intravenous feeding, highlighting the need of dietary management in treating disease severity while balancing nutritional needs.

5.3 Recommendations

Because IBD patients often use multiple water sources, public health officers should monitor water quality and promote safe water practices. Collaboration with healthcare providers can help educate patients on reducing environmental risks that may influence disease progression.

Clinicians and nutritionists should include dietary counselling in IBD management to address medication-related gastrointestinal effects and ensure dietary changes support treatment while preventing nutrient deficiencies.

Hospital nutritionists and dietitians should design individualized dietary plans based on each IBD patient's symptoms and nutritional needs. Because many patients follow restrictive diets to manage bloating and diarrhea, professional guidance is essential. During severe episodes, timely enteral or intravenous nutrition support should be provided to prevent malnutrition and support recovery, ensuring nutrition remains central to effective IBD management.

5.4 Recommendation for Further Research

To find possible environmental triggers impacting the start and progression of the disease, future research should examine the microbiological and chemical makeup of the various water sources that IBD patients utilize.

The long-term effect of lifestyle factors such stress, smoking, alcohol consumption, and physical exercise on the severity and cause of IBD should be evaluated through longitudinal study.

To improve patient-centered nutritional counselling, more research should examine the cultural, economic, and psychosocial aspects that both encourage and hinder dietary adherence in IBD patients.

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APPENDICES

I. INFORMED CONSENT FORM

Title of the study

“Dietary and Nutritional Risk Factors in Inflammatory Bowel Disease Patients. A Case Study at Kenyatta National Hospital, Nairobi, Kenya.”

Principal Investigator

Rebecca Kivuli Onono a student at Kenya Methodist University- Nairobi Campus, pursuing a Master of Science in Human Nutrition.

Co-Investigators

Dr. Job Mapesa Senior Lecturer Department of Public Health & Nutrition and Dr. Lawrence Thiauru Mugambi Lecturer Department of Public Health & Nutrition at Kenya Methodist University

Introduction:

This form provides information about a study by the researchers listed above to help you decide whether to participate. You are encouraged to ask questions about the study’s purpose, procedures, risks, benefits, and your rights as a participant. Once all your questions are answered, you may choose to take part. This process is called *informed consent*, and you will receive a copy of this form for your records.

May I continue? (YES / NO)

This study has a KNH-UoN ERC approval

Purpose

This study seeks to assess dietary and nutritional risk factors linked to Inflammatory Bowel Disease (IBD), including Ulcerative Colitis and Crohn’s Disease. Participants will provide information on their socioeconomic background, dietary habits, and may undergo simple physical assessments. With consent, relevant medical and nutritional records may be reviewed. About 122 participants will take part, and your consent is requested to participate.

Procedure

If you agree to participate, you will take part in a 30-minute private interview conducted by a trained researcher. The discussion will focus on your dietary and lifestyle habits, medical and

family history, and household socioeconomic details. After the interview, you may be asked to undergo basic health assessments, such as anthropometric measurements or laboratory tests, if necessary. We will also request your telephone contact for follow-up purposes related to your diet, medication, or lifestyle. Your information will remain strictly confidential and used only for this study.

Are There Any Risks, Discomforts Associated With This Study?

The main risk of this study is potential loss of privacy. However, all information will remain confidential and used only for research and treatment purposes. Your identity will not be disclosed; instead, you will be assigned a random code stored in a secure, password-protected database, and paper records will be locked safely. Although full confidentiality cannot be absolutely guaranteed, every effort will be made to protect your privacy.

Some interview questions may cause discomfort or embarrassment, but you are free to skip any that you prefer not to answer. All interviews will be conducted privately by trained professionals. Recalling past meals or medications may feel tiring, but assistance will be provided.

If you experience any illness or complications related to this study, please contact the study team immediately using the number provided at the end of this form.

Are There Any Benefits Being In This Study?

You may benefit from this study by receiving free nutritional counseling and, if necessary, referral to a medical specialist for further care and support. Additionally, the information you provide will contribute to a better understanding of medical nutrition therapy for gastrointestinal conditions, supporting both scientific and academic advancement.

Will Being In This Study Cost You Anything?

No. This study does not require any payments to be enrolled nor will you be penalized or lose benefits and medical care if you do not enroll. You will neither be paid nor will you receive any monetary value for your participation

Will You Get Refund For Any Money Spent as Part Of This Study?

There will be no refunds to be made, since there will be no payments made to be enrolled in the study. There will be no extra costs to be incurred

In case of questions in the future

If you have any questions or concerns about your participation, please call or text the study team using the contact number provided below. For information about your rights as a research participant, you may contact the Secretary, Kenyatta National Hospital–University of Nairobi Ethics and Research Committee, at Telephone No. 2726300 Ext. 44102. Any study-related communication costs will be reimbursed by the research team.

What are Your Other Choices?

Your decision to participate in this research is voluntary, and you will not be penalized or lose benefits if you refuse to participate or withdraw and decide to stop from participation at any time which will not jeopardize your medical care nor will you experience any injustice .

Participant’s statement

I have read and understood this consent form and discussed it with the researcher. I know the study’s purpose, risks, and benefits, and my questions have been answered clearly. I understand that participation is voluntary and I may withdraw at any time. My information will remain confidential. By signing below, I freely consent to participate without waiving any of my legal rights.

I agree to participate in this research study:	Yes	No
I agree to have a few drops of my blood preserved for later study:	Yes	No
I agree to provide contact information for follow-up:	Yes	No

.....		
Signature/Thumbprint	Name of the Participant	Date

Researcher’s statement

I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has freely given his/her consent.

.....		
Signature/Thumbprint	Principal investigator	Date

For more information contact

Phone no: **Email:**

Time: **To**

Witness Printed Name (*If witness is necessary, a witness is a person mutually acceptable to both the researcher and participant*)

.....

Signature/Thumbprint

Witness

Date

.....

Phone Number

Email address

Thanks for your participation in my study.

II. QUESTIONNAIRE

a) RESPONDENT

Letter of introduction, Household Identification and Consent

Scripted Introduction:

Hi, my name is Rebecca Kivuli Onono, the principal investigator from Kenya Methodist University, Nairobi Campus. I am conducting a study on “*Dietary and Nutritional Risk Factors in Inflammatory Bowel Disease Patients at Kenyatta National Hospital.*” The study involves a 30-minute interview to gather your views. Participation is voluntary, and your decision will not affect any services you receive. No payment or gifts will be provided, and all information shared will remain strictly confidential.

Would you like to participate in the study? [If yes, the interviewee is to sign the consent forms. If not, the interviewer to thank the interviewee for their time]

Record time the interview is started in 24hr. format	Hrs.:	Min:
	You have been selected to take part in this study, which aims to improve your health and that of your household. We will ask brief questions about your diet and background and take simple body measurements to assess your nutritional status. Your information will remain confidential, and no personal identifiers will be recorded. Participation is voluntary, and you may withdraw at any time without affecting your medical care. Do you have any questions before we	

Consent	proceed?		
	Do you agree to participate in the survey? Enumerator: Is the respondent a patient above 18 years of age, AND does the respondent agree to participate in the survey?	1= yes 2= No	If 2; thank them for their time And END, the session.

Participant's signature

IDENTIFICATION	CODES
QUESTIONNAIRE IDENTIFICATION	
County of Research: Nairobi Supervision Area: Kenyatta National Hospital	
Respondents Name: Researcher's Name: Date of Interview: ____ / ____ / ____ Day/ Month/ Year	

Time began:

SECTION A

• Particulars of the Respondent

Identify the target Participant/Respondent, verify the age using the identification number and assign a code. **P.01.02..., 56... (Patient number 01, 02..., 56...)**

1) What is your gender?

- ☐ Female
- ☐ Male

2) What is your age bracket?

- ☐ 18-29 years
- ☐ 30-39 years
- ☐ 40-49 years
- ☐ 50-59 years

☐ Above 60 years
Specify.....

- ☐ College
- ☐ University

3) Do you have an identification card?

- ☐ Yes
- ☐ No

6) What is your Employment status?
(indicate place of work)

- ☐ Unemployed
- ☐ Employed

Specify.....
.....
.....
.....

4) What is your marital-status?

- ☐ Single
- ☐ Married
- ☐ Separated/Divorced
- ☐ Unknown

7) What is your household income before taxes during the past year (Kshs.)? Indicate the actual amount if comfortable.

5) What is your level of Education?
(indicate any certifications and point/class)

- ☐ Primary
- ☐ Secondary
- ☐ Tertiary

- ☐ <5,000
- ☐ 5,000-10,000
- ☐ 1000-15,000
- ☐ 15,000- 20,000
- ☐ >20,000

WATER SANITATION AND HYGIENE

Always note that the rainwater catchment tank needs be completely enclosed, have a tap to withdraw water, and at least be able to hold a water capacity of 3,000 liters.

8) What is the main source of water for consumption & daily usage?

- ☐ Household connection/taped water
- ☐ Unprotected Dug well
- ☐ Borehole
- ☐ Pond, river or stream
- ☐ Protected dug well
- ☐ Unimproved rainwater collection
- ☐ Improved rainwater collection
- ☐ Vendor-provided water
- ☐ Bottled water

- ☐ Tanker truck water

Others (specify).....

a) Do you use the main water source all year or only part of the year?

- ☐ Always
- ☐ Sometimes
- ☐ Rarely

9) What is the main source of water for consumption and usage during different times of the year?

(drought/rainy seasons)

- ☐ Household connection/taped water
- ☐ Unprotected Dug well
- ☐ Borehole
- ☐ Pond, river or stream
- ☐ Protected dug well
- ☐ Unimproved rainwater collection
- ☐ Improved rainwater collection
- ☐ Vendor-provided water
- ☐ Bottled water
- ☐ Tanker truck water

Others (specify).....

10) Do you treat your water in any way to make it Safer for drinking?

- ☐ Yes
- ☐ No
- ☐ Don't know

a) What do you usually do to the water to make it safe for consumption?

- ☐ Boil
- ☐ Add bleach / chlorine
- ☐ Strain it through a cloth
- ☐ Use water filter (ceramic, sand, composite, etc.)
- ☐ Solar disinfection
- ☐ Let it stand and settle
- ☐ Don't know

Others (specify).....

11) Please state all the occasions in which you should wash your hands. (Let the respondent mention without reading.)

- ☐ Before meals

- ☐ After meals
- ☐ Before praying
- ☐ Before breastfeeding or feeding a child
- ☐ Before and after preparing meals
- ☐ After visiting the toilet/latrine
- ☐ After cleaning a child that has
- ☐ Changing a child's nappy
- ☐ When my hands are dirty
- ☐ After cleaning the house
- ☐ Does not know

- ☐ Other

(Specify).....

12) Do you use soap and water to clean your hands, utensils, yourself and the house?

- ☐ Yes
- ☐ No
- ☐ Don't know

13) What is the main type of toilet facility used by members of your household?

- ☐ Flush to piped sewer system
- ☐ Flush to septic tank
- ☐ Flush to pit (latrine)
- ☐ Pit latrine
- ☐ Ventilated improved pit latrine
- ☐ Pit latrine with slab
- ☐ Composting toilet
- ☐ Bucket

- No facility, bush, field

Other (specify).....

LIFESTYLE HABITS

PHYSICAL ACTIVITY

14) Do you exercise?

- Yes
- No
- Don't know (*if no skip to question 15*)

15) What type of exercise do you practice?

- Aerobic
- Yoga
- Swimming

Others
(specify).....

a) Where do you exercise?

- Home
- Gym

b) What is the duration of your exercise per day?

- <3hours/day
- >3hours/day
- Don't know

c) What is your Activity Factor in exercise?

- **Slightly Sedentary** (little/No Exercise)
- **Slightly Active** (light: 1-3days/week)
- **Moderately Active** (Moderate: 3-5days/week)
- **Very Active** (Hard: 6-7days/week)

SMOKING

16) Do you smoke?

- Yes
- No (*if no skip to question 17*)

a) How many times a day do you smoke?

- <3 times/day
- >3 times/day

Others (specify).....

b) How many tabs of cigarette do you smoke a day?

- <3 sticks/day
- >3 sticks/day

Others (specify).....

c) Do you stay/leave with someone who smokes?

- Yes
- No

SECTION B

MEDICATIONS/SUPPLEMENTS

17) Are you on any supplements?

- ☐ Yes
- ☐ No (*if no skip to question 18*)

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

If yes, please indicate which ones

- ☐ Omega-3
- ☐ Omega-6
- ☐ Folic acid
- ☐ Iron
- ☐ Phosphorus
- ☐ Sodium
- ☐ Calcium
- ☐ Vitamin D
- ☐ Vitamin C
- ☐ Vitamin E
- ☐ Vitamin K
- ☐ Vitamin B12

Others,
specify.....
.....

18) Are you currently on medications?

- ☐ Yes
- ☐ No (*if No skip to question 19*)

If yes, please indicate which ones

- ☐ Corticosteroids
- ☐ Cholestyramine
- ☐ Sulfasalazine
- ☐ Methotrexate

Others,specify.....
.....
.....
.....
.....
.....
.....

BIOCHEMICAL DATA/MEDICAL TESTS/PROCEDURES

19) What are some of the procedures you have undergone?

- ☐ X-ray
- ☐ Endoscopy
- ☐ Ultra sound
- ☐ Gastronomy
- ☐ jejunostomy

Others,
specify.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

20) What are the biochemical/lab tests/procedures done?

- ☐ UECS
- ☐ LFTS
- ☐ Bone chemistry
- ☐ Stool test

Others,
specify.....
.....
.....
.....
.....
.....
.....
.....
.....

[illegible]

21) What was your Medical Diagnosis

- Inflammatory Bowel Disease
- Gastritis
- Celiac Sprue
- Irritable Bowel Syndrome
- Gastroenteritis

.....

- Crohn's disease
- Ulcerative colitis

.....

.....

.....

ANTHROPOMETRIC ASSESSMENT

BMI:

22) Nutritional Status

- ### a) Degree of Malnutrition

- Severe Acute Malnutrition- SAM
- Moderate Acute Malnutrition – MAM
- Underweight
- Normal
- Overweight
- Obese

NUTRITIONAL FOCUSED CLINICAL / PHYSICAL FINDINGS

23) Presence of bilateral pitting Edema

- ☐ Yes
- ☐ No

24) Indicate if there is presence of the following;

- ☐ Pallor
- ☐ Jaundice
- ☐ Dehydration
- ☐ Ascites
- ☐ Oral sores

Others, specify

25) Any episodes of diarrhea?

- ☐ Yes
- ☐ No (*if no skip to question 26*)

a) How many episodes of diarrhea in the last 24hrs?

- ☐ <5 episodes
- ☐ >5 episodes
- ☐ I don't know

b) What is the consistency of the diarrhea?

- ☐ Loose
- ☐ Mucus
- ☐ Watery
- ☐ bloody

Others, specify.....

.....

c) How long has the diarrhea lasted?

- ☐ <5 days
- ☐ >5days
- ☐ Don't know

d) Is the diarrhea as a result of any of the following?

- ☐ Food poisoning/contamination
- ☐ Food allergic Reaction
- ☐ Medication

Others

(specify).....

.....

....

26) Any allergies?

- ☐ Food
- ☐ Medication

Specify.....

.....

27) Any prior or current infections?

- ☐ Yes
- ☐ No
- ☐ Don't know

If yes, Specify.....

.....

28) Has there been an incident of psychological breakdown/disturbance?

- ☐ Stress
- ☐ Depression
- ☐ Don't know

SECTION D

DIETARY ASSESSMENTS

29) Do you have any food allergies

- ☐ Yes
- ☐ No
- ☐ Don't know

Specify if any.....

.....

.....

30) Do you have any difficulty in swallowing/chewing?

- ☐ Yes
- ☐ No
- ☐ Don't know

Specify.....

.....

.....

31) Do you have any food likes/dislikes or preferences?

- ☐ Yes
- ☐ No
- ☐ Don't know

(If No skip to question 32)

If Yes;

- specify

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- give reasons why

.....

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- state the replacements for the specific foods (disliked/preferred)

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.....

32) What are the feeding methods are you on?

- ☐ Oral
- ☐ Enteral feeding
- ☐ Parenteral feeding

Others (specify).....

.....

.....

.....

(If Oral type of feeding skip to question 33)

a) If enteral type of feeding, specify the type.

Mechanically inserted

- ☐ Nasogastric tube
- ☐ Orogastric tube
- ☐ Nasojejunal
- ☐ Nasoduodenal

Surgically inserted

- ☐ Gastrostomy
- ☐ Jejunostomy
- ☐ Esophagostomy

b) If parenteral type of feeding, specify the type

- ☐ Peripheral Parenteral Nutrition
- ☐ Total Parenteral Nutrition

33) Are there any complications due to the type of feeds?

- ☐ Yes
- ☐ No (*if no, skip to question 34*)
- ☐ Don't know

If yes, specify;

.....

.....

.....

.....

.....

34) Have you undergone any medical procedures?

- ☐ Yes

24-HR DIETARY RECALL QUESTIONNAIRE

DAY ONE INTAKE QUESTIONNAIRE

Quick list of items	Column 1		Column 2		Column 3	Column 4	Code use only	
	A. Time	B. Occasion	A. Food/Drink & Additions	B. Description of food/Drink & ingredients	Amount of food consumed	Where the food was obtained	Food Code	Amount
STARCH								
Fiber								
Cereals								

- ☐ No
- ☐ Don't know

(If No, skip to the next section)

35) Has the procedure affected your feeding?

- ☐ Yes
- ☐ No
- ☐ Don't know

Tubers								
Roots								
ANIMAL PROTEIN								
Beef								
Mutton								
Pork								
Poultry								
Eggs								
Fish								
PLANT PROTEIN								
Legumes								
Lentils								
MILK & MILK PRODUCTS								
Whole milk								
Skimmed								
Low fat								
Cheese								
Cream								
Butter								
FRUITS & VEGETABLES								

Edible Fruits								
Leafy- Green Vegez								
Dark- Green Leafy Vegez								
SUGAR								
Refined sugars								
Artificial sweetener s								
Natural sweetener s								
FATS/OILS								
Seeds								
Vegetable								
Animal								

INDIVIDUAL INTAKE

Occasion (1) Breakfast (2) Brunch/snack (3) Lunch (4) Snack (5) Dinner (6) snack (7) Other (specify):

Snack: (a) Milk (b) yoghurt (c) Fruit (d) Porridge (e) Ice cream (f) Shake (g) Others specify:

Source of Food: (1) Homemade (2) Restaurant/Cafeteria/Fast Food/Deli (3) Day care (4) Work place tuck/shop (5) Friends/Relatives Home (6) Food Stall/Hawker/Hotel/Vendor (7) Supermarket/Food stores/Open Market (8) Party/Banquets/Barbeque/Special event (9) Others specify:

Amount of food: (1) $\frac{1}{2}$ cup (2) $\frac{1}{4}$ cup (3) $\frac{3}{4}$ cup (4) 1 cup (5) tablespoon-tbsp (6) teaspoon-tsp (7) palm size (8) match box size

SPECIFIC FOOD COMPONENTS

FOOD FREQUENCY QUESTIONNAIRE –FFQ

Below different types of foods known to you, they are categorized as different food groups making up the specific food components. (Please indicate the specific food types you consume. You can indicate more than one).

FOOD AND AMOUNTS	Code	Never	less than a	1-3 per month	Once a week	2-4 per week	5-6 per week	Once a day	2-4 per day	4-5 per day	6+ per day
• Starch:											
Bread/Rolls											
Biscuits											
Cereals:											
Breakfast cereal											
Porridge											
Potato, Pasta, Plantain & Rice											
Potatoe											
Cassava/yams/sweet/Potatoe											
Rice											

Pasta											
Plantain											
Ugali											
Chapatti/Pancakes											
Pizza											
• <i>Protein</i>											
<i>Meat, poultry, fish:</i>											
Soya meat(stew)											
Beef											
Lamb											
Pork											
Chicken (poultry)											
Eggs											
Sausage/Ham/Bacon/Brawn											
Fish											
<i>Dairy products & fats</i>											
Fresh milk											
Yoghurt											

Soy milk											
Fermented milk											
Salad-cream/ mayonnaise											
Cheese											
Butter/Margarin e											
Vegetable/Seed Oil/Cooking Fat											
<i>Legumes</i>											
Green grams/Lentils/B ean/Soya											
• <i>Soups</i>											
Vegetable											
Meat bone											
Peanut butter											
Tomato sauce/											
Jams/Marmalad es											
Gravy											
• <i>Sweets & Snacks</i>											
Cakes/muffins											

Nuts											
Sweets											
Ice Creams/Milkshakes											
Sweetners											
Crisps & other packed snacks											
• Fruits											
Apples/Peaches/ Pears/guavas											
Berries											
Avocado											
Banana											
Melon											
Pineapple											
Orange											
Mango											
Grapes											
Beetroot											
• Drinks											
Tea/coffee/choc											

olate											
Beer/spirits											
Fresh juice/lemonade/f izzy drinks											
<i>Vegetables</i>											
<i>Green leafy vegetables</i>											
Indigenous vegetables											
Spinach/kales											
Lettuce											
<i>Green vegetables</i>											
Green beans/peas											
Tomatoes											
Onions											
Ginger/garlic											
Bell pepper											
Carrots											
Broccoli/Caulifl ower											
Mushroom											
Food											

Additives/Herbs											
-Fresh											

1) Was the amount of food that you ate yesterday about usual, less than usual, or more than usual?

- ☐ Usual (Go to qn.4)
- ☐ Less than usual (Go to qn.2)
- ☐ More than usual (Go to qn.3)

2) What is the main reason the amount you ate yesterday was less than usual?

- ☐ Sickness
- ☐ Short of money
- ☐ Traveling
- ☐ At a social function, special meal or on a special day
- ☐ On vacation
- ☐ Too busy
- ☐ Not hungry
- ☐ Dieting
- ☐ Fasting
- ☐ Bored
- ☐ Stressed

Other reason: _____

3) What is the main reason the amount you ate yesterday was more than usual?

- ☐ Traveling
- ☐ At a social function, special meal, or on a special day
- ☐ On vacation or day off

Thank you for your cooperation!

- Very hungry
- Bored or stressed
- Some _____ other _____ reason:
- _____

4) How could you describe your current dietary habit?

- No special diet, I eat almost everything
- Vegetarian
- Special diet: _____

5) What are the DOs and Don'ts in your disease management?

DOs

.....

DON'Ts

.....

End of interview: Time:

Date:

III. GASTROENTEROLOGIST

NAME :

LICENSE NO. :

DESIGNATION :

QUESTIONS

- How do you define Inflammatory Bowel Disease (IBD) in your understanding?
- Can you provide a clear classification of IBD, considering its various subtypes?
- Are there any current incidences in IBD?
- What are the key clinical signs and symptoms that indicate the presence of IBD?
- What specific indicators in a patient's history, physical examination, or diagnostic tests suggest the presence of IBD?
- From your perspective, what are the primary causes or factors that contribute to the development of Inflammatory Bowel Disease in Kenya (IBD)?
- In your view, what indicators help you recognize the presence of IBD in your patients?
- What are the disease severity scores? (based on clinical assessments or medical records)
- What factors are considered as potential causes or contributors to the development of IBD?
- Depending on the occurrence of IBD, what is the frequency and severity of the symptoms?
- Elaborate on the symptom's scores in case of change in IBD symptoms?
- Could you describe the biochemical markers and specific laboratory tests you rely on to diagnose IBD and are there specific laboratories in use?
- When it comes to managing IBD, including drug therapy, medications, and supplementation, what treatment procedure/criteria do you generally follow, and are there any specific guidelines in place?

- Are there any specific drug contraindications or interactions that you take into consideration when treating your IBD patients?
- How significant of a role, if any, does diet and nutrition therapy play in the management of IBD in your clinic or treatment regimen?
- Drawing distinctions between IBD and other GIT disorders, particularly conditions like Celiac sprue, Gastroenteritis, Irritable Bowel Syndrome, Gastritis, and Gastric/Peptic Ulcers, what sets apart their relationships and how does the treatment or management vary in your perspective in Kenya?
- Is there anything else you think I need to know that will improve our understanding of IBD treatment and management?

IV. NUTRITIONIST

NAME :

LICENSE NO. :

DESIGNATION :

QUESTIONS

- How well do you understand the connection between IBD and its Dietary & Nutritional Management?
- What approaches do you employ to address the symptoms of IBD effectively?
- Can you elaborate on the various methods of feeding used in IBD? Please provide reasoning for your preferred feeding method.
- What type of dietary intervention is applied to the IBD patients? (such as personalized diet plans, supplementation, elimination diets)
- What is the approximate RDA of the patient's daily food (macro & micronutrient) intake?
- Have you implemented any dietary modifications in your management approach? If so, kindly specify the modifications and the rationale behind them.
- Could you elucidate the specific instructions you implement in the management of IBD?
- What insights can you share regarding the interactions between drugs and nutrients during

IBD treatment and management?

- Have you observed any deficiencies in macro/micronutrients during the course of treating and managing IBD?
- Are there any dietary protective factors identified by the patients and do they have any dietary preferences?
- How do these identified deficiencies impact the nutritional well-being of individuals undergoing IBD treatment?
- Is there a particular dietary component that holds significance in the management of IBD?
- In what ways does medical nutrition therapy influence the strategies for nutritional intervention in IBD cases?
- Is there a distinction between medical nutrition therapy and dietary management when dealing with IBD, as opposed to other Gastroesophageal Disorders like:
 - i. Celiac disease
 - ii. Gastroenteritis
 - iii. Irritable bowel syndrome (IBS)
 - iv. Gastritis
 - v. Gastric/peptic ulcers?

V. ETHICAL CLEARANCE



KENYATTA NATIONAL HOSPITAL
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KNH/NUT/RF/37/VOL.1

Date: Monday, September 2, 2024

Rebecca Kivuli Onono
Reg: HND-3-1728-1/2022
Dept. of Public Health Human Nutrition & Dietetics
KENYA METHODIST UNIVERSITY

Dear Rebecca,

RE: APPROVAL TO CONDUCT A STUDY AT THE KNH NUTRITION DEPARTMENT

Following approval by the KNH/UON-Ethics & Research Committee for your research proposal and subsequent filing of the study registration certificate no. P38/01/2024, this is to inform you that authority has been granted to collect data in Nutrition Department, on your study titled "**Dietary and Nutritional risk factors for inflammatory bowel disease; A case study at Kenyatta National Hospital in Nairobi, Kenya**". By a copy of this letter, HOD - Nutrition is informed and requested to facilitate.

You will also be required to submit a report of your study findings to the office of the undersigned after completion of your study.


Agnes Sitati-Wangusi (Mrs)
HOD – NUTRITION

cc: HOD - Medicine
DCN - Medical Services



Vision: A world class patient centered specialized care Hospital

ISO 9001: 2015 CERTIFIED



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Ref: KNH-ERC/A/287

Rebecca Kivuli Onono
Reg. No. HND-3-1728-1/2022
Dept. of Public Health, Nutrition & Dietetics
Kenya Methodist University (KeMU)

12th August, 2024



Dear Rebecca,

ETHICAL APPROVAL-RESEARCH PROPOSAL: DIETARY AND NUTRITIONAL RISK FACTORS FOR INFLAMMATORY BOWEL DISEASE: A CASE STUDY AT KENYATTA NATIONAL HOSPITAL IN NAIROBI KENYA (P38/01/2024)

This is to inform you that KNH-UoN ERC has reviewed and approved your above research proposal. Your application approval number is **P38/01/2024**. The approval period is 12th August 2024 – 11th August 2025.

This approval is subject to compliance with the following requirements:

- i. Only approved documents including (informed consents, study instruments, MTA) will be used.
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by KNH-UoN ERC.
- iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to KNH-UoN ERC 72 hours of notification.
- iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH-UoN ERC within 72 hours.
- v. Clearance for export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days upon completion of the study to KNH-UoN ERC.

Protect to discover

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://research-portal.nacosti.go.ke> and also obtain other clearances needed.

Yours sincerely,



PROF. BEATRICE K.M. AMUGUNE
SECRETARY, KNH- UoN ERC

c.c. The Dean, Faculty of Health Sciences, UoN
 The Senior Director, CS, KNH
 The Chairperson, KNH- UoN ERC
 The Assistant Director, Health Information Dept., KNH
 The Chair, Dept. of Public Health, Nutrition & Dietetics, KeMU
Supervisors: Dr. Job Mapesa, Dept. of Public Health, Nutrition & Dietetics, KeMU
 Dr. Lawrence Thiauru Mugambi, Dept. of Public Health, Nutrition & Dietetics, KeMU

Protect to discover



REPUBLIC OF KENYA

Ref No: 473506



NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY & INNOVATION

Date of Issue: 30/August/2024

RESEARCH LICENSE



This is to Certify that Ms. Rebecca Kivuli Onono of Kenya Methodist University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: Dietary and Nutritional risk factors for Inflammatory bowel disease; A Case study at Kenyatta National Hospital in Nairobi, Kenya for the period ending : 30/August/2025.

License No: NACOSTI/P/24/39330

473506

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY &
INNOVATION

Verification QR Code



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See overleaf for conditions

VI. MAP OF STUDY AREA



