# Nutritional deficiencies and associated pathologies present unique challenges of diagnosing paediatric inflammatory bowel disease in sub-Saharan Africa

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## INTRODUCTION

Inflammatory bowel disease (IBD) represents two idiopathic conditions (Crohn's and ulcerative colitis (UC)) of chronic inflammation of the gastrointestinal tract affecting all ages with no known cure. Approximately 4.9 million cases of IBD were reported in 2019, and this number is projected to increase.[1] IBD is driven by intestinal epithelial damage and dysfunction, dysbiotic gut microbiome and inappropriate immune response in genetically susceptible individuals. Clinical presentations are abdominal pain, diarrhoea, rectal bleeding, malnutrition and poor growth in children and adolescents.[2] Diagnosis involves taking a comprehensive history, conducting relevant investigations, performing endoscopy and biopsy on patients with relevant clinical features by a well-trained clinician. Specific tissue histological findings such as neutrophilic inflammation, cryptitis and crypt abscess for UC and non-caseating granuloma in Crohn's disease (CD) and radiological imaging are used to confirm the diagnosis.[3] A delay in diagnosis or misdiagnosis resulting in untreated IBD can lead to worsened clinical outcomes. This includes persistent inflammation, development of systemic symptoms, potential complications like stenosis and fistulas with increased risk of bowel surgery.[4 5] Compounding this problem are nutritional deficiencies, a frequent complication and comorbidity of IBD. Overt malnutrition (ie, undernutrition and overnutrition) like IBD is characterised by chronic inflammation, mucosal damage, intestinal barrier dysfunction, gut microbiome dysbiosis, altered immune response and malabsorption.[6] In countries where childhood undernutrition is endemic, this presents an additional challenge in distinguishing malnutrition secondary to IBD. Additionally, nutritional deficiencies can worsen IBD pathophysiology and impede therapeutic response complicating disease management.[6] This may lead to further misdiagnosis and underreporting of IBD's prevalence in sub-Saharan Africa. Therefore, there is a crucial need to understand these challenges and underlying malnutrition in these settings. Moreover, reconciling malnutrition-driven pathologies may reveal unique subtypes of IBD, requiring a different approach to diagnosis and management.

## IBD TRENDS IN SUB-SAHARAN AFRICA

IBD's global epidemiological pattern has shifted in recent years. Previously considered a disease of high-income countries, recent reports have indicated a rapid rise in newly industrialised countries in South America, Eastern Europe, Asia and Africa.[7] However, data reflecting continental incidence and prevalence lag and the literature continues to be over-represented by high-income countries.

Currently, there are no paediatric or adult IBD epidemiological studies in sub-Saharan Africa. Most publications are from South Africa with a few reports from Ghana and Nigeria.[8] Archampong *et al* reported a 65% increase in case finding in adults over 15 years at a single referral centre in Ghana.[9] South Africa is the most industrialised country in Africa with healthcare facilities almost on par with high-income countries and diverse ethnicities. Yet only 5%[10] of IBD's prevalence is in indigenous (black) Africans, although they constitute roughly 81%[11] of the national population. A recent systematic review also found 210 cases of IBD reported in sub-Saharan Africa which excluded S. Africa.[12] Thus, one may safely assume that the increasing incidence of IBD may not be strongly associated only with reported race or industrialisation and other underlying factors may be contributing to disease onset.

## TRENDS, CHALLENGES AND NUTRITIONAL DEFICIENCIES IN PAEDIATRIC IBD IN SUB-SAHARAN AFRICA

Globally, paediatric IBD is on the rise. About 10% of IBD is diagnosed in children<16 years.[13] The clinical course of paediatric onset IBD is characterised by a greater disease burden compared with adult-onset IBD.[2] For example, very-early onset IBD in children<6 years have a greater dominant colonic damage and disease extension whereas in older children the ileocolonic disease is more frequent.[2] Similar to the adult literature, fewer studies have been done in sub-Saharan Africa. Cape Town, S. Africa reported that children and adolescents≤18 years at diagnosis represent 9.7% of 3278 cases of the IBD Africa Registry which is consistent with Western countries.[12 13] Apart from S. Africa, Nigeria is the only other country with reported paediatric IBD cases.[14 15]

Diagnosing IBD in African children presents a considerable challenge. Atypical forms of IBD and underlying pathologies such as chronic diarrhoea, iron deficiency anaemia, malnutrition and failure to thrive because of chronic enteric infections, parasites, intestinal tuberculosis and environmental enteropathy are

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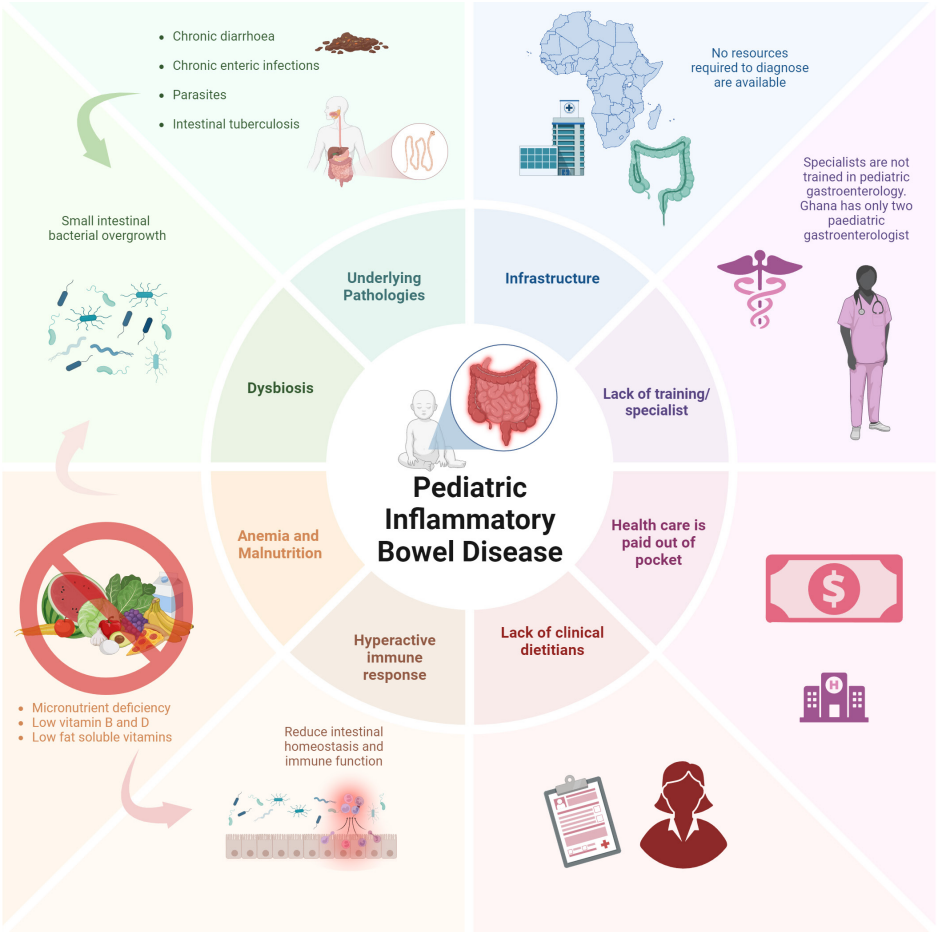


**Figure 1** Underlying pathogenies and infrastructural challenges to diagnosing and managing paediatric IBD in sub-Saharan Africa. IBD, inflammatory bowel disease.

pervasive clinical problems. Deciphering these common intestinal maladies and underlying malnutrition from IBD presents an enormous challenge for clinicians including clinical dietitians.[16] For example, enteric pathogenic infections in children synergistically result in small intestinal bacterial overgrowth and hyperactive immune response, both of which are hallmarks of IBD.[17 18] In addition, children with IBD often present with disease-related malnutrition, micronutrient deficiencies and protein-energy malnutrition at diagnosis during active disease and remission.[19 20] Specifically, iron, zinc, B vitamins, fat-soluble vitamins and protein-energy deficiencies are most common.[19 20] These are also common nutritional deficiencies in children living in low- and middle-income countries and are of particular concern in sub-Saharan Africa where an estimated 216 million children suffer from stunting and malnutrition.[21] Malnutrition can exacerbate IBD severity, impair intestinal wound healing and alter treatment response. For example, deficiencies in vitamin D, iron and zinc which are critical nutrients for intestinal homeostasis and immune function can impair these processes in IBD.[22] Similarly, protein-energy malnutrition which leads to stunting and growth failure are also frequently observed in malnourished children with IBD.[22] On the other hand, the chronic inflammation and ensuing tissue damage caused by IBD may precipitate malabsorption and increased nutrient loss creating a vicious cycle.[6] Whether preexisting and persistent intergenerational malnutrition is a mechanistic cause or consequence of IBD in sub-Saharan African children or leads to new atypical subtypes remains to be experimentally explored.

Finally, in Ghana and most other African countries, general paediatricians, surgeons and other healthcare staff with no specialist training in paediatric gastroenterology are tasked with diagnosing and managing gastroenterological conditions which result in delayed diagnoses, unnecessary surgeries and mortality.[16] Resources are required to diagnose paediatric IBD such as skilled endoscopists using paediatric endoscopes, collection of mucosal biopsies and pathological services including transportation, preparation and biopsy reports widely available in Africa. For example, there are 2232 paediatric gastroenterologists in America,[23] 67 gastroenterologists in South Africa and probably fewer paediatric gastroenterologists while as of June 2024 Ghana has 11 for adults and 2 for paediatrics (of which the corresponding author is one). In Ghana, Korle Bu Teaching Hospital (main teaching hospital) started paediatric endoscopy services in 2014 while paediatric gastroenterology commenced in 2016. Prior to this, all paediatric endoscopy services for children and adolescents were delivered by either general surgeons, paediatric

surgeons or adult gastroenterologists. This, combined with the uneven distribution of pathologists within the subregion creates further challenges. Indeed, one-third of all pathologists in Africa are in South Africa. West Africa (Nigeria, Ghana) and East Africa (Kenya, Uganda and Tanzania) comprise the second highest concentration whereas some countries in sub-Saharan Africa have none. Furthermore, the lack of subspecialist pathologists, poor supporting infrastructure and hence low-quality pathology reports aggravate the situation.[24] Moreover, once IBD diagnosis is confirmed, accessing appropriate treatment is difficult and if achieved, almost impossible to sustain financially as most healthcare services are paid out-of-pocket by the patients and their caregivers.[25] Moreover, there is a lack of registered dietitians in Ghana and the few that exist may lack specialised training in identifying and managing IBD-related malnutrition.[26] In summary, these hurdles heighten the perception that paediatric IBD in Africa is rare and thus support for research and medical education are not prioritised. Moreover, underlying malnutrition may mask, exacerbate or contribute to IBD development and pathophysiology. Taken together, we hypothesise that IBDs in African children may present entirely different subtype(s) yet to be named and may require different approaches to diagnosis, treatment and management. Accordingly, more research and infrastructural resources are needed to appropriately describe the pathogenesis, clinical pathology and appropriate management strategies in countries such as Ghana (figure 1).

## SUGGESTED APPROACH TO PAEDIATRIC IBD IN SUB-SAHARAN AFRICA

A good starting point is promoting awareness of IBD among general paediatricians, paediatric and adult surgeons during their medical training and clinical practice to improve their capacity to delineate, recognise and diagnose IBD from other causes of chronic diarrhoea and infectious colitis commonly seen in African children. Understanding how underlying malnutrition mechanistically contributes to IBD in African children and developing advanced tools to delineate malnutrition from IBD would significantly improve diagnostic accuracy and care and issues of disease management by practitioners would be creditably addressed. The future of IBD care in sub-Saharan Africa also depends on efforts aimed at increasing diagnostic capacities across the region such as postgraduate colleges, institute infrastructure for paediatric gastroenterologists, subspecialty training of pathologists, radiologists, dietitians/nutritionists and all related disciplines. Partnering with global entities such as NNEdPro Global Institute for Food, Nutrition and Health who are committed to ending all forms of malnutrition by 2030 would significantly enhance these educational efforts. Additionally, health insurance coverage for all confirmed paediatric IBD cases would alleviate the financial burden associated with IBD care and significantly improve disease outcomes. Collaborative research on paediatric IBD between African and international partners would also enhance our understanding of how Africa's rich genetic diversity and varied environment influence disease course. These endeavours would also build local research capacity, enhance knowledge exchange, foster innovation and attract funding while addressing global health inequities and ensuring research inclusivity. We hope this editorial stimulate discussion and inspires initiatives to develop solutions to improve the health and well-being of children suffering from IBD in sub-Saharan Africa.

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