

# The burden of irritable bowel syndrome and chronic constipation on health-related quality of life in black Africans: a comparison with healthy control subjects in Côte d'Ivoire, West Africa

This article was published in the following Dove Press journal:  
*Clinical and Experimental Gastroenterology*

Alassan Kouamé Mahassadi  
Paulin Christian Ebela  
Aboubacar Demba Bangoura  
Alain Koffi Attia

Hepatology and Gastroenterology Unit,  
Centre Hospitalier et Universitaire de  
Yopougon, Abidjan, Côte d'Ivoire

**Background:** Although patients with irritable bowel syndrome (IBS) and chronic constipation (CC) have an impaired health-related quality of life (HRQoL), little is known in black African patients compared with control subjects. This study provided the magnitude and the influencing factors of HRQoL impairment in black African outpatients with IBS or CC compared with control subjects using the generic SF-36 questionnaire.

**Materials and methods:** One hundred and four consecutive black African outpatients complaining with IBS (n=72, mean age=38.9 years, female=62.5%) and CC (n=32, mean age=37.4 years, female=75%) met Rome 3 criteria were compared with 210 control subjects (mean age=37.4 years, 63.8% male). The SF-36 scores in all domains of HRQoL with the corresponding physical (PCS) and mental (MCS) composite scores between groups were compared with post hoc analysis and multivariate linear regression analysis for the assessment of the influencing factors.

**Results:** Overall, IBS and CC patients exhibited low SF-36 scores in the 8 domains of HRQoL in comparison with control subjects. IBS patients scored less in mental health (mean difference=-10.3,  $p=0.001$ ), bodily pain (mean difference=-23.5,  $p\leq 0.0001$ ), and social functioning domains (mean difference =-15.1,  $p=0.01$ ) in comparison with CC patients. Post hoc analysis demonstrated a trend down of PCS (mean difference=-12.9,  $p<0.0001$ ) and MCS (mean difference=-11.2,  $p=0.01$ ) disfavoring IBS patients than those with CC in comparison with control subjects. In multivariate linear regression analysis, besides the negative impact of IBS and CC, factors influencing PCS were BMI ( $\beta=0.4$ ;  $p=0.01$ ) and comorbidities ( $\beta=-5.9$ ;  $p=0.002$ ). Those influencing MCS were the presence of remunerated activity ( $\beta=2.7$ ,  $p=0.02$ ), and patient living alone ( $\beta=9.4$ ;  $p=0.04$ ).

**Conclusion:** IBS and CC impact negatively on the HRQoL in black African subjects and more importantly in those with IBS than CC.

**Keywords:** irritable bowel syndrome, chronic constipation, quality of life, SF-36 questionnaire, black Africans

Correspondence: Alassan Kouamé Mahassadi  
Service de médecine et d'hépatogastroentérologie, CHU de Yopougon, 23 BP 621 Abidjan 23, Abidjan, Côte d'Ivoire  
Tel +2252 353 7550  
Email kouame.mahassadi@univ-fhb.edu.ci

## Introduction

Irritable bowel syndrome (IBS) and chronic constipation (CC) are both the most prevalent functional gastrointestinal diseases affecting, respectively, 11.2% and 14% of the individuals worldwide with geographical variations.<sup>1,2</sup>

IBS and CC are not life-threatening diseases.<sup>3</sup> However, both impacts negatively on the health-related quality of life (HRQoL) causing high rates of care

seeking behavior, direct and indirect medical costs, low productivity, and absenteeism.<sup>4-10</sup>

Various tools depicting health impairment are used to assess HRQoL in patients with functional gastrointestinal diseases.<sup>11</sup> Among them, generic questionnaires such as the Medical Outcome Short Form quality of life (SF-36) have shown high accuracy and reliable results in Caucasian and Asian patients depicting low scores of HRQoL in patients with IBS and CC.<sup>4,5,12</sup>

The SF-36 is a psychometric evaluation of well-being in its physical and mental dimensions and comprises 36 items questioning various aspects of health status, particularly physical, psychological, and social functioning aspects.<sup>13</sup> Besides diseases and disabilities, age, gender, body mass index, marital status, employment, and income are closely linked to health quality.<sup>14-17</sup>

The previous population-based studies markedly reported an impaired HRQoL in subjects with IBS or CC compared with healthy control subjects.<sup>4,5</sup> Moreover, IBS and CC exerted psychological distress aggravating the impairment of HRQoL of those affected.<sup>3,18,19</sup>

IBS is subdivided into 4 symptomatic profiles and according to the stool pattern and frequency that are IBS with constipation predominant (IBS-C), IBS with diarrhea predominant (IBS-D), IBS with alternating diarrhea or constipation known as mixed IBS (IBS-M), and unclassified IBS.<sup>3</sup>

IBS and CC are prevalent in Africa and are the main reasons for seeking care amongst outpatients, while IBS-C is likely the most frequent subtype encountered in clinical practice.<sup>20-22</sup>

African subjects with IBS express more mystic beliefs regarding the chronicity and bothersomeness of their symptoms than those with CC that may hamper their health quality.<sup>23</sup> In Nigeria, Ladep et al have reported that black Africans with IBS exhibit low scores of HRQoL and psychological distress.<sup>24</sup> However, to our knowledge, there are no data reporting the magnitude of HRQoL impairment in black African subjects with IBS or CC compared with that of healthy control subjects.

Moreover, symptoms overlap between IBS and CC as subjects with CC may experience occasionally more severe abdominal symptoms (discomfort and bloating) than subjects with IBS-C suggesting a fluctuating score of HRQoL according to symptoms onset.<sup>25,26</sup> Little is known about the HRQoL in black African subjects with IBS or CC and relevant influencing factors.

This study was undertaken to determine firstly, the HRQoL in black African subjects with IBS or CC, compared to that of healthy control subjects and, secondly, to assess factors associated with physical and mental dimensions impairment of HRQoL in patients with IBS and CC in African setting and the role of abdominal pain in patient with CC.

## Materials and methods

### Subjects

One hundred and four consecutive outpatients complaining with IBS (n=72, mean age=38.9 years, female=62.5%) and CC (n=32, mean age=37.4 years, female=75%) met Rome 3 criteria<sup>3</sup> and referred to the gastroenterology units of the three tertiary care university hospitals (Cocody, Yopougon, Treichville) in Abidjan, the economic capital of Côte d'Ivoire from March to September 2016 were enrolled in the study. Outpatients were eligible if they met these following criteria: age  $\geq 15$  years old, absence of concomitant organic gastrointestinal diseases, presence of reading and writing skills, and capable to complete the survey questionnaire. Outpatients with organic gastrointestinal diseases such as infectious diarrhea, fever, hepatomegaly, splenomegaly, peptic ulcer, or having low education level or difficulties for reading and understanding words written in French or refusing to participate in the study were not included. For comparison, 210 control subjects (mean age=37.4 years, 63.8% male) were recruited from 3 cities of Côte d'Ivoire (Abidjan, Grand Bassam, and Bonoua). After they have read the consent form and accepted verbally to participate in the survey, both patients and control subjects were asked to complete the questionnaire. Those aged  $< 18$  years old completed the questionnaire under parental acceptance. The Ethics committee of the Medical and Scientific Board (Direction Medicale et Scientifique) of the teaching hospital of Yopougon approved the protocol of the study, the verbal consent method, and parental acceptance before the completion of the questionnaire.

### The survey questionnaire

The survey questionnaire comprised three sections retrieving social and demographic data, clinical data and items related to SF-36 questionnaire,<sup>13</sup> and stool patterns according to the Bristol stool scale.<sup>27</sup>

In the section retrieving clinical data, subjects were asked to respond to a set of questions (Box 1)

**Box 1** Survey questionnaire

- i-Do you suffer from chronic constipation. Yes or no?
- ii-Do you suffer from irritable bowel syndrome. Yes or no?
- iii-How many times did you suffer from chronic constipation or irritable bowel syndrome? Less than 3 years, between 3 and 5 years, more than 5 years
- iv-Do you have a regular bowel movement. Yes or no?
- v-In these past 4 weeks, do you have difficulties to evacuate stools. Yes or no?
- vi-How many times per week do you have a bowel movement: less than 3 times a week, between 2 and 3 times a week or more than 3 times a week?
- vii-Do you complain abdominal pain or discomfort. Yes or no?
- viii-If so, during these past 4 weeks, how many times have you complain with abdominal pain or discomfort: less than 3 times a week, between 2 and 3 times a week, more than 3 times a week?
- ix-Do you have complaints with abdominal pain or discomfort during these past 3 months, 4 months, 6 months?
- x-Do you have difficulties to evacuate stools during these past 3 months, 4 months, 6 months?
- xi-Please chose on the figure below, the corresponding box (only one choice to be done) depicting the stool pattern that you usually have.
- Type 1: Separate hard lumps
- Type 2: Lumpy and sausage like
- Type 3: A sausage, sharp with cracks in the surface
- Type 4: Like a smooth, soft sausage or snake
- Type 5: Soft blobs with a clear-cut edge
- Type 6: Mushy consistency with ragged edges
- Type 7: Liquid consistency with no solid pieces

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The SF-36 comprised 36 items or questions depicting the impact of diseases or disabilities on the state of well-being.<sup>13</sup> These 36 items are grouped into 8 domains that are: physical activity (AP), role of physical limitation (RPL), role of emotional limitation (REL), bodily pain (BP), general health (GH), social functioning (SF), vitality (VT), and mental health (MH). The 8 domains are aggregated into 2 composites summaries: physical (PCS) and mental (MCS). The SF-36 score of an individual varies from 0 (minimal score) to 100 (maximal score).

## Methods

### Administration of the questionnaire

All patients attending the gastroenterology units for symptoms belonging to functional gastrointestinal diseases at the consultation unit were asked to fill the questionnaire,

after the explanation of the purpose of the survey. Control subjects were recruited in the main streets of the cities mentioned earlier using a face-to-face interview method.<sup>28</sup> Participants read the consent form and those who gave their consent were asked to fill the questionnaire. The questionnaire was completed by participants without any interference of the surveyor. Additional explanations were given by the surveyor to those who expressed difficulties to understand the meaning of some questions without any interference in the choice of the response.

### Collection of data

Social, demographic, and clinical data were retrieved for all participants included in the study comprising, age, gender, medical history, weight, height, body mass index, body mass index, marital status (widowed, married, living with partner, separated), medical history (ongoing disease or treatment), the presence of remunerated activity, stools pattern, the scores of the 8 domains of HRQoL calculated from the 36 items of SF-36 questionnaire (AP, RPL, REL, BP, GH, VT, MH), and the corresponding composites summaries: PCS and MCS.<sup>13</sup>

### Definitions

IBS was defined in those experiencing abdominal pain or discomfort occurring 3 times a week during the previous non-consecutive 3 months and lasting more than 6 months with observed changes in stool pattern and frequency.<sup>3</sup> According to bowel movement habits, IBS-C were those having symptoms of CC as stated earlier and picking out from the questionnaire the images of type 1 or 2 as frequent stool pattern exhibited during the bowel movement. Those with IBS-D were those fulfilling also IBS criteria and picking out from the questionnaire the images of type 6 and 7 as frequent stool pattern exhibited during bowel movement according to Bristol stool scale.<sup>27</sup>

CC was defined in those meeting 2 of these following Rome 3 criteria (Box 2)<sup>3</sup>

CC was ascertained when the subjects picked out from the questionnaire the images stools of type 1 or 2 scales as stool pattern frequently exhibited during bowel movement.<sup>27,29</sup>

Painful CC was defined as abdominal pain or discomfort occurring in those meeting Rome 3 criteria of CC but less than 3 times a week.<sup>3,29</sup>

The non-painful CC was the absence of abdominal pain or discomfort in those meeting Rome 3 criteria of CC.<sup>3,29</sup>

**Box 2** Rome 3 criteria

- i- a stool frequency less than 3 times a week
- ii- a strain during bowel movement occurring more than 25% of defecation
- iii- a sensation of an incomplete evacuation occurring more than 25% of defecation
- iv- a sensation of anal obstruction occurring more than 25% of defecation
- v- using digital maneuvers for stools evacuation more than 25% of defecation
- vi- the onset of these symptoms above lasting more than 6 months and which have occurred non-consecutively 3 months before the study.

The ulcer-like disease was retained in those declaring to suffer from stomach ulcer without providing its assessment by upper digestive endoscopy and in those reporting burn or epigastric pain referring to functional dyspepsia.<sup>30</sup>

## Statistical analysis

Continuous variables were expressed as means and standard deviation if normally distributed, otherwise as median and range. Categorical variables were expressed as number and percentage. The calculation of the 8 domains of HRQoL was assessed using the syntax for SPSS® available on [www.umcg.nl](http://www.umcg.nl) and method described by Ware et al.<sup>31,32</sup> The internal consistency of the SF-36 questionnaire was assessed using the Cronbach's alpha estimate.<sup>33</sup> The mean scores of HRQoL comparison between groups were done using the analysis of variance (ANOVA) with post hoc Bonferroni multiple comparison methods and significance level set at 0.02.<sup>34</sup> The subgroup comparison among IBS and subgroups of CC patients was computed using Kruskal Wallis (KW) for nonparametric multiple comparisons using a SAS macro published by Elliot et al.<sup>35</sup> The absence of finite cut-off of SF-36 scores that indicates a good HRQoL,<sup>36</sup> we decided to use multivariate linear regression analysis to determine factors affecting physical and mental dimensions of HRQoL with PCS and MCS as dependant continuous variables. The adjustment variables were age, gender, BMI, remunerated activity, marital status, ongoing disease or treatment, and duration of the

disease. The independent variables of interest were CC or IBS compared with the control group and CC compared with IBS. All the analysis was computed with SPSS version 16 and SAS version 9.0 using two sided tailed tests with a significance level less than 0.05.

## Results

### The characteristic description of enrollment

CC and IBS were found in women in 62.5% and 75%, respectively. Globally, 93 (89.4%) experienced abdominal pain or discomfort occurring more than 3 times a week in 41 (39.4%) patients, lasting more than 5 years in 55 (63.5%) patients. Irregular bowel movements were reported by 25 (24%) patients and 96 (37.5%) declared having less than 3 stools evacuations per week, mostly of type 1 (39.4%) and type 2 (20.2%) according to the Bristol stool scale. In addition to IBS or CC, 25 (29.8%) patients declared comorbidities (diabetes: 2 patients, arterial hypertension: 6 patients, ulcer-like pain: 23 patients). In contrast with the result of Rome 3 criteria, 54 (51.4%) and 50 (48.1) of interviewed patients self-reported having, respectively, IBS and CC. Baseline characteristics are depicted in [Table 1](#). Based upon Rome 3 criteria, IBS-C was seen in 42 (58.3%) and diarrhea-predominant IBS in only 1 (14.4%) among patients with IBS. The remaining IBS patients (40.1%) were considered as having unclassified IBS ([Table 1](#)).

### Distribution of SF-36 scores in the population of the study

As shown in [Table 2](#), patients with IBS or CC obtained low SF-36 scores in the 8 domains compared to that of control subjects. More importantly, IBS patients had significantly lower SF-36 scores in 6 domains in comparison with CC patients except for PF and VT. Overall, PCS and MCS were profoundly low in IBS patients (mean differences of -30.9 and -23.6, respectively) than that of CC patients (mean differences of -18 and -12, respectively) in comparison with control subjects. Overall, the internal consistency of the SF-36 questionnaire in our study was high with a Cronbach's alpha estimate of 0.87. Within the subgroups, the Cronbach's alpha estimates were 0.84, 0.81, and 0.76 in IBS, CC, and control groups, respectively.

There were any significant differences of the median or mean values of SF-36 scores adjusted with gender ([Table 3](#)) and age ([Figure 1](#)) within all subgroups of subjects with IBS, CC, or control groups.

**Table 1** Baseline characteristics at inclusion

<b>Sociodemographic and clinic parameters</b>	<b>IBS (n=72)</b>	<b>CC (n=32)</b>	<b>Controls (n=210)</b>	
<b>Demographic parameters</b>				P-value
Age (years) [mean(SD)]	38.9(10.5)	37.4(9.3)	37.8(9)	0.6
Age in class (years)[n(%)]				
15–30	14(19.4)	6(19)	45(21.4)	
31–40	29(40.3)	18(56.2)	93(44.3)	
41–50	20(28)	6(19)	55(26.2)	
51–60	6(8.3)	1(3.1)	12(5.7)	
≥61	3(4.2)	1(3.1)	5(2.4)	
Gender (Female)[n(%)]	45(62.5)	24(75)	76(36.2)	<0.0001
BMI	25.1(5.6)	25.9(5.9)	25.4(5)	0.8
<b>Marital status (yes) [no(%)]</b>				<0.0001
Married	33(45.8)	13(40.6)	91(43.3)	
Living with a partner	11(15.3)	2(6.2)	49(23.3)	
Widowed	1(1.4)	0(0)	17(8.1)	
Single	23(31.9)	17(53.1)	38(18.1)	
Living alone	3(4.2)	0(0)	15(7.1)	
<b>Remunerated activity (yes)[no(%)]</b>	46(63.9)	23(71.9)	141(67.1)	0.7
<b>Medical history</b>				0.1
Arterial hypertension	3(4.2)	3(9.4)	18(8.6)	
Diabetes	1(1.4)	1(3.1)	4(1.9)	
Epigastralgia	16(22.2)	7(21.9)	23(11)	
None	51(70.8)	19(59.4)	147(70)	
<b>Comorbidities (yes)[n(%)]</b>	21(28.2)	13(40.6)	63(30)	
<b>Functional symptoms</b>				NA
Abdominal pain or discomfort	72(100)	21(65.6)	34(16.2)	<0.0001
Regularity of bowel movement (yes)[n(%)]	18(25)	7(21.9)	202(96.2)	
Number of bowel movement per week [n (%)]				
<2	25(34.7)	14(43.8)	0(0)	
2–3	27(37.5)	12(37.5)	1(0.5)	
>3	20(27.8)	6(18.8)	208(99)	
<b>Duration of symptoms (years)[n(%)]</b>				NA
<5	25(34.7)	14(43.8)	0	
5–10	19(26.4)	10(31.2)	0	
10–15	15(20.8)	4(12.5)	0	
>15	13(18.1)	4(12.5)	0	
<b>Bristol stool scale [n (%)]</b>				<0.0001
Type 1	26(36.1)	15(46.9)	0(0)	
Type 2	16(22.2)	5(15.6)	6(2.9)	
Type 3	13(18.1)	7(21.9)	13(6.2)	
Type 4	14(19.4)	5(15.6)	97(46.2)	
Type 5	2(2.8)	0(0)	55(26.2)	
Type 6	1(1.4)	0(0)	29(13.8)	
Type 7	0(0)	0(0)	10(4.8)	

**Notes:** The comparison was computed between irritable bowel syndrome and chronic constipation versus controls. NA, non-applicable between the two groups because variables entered in the definition of irritable bowel syndrome or painful chronic constipation (Abdominal pain or discomfort) or not assessed in the control group (duration of symptoms).

**Abbreviations:** IBS, irritable bowel syndrome; CC, chronic constipation; SD, standard deviation.



**Table 2** Mean scores of SF-36 questionnaire items and differences comparison between groups

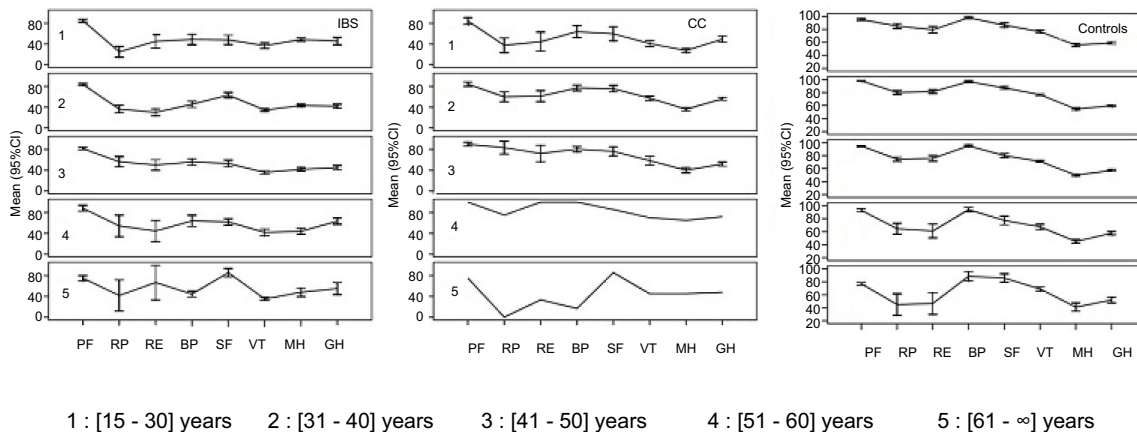
	Mean values (standard deviation)			Mean differences (standard error of difference) between groups					
	IBS	CC	Ct	IBS vs CC	p	IBS vs Ct	p	CC vs Ct	p
PF	83.3(10.8)	85.5(15.4)	95.7(8.6)	-2.1(2.6)	0.4	-12.4(1.4)	0.0001	-10.3(2.8)	0.001
RP	41.3(42.4)	58.6(39.5)	78(28.2)	-17.2(8.8)	0.05	-36.7(5.4)	0.0001	-19.4(5.7)	0.01
RE	41.2(42.8)	60.4(42.7)	77.5(31.2)	-19.2(9.1)	0.04	-36.7(5.4)	0.0001	-17.1(7.9)	0.04
BP	50.5(31)	74(25)	96.3(11.3)	-23.5(6.2)	0.0001	-45.8(3.7)	0.0001	-22.3(4.5)	0.0001
SF	58.1(29)	73.2(26.4)	84.6(22.4)	-15.1(6)	0.01	-26.4(3.8)	0.0001	-11.3(4.9)	0.01
VT	35.8(15.4)	36.3(14.3)	52.7(15.7)	-0.4(3.2)	0.8	-16.9(3.7)	0.0001	-16.5(2.9)	0.0001
MH	44(13.7)	54.3(12)	58.7(12.8)	-10.3(2.8)	0.0001	-14.7(1.8)	0.0001	-4.4(2.4)	0.1
GH	45.8(21.2)	54.4(17.9)	74.5(13.5)	-8.6(4.3)	0.05	-28.7(2.7)	0.0001	-20.1(3.3)	0.0001
PCS	55.2(21.6)	68.1(19.6)	86.1(10.7)	-12.9(4.5)	0.01	-30.9(1.9)	0.0001	-18(3.5)	0.0001
MCS	44.8(20.4)	56(19.1)	68.4(15.3)	-11.2(4.2)	0.01	-23.6(2.6)	0.0001	-12.4(3)	0.0001

**Abbreviations:** IBS, irritable bowel syndrome; CC, chronic constipation; Ct, controls; PF, physical functioning; RP, role of physical; RE, role of emotional; BP, bodily pain; SF, social functioning; GH, general health; VT, vitality; MH, mental health; PCS, physical composite score; MCS, mental composite score.

**Table 3** Distribution of the scores of SF-36 questionnaire according to the gender within the subgroup of subjects with irritable bowel syndrome, chronic constipation, or control subjects

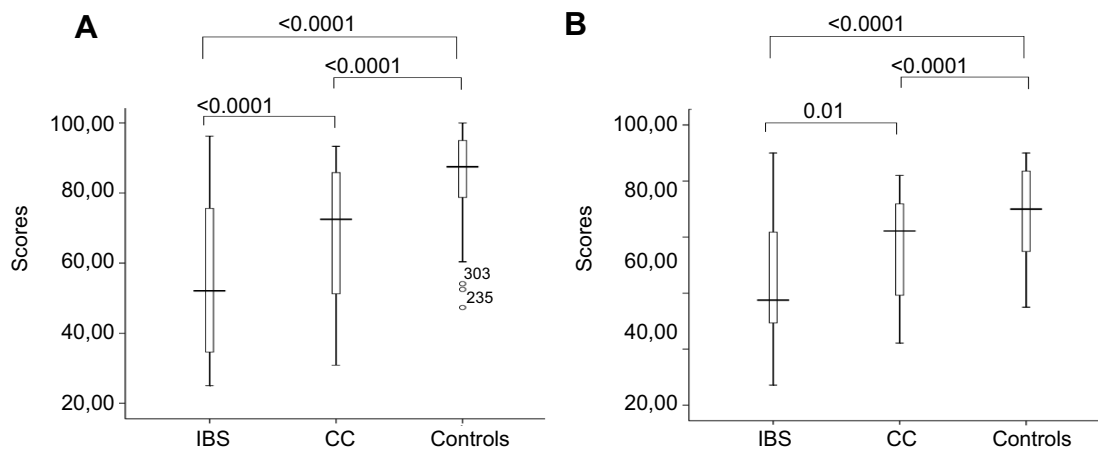
	Median values (range) of SF-36 scores								
	IBS			CC			Control subjects		
	Female	Male	p-value	Female	Male	p-value	Female	Male	p-value
PF	80(35)	85(45)	0.4	85(65)	95(15)	0.1	100(50)	100(45)	0.8
RP	25(100)	25(100)	0.2	63(100)	88(100)	0.7	100(100)	100(100)	0.6
RE	33(100)	100(100)	0.7	67(100)	83(100)	0.9	100(100)	100(100)	0.3
BP	50(100)	67(100)	0.4	75(83)	83(100)	0.6	100(43)	100(86)	0.3
SF	57(100)	57(100)	0.5	71(86)	79(71)	0.6	100(57)	100(71)	0.2
VT	35(80)	35(60)	0.8	40(50)	28(45)	0.4	50(55)	50(60)	0.7
MH	44(56)	40(72)	0.7	54(36)	52(44)	0.5	60(44)	60(60)	0.4
GH	45(80)	50(85)	0.4	55(70)	60(50)	0.9	75(65)	70(50)	0.7
PCS	54(71)	51(70)	0.8	71(63)	83(53)	0.4	88(48)	88(53)	0.5
MCS	37(75)	40(75)	0.9	60(60)	64(59)	0.8	71(54)	69(55)	0.7

**Abbreviations:** IBS, irritable bowel syndrome; CC, chronic constipation; PF, physical functioning; RP, role of physical; RE, role of emotional; BP, bodily pain; SF, social functioning; GH, general health; VT, vitality; MH, mental health; PCS, physical composite score; MCS, mental composite score.



**Figure 1** Distribution and trend of means scores of SF-36 questionnaire items adjusted to age within all subgroups. Lines were smoothed because of the presence of one subject in the belonging age class.

**Abbreviations:** IBS, irritable bowel syndrome; CC, chronic constipation; Ct, controls; PF, physical functioning; RP, role of physical; RE, role of emotional; BP, bodily pain; SF, social functioning; GH, general health; VT, vitality; MH, mental health; PCS, physical composite score; MCS, mental composite score.



**Figure 2** Box plots depicting the distribution and trends of physical (A) and mental (B) composite scores between patients with irritable bowel syndrome, chronic constipation, and control subjects. The box represents the interquartile range; the top and the bottom of the box are, respectively, the 25<sup>th</sup> and 75<sup>th</sup> percentile. The line across the box is the median. The lower and upper values are indicated by the whiskers. Stars and circles represent the outliers and extreme values.

**Abbreviations:** IBS, irritable bowel syndrome; CC, chronic constipation.

### Post Hoc comparisons of the SF-36 scores

Post hoc analysis demonstrated that IBS patients had low PCS (mean difference = -12.9,  $p=0.01$ ) and MCS (mean difference = -11.2,  $p=0.02$ ) compared with CC patients. There was a trend down of PCS and MCS disfavoring IBS patients compared with CC patients and control subjects (Figure 2). IBS patients scored less in MH domain (mean difference = -10.3,  $p=0.001$ ), BP domain (mean difference = -23.5,  $p \leq 0.0001$ ), and SF domain (mean difference = -15.1,  $p=0.01$ ) in comparison with CC patients (Table 2).

### Influence of abdominal pain on HRQoL in patients with CC compared with IBS patients

Among the 32 patients with CC, 21 (65.6%) complained about abdominal pain. There were no differences between age and gender between groups. As shown in Figure 2, the overall comparison of the median score values of PCS ( $p=0.01$ ) and MCS ( $p=0.03$ ) was significantly different between IBS patients and subgroups of patients with no pain and painful CC. The post hoc analysis showed that IBS patients exhibited significant impairment of HRQoL both on its physical (median values of PCS: 52.1 vs 72.5, KW post hoc test = 2.76,  $DF=2$ ,  $p < 0.05$ ) and mental (median value of MCS: 37.5 vs 62.7, KW post hoc test = 2.91,  $DF=2$ ,  $p < 0.05$ ) dimensions than those with painful CC. In contrast, patients with no painful CC have a similar pattern of PCS (72.5 vs 52.1;  $p=ns$ ) and MCS (53 vs 37.5;  $p=ns$ ) in comparison with IBS patients (Figure 3).

### Factors influencing the HRQoL between CC and IBS patients compared with control subjects

#### Influencing factors of HRQoL in comparison with control subjects

In multivariate analysis using control subjects, factors lowering PCS were comorbidities ( $\beta=-5.9$ , 95% IC = -9.7, -2.1,  $p=0.02$ ), IBS ( $\beta=-30.1$ , 95% IC = -34, -26.2,  $p < 0.0001$ ), and CC ( $\beta=-17.3$ , 95% IC = -22.8, -11.9,  $p < 0.0001$ ) and the enhancing factor was BMI ( $\beta=0.4$ , 95% IC = 0.1, 0.7,  $p=0.02$ ).

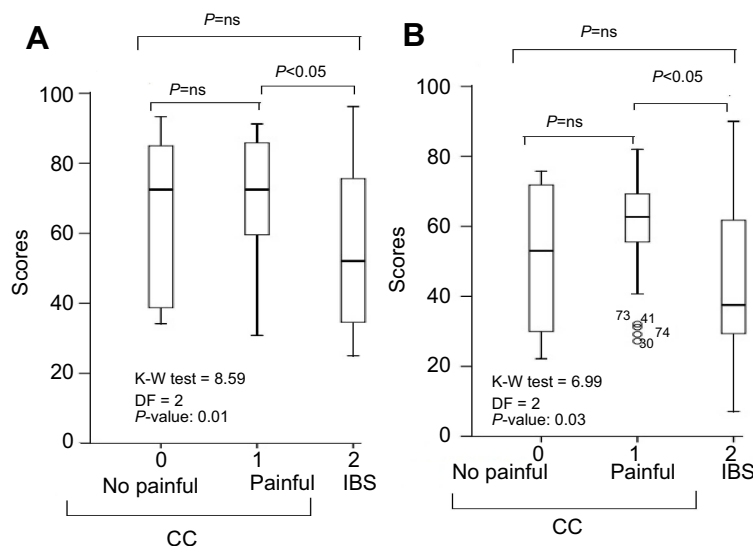
For MCS, the lowering factors were IBS ( $\beta=-23.3$ , 95% IC = -27.9, -18.7,  $p < 0.0001$ ) and CC ( $\beta=-11.8$ , 95% IC = -18.3, -5.3,  $p=0.0004$ ) and the enhancing factors were remunerated activity ( $\beta=2.7$ , 95% IC = 0.4-5.1,  $p=0.02$ ) and patient living alone ( $\beta=9.4$ , 95% IC = 0.6, 18.3,  $p=0.04$ ).

#### Factors influencing the HRQoL in the subgroup of patients with IBS or CC

Both BMI and a remunerated activity remained the enhancing factors of HRQoL when comparing IBS and CC patients. The duration of symptoms did not appear as a lowering factor (Table 4).

### Discussion

We have demonstrated in this study that black African patients with IBS and CC exhibit low HRQoL in comparison with control subjects. The mean differences of SF-36 scores in all dimensions of HRQoL were



**Figure 3** Box plots depicting the distribution, comparison, and trends of physical (A) and mental (B) composite summaries between subjects with no painful chronic constipation (0), painful chronic constipation (1) and irritable bowel syndrome (2). The box represents the interquartile range; the top and the bottom of the box are, respectively, the 25<sup>th</sup> and 75<sup>th</sup> percentile. The line across the box is the median. The lower and upper values are indicated by the whiskers. Stars and circles represent outliers and extreme values. SE: standard error; Q = calculated statistic, Q(0.05): the critical value of tabled Q statistic =2.39. KW = Kruskal Wallis test. **Abbreviations:** IBS, irritable bowel syndrome; CC, chronic constipation.

**Table 4** Predictive factors affecting physical and mental composite summaries of the SF-36 scores in subjects with irritable bowel syndrome compared with those with chronic constipation: multivariate regression analysis

	PCS		p	MCS		p
	β	95%CI		β	95%CI	
BMI	1.2	0.5, 1.9	0.001	0.91	0.2, 1.6	0.01
Remunerated activity (yes)	8.2	0.1, 16.2	0.05	-	-	-
Duration of symptoms (years)						
<5 years	1	-	-	-	-	-
5–10	0.8	-8.8, 10.3	0.9	-	-	-
10–15	-9.9	-20.7, 0.9	0.07	-	-	-
>15	-1.2	-12.4, 10.0	0.8	-	-	-
IBS vs CC	-10.3	-18.5, -2.03	0.02	-9.9	-18.1, -1.9	0.02

**Notes:** Adjusted R for PCS=0.21, Adjusted R for MCS=0.13. Bristol stool scale was not included in the analysis. **Abbreviations:** PCS, physical composite summary; MCS, mental composite summary; β=regression coefficient; CI, confidence interval; BMI, body mass index; IBS, irritable bowel syndrome; CC, chronic constipation.

significantly lower in IBS patients than in CC patients in comparison with controls. Moreover, IBS patients have a profound impairment of HRQoL in comparison with CC patients. Painful constipation did not seem to reduce HRQoL in comparison with IBS. Besides CC and IBS, factors affecting HRQoL were BMI, marital status, and the presence of remunerated activity.

IBS and CC are known to impair HRQoL in several clinical studies from the western and Asian countries. Both IBS and CC patients exhibit lower SF-36 scores in all domains of HRQoL in comparison with US normative

data and elsewhere, similar to our findings in Ivorian patients with IBS and CC.<sup>4,5,12,37</sup>

However, the magnitude of HRQoL impairment may differ between IBS and CC patients regarding the 8 domains of the SF-36 questionnaire in comparison with healthy subjects.<sup>38,39</sup> In the study of Ruiz-Lopez, IBS-C and CC patients exhibit similar scores in the domains of physical functioning, role of physical limitation, role of emotional limitation, and general health except for vitality.<sup>38</sup> Meanwhile in the study of Zhao et al, in Chinese patients using Rome 2 criteria, only mental health was significantly lower in IBS-C patients compared with



CC patients.<sup>39</sup> We have found similar results of the mean SF-36 scores on physical functioning and vitality domains between IBS and CC patients and low scores for other domains, particularly role of emotional limitation, social functioning, general health, and mental health. Moreover, in our study, the HRQoL was more profoundly affected in IBS patients with a disfavoring trend down of physical and mental composite scores. Similar patterns of HRQoL have been described in German subjects with IBS-C compared with those having functional constipation.<sup>40</sup> However, in the study of Wong et al, in the United States, using the same profile of subjects and the SF-12 questionnaire, only the mental composite score was affected in IBS-C patients in comparison with subjects with functional constipation (48.9 vs 52.4,  $p < 0.001$ ).<sup>41</sup>

This discrepancy suggests different patterns of HRQoL. In Côte D'Ivoire, IBS and CC may alter both physical and mental dimensions of state of well-being and, more importantly in IBS subjects that may lead to anxiety and depression as reported in Nigerian IBS subjects.<sup>18,19,24</sup> We have previously reported in Côte d'Ivoire that IBS subjects expressed mystic beliefs than those with CC.<sup>23</sup> The valuable explanation is that, in Africa, the disease perception is surrounded by mysticism leading to psychological distress owing to the chronicity and bothersomeness of the underlying disease.<sup>4-10,42</sup>

IBS patients seeking care exhibit more severe symptoms and a high degree of anxiety compared with non-consulters and display low scores in physical functioning and role of physical functioning.<sup>43</sup> In this study, physical functioning and vitality scores were lower compared with that of control subjects, but similar between IBS and CC patients, suggesting the existence of other factors that could motivate IBS and CC patients to seek care in an African setting.

Painful and no painful CC patients in our study have similar physical and mental composite scores of the SF-36 questionnaire. Painful constipation symptoms did not seem to alter the HRQoL of those with CC in comparison with IBS patients, probably due to the infrequent onset of pain during the course of constipation, even though, painful CC and IBS-C subjects have more symptoms of constipation than those with no painful constipation.<sup>3,29</sup> However, the clinical spectrum of CC and IBS marked by the overlap of their symptoms may explain the same results of physical and mental composite scores of SF-36 questionnaire between non-painful constipation and IBS patients in our study.<sup>3,29</sup>

It was not surprising to find out that comorbidities were factors associated with physical dimension impairment of

HRQoL. Diseases and disabilities are common sources of health quality impairment in human being.<sup>44</sup> The beneficial effect of BMI on the physical component of HRQoL may be attributed to the mean value within the normal range of this variable in our study and closely linked to a better HRQoL in comparison with underweight or overweight subject.<sup>45</sup> A remunerated activity may provide subsidies that promote a better well-being.<sup>14</sup> Moreover, even though marriage status enhances good quality of life, the absence of marriage constraints in the African context may explain probably the favorable mental well-being of those living alone in our study.<sup>46,47</sup>

The main limitation of our study was the absence of finite characterization of the defecation pattern (straining, anal blockage, digital maneuver) exhibited by patients.<sup>3,48</sup> IBS and painful CC are considered by some authors as two entities of the same disease that do not stabilize over time, which can lead to misclassification of patients due to the symptoms overlapping.<sup>40,41,49</sup> Finally, the absence of cultural adaptation of the SF-36 questionnaire into local languages limits the generalizability of our results to nonliterate subjects in Côte d'Ivoire.<sup>50</sup>

However, our study provided new insights into the HRQoL in black African patients with IBS and CC. Finally, the results of HRQoL in patients with IBS and CC were globally in the line of previous reports confirming the reproducibility of the SF-36 questionnaire, whatever the environment and type of patients.<sup>4,5,12</sup>

In conclusion, IBS and CC impact negatively on the HRQoL in black African subjects in Côte d'Ivoire and more importantly in those with IBS-C. The assessment of HRQoL may be used to distinguish between IBS-C subjects and those with painful CC in order to motivate the use of the more psychological treatment in the former in an African setting.<sup>51</sup>

## Acknowledgments

We want to thank Mr Gadafi Iddrisu Balali, Department of Theoretical and Applied Biology, Kwame Nkrumah University of Science and Technology, Kumasi Ghana, for having corrected the English translation of the manuscript.

## Disclosure

Dr Alassan Kouamé Mahassadi reports personal fees and non-financial support from Genix Pharma and Sanofi, outside the submitted work. The authors report no other conflicts of interest in this work.

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