Beyond Symptoms: How Access to Diagnostic Services Shapes Inflammatory Bowel Disease Detection at Kenya's Tertiary Hospital

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ABSTRACT

Context: Inflammatory Bowel Disease (IBD) is increasingly recognized in Sub-Saharan Africa, yet its detection in low-resource settings remains constrained by limited access to specialized diagnostic procedures. In Kenya, empirical evidence linking diagnostic access to IBD detection in tertiary hospitals is scarce.

Aim: This study assessed whether access to selected diagnostic procedures influences the diagnosis of IBD at Kenyatta National Referral Hospital (KNH), Nairobi, Kenya.

Methods: A cross-sectional analytical study was conducted among patients attending the gastroenterology unit at KNH. Of the 184 patients approached, 151 completed the study (response rate: 82%). Data were collected using a researcher-administered questionnaire and a checklist verifying hospital records. Access to ten diagnostic procedures (bone chemistry, stool tests, blood tests, endoscopy, ultrasound, physical examination, X-ray, CT scan, liver function tests, and MRI) was assessed as a binary exposure. The outcome was confirmed IBD diagnosis (yes/no). Descriptive statistics summarized participant characteristics and diagnostic access.

Results: The mean age of participants was 38.6±2.41 years; 52.3% were females, 44.4% were married, and 41.7% had secondary education. Overall, 45 participants (29.8%) had IBD, while 106 (70.2%) were diagnosed with irritable bowel syndrome (IBS). Among IBS cases, gastroesophageal and gastric disorders were most common (43.7%). Clinical symptoms frequently reported included abdominal pain (55.5%), diarrhea (50.3%), and dehydration (42.4%). Access to diagnostic procedures was generally low: 86.8% did not have access to MRI, 78.8% lacked access to bone chemistry testing, 78.8% could not access CT scans, 72.2% did not have access to blood tests, and 66.9% did not have access to endoscopy. Chi-square analysis showed no significant association between IBD diagnosis and access to all routine diagnostics procedures assessed by the study, including endoscopy (χ^2=1.373, p=0.241), stool tests (χ^2=0.183, p=0.669), blood tests (χ^2=0.999, p=0.318), CT scan (χ^2=0.055, p=0.815), MRI (χ^2=0.254, p=0.614), or liver function tests (χ^2=0.521, p=0.470).

Conclusion: IBD accounted for nearly one-third of gastrointestinal diagnoses at KNH. Access to routine diagnostic investigations was limited and not independently associated with IBD detection. These findings highlight persistent diagnostic access gaps and underscore the need for earlier, equitable access to definitive diagnostic services to improve timely IBD detection in Kenyan tertiary settings.

Keywords: Access to diagnostic services, inflammatory bowel disease, tertiary hospital

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1. Introduction

Inflammatory Bowel Disease (IBD), which includes Crohn's disease and ulcerative colitis, has historically been perceived as uncommon in Sub-Saharan Africa (SSA). Still, recent regional literature shows that this perception is changing as diagnostic procedures improve as case reports and small series accumulate *(Watermeyer et al., 2023).* Recent global estimates suggest that approximately 10 million individuals worldwide live with IBD *(Ruan et al., 2025).* In contrast to earlier decades, regions previously considered low burden, including Africa, have reported a rising number of IBD cases. Data from SSA show regional variations in prevalence, estimated at 11.2 per 100,000 population in Western SSA, 9.9 per 100,000 in Eastern SSA, and 10.2 per 100,000 in Central SSA *(Zhang et al., 2025; Mwachiro et al., 2021).* Apparent increases in IBD reporting may reflect both real changes (urbanization, shifting environmental exposures) and greater availability of diagnostic services, rather than purely a change in disease biology *(Hodges et al., 2025).* In Kenya, detailed epidemiological data on IBD, particularly incidence and prevalence estimates and determining factors, remain limited.

Accurate and timely classification of IBD depends on access to specific diagnostic procedures, particularly colonoscopy with biopsy and histopathological assessment, supplemented by appropriate cross-sectional imaging and laboratory tests. Systematic reviews of diagnostic intervals and outcomes demonstrate that time to diagnosis is a measurable, clinically important metric: Longer intervals from symptom onset to definitive diagnosis are consistently associated with worse structural bowel damage and higher rates of surgery, particularly for Crohn's disease *(Jayasooriya et al., 2023).* These studies show that diagnostic access is not an abstract systems metric but a

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proximal determinant of disease phenotype at presentation and subsequent outcomes. Reviews focused specifically on diagnostic delay in adult IBD underscore a complex causation that includes patient factors, clinician recognition, and structural barriers to investigation, with the latter (availability and timeliness of endoscopy, biopsy, and imaging) being particularly prominent in Low- and Middle-Income country (LMIC) settings *(Cross et al., 2023).*

A growing literature has therefore examined tools and strategies to reduce diagnostic delay when procedural capacity is limited. Diagnostic screening instruments and the combined use of non-invasive biomarkers (e.g., fecal calprotectin) with early referral algorithms have been proposed and evaluated as ways to prioritize patients for scarce endoscopy slots and limit avoidable delays *(Vălean et al., 2024; Cantoro et al., 2023).* Previous literature elucidates that when endoscopy capacity is constrained, intelligent triage and low-cost screening can improve the yield of diagnostic procedures and shorten the interval to definitive diagnosis. However, these approaches require validation within local referral pathways and depend on feasible laboratory support, conditions that vary widely across African tertiary centers, including those in Kenya *(Cantoro et al., 2023).*

Capacity studies from the African region repeatedly identify endoscopy and histopathology as major impediments attributable to unavailability of trained health care personnel, limited numbers of functional endoscopy suites, high patient loads, and variable histopathology turnaround times *(Asombang & Bhat, 2024).* Inflammatory bowel disease (IBD) has traditionally been considered uncommon in SSA; however, recent evidence indicates that its burden is increasing, particularly in urban referral centers. In Western countries, millions of people live with IBD, and emerging data suggest similar upward trends in regions previously thought to be low burden. In SSA, reported prevalence ranges between approximately 9 and 11 cases per 100,000 population, with variation across regions.

In Eastern Africa specifically, recent work describes constrained endoscopy capacity. It explores pragmatic alternatives such as task-sharing, targeted training, frugal digitization of endoscopic records, and use of screening biomarkers, which are often adopted as partial mitigations *(Asombang & Bhat, 2024).* These system-level analyses are important because they link measurable service constraints (wait times, equipment, human resources) to the upstream exposure of interest in an IBD study: whether patients who ultimately receive an IBD diagnosis had different access to diagnostic procedures compared with those who did not, and whether differential access predicts later stage or complication at diagnosis.

2. Significance of the study

Despite these multi-country and regional analyses, data that explicitly examine diagnostic access as a determinant of IBD within Kenyan tertiary centers remain sparse. Most Kenyan publications are descriptive case series or single-center reports that describe clinical profiles and outcomes but do not systematically measure access to diagnostic tests, mainly colonoscopy, histopathology, imaging, or the time intervals along the diagnostic pathway *(Watermeyer et al., 2023).* Kenyatta National Referral Hospital (KNH) is Kenya's largest tertiary referral facility and a major hub for endoscopy and histopathology services; yet, how availability, cost, referral pathways, and wait times at KNH influence who gets investigated and who is labelled with IBD have not been quantified. This gap limits clinicians' and policymakers' ability to interpret reported IBD caseloads, design equitable service improvements, or prioritize interventions that would shorten diagnostic intervals and improve outcomes.

While regional reviews and systematic analyses demonstrate that diagnostic access influences IBD recognition and outcomes, there is a specific evidence gap for Kenya: no recent, peer-reviewed, and systematic studies have measured whether differential access to diagnostic procedures at a Kenyan tertiary referral hospital (KNH) determines the likelihood of receiving an IBD diagnosis or influences disease stage at presentation. The present study therefore sought to quantify diagnostic access (bone chemistry, stool test, blood test, endoscopy, ultrasound, physical examination, X-ray, CT scan, Liver Function Tests (LFT's), and Magnetic Resonance Imaging (MRI)) as possible determinants of IBD at Kenyatta National Referral Hospital, thereby filling a critical knowledge gap needed to guide clinical triage, resource allocation, and policy decisions in Kenya and similar LMIC tertiary contexts.

In Kenya, IBD cases are increasingly encountered in tertiary hospitals such as Kenyatta National Referral Hospital, yet national and county-level epidemiological data remain limited. Diagnosis of IBD relies heavily on access to specialized diagnostic procedures, including colonoscopy, histopathology, and imaging, which are often constrained in resource-limited settings. Limited access to these services is assumed to contribute to delayed diagnosis, under-recognition of disease, and presentation with more advanced complications.

Thus, this paper provides empirical evidence on the epidemiology of IBD in Nairobi County and explicitly examines access to diagnostic procedures as a determinant of IBD diagnosis within Kenya's largest tertiary referral hospital. By quantifying diagnostic access and subsequent IBD diagnosis, the study adds locally relevant data that address a critical knowledge gap in Kenya and offers evidence to inform clinical triage, diagnostic planning, and policy decisions aimed at improving timely and equitable IBD diagnosis in similar low-resource settings.

3. Aim of the study

To assess whether access to selected diagnostic procedures influences the diagnosis of Inflammatory Bowel Disease (IBD) at Kenyatta National Referral Hospital, Nairobi, Kenya.

3.1. Operational definition of terms

Crohn's disease is a type of IBD affecting any part of the gastrointestinal tract.

Determinant was operationalized as access to diagnostic procedures, factors assessed at a single point in time that had the potential to influence whether a patient received a confirmed IBD diagnosis.

Intestinal Bowel Disease in this study referred to a confirmed case of IBD diagnosed through appropriate diagnostic tests and medical examination.

Irritable Bowel Syndrome in this study referred to a functional gastrointestinal disorder characterized by recurrent abdominal pain associated with changes in bowel habits, such as gastroesophageal and gastric disorders, hepatobiliary and pancreatic diseases, and infectious and acute gastrointestinal diseases, or their combination, in the absence of identifiable structural or biochemical abnormalities.

Ulcerative colitis is a type of IBD affecting the large intestine.

4. Subjects & Methods

4.1. Research Design

The current study employed a cross-sectional analytical design, which involves collecting and analyzing data from a population or a representative subset at a single point in time. The researchers sampled patients presenting with Inflammatory Bowel Disease, including Ulcerative Colitis and Crohn's disease. The dependent variable was IBD diagnosis assessed on a binary scale (presence vs absence), whereas the independent variable was IBD diagnostic procedures. This design is particularly useful for assessing the prevalence of outcomes and examining associations between variables without requiring follow-up. This design enabled efficient data collection from patients attending the gastroenterology unit. It allowed examination of associations between health system factors (diagnostic access) and disease recognition without the need for longitudinal follow-up.

In this study, the independent variable was access to diagnostic procedures, including bone chemistry, stool test, blood test, endoscopy, ultrasound, physical examination, x-ray, CT scan, liver function tests (LFTs), and magnetic resonance imaging (MRI). The dependent variable was IBD diagnosis, classified as a binary outcome (yes/no) based on clinical and diagnostic criteria. By analyzing the relationship between access to diagnostic procedures and IBD diagnosis, this study aimed to determine whether differences in access to diagnostic procedures influence the likelihood of IBD diagnosis at Kenyatta National Referral Hospital.

4.2. Study Setting

The study was conducted at Kenyatta National Referral Hospital (KNH), located in Nairobi County, Kenya. KNH is the largest tertiary referral and teaching hospital in the country, serving as a national referral center for complex medical and surgical cases. Established in 1901 and modernized over several phases of expansion. The hospital occupies a large campus with multiple wards, outpatient clinics, diagnostic facilities, and administrative buildings.

KNH handles a high patient volume, with over 1,800 beds and an estimated 1,500–2,000 outpatient visits per day, reflecting a diverse population from Nairobi County and across Kenya. The hospital provides a wide range of services, including general medicine, surgery, pediatrics, obstetrics and gynecology, specialized clinics for gastroenterology and infectious diseases, diagnostic imaging, endoscopy, and laboratory services. The gastroenterology unit, where patients with suspected inflammatory bowel disease are evaluated, offers colonoscopy, histopathology, imaging, and other diagnostic procedures. However, access is sometimes constrained by high demand and limited procedural slots.

Kenyatta National Referral Hospital (KNH) operates as a public referral facility, offering services at subsidized rates to patients in the government health system. In contrast, some services incur additional fees for private care or specialized procedures. Distinctively, KNH serves as a training institution for medical students, nursing staff, and residents, integrating clinical care with research and teaching, which enhances its capacity for complex diagnostics and longitudinal patient follow-up. Thus, the study setting provides an ideal environment to study diagnostic access and its influence on the detection of inflammatory bowel disease, given its large patient flow, comprehensive diagnostic facilities, and status as the main referral center for gastroenterology in Kenya.

4.3. Subjects

The study targeted patients being treated and managed for IBD in Kenyatta National Hospital, Nairobi, Kenya. A purposive sampling approach was used to select the study hospital, justified by the fact that it is the main referral hospital in the study context in Kenya. A sample of 184 was determined based on Fisher's *et al*. formula *(Mugenda and Mugenda, 2003)* and adjusted for the sampling frame established through the hospital's health records.

Systematic random sampling was used to select study participants until the study sample was realized. The hospital records demonstrated that 1052 clients have ever been enrolled for IBD related diagnosis. Thus, the sampling interval was generated by dividing the total number of clients ever enrolled (1052) by the sample size (184). Therefore, a sampling interval of six (6) was used to sample the study respondents until the desired sample size was realized.

The inclusion criteria were patients who consented to participate in the study for the entire study period. The exclusion criteria were subjects presenting with other underlying chronic medical conditions that would hinder the assessment of the variables under study. To establish the exclusion criteria, a brief medical assessment form was administered before subjects were enrolled in the study.

4.4. Tools of Data Collection

The study employed a researcher-administered questionnaire and an observation checklist to collect data on the study variables. The questionnaire and observation checklist were developed by the researcher and adapted from published instruments assessing diagnostic access and IBD evaluation *(Cross et al., 2023; Watermeyer et al., 2023; Omede et al., 2026)*. Items were modified to reflect the local context at Kenyatta National Referral Hospital.

4.4.1. Researcher Administered Questionnaire

The researcher developed this tool, which comprised four sections to assess socio-demographic characteristics, clinical history, access to diagnostic procedures, and IBD diagnosis. Section A focused on socio-demographic information and included five items capturing age, gender, marital status, education level, and occupation. The questions in this section were open-ended, allowing participants to provide their own responses. Section B gathered information on clinical history and symptomatology using closed-ended questions about gastrointestinal symptoms reported by the subjects.

Section C assessed access to diagnostic procedures with ten items including bone chemistry, stool test, blood test, endoscopy, ultrasound, physical examination, x-ray, CT scan, liver function tests (LFT's), and magnetic resonance imaging (MRI) assessed using closed-ended questions eliciting responses on a binary categorical scale (yes vs no). Section D captured IBD diagnosis and outcomes through two open-ended questions that recorded whether a patient had been diagnosed with IBD, or irritable bowel syndrome (IBS) and the respective types of IBS diagnosed.

4.4.2. Medical Record Review Checklist

This data collection tool was developed by the researcher and used to verify patient files and hospital records, ensuring the accuracy of reported diagnostic procedures and confirming the IBD diagnosis. The tool was in the form of questionnaire, which allowed for abstraction of the variables under study. The questionnaire tool comprised of both open- and close-ended questions synthesizing information on the study variables.

4.5. Procedures

Ethics and consent to participate in the study: The Kenyatta National Hospital Ethical Review Committee approved the study. Informed, written, and voluntary consent was obtained from all participants, and data were anonymized to ensure confidentiality. No information linked to any of the participants is published.

Content validity was established through review by three gastroenterology experts and two public health researchers, who evaluated clarity, relevance, and comprehensiveness of the items. Reliability was tested during a pilot study with 18 patients not included in the main study.

The Cronbach's alpha coefficient for the diagnostic access section was 0.82, and 0.78 for the clinical history section, indicating good internal consistency. The study tools (questionnaire and observation checklist) were developed in English, with oral translation into Kiswahili for participants with limited English proficiency, followed by back-translation to ensure accuracy.

Data collection was conducted over eight weeks. Trained research assistants administered the questionnaires face-to-face, while the checklist was used to verify hospital records. The principal investigator monitored data completeness daily and resolved any discrepancies directly with participants or medical records.

4.6. Limitation of the study

Limitations of the study included a cross-sectional design, which limits causal inference; potential recall bias in self-reported data; exclusion of patients with incomplete hospital records; and limited generalizability beyond tertiary referral settings in Kenya.

4.7. Data Analysis

The collected survey data were first checked for completeness, cleaned, and exported to IBM SPSS Version 27 for analysis using both descriptive and inferential statistics. The Chi-square test was used to assess statistically significant associations between IBD diagnosis (ulcerative colitis or Crohn's disease) and independent variables, including participants' socio-demographic characteristics and access to diagnostic procedures. Statistical significance was determined at $p \leq 0.05$.

5. Results

The study targeted 184 subjects, all of whom were included. However, 33 questionnaires were rejected for being incomplete; hence, a response rate of 151 (82%) was realized and is reported in the study.

Table 1 displays the socio-demographic features of the study population, with a high proportion of the study subjects (56, 37.1%) aged 21-40, and a mean age of 38.6±2.41 SD. Regarding gender, slightly above average 79(52.3%) were females, and most of them, 67(44.4%), reported being married. A high percentage of the subjects, 63(41.7%), reported having completed secondary school, and a high proportion, 54(35.8%), reported not being engaged in any occupation.

Figure 1 provides findings on clinical history and symptomatology among the study subjects. Notable, less than a quarter 32(21.1%) presented with pallor, 28(18.5%) had jaundice (both clinical and nutritional), less than average; 64(42.4%) were dehydrated, average; 76(50.3%) had diarrhea, 20(13.2%) presented with fatigue, 83(55.0%) had abdominal pain, 28(11.9%) had bloody stool, 47(31.1%) experienced appetite loss, 47(31.1%) had experienced weight loss, 22(14.6%) were nauseated, 72(47%) experienced vomiting, and 23(15.2%) reported that they had experienced fever and chills.

Table 2 reveals the incidence of irritable bowel syndrome (IBS) was 106(70.2%) and 45(29.8%) for Inflammatory Bowel Disease (IBD). The most common incidence of IBS was gastroesophageal and gastric disorders reported by 66(43.7%) of the participants.

As shown in Figure 2, in terms of access to IBD diagnostic procedures, 131(86.8%) did not have access to MRI scanning, 119(78.8%) did not have access CT-scan, 119(78.8%) of the participants did not have access to bone chemistry, 118(78.1%) had no access to physical examination, 112(74.2%) did not have access to x-ray, 109(72.2%) did not have access to blood test, 101(66.9%) did not access endoscopy, above average; 90(59.6%) did not have access stool test, and 81(53.6%) did not have access to ultrasound. More than three quarters; 115(76.2%) had access to LFT.

As shown in Table 3, the study demonstrates that access to the following IBD diagnostic tests did not

demonstrate associations to positive diagnosis for IBD at p ≤0.05; bone chemistry (χ^2=1.219, df=1, p=0.269, CI=95%), stool test (χ^2=0.183, df=1, p=0.669, CI=95%), blood test (χ^2=0.999, df=1, p=0.318, CI=95%), endoscopy (χ^2=1.373, df=1, p=0.241, CI=95%), ultrasound (χ^2=0.094, df=1, p=0.759, CI=95%), physical examination (χ^2=1.489, df=1, p=0.222, CI=95%), x-ray (χ^2=0.024, df=1, p=0.878, CI=95%), CT scan (χ^2=0.055, df=1, p=0.815, CI=95%), liver function tests (χ^2=0.521, df=1, p=0.470, CI=95%), and magnetic resonance imaging (χ^2=0.254, df=1, p=0.614, CI=95%).

Table (1): Frequency and percentage distribution of participants' socio-demographic characteristics (n=151).

Sociodemographic characteristics	Frequency (n)	Percentage (%)
Age categories		
<20	29	19.2
21-40	56	37.1
41-60	41	27.2
61-80	25	16.6
Mean±SD	38.6±2.41	
Gender		
Male	72	47.7
Female	79	52.3
Marital status		
Single	65	43.0
Married	67	44.4
Separated	19	12.6
Education level		
Incomplete	6	4.0
Primary	50	33.1
Secondary	63	41.7
Tertiary	32	21.2
Occupation		
Self-employed	41	27.2
Employed	20	13.2
Casual jobs	16	10.6
No occupation	54	35.8
Minor	20	13.2

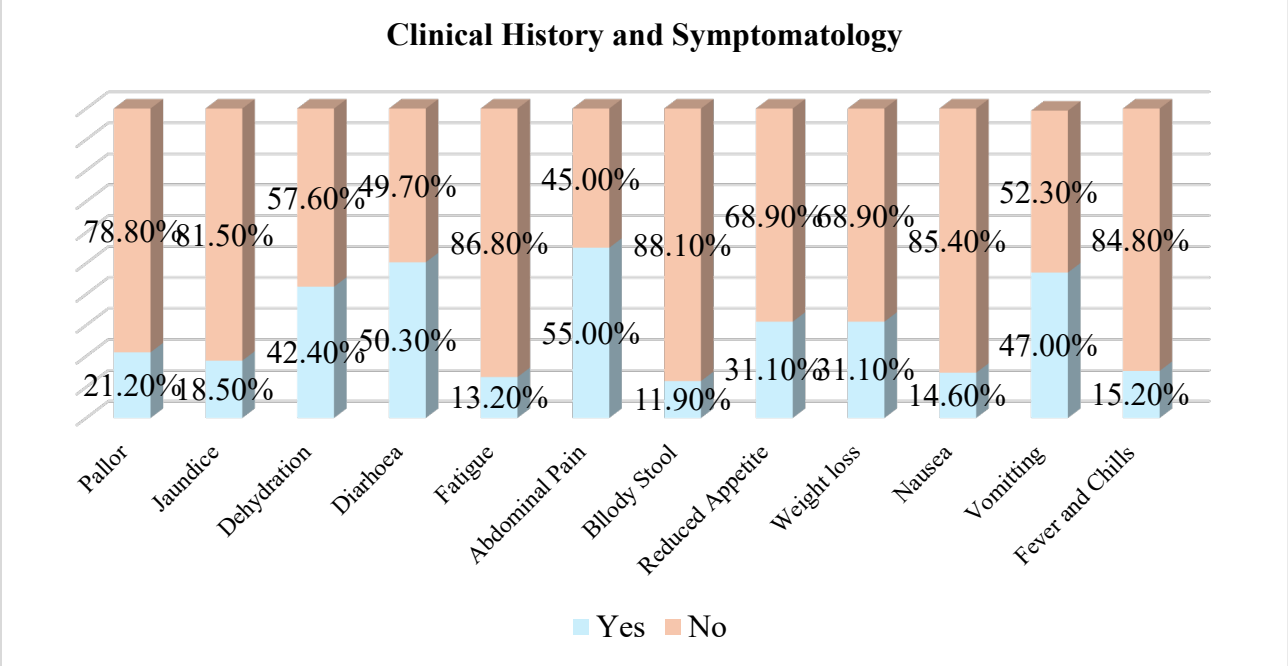
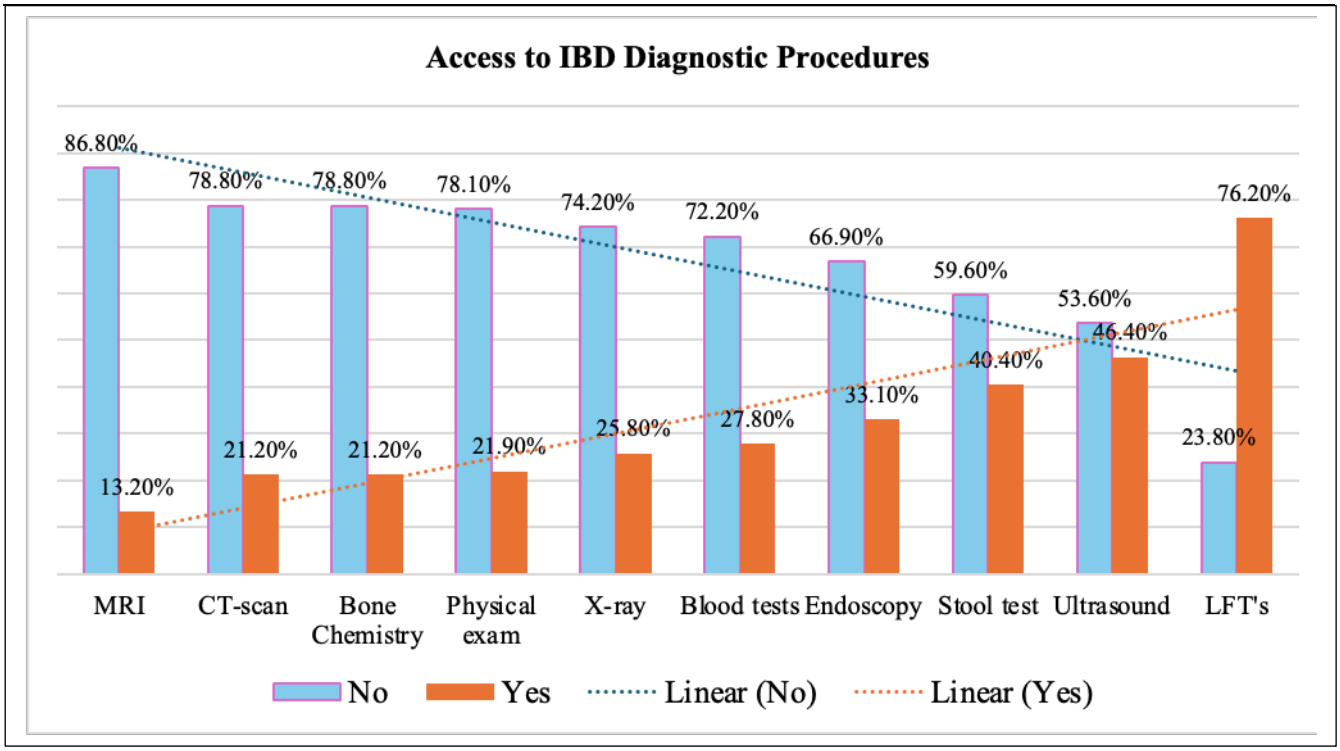


Figure (1): Percentage distribution of clinical history and symptomatology of the study subjects (n=151).

Table (2): IBD and non-IBD incidence among the subjects (n=151).

Diagnosis	Frequency (n)	Proportion (%)
Inflammatory Bowel Disease	45	29.8
Irritable Bowel Syndrome	106	70.2
Gastroesophageal and gastric disorders	66	43.7
Infectious and acute gastrointestinal diseases	33	21.9
Hepatobiliary and pancreatic diseases	7	4.6



6. Discussion

This study contributes to the limited body of evidence on inflammatory bowel disease (IBD) in sub-Saharan Africa by examining how health-system diagnostic capacity shapes disease recognition in routine clinical practice. In low- and middle-income settings, the diagnosis of IBD is often challenged by overlapping clinical presentations with infectious gastrointestinal diseases, limited availability of specialized investigations, and delayed access to definitive diagnostic procedures. At Kenyatta National Referral Hospital, a tertiary referral center serving a large and diverse patient population, access to endoscopy, imaging, and histopathology is critical for confirming IBD and differentiating its subtypes. Understanding whether and how access to selected diagnostic procedures influences IBD diagnosis is essential for identifying care gaps, informing resource allocation, and improving timely, accurate diagnosis in similar settings. This study aimed to assess whether access to selected diagnostic procedures influences the diagnosis of IBD at Kenyatta National Referral Hospital (KNH), Nairobi.

The present study identifies a markedly higher incidence of irritable bowel syndrome (IBS) compared with inflammatory bowel disease (IBD), with IBS accounting for more than two thirds of cases and IBD of less than one third. This finding is consistent with recent epidemiological data demonstrating that IBS, classified as a disorder of gut–brain interaction, is substantially more prevalent than organic inflammatory bowel conditions in both community and clinical settings *(Black & Ford, 2020; Ozojide et al., 2025; Palsson et al., 2020).* Global prevalence estimates suggest that IBS affects between 5% and 15% of the adult population, whereas IBD prevalence remains considerably lower, typically below 1% in most regions *(Kaplan, 2015; Ng et al., 2023).* Consequently, the predominance of IBS observed in this study likely reflects the natural distribution of gastrointestinal disorders rather than a selection bias.

An important finding of this study was that gastroesophageal and gastric disorders constituted the most frequent IBS-associated presentations, reported by nearly half of the participants. This observation aligns with accumulating evidence of substantial overlap between IBS and upper gastrointestinal disorders, such as Gastroesophageal Reflux Disease (GERD) and functional dyspepsia *(Alshammari et al., 2023; Aziz et al., 2019).* Recent systematic reviews and population-based studies indicate that a significant proportion of individuals with IBS experience concurrent upper gastrointestinal symptoms, supporting the concept of overlapping functional gastrointestinal disorders rather than isolated disease entities *(Ford et al., 2017; von Wulffen et al., 2019).*

Table (3): Associations between access to IBD diagnostic procedures and IBD incidence among study subjects.

Access to IBD Diagnostic procedure	Incidence of IBD		Incidence of IBS		χ^2	p-value
	No.	%	No.	%		
Bone chemistry						
Yes	7	4.6	25	16.6	1.219	0.269
No	38	25.2	81	53.6		
Stool test						
Yes	17	11.3	44	29.1	0.183	0.669
No	28	18.5	62	41.1		
Blood tests						
Yes	10	6.6	32	21.2	0.999	0.318
No	35	23.2	74	49.0		
Endoscopy						
Yes	18	11.9	32	21.2	1.373	0.241
No	27	17.9	74	49.0		
Ultrasound						
Yes	20	13.2	50	33.1	0.094	0.759
No	25	16.6	56	37.1		
Physical examination						
Yes	7	4.6	26	17.2	1.489	0.222
No	38	25.2	80	53.0		
X-ray						
Yes	12	7.9	27	17.9	0.024	0.878
No	33	21.9	79	52.3		
CT scan						
Yes	9	6.0	23	15.2	0.055	0.815
No	36	23.8	83	55.0		
LFTs						
Yes	36	23.8	79	52.3	0.521	0.470
No	9	6.0	27	17.9		
MRI						
Yes	5	3.3	15	9.9	0.254	0.614
No	40	26.5	91	60.3		

Pearson Chi-Square (χ2) test for associations.

Current pathophysiological models provide plausible explanations for this overlap, emphasizing dysregulation of the gut–brain axis. Altered visceral sensitivity, abnormal gastrointestinal motility, autonomic nervous system imbalance, and central pain processing disturbances have been implicated across the spectrum of functional gastrointestinal disorders *(Mayer et al., 2015; Soufan et al., 2025).* Additionally, emerging research on the gut microbiota suggests that dysbiosis may influence sensory signaling throughout the gastrointestinal tract, contributing to both gastric and intestinal symptom generation in IBS patients *(Wang et al., 2025; Stoyanova et al., 2025).* These mechanisms support the interpretation that the high frequency of upper gastroesophageal symptoms in IBS patients observed in this study is biologically plausible.

Although IBD accounted for a smaller proportion of cases in this study, its clinical importance remains substantial due to its chronic inflammatory nature and potential for progressive complications. Recent literature highlights that while symptom overlap between IBS and IBD is common, particularly during IBD remission, whereby IBD is characterized by objective evidence of inflammation, including elevated fecal calprotectin and endoscopic abnormalities *(Quigley, 2016; Gracie et al., 2025).* The lower incidence of IBD observed in this study is consistent with global epidemiological trends but underscores the necessity of accurate diagnostic differentiation to avoid misclassification and inappropriate management *(Kaplan, 2015; Torres et al., 2020).*

This study reveals marked disparities in access to diagnostic procedures for inflammatory bowel disease (IBD), with advanced imaging modalities such as MRI and CT scans showing the highest levels of non-access, as over three-quarters of respondents reported unavailability. This aligns with evidence that advanced radiologic services are often limited in resource-constrained settings due to cost and infrastructural demands *(Kaplan, 2015; Ng et al., 2017).* Access improved for more routine investigations, including physical examinations, x-rays, and blood tests, though gaps persisted despite their importance in initial IBD assessment *(Torres et al., 2020).* Endoscopy and stool tests showed moderate accessibility, despite endoscopy with biopsy remaining the diagnostic gold standard *(Lamb et al., 2019).* Ultrasound was relatively widely available, while liver

function tests were the most accessible. The overall trend indicates that simpler, lower-cost tests are more available than specialized procedures, highlighting systemic inequities that may contribute to delayed diagnosis and suboptimal IBD management.

The present study demonstrates that access to most commonly used diagnostic investigations, including bone chemistry, stool tests, blood tests, endoscopy, ultrasound, physical examination, x-ray, CT scan, liver function tests, and magnetic resonance imaging, did not show a statistically significant association with a positive diagnosis of inflammatory bowel disease (IBD). This finding may initially appear contradictory to established diagnostic guidelines, which emphasize laboratory tests, endoscopic evaluation, and imaging as central components of IBD diagnosis *(Torres et al., 2020; Lamb et al., 2019).* However, recent evidence suggests that access to diagnostic tests alone does not necessarily equate to diagnostic accuracy or confirmed disease, particularly in resource-limited or non-specialist healthcare settings *(Kaplan & Windsor, 2021; Ng et al., 2023).* The lack of association observed in this study may therefore reflect variability in test utilization, timing, or interpretation rather than the diagnostic value of these modalities themselves.

Laboratory investigations such as stool tests, blood tests, liver function tests, and bone chemistry are widely used as supportive tools in IBD evaluation. Still, they are known to lack disease specificity when used in isolation. Biomarkers such as C-reactive protein and fecal calprotectin can be elevated in a range of inflammatory and infectious conditions, potentially diluting their predictive value for IBD when assessed without clinical correlation *(Lichtenstein et al., 2025; Lin et al., 2014).* This may explain why access to these tests did not demonstrate a significant association with confirmed IBD in the present study, particularly if definitive biomarkers or standardized cutoff values were not consistently applied.

Similarly, the absence of a significant association between access to endoscopy or cross-sectional imaging (CT scan, MRI, ultrasound, and X-ray) and IBD diagnosis may reflect structural or systemic barriers rather than clinical irrelevance. Although endoscopy with histological confirmation remains the gold standard for IBD diagnosis, recent studies emphasize that delayed referral, limited specialist availability, and restricted procedural access can reduce its diagnostic yield in real-world practice *(Gomollón et al., 2016; Roda et al., 2020).* Furthermore, imaging findings may be non-specific in early or mild disease, contributing to false-negative results and attenuated statistical associations *(Lavalle et al., 2025).*

7. Conclusion

Overall, these findings suggest that while routine diagnostic tests are essential components of IBD evaluation, their mere availability does not guarantee diagnostic accuracy. This underscores the importance of a comprehensive, stepwise diagnostic approach that integrates clinical assessment, objective testing, specialist interpretation, and longitudinal disease course.

8. Recommendations

Clinically, this study's findings emphasize the need for a comprehensive, patient-centered approach to gastrointestinal symptom evaluation. The high prevalence of IBS and its frequent association with gastroesophageal and gastric symptoms suggest that management strategies should address the entire gastrointestinal tract and incorporate therapies targeting gut–brain interactions, including dietary modification, neuromodulators, and psychological interventions.

At the same time, the selective use of inflammatory biomarkers and endoscopic evaluation remains essential to exclude IBD in patients with alarm features. Future research should adopt longitudinal designs and incorporate assessments of psychosocial factors, the microbiome, and biomarkers to further clarify the complex interactions underlying overlapping gastrointestinal disorders. Future studies should examine the quality, timing, and interpretation of diagnostic testing, as well as healthcare system factors, to better understand how access to investigations translates into accurate, timely IBD diagnosis.

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