

Racial Differences in the Impact of Irritable Bowel Syndrome on Health-Related Quality of Life

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Goals: To compare the impact of irritable bowel syndrome (IBS) on health related quality of life (HRQOL) for non-white and white IBS patients.

Background: There are no reported data evaluating the HRQOL of non-white persons with IBS.

Study: SF-36 scores are compared between non-white IBS patients ($n = 166$), white IBS patients ($n = 707$), the general US population, and patients with selected chronic diseases.

Results: Of the $n = 166$ non-white IBS patients included for analysis, 66 (40%) described themselves as African-American, 56 (34%) as Hispanic, 25 (15%) as Asian-American, 2 (1%) as Native American and the remaining 17 (10%) as "other." Compared with white IBS patients, non-white IBS patients reported similar decrements in their HRQOL after controlling for age, gender, income and education level. On all 8 SF-36 scales, non-white IBS patients had significantly worse HRQOL compared with the general US population, ($P < 0.001$). Compared with GERD patients, non-white IBS patients scored significantly lower on all SF-36 scales ($P < 0.001$) except physical functioning. Similarly, non-white IBS patients had significantly worse HRQOL on selected SF-36 scales compared with diabetes mellitus and ESRD patients. Non-white IBS patients had significantly better emotional well-being than depressed patients, ($P < 0.001$).

Conclusions: Non-white IBS patients experience impairment in vitality, role limitations—physical, and bodily pain. Yet overall, non-white IBS patients report similar HRQOL to white IBS patients. These data provide the first detailed evaluation of the impact of IBS on HRQOL in non-white IBS patients.

Key Words: health-related quality of life, functional status, irritable bowel syndrome, functional bowel disease

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IBS is a functional disorder of the gut manifesting as chronic or recurrent abdominal pain, discomfort, and alteration of bowel habits.^{1,2} IBS is common with prevalence estimates in developed countries ranging from 14% to 24% in women and 5% to 19% in men.^{1–3} There are only limited data assessing prevalence of IBS in ethnic populations.^{4,5} Although only a fraction of persons with symptoms consistent with IBS seek medical care, those who do seek medical attention for their bowel complaints account for millions of physician visits and medical prescriptions annually.^{6–9} This translates into staggering direct medical care costs.^{6,7} Moreover, population-based surveys indicate greater indirect costs among persons with IBS symptoms. For example, persons with IBS symptoms report missing more work-days and being too ill to work as compared with persons without similar bowel symptoms.⁹

Patient-centered outcome data are now recognized as essential in assessing the impact of chronic disease, such as IBS, on day to day functioning and sense of well-being.^{10–18} Generic HRQOL measures, such as the SF-36 Health Survey, are designed to evaluate aspects of functional status and well-being that are applicable to a population.^{15,19–21} Furthermore, generic instruments can provide a basis for comparing a sample of patients with other groups of chronically ill patients

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or with normative general population data.¹³⁻¹⁵ HRQOL data can assist both medical decision-makers and policy planners in evaluating the impact of a chronic disease and in allocating medical resources for management of patients with chronic disease such as IBS.¹⁸ We previously reported on the impact of IBS on HRQOL in a large cohort of predominantly white (81%) IBS patients seen at a tertiary care medical center.²² Since publication of that report, others have reported similar findings.²³⁻²⁵ However, none of these previously published studies systematically examined potential racial differences in HRQOL.

We hypothesized that the HRQOL of non-white IBS patients would be worse (lower SF-36 scores) than that of white IBS patients. Limited data suggest that as compared with their white counterparts, non-whites report worse HRQOL for certain disease states.²⁶⁻²⁸ Moreover, we hypothesized that the self-reported HRQOL of non-white IBS patients would be significantly worse than that of both the US general population and with selected chronic diseases. In this study, we compare the HRQOL of non-white IBS patients with white IBS patients and with previously reported HRQOL data for the general US population and with selected chronic diseases.

MATERIALS AND METHODS

Subjects and HRQOL Data Collection

Subjects asked to participate were ambulatory adults, age 18 years or older, evaluated at the University of California, Los Angeles (UCLA) Functional Bowel Disease Clinic. Approximately 1/3 of these individuals was self-referred whereas 2/3 were referred by primary care providers or community gastroenterologists. Individuals excluded from participation were those unable to read and understand English or those refusing to provide written informed consent.

From September 1994 to June 1998, the SF-36 Health Survey Version 1 was administered to *n* = 1,433 consecutive ambulatory patients. The SF-36, a self-report, generic HRQOL measure, includes 8 multi-item scales (35 items) that evaluate physical, mental, and social functioning and well-being. An additional single item assesses change in the respondent's health over the past year.^{19,29} The physical functioning scale (10 items) assesses limitations due to health in activities that range from self-care to vigorous physical activities. The role limitations—physical (4 items) and role limitations—mental scales (3 items) measure the extent to which physical health and emotional problems interfere with performing work or other routine daily activities. The social functioning scale (2 items) assesses the extent to which health interferes with social activities. The emotional well-being scale (5 items) assesses mood or affect, including depressive symptoms, anxiety, and positive well-being. Frequency of bodily pain and extent of role interference due to pain are captured by the pain scale (2 items). The vitality scale (4 items) assesses self-perceived en-

ergy level. General health perceptions (5 items) are global evaluations of health, such as feeling well or ill. SF-36 physical and mental health summary scores have also been derived based on weighted combinations of the 8 SF-36 scale scores.³⁰ The SF-36 is scored from 0 (worst health) to 100 (best health). The physical and mental health summary scores have a mean and standard deviation in the general US population of 50 and 10, respectively. Support for the reliability and validity of the SF-36 has been obtained from multiple patient populations and medical conditions.^{20,21,29} In addition, subjects completed 6 questions regarding their age, gender, race, marital status, level of education, and annual household income. Non-whites were defined as those reporting that they were African-American, Hispanic, Asian/Pacific Islander, Native American, or other.

From the *n* = 1,433 consecutive ambulatory patients, 873 patients (707 white (81%) and 166 non-white (19%)) are included in this analysis because they met Rome I criteria or ≥ 3 Manning criteria for the diagnosis of IBS and reported information on race.³⁰⁻³² This standardized definition of IBS was chosen because Rome I and ≥ 3 Manning criteria have been reported to be more stringent^{2,33} (Table 1). Of the *n* = 166 non-white IBS patients included for analysis, 66 (40%) described themselves as African-American, 56 (34%) as Hispanic, 25 (15%) as Asian-American, 2 (1%) as Native American and the

TABLE 1. Rome and Manning Criteria for Diagnosing Irritable Bowel Syndrome

Rome I criteria
≥ 3 months of continuous or recurrent symptoms* of the following:
Abdominal pain or discomfort
Relieved with defecation, or
Associated with a change in frequency of stool, or
Associated with a change in consistency of stool
Two or more of the following, at least on one fourth of occasions or days:
Altered stool frequency or
Altered stool form (lumpy/hard or loose/watery), or
Altered stool passage (straining, urgency, or feeling of incomplete evacuation), or
Passage of mucus, or
Bloating or feeling of abdominal distention
Manning criteria
Abdominal pain relieved by defecation
Looser stools with onset of pain
Increased frequency of stools with onset of pain
Abdominal distension
Passage of mucus per rectum
Sensation of incomplete evacuation of stool

*Evaluation includes a physical examination, flexible sigmoidoscopy, and additional testing when indicated.

remaining 17 (10%) as “other.” The remaining 560 patients either failed to meet the specified criteria for IBS ($n = 483$), were less than 18 years of age ($n = 73$) or failed to provide demographic information on race ($n = 4$) and are excluded from this analysis.

Comparison Groups

We compared the HRQOL of non-white IBS patients with white IBS patients. To compare the 8 individual SF-36 scale scores between the non-white and white IBS cohorts, we transformed the raw scale scores (0–100 possible range) linearly to t -scores (mean = 50, SD = 10).

In addition, we compared the HRQOL of non-white IBS patients with previously published SF-36 data for the US general population ($n = 2,474$), depression patients ($n = 502$), and diabetes mellitus patients (DM, $n = 541$) from the medical outcomes study (MOS).^{34,35} The majority of the MOS study participants was female (61%), married (55%), white (78%), and high school educated (86%). The mean age of the MOS sample was 46 years.³⁵ The normative general population comparison group was a random sample of US adults.²⁹

In addition, we compared the HRQOL of the non-white IBS patients with published SF-36 data in a large cohort of patients with moderate to severe symptomatic gastroesophageal reflux disease (GERD, $n = 516$) and a cohort of dialysis-dependent, end-stage renal disease patients (ESRD, $n = 165$).^{36,37} The GERD sample had a mean age of 46 years (SD = 14) and was primarily women (58%) who were white (86%). The dialysis-dependent ESRD patients had a mean age of 53 years, were also primarily women (52%) and non-white (53%).

Adjusted SF-36 scale scores were estimated for white and non-white IBS patients using linear regression. The model included race (where non-white = 1), age (continuous), gender (where male = 1), income (\$0–\$39,999; \$40,000–\$79,999; \geq \$80,000) and education (high school or less, some college, college degree, or higher). The intercept value generated for each scale score represented the age, gender, income, and education-adjusted score for whites. Non-white scale scores were calculated by adding the beta for non-whites to the intercept value. Significance of differences between age and gender-adjusted SF-36 scale scores for the IBS patients compared with the general US population data and selected chronic diseases was estimated using 2-sided t tests. Comparisons were adjusted by selecting for each IBS patient the mean general population SF-36 scale score for the appropriate age and gender subgroup. The Hochberg correction for multiple comparisons was used.^{38,39}

RESULTS

Sample Characteristics

The mean age of the non-white IBS cohort ($n = 166$) was significantly younger than the white IBS patients ($n = 707$),

42.9 years (SD = 13 years), and 46.1 years (SD = 14 years) respectively, ($P = 0.005$). The majority of both the non-white and white IBS cohorts was female, 71% and 66%, respectively. Demographic information regarding marital status, education level, and annual household income is provided in Table 2.

Comparison of Non-white and white IBS Cohorts

Adjusting for age and gender, the non-white and white IBS patients had the lowest observed SF-36 scores in the social functioning (39.1, 40.1), bodily pain (39.3, 39.3), vitality (39.7, 40.8), general health perceptions (40.0, 40.8), and role limitations due to physical health scales (40.1, 39.2), respectively. Moreover, compared with the white IBS patients, non-white IBS patients reported significantly worse HRQOL on 2 of the 8 SF-36 scales, physical functioning, and emotional well-being ($P = 0.04$ and $P = 0.03$). However, when additionally adjusting for income and education level, these significant differences disappeared. Therefore, when controlling for age, gender, as well as income and education, non-white IBS patients were found to have similar HRQOL on all 8 SF-36 scales. Moreover, the physical and mental health summary scores did not differ significantly between the non-white and white IBS subgroups. See Table 3 and Table 4.

We further evaluated the HRQOL of the non-white IBS patients by self-reported race/ethnicity (Black, Latino, Asian, and “other”). See Table 5 and Table 6. As compared with the white IBS patients, black IBS patients reported the worst physical functioning, yet after adjusting for multiple comparisons (Hochberg method), this observed difference was not statistically different. We also found that “other” non-white patients reported worse emotional well-being, vitality, and general health perceptions compared with white IBS patients, yet when adjusting for multiple comparisons, these observed significant differences went away. There were no significant differences in HRQOL between Latinos or Asians compared with white IBS patients. When comparing by specific race/ethnicity, SF-36 physical and mental health summary scores were not significantly different from white IBS patients. See Tables 5 and 6.

Comparison of Non-white IBS Patients with US General Population Data

Compared with the US general population (adjusted to the age and gender of our non-white IBS sample), the non-white IBS patients scored significantly lower on all of the 8 SF-36 scales ($P < 0.05$ based upon Hochberg correction for multiple comparisons) and on the physical and mental health component summary scores ($P < 0.05$). See Table 7.

TABLE 2. Non-White and White IBS Cohorts Characteristics

IBS Cohort	Non-White (n = 166)	White (n = 707)	P-Value
Gender, n of females (%)	118 (71)	469 (66)	0.27**
Age in years, mean (SD)	42.9 (13)	46.2 (14)	0.005B
Race, n (%)			
White	—	707 (81)	
African-American	66 (8)	—	
Hispanic	56 (6)	—	
Asian/pacific Islander	25 (3)	—	
Native American	2 (0.2)	—	
Other	17 (2)	—	
Marital Status, n (%)	N missing = 4	N missing = 8	0.66*
Never married	50 (31)	208 (30)	
Married	668 (41)	322 (46)	
Separated	8 (5)	17 (2)	
Divorced	33 (20)	127 (18)	
Widowed	5 (3)	25 (4)	
Education level, n (%)	N missing = 3	N missing = 8	0.02*
8 th grade or less	1 (1)	2 (<1)	
Some high school	6 (4)	19 (3)	
High school completed	17 (10)	61 (9)	
Vocational school or some college	63 (39)	232 (33)	
College graduate	41 (25)	166 (24)	
Professional or graduate degree	35 (21)	219 (31)	
Total household income, n (%)	N missing = 15	N missing = 105	<0.001*
<\$10,000	20 (13)	37 (6)	
\$10,000–\$19,000	24 (16)	52 (9)	
\$20,000–\$29,000	13 (9)	66 (11)	
\$30,000–\$39,000	27 (18)	75 (12)	
\$40,000–\$49,000	14 (9)	68 (11)	
\$50,000–\$59,000	11 (7)	55 (9)	
\$60,000–\$69,000	5 (3)	40 (7)	
\$70,000–\$79,000	16 (11)	49 (8)	
≥\$80,000	21 (14)	160 (27)	

*P-value based on Cochran test for trend 2-sided test

**P-value based on Chi square 2-sided test

B P-value based on ANOVA

Comparison of Non-white IBS Patients with GERD Patients

Compared with moderate to severe symptomatic GERD patients, the non-white IBS patients scored significantly lower on all SF-36 scales ($P < 0.05$) except physical functioning. See Table 7. Moreover, the physical and mental health summary scores were significantly lower in the non-white IBS patients compared with the GERD patients, ($P < 0.05$).

Comparison of Non-white IBS Patients with Diabetes Mellitus Patients

Non-white IBS patients reported significantly worse on 5 of 8 SF-36 scales compared with diabetes mellitus patients: bodily pain, emotional well-being, role limitations due to emotional problems, vitality, and social functioning. Moreover, non-white IBS patients reported similar physical functioning, role limitations due to physical health, and general health perceptions as diabetic patients. See Table 7.

TABLE 3. Comparison of SF-36 Scale Scores Between Non-White and White IBS Cohorts Adjusting for Age and Gender Only

SF-36 Scale	Non-White Cohort (n = 163)	White Cohort (n = 691)	P-Value
Physical functioning	45.2	46.8	0.04
Role limitations—physical	40.1	39.2	0.37
Bodily pain	39.3	39.3	0.99
General health	40.0	40.8	0.44
Emotional well-being	42.0	44.0	0.03
Role limitations—emotional	43.2	44.0	0.44
Vitality	39.7	40.8	0.31
Social functioning	39.1	40.1	0.26
Aggregate physical health	49.0	49.0	0.73
Aggregate mental health	49.5	49.5	0.47

SF-36 scores (t-scores) are adjusted for age and gender using linear regression. SF-36 scale scores have a possible range from 0–100 with higher scores indicating better HRQOL. *P*-values were adjusted for multiple comparisons using Hochberg method.

Comparison of Non-white IBS Patients with Depression Patients

We found that non-white IBS patients reported significantly better emotional well-being and role limitations due to emotional problems than patients with depression did. See Table 7. The non-white IBS patients also reported better physical functioning, role limitations due to physical health, and social functioning, yet these scores failed to reach statistical sig-

TABLE 4. Comparison of SF-36 Scale Scores Between Non-White and White IBS Cohorts After Adjusting for Age, Gender, Income, and Education

SF-36 Scale	Non-White Cohort (n = 163)	White Cohort (n = 691)	P-Value
Physical functioning	50.5	50.9	.65
Role limitations—physical	45.3	43.6	.13
Bodily pain	44.3	43.4	.28
General health	43.9	45.0	.93
Emotional well-being	46.6	47.8	.21
Role Limitations—emotional	47.7	47.8	.92
Vitality	44.8	44.8	.99
Social functioning	44.6	44.2	.72
Aggregate physical health	53.6	52.8	.33
Aggregate mental health	51.5	52.3	.37

SF-36 scores (t-scores) are adjusted for age, gender, education, and income using linear regression. SF-36 scale scores have a possible range from 0–100 with higher scores indicating better HRQOL.

nificance. Overall, non-white IBS patients had significantly better physical and mental health summary scores compared with depressed patients in the MOS.

Comparison of Non-white IBS Patients and Dialysis-dependent End-stage Renal Disease Patients

Non-white IBS patients had significantly better physical functioning and role limitations due to physical health compared with dialysis-dependent ESRD patients. However, non-white IBS patients had significantly worse self-reported emotional well-being and interestingly, there was no significant difference between non-white IBS and ESRD patients in terms of role limitations due to emotional problems, vitality, bodily pain, social functioning, and general health perceptions. See Table 7.

DISCUSSION

IBS impacts greatly upon HRQOL.^{22–25} As with other chronic diseases, the goals of treatment of persons with IBS are to relieve symptoms and improve functioning. Thus, the measurement of HRQOL in persons with IBS is a relevant and important complement to currently prevailing outcome measures in IBS (eg, patient-reported improvement in abdominal discomfort, diarrhea and/or constipation symptoms, abdominal bloating, or a symptom severity score). We previously reported on the impact of IBS on HRQOL in 877 IBS patients seen in an academic, tertiary care setting.²² We demonstrated that patients with IBS experience significant impairment in their HRQOL as compared with normative US population data as well as with several selected chronic diseases. However, that sample was almost exclusively white (81%). Although evidence suggests that IBS has no specific race or ethnic boundaries, there are no reported data evaluating the impact of IBS in a non-white population.

In this study we initially found that non-white IBS patients, seen in the same tertiary care setting, had significantly impaired HRQOL compared with white IBS patients, with the most pronounced decrements being found in social functioning, bodily pain, vitality, general health perceptions, and role limitations due to physical health. Interestingly however, these observed reductions in HRQOL disappeared after additionally controlling for income and education. Based on data from other medical conditions, we hypothesized that the self-reported HRQOL of non-white IBS patients would be worse than that of white IBS patients.^{26–28} Interestingly however, the non-white and white IBS cohorts had equivalent SF-36 physical and mental health summary scores. These findings may be secondary to non-whites underreporting their IBS symptoms, better family/social support systems for non-white patients, demographic characteristics, their greater religiosity, or self-selection of the non-white cohort.^{40–42}

TABLE 5. Comparison of SF-36 Scale Scores of IBS Cohorts by Race/Ethnicity Adjusting for Age and Gender Only

SF-36 Scale	White n = 691	Black n = 64	Latino n = 55	Asian n = 25	Other n = 19
Physical functioning	77.3 (1.0)	69.2* (2.8)	78.3 (3.0)	79.9 (4.3)	65.8* (4.9)
Role limitations—physical	44.6 (1.9)	50.9 (5.4)	45.6 (5.8)	52.8 (8.3)	37.1 (9.5)
Bodily pain	50.4 (1.1)	48.3 (3.2)	50.0 (3.4)	60.1 (5.0)	45.4 (5.7)
General health	53.6 (1.0)	52.8 (3.0)	54.6 (3.2)	51.7 (4.7)	42.9* (5.4)
Emotional well-being	64.1 (0.9)	59.6 (2.5)	62.7 (2.7)	67.8 (4.0)	47.6† (4.5)
Role limitations—emotional	61.5 (1.8)	56.7 (5.3)	64.7 (5.7)	55.3 (8.3)	53.5 (9.5)
Vitality	41.9 (2.2)	36.2 (3.0)	43.6 (3.2)	49.1 (4.6)	27.5‡ (5.3)
Social functioning	61.5 (1.0)	58.4 (3.6)	59.8 (3.9)	65.3 (5.6)	50.9 (6.4)
Physical health composite	49.0 (0.4)	49.1 (1.3)	48.9 (1.3)	48.9 (1.9)	48.9 (2.2)
Mental health composite	49.5 (0.4)	49.6 (1.3)	49.5 (1.3)	49.5 (1.9)	49.5 (2.2)

Standard errors in parentheses.

**P* < 0.05

†*P* < 0.001

‡*P* < 0.01 versus white IBS patients.

P-values adjusted for multiple comparisons using Hochberg method.

We also found that the non-white IBS cohort had significantly worse HRQOL on all SF-36 scales as compared with the general US population, adjusted to the age and gender distribution of the non-white IBS cohort. Similarly, we found that except for physical functioning, IBS patients have significantly worse HRQOL on all other scales compared with patients with moderate to severe GERD, a disease previously shown to be associated with significantly reduced HRQOL.^{36,43}

In comparing non-white IBS patients with diabetes mellitus patients from the MOS, we again found that the non-white

IBS patients had significantly worse HRQOL on several SF-36 scales. Moreover, the non-white IBS patients reported physical functioning, role limitations due to physical health, and general health perceptions no different from the diabetes mellitus group. These findings are provocative given that almost 50% of the diabetes mellitus cohort from the MOS had one or more physician-reported complications related to their diabetes (eg, retinopathy, nephropathy, and neuropathy). Similarly, we found there was no significant difference between non-white IBS and dialysis-dependent ESRD patients in terms of reported role limitations due to emotional problems, vitality,

TABLE 6. Comparison of SF-36 Scale Scores of IBS Cohorts by Race/Ethnicity After Adjusting for Age, Gender, Income, and Education

SF-36 Scale	White n = 691	Black n = 64	Latino n = 55	Asian n = 25	Other n = 19
Physical functioning	86.6 (1.8)	80.7 (2.9)	90.4 (3.1)	87.9 (4.2)	85.3 (5.2)
Role limitations—physical	59.3 (3.5)	68.0 (5.7)	63.3 (6.1)	65.8 (8.2)	58.4 (10.3)
Bodily pain	59.6 (2.1)	59.6 (3.4)	61.8 (3.7)	68.3 (5.0)	61.2 (6.2)
General health	62.0 (2.0)	61.9 (3.2)	65.4 (3.4)	59.4 (4.7)	55.1 (5.8)
Emotional well-being	70.6 (1.7)	67.8 (2.7)	70.8 (2.9)	73.3 (3.9)	54.8 (4.8)
Role limitations—emotional	74.2 (3.5)	73.4 (5.6)	83.48 (6.0)	66.0 (8.1)	69.3 (10.2)
Vitality	50.0 (2.0)	45.8 (3.2)	54.5 (3.4)	56.7 (4.6)	40.1 (5.7)
Social functioning	71.4 (2.3)	70.5 (3.8)	70.5 (4.0)	73.7 (5.5)	65.4 (6.8)
Physical health composite	52.8 (0.8)	52.7 (1.3)	54.1 (1.4)	53.9 (1.9)	53.9 (2.4)
Mental health composite	52.2 (0.8)	51.1 (1.4)	53.0 (1.9)	52.2 (2.4)	46.3 (0.9)

Standard errors in parentheses. SF-36 scores are adjusted for age, gender, income, and education using linear regression. SF-36 scale scores have a possible range from 0–100 with higher scores indicating better HRQOL.

TABLE 7. SF-36 Scale Scores in Non-White IBS Patients Compared with US General Population, Gastroesophageal Reflux Disease, Depression, Diabetes Mellitus, and End-Stage Renal Disease Patients

SF-36 Scale	IBS n = 163	US Population n = 2474	GERD n = 516	DM n = 541	DEP n = 502	ESRD n = 165
Physical functioning	73.5 (23.9)	85.2 (7.2)*	79.7 (22.6)	67.7 (28.7)*	71.6 (27.2)*	52.4 (29.7)*
Role limitations—physical	47.8 (45.8)	82.1 (7.6)*	71.6 (37.6)*	56.8 (41.7)	44.4 (40.3)	33.1 (39.7)*
Bodily pain	50.4 (27.5)	74.8 (5.0)*	58.1 (21.0)*	68.5 (26.5)*	58.8 (26.7)*	59.4 (29.7)
General health	52.1 (25.8)	72.3 (4.9)*	67.7 (20.5)*	56.1 (21.1)	52.9 (23.0)	44.3 (24.8)
Emotional well-being	60.5 (21.8)	74.2 (1.7)*	71.2 (18.5)*	76.7 (18.3)*	46.3 (20.8)*	70.1 (20.4)*
Role limitations—emotional	58.8 (45.5)	81.6 (2.5)*	77.8 (35.2)*	75.6 (36.6)*	38.9 (39.8)*	60.0 (43.9)
Vitality	39.6 (25.5)	60.5 (2.6)*	57.4 (19.9)*	55.7 (21.6)*	40.1 (21.1)	46.2 (24.1)
Social functioning	59.1 (30.6)	83.4 (2.4)*	79.1 (23.2)*	82.0 (25.0)*	57.2 (27.7)	64.2 (29.8)
Physical health composite	49.0 (1.4)	50.0 (10.3)*	45.9 (9.3)*	41.5 (11.3)	45.0 (12.1)*	35.1 (20.1)*
Mental health composite	49.5 (0.5)	48.2 (10.2)*	49.2 (10.3)	51.9 (9.6)*	34.8 (12.2)*	47.8 (17.3)

* $P < 0.05$ compared with non-white IBS sample adjusted for multiple comparisons using Hochberg method. SF-36 scale scores have a possible range from 0–100 with higher scores indicating better HRQOL. Scores are mean SD.

IBS, irritable bowel syndrome; DM, diabetes mellitus; US Pop, United States population; DEP, depression; GERD, gastroesophageal reflux disease; ESRD, end-stage renal disease.

bodily pain, social functioning, and general health perceptions. These findings are again quite striking because dialysis dependent ESRD patients are often debilitated and report being medically disabled.^{44,45}

Anxiety and depression are believed to play a major role in symptom development, symptom expression, and health-care seeking behavior of IBS patients.^{46–48} When we compared the HRQOL of non-white IBS patients with the sample of MOS depression patients, we found that the non-white IBS patients scored significantly better on the SF-36 mental health measures. The “depression” patients in the MOS were defined as having noteworthy depressive symptoms if they exceeded a cutoff point on an 8-item depression symptom scale.^{49,50} Similar to the findings in our previous study of a predominantly white IBS cohort, non-white IBS patients had significantly better SF-36 physical and mental health summary scale scores than patients with clinical depression. The observed mean difference of 15 on the SF-36 mental health summary score (49.5 vs. 34.8) is considered to be large.⁴⁸

There are several strengths of this study. These strengths include the use of an unambiguous and strict definition of IBS, a psychometrically sound HRQOL measure, a similar accepted methodology comparing impact of disease with other chronic diseases, a large sample of non-white IBS patients, and results that appear robust to adjustment for multiple comparisons.^{22,51}

There are however, limitations to this study. The non-white IBS population studied is from a large, tertiary care referral center and therefore may reflect more severe disease as compared with non-white IBS patients who do not seek medical care or who are seen in a primary care or community gastroenterology practice setting. However, one could postulate that because non-English speaking IBS patients were excluded

from participating in this study, we may have actually had a healthier sample of non-white patients. Because of limitations in healthcare delivery that can occur secondary to language barriers, patients with such barriers may report at a more advanced stage of disease or with worse disease. We were likely under powered to assess differences in HRQOL between different non-white groups (eg, comparing African-Americans, Hispanics, Asians/Pacific Islanders), which would have provided additional information on which race/ethnic groups were most vulnerable to an impeded HRQOL. Moreover, although it would have been enlightening, we were unable to compare our non-white IBS patients with non-white “controls” because to the best of our knowledge, such non-white US general population SF-36 data do not exist. Other study limitations exist as well. Although the general US population data was age and gender adjusted, we compared our IBS sample with mean scores from published data. Unfortunately it was not possible to control for age, gender, race, education or co-morbidity in comparing the non-white IBS patients with the GERD, diabetes mellitus, depression or dialysis-dependent ESRD samples.

In summary, non-white IBS patients seen in a tertiary care setting experience similar impairment in their HRQOL as compared with white IBS patients. Moreover, non-white IBS patients report significantly worse HRQOL as compared with normative US population data, as well as with selected chronic diseases. These HRQOL data, combined with the significant prevalence of IBS in the general population, further emphasize the overall human and social cost of IBS. Additional studies evaluating impact of disease, HRQOL, demographic variables (eg, age, gender, income, education, and marital status), and health care seeking behavior in non-white IBS sufferers are urgently needed.

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