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Health-Related Quality of Life Differences between African-Americans and Non-Hispanic Whites with Head and Neck Cancer

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Abstract

Background—Cancers of the head and neck are associated with detriments in health-related quality of life (HRQOL), however little is known about different experiences between African Americans and non-Hispanic whites.

Methods—HRQOL was measured by the Functional Assessment of Cancer Therapy – Head and Neck approximately five months post diagnosis among 222 cancer patients from North Carolina. Higher scores represent better HRQOL. Regression models included sociodemographic characteristics and clinical factors.

Results—African Americans reported higher Physical Well-Being than Caucasians (adjusted means 23.1 vs 20.9). African Americans with incomes <\$20,000 reported higher Emotional Well-Being (21.4) and fewer head and neck symptoms (22.0). Non-Hispanic whites making <\$20,000 reported the poorest Emotional Well-Being (17.3) while African Americans making >\$20,000 reported the most head and neck symptoms (18.7).

Conclusions—Further investigation is needed to explore variation in HRQOL experiences among different race and socio-economic groups that may inform resource allocation to improve cancer care.

Keywords

health-related quality of life; head and neck cancer; African Americans

INTRODUCTION

In 2012, an estimated 52,610 individuals in the United States will be diagnosed with head and neck cancer and approximately 11,500 Americans are expected to die from a head and neck cancer.¹ Cancers of the head and neck include a diverse group of malignant neoplasms that are grouped together due to similarities in pattern of spread, staging, and treatments.²

Disease- and treatment-related morbidity and symptom burden can have deleterious effects upon mood, sleep quality, physical function and social function.²⁻⁹ Physical side effects from treatment (surgery, radiation, and/or chemotherapy) include voice loss, difficulty eating, taste changes, difficulty swallowing, difficulty breathing, fatigue, pain, and disfigurement.⁸⁻¹¹ Depression is common among patients with head and neck cancer even before the start of treatment and increases during treatment.^{2,9,12-14} Some studies have found 40–46% of patients screened positive for depressive symptoms.¹³⁻¹⁴ Sleep disturbances are also common.¹⁵ Together, the symptom burden, poor mental health, and decreased functioning (i.e., communication, eating, breathing, sleep, socialization) all have a negative effect on quality of life, especially in the area of social well-being.⁸⁻⁹ Inability to communicate or to share meals at restaurants with friends and family members then further have a negative impact on mental health.

The burden of head and neck cancer is particularly great on African Americans.¹⁶⁻¹⁸ Compared to non-Hispanic Whites, African Americans tend to be diagnosed with head and neck cancer at a younger age, at a more advanced stage, and with reduced survival probability.^{17,18} In addition, some studies have found that African Americans are under treated for cancer relative to non-Hispanic Whites.¹⁹ As a result, African Americans suffer greater morbidity and mortality due to head and neck cancer than other races/ethnicities.¹⁶⁻¹⁸ To the best of our knowledge, there are no large population-based studies evaluating differences in health-related quality of life (HRQOL) between African Americans and non-Hispanic whites with head and neck cancers.

To address this critical knowledge gap, a HRQOL study was incorporated into the Carolina Head and Neck Cancer Epidemiology Study (CHANCE). The CHANCE study is one of the largest population-based molecular epidemiology studies of head and neck cancer (oral, pharynx, larynx) conducted in the United States, to date, with 1,396 patients participating from across North Carolina. In studying the experiences of head and neck cancer survivors and disparities in HRQOL among African Americans, the goal is to help health care professionals more effectively manage the impact of treatment on patients' quality of life. Given the health disparities reported for African Americans in terms of disease stage and survival rates, it was expected that African Americans would report poorer HRQOL than non-Hispanic whites. In addition, lower income African Americans would disproportionately be affected, as low socioeconomic status has been related to poorer access to health care and poorer HRQOL.²⁰⁻²² This hypothesis is consistent with the Behavioral Model for Vulnerable Populations which suggests that both race/ethnicity and SES impact health status.^{23,24}

MATERIALS AND METHODS

Participants

The Carolina Head and Neck Cancer (CHANCE) Study included cases, aged 20–80, who were residents of a 46 county region in North Carolina, with a newly diagnosed first primary invasive squamous cell carcinoma between January 1, 2002 and February 28, 2006.²⁵ This study was approved by the Institutional Review Board of the University of North Carolina at Chapel Hill. Patients were excluded if they had tumors of the lip, salivary glands,

nasopharynx, nasal cavity, and nasal sinuses. Individuals with carcinomas of other histologies, carcinomas at other head and neck sites, or a history of recurrent or second primary tumors, were also not eligible. Using rapid case ascertainment conducted through the North Carolina Central Cancer Registry, newly-diagnosed cancer cases were identified, and reported to the study office every month. Pathology reports and corresponding slides of tumor specimens from the patient's diagnostic surgery were obtained and histologic confirmation was verified by the study pathologist.

After physician notification, potentially eligible participants (able to read/write English, cognitively able to self-report) were first contacted by mail and then by nurse-interviewers to verify eligibility and schedule a baseline interview. Written informed consent was obtained prior to the interview. From the baseline interview process, permission to obtain medical records was obtained. The medical records were collected and abstracted in order to obtain comprehensive information on each patient's first course of treatment (usually within 6 months of initial diagnosis) and information on pertinent co-morbid conditions.

Measures

The HRQOL assessment was incorporated in the CHANCE protocol in 2005 among a subcohort of 267 patients invited to participate. The in-person interview collected data on individuals' sociodemographic characteristics including age (less than 50, 50–64, 65–74, and 75 or more years), sex (male or female), race (African American or Non-Hispanic White), education (high school graduate or less, some college, or college degree or higher), marital status (living alone or living with spouse or significant other), and insurance status (none, private, government, multiple insurance types). Participants reported their health behaviors as they relate to tobacco use (never, former, recently quit, current smoker) and alcohol use (never, former, recently quit, current drinker). Individuals also reported their height and weight (for calculating body mass index, BMI; categorized as underweight/normal, overweight, obese) and comorbid conditions including anemia, liver disease, hepatitis, cardiovascular disease, pulmonary disease, renal disease, diabetes, and cancers other than head and neck. The comorbid conditions variable was categorized as no versus one or more chronic conditions. Patients also self-reported type of treatment they received (e.g., surgery, radiation, chemotherapy) and if they were currently using a feeding tube.

For HRQOL, individuals completed the Functional Assessment of Cancer Therapy – Head and Neck (FACT-H&N) Questionnaire.^{26,27} The FACT-H&N included the FACT-G which assesses Physical Well-Being (7 questions; score range 0–28; minimally important difference, MID, = 2–3 points), Social/Family Well-Being (7 questions; score range 0–28; MID not available), Emotional Well-Being (6 questions; score range 0–24; MID = 2 points), and Functional Well-Being (7 questions; score range 0–28; MID = 2–3 points).^{28,29} The FACT H&N includes 12 additional questions on symptoms and issues specific to head and neck cancers including ability to eat, dry mouth, difficulty breathing, difficulty swallowing, voice quality, ability to communicate, body image, pain in the mouth, throat or neck, and alcohol and tobacco use. Following the FACT H&N scoring guidelines, we summed across 9 of the 12 questions in the FACT H&N (excluding alcohol and tobacco use, and pain) to create the Head and Neck Cancer Subscale (HNCS) score (score range 0–36; MID = 3–4 points). All items on the FACT-H&N use a 7 day reference period and include 5 response options: “Not at all”, “A little bit”, “Somewhat”, “Quite a bit”, and “Very much”. High scores on all scales of the FACT-H&N represent better HRQOL.²⁹ MIDs are defined as the smallest difference in scores between groups that patients perceive as important or personally meaningful, either beneficial or harmful.^{29,30}

Reliability for three of the FACT subscales was satisfactory for group comparisons: Physical Well-Being = 0.87, Social Well-Being = 0.75, Functional Well-Being = 0.88. However,

reliability was insufficient (i.e., below .70) for Emotional Well-Being ($r = 0.62$) and the H&N Cancer subscale ($r = 0.49$). Subscale reliabilities by race were similar to the reliabilities with the groups combined.

The HRQOL data collection was conducted between April 18, 2005 and December 19, 2005. FACT-H&N questionnaires were mailed to 267 survivors within approximately one year after diagnosis. The total number of questionnaires obtained during this period was 233. The response rate was excellent: 87.3% overall, and 84.9% among African-Americans, and 89.5% among whites. After eliminating ineligible patients (6) and those with extensive missing data (5), HRQOL and other data were available for a total of 222 patients (54 African Americans; 168 non-Hispanic whites). The sample ($n = 222$) with baseline HRQOL data did not significantly differ from the rest of the total cohort on the basis of stage, tumor site, type of treatment, age, sex, and race.

Clinical data was abstracted from the patients' medical records including tumor site (oral, laryngeal, pharyngeal), stage (I, II, III, IV), time from diagnosis to HRQOL questionnaire administration (0 to 6 months, > 6 to 12 months, and > 12 months), lymph node status (yes, no), and angiolymphatic invasion (yes, no).

Data Analyses

Demographic and clinical characteristics were summarized within each race group and overall. Comparisons of proportions between the two race groups were based on chi-square test at .05 significance level. Analysis of variance (ANOVA) or t-tests were used to compare the unadjusted means on the FACT HRQOL subscales between the two race groups. Linear regression models were used to model each of the FACT HRQOL subscales regressed on demographic and clinical characteristics. To identify factors that are related to the FACT HRQOL subscales, backward variable selection procedures were used. The initial full model contained all variables listed in the first column of Table 1 and the interaction between race and income. Because of the large number of candidate variables (22) and relatively limited sample size ($n = 222$), we used .10 significance level for the deletion criterion. Race was forced in the model regardless of whether it was statistically significant, since it was the primary focus for this study. The variable selection procedure kept the hierarchical structure of the model such that the model would include both the main effects for race and income if the interaction between them was statistically significant. In addition to the terms related to race and income, the final model only included the variables significantly associated with the FACT HRQOL subscale. Adjusted means and the associated standard error are presented for the final model. The adjusted means for different levels of a factor are evaluated at the mean level of the other variables in the model. Since all the covariates are categorical, the mean of a variable is equivalent to the proportion of that category in the sample. Analyses were performed using GLMSELECT and GLM procedures in SAS[®]9.2.

With the current study sample size of 54 African Americans and 168 non-Hispanic whites and at the .05 significance level, power for the study was 38%, 49%, and 79% to detect an MID of 2 points for the Functional Well-Being, Physical Well-Being, and Emotional Well-Being subscales, respectively; and power was 61% to detect an MID of 3 points for the H&N Cancer subscale.

RESULTS

Table 1 provides a summary of the demographic and clinical characteristics for the 222 participants in the study stratified by race, including African Americans ($n = 54$) and non-Hispanic whites ($n = 168$). Compared to non-Hispanic whites, African Americans were poorer (70% with income less than \$20,000 compared to 26% of whites), less educated (78%

with high school degree or less compared to 54% of whites), living alone (59% alone compared to 31% of whites), receiving insurance through Medicare or Medicaid (61% compared to 32% of whites), and smoked in their lifetime (98% compared with 79% of whites). African Americans were marginally more likely ($p = .0541$) than non-Hispanic whites to have been diagnosed with laryngeal cancer (46% vs. 32%, respectively), and less likely to have oral cancer (39% vs 58%, respectively). On average the time from diagnosis to survey ranged from 1 to 43 months with the average time since diagnosis about 4.8 months (4.5 months for African Americans and 4.9 months for non-Hispanic whites).

Unadjusted mean scores and standard deviations for each of the FACT subscales (Physical Well-Being, Emotional Well-Being, Social Well-Being, Functional Well-Being, and Head and Neck (H&N) concerns) are provided in Table 2. For each outcome (i.e., FACT subscale), Table 3 includes the adjusted means and standard errors (se) controlling for each variable that remained in the model after using backward regression selection methods.

FACT Physical Well-Being Subscale

African Americans had statistically significantly higher (better) Physical Well-Being scores than non-Hispanic whites, with adjusted PWB means of 23.1 and 20.9, respectively (Table 3). This difference exceeds the MID for the PWB subscale. Poorer Physical Well-Being for those with head and neck cancer was associated with having 4 or more individuals in the household, younger age, lower education, government insurance, current smoker or recently quit smoking, diagnosed with cancer within 6 months from survey, having a feeding tube, and having received radiation treatment.

FACT Emotional Well-Being Subscale

There was a significant race by income interaction for Emotional Well-Being. Low income non-Hispanic whites reported the poorest Emotional Well-Being (adjusted mean = 17.3). In contrast, low income African-Americans reported the highest Emotional Well-Being (adjusted mean = 21.4) relative to the other groups. This difference exceeds the MID for the subscale. In addition, poorer Emotional Well-Being was found to be statistically significantly related to current smoker, having one or more comorbid conditions, and having laryngeal or pharyngeal cancer.

FACT Social/Family Well-Being Subscale

There was no significant relationship between race and Social Well-Being. Poorer Social Well-Being was associated with lower income, living alone, current alcohol use, having one or more comorbid conditions, having laryngeal cancer, and having stage III or IV cancer.

FACT Functional Well-Being Subscale

There was no significant relationship between race and Functional Well-Being. Worse functioning was statistically significantly associated with having 4 or more individuals in the household, having no insurance, being a current smoker, having one or more comorbid conditions, having stage III cancer, within 6 months from cancer diagnosis, having a feeding tube, and having received radiation treatment.

FACT Head and Neck Cancer Subscale

There was a significant race by income interaction for head and neck concerns. African Americans with income greater than \$20,000 reported the most problematic symptoms and concerns associated with head and neck cancer (adjusted mean = 18.7). Lower income African Americans reported fewer problems (adjusted mean = 22.0) relatively. This difference exceeds the MID for the subscale. In addition, more head and neck concerns was

associated with having 4 or more individuals in the household, lower education levels, having one or more comorbid conditions, having stage III or IV cancer, having a feeding tube, and having received radiation treatment.

HRQOL Differences by Race for Individuals Within 6 Months from Diagnosis

Since approximately 86% of the cancer patients were within 6 months from diagnosis, we performed a sensitivity analysis to see if the race effects we observed in the full sample for the HRQOL outcomes differed if we excluded those who completed the HRQOL questionnaire greater than 6 months from diagnosis. The findings restricted to those within 6 months from diagnosis were consistent with the full sample for the domains of PWB ($p = .03$) and EWB ($p = .01$ for race by income interaction; $p = .02$ for race main effect). However for those whose cancer diagnosis was within 6 months, there was no significant interaction between race and income for the FACT H&N Cancer subscale ($p = .17$). For these individuals, being in radiation treatment ($p < .01$) was associated with more H&N Cancer symptoms.

DISCUSSION

This is one of the first population-based studies to examine differences in health-related quality of life between African Americans and non-Hispanic whites in North Carolina who have a head and neck cancer. With an average of about 5 months from diagnosis to survey, African Americans reported better Physical Well-Being than non-Hispanic whites at a magnitude that exceeds what is considered the minimally important difference (MID) estimate. These differences remained even when limiting the sample to individuals within 6 months from diagnosis. There were no race differences for Social or Functional Well-Being. A more complex race by income interaction was observed for Emotional Well-Being and for Head and Neck Cancer specific concerns and symptoms.

There are a number of underlying factors that may account for the differences in HRQOL experiences among African Americans and non-Hispanic whites with head and neck cancer. Tobacco and alcohol use are primary risk factors associated with the development of head and neck cancer.^{31–37} They are also behavioral factors associated with poorer HRQOL.^{38,39} In our cohort, only 2% of African Americans never smoked, compared to approximately 21% of non-Hispanic whites who never smoked. At the time of the survey, we found equal percentages (26%) of current smokers; however, 46% of African Americans recently quit smoking since being diagnosed with cancer, relative to 22% of non-Hispanic whites. We included history of tobacco use as a covariate and thus differences in other factors were adjusted for tobacco use.

A similar trend was observed with alcohol use; however it was not significantly different between the two groups. Approximately 4% of African Americans never drank alcohol compared to 13% of non-Hispanic whites. African Americans reported slightly lower levels of current drinking relative to whites (20% versus 26%, respectively); however, a greater percentage of African Americans recently quit drinking than non-Hispanic whites (37% versus 26%, respectively).

Lower socio-economic status (SES) also is a major risk factor for head and neck cancer as well as it is associated with poorer HRQOL. Individuals with low SES often have no or inadequate health insurance and poorer access to healthcare.⁴⁰ Low SES can have a significant effect on HRQOL.^{41,42} A number of studies have found a significant number of patients with head and neck cancer who became disabled after cancer diagnosis, ranging from 33% to 52%^{21,43,44}, impacting their ability to work and, thus, lowering their SES. In our sample of individuals with head and neck cancer in North Carolina, African Americans

had disproportionally lower income levels (70% of African Americans with income below \$20,000 relative to 26% of non-Hispanic whites) and lower education levels (78% of African Americans only had a high school education or less relative to 54% of non-Hispanic whites). Further, health insurance coverage varied by race. African Americans reported 17% with private insurance (49% for whites), and 61% with government insurance (32% for whites), and 15% of African Americans reported no health insurance relative to 9% for whites.

We found two significant income-by-race interactions in this study. African Americans with income greater than \$20,000 reported the most problems associated with Head and Neck Cancer concerns and symptoms (e.g., difficulty eating, voice quality, unhappy with appearance of face and neck). In contrast, lower income African Americans reported the least concerns and symptoms relative to the other groups. However, the income-by-race interaction was not significant when limiting the sample to individuals within 6 months from diagnosis. The other significant interaction was that lower income African Americans reported better Emotional Well-Being compared to other groups, while lower income non-Hispanic whites reported the poorest Emotional Well-Being. These differences exceeded the MID estimates emphasizing their clinical importance. Also, the interaction remained even after limiting the sample to individuals within 6 months from diagnosis.

There are few studies in cancer that have examined HRQOL differences by race.⁴⁵ In a sample of 1,428 cancer patients (80% had head and neck cancer) participating in Radiation Therapy Oncology Group (RTOG) trials, Movsas et al found no statistically significant differences in Physical, Social, or Emotional Well-Being scores between African Americans and whites.⁴⁵ In a study by Rao et al.⁴⁶ among 502 African Americans and 396 non-Hispanic whites with AIDS-related malignancies or breast, colon, head and neck (28 whites, 45 African Americans), and lung cancer, African Americans reported poorer Physical and Social Well-Being but better Emotional Well-Being than non-Hispanic whites. Better coping strategies, close-knit friends and family, and spirituality were speculated, but not empirically tested, to contribute to better Emotional Well-Being for African Americans.^{16,46,47}

Beyond the cancer literature, epidemiologic studies have found that, compared to non-Hispanic whites, African Americans have lower rates of mental health disorders even after controlling for SES, despite poorer physical health.⁴⁸⁻⁵¹ According to one theory for this finding by Jackson, African Americans engage in more poor health behaviors (e.g., smoking, alcohol use) because they are the most accessible coping strategies for disadvantaged groups.^{51,52,53} These behaviors act on common biologic structures and process associated with pleasure and reward systems; thus alleviating stress.^{51,54-57} While we can't confirm this theory, it does provide one possible explanation for our finding of better Mental Well-Being among African Americans compared to non-Hispanic whites.

One of the strengths of this study is that the FACT instruments have been extensively used in other cancer studies in the US. Table 4 compares the unadjusted mean scores for the African Americans and non-Hispanic whites in the present study with the general US population means and with other published head and neck cancer studies. Since we don't have access to the data from these other sources, we cannot perform formal statistical testing; however, we observe differences between our study and other studies based on the magnitude of differences between study results compared to published MIDs on the FACT subscales.²⁹ Compared to the US general population, the African Americans and non-Hispanic whites appear to have similar levels of PWB and EWB, better SWB, but decreased FWB.²⁹ Lack of differences between the US general population and the individuals with head and neck cancer may be partially explained by a response shift; that is, cancer patients may experience a recalibration of what Physical Well-Being (e.g., pain, fatigue) and

Emotional Well-Being (e.g., depressive mood and anxiety) means to them and how they may be affected by it.⁵⁸⁻⁶¹ This cross sectional study cannot empirically evaluate this cognitive process.

The HRQOL of individuals with head and neck cancer observed in this study were relatively comparable to patients in other published studies with head and neck cancer patients, but there were some differences noted below. The original validation study of the FACT-H&N (List et al, 1996) included 151 patients who were receiving or had completed treatment (63%) and included African Americans (31%).²⁷ Compared to the List et al study, the participants in this current study appear to have better EWB, but worse FWB. The Pandey et al (2009) study included 123 patients with head and neck undergoing active treatment.² PWB appears to be worse, but FWB appears to be better for individuals in the Pandey et al study relative to the individuals in the current study.² Rogers et al. evaluated HRQOL in 65 head and neck cancer patients approximately 6 months from diagnosis and off treatment.³ The individuals in Rogers et al. study appear to have worse SWB but better FWB than the individuals in the current study.³ Both Pandey et al. and Rogers et al. studies used a different number of items to calculate the Head and Neck subscale scores from this study; thus we could not compare their scores to ours.^{2,3}

This study had several limitations. The HRQOL study was added on after the parent study had begun, thus resulting in lower sample sizes. Thus, power for many of our comparisons was reduced, impacting standard error estimates. This limited our ability to fully explore differences by race for each tumor site or for different treatment modalities. The survey was done after diagnosis and baseline pre-diagnosis HRQOL data were not available; thus, we could not look at changes in HRQOL before or at diagnosis. Also, the reliability for the FACT Emotional Well-Being and the H&N subscales were not sufficient for group level measurement indicating the measure was not precise for differentiating among our groups; however we were able to still detect racial differences on these subscales. Further, we could not include a control group (i.e., those without cancer) to help us disentangle what may be underlying causes of lower HRQOL in respect to background variables such as SES. Last, the samples are limited to patients residing in North Carolina; thus, we cannot generalize results to other regions of the country. Together, it is important for future research to replicate the findings observed in this study and to look more in depth at race and SES differences by specific cancer sites and types and phases of treatment.

Despite its limitations, this study advances our knowledge of the effects of head and neck cancer and its treatment on the lives of African Americans. The study sample was based on a large population-based study with collection of covariates and medical history data. This study found that Social and Functional Well-Being was similar between African Americans and non-Hispanic whites; however, there was a race by income level interaction for Emotional Well-Being and Head and Neck cancer symptoms. Surprisingly, low income African Americans reported better HRQOL on these two outcomes relative to the other groups. Further, African Americans reported better Physical Well-Being than non-Hispanic whites. Underlying reasons for this finding will have to be explored in further studies. It is hoped that future studies of the HRQOL of individuals with head and neck cancer will consider over sampling under served populations (e.g., African Americans, Hispanics, and low income) to allow us to better understand the health disparities among these populations and look for opportunities to provide better psycho-social support services to improve their care.

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Table 1

Distribution of demographics and clinical characteristics by race for individuals with head and neck cancer

Demographic and Clinical Characteristics	African Americans (% of N = 54)	Non-Hisp. Whites (% of N = 168)	Total (% of N = 222)
Age (years)			
< 50	22%	22%	22%
50–64	56%	48%	50%
65–74	15%	24%	22%
75+	7%	7%	7%
Income *			
\$0 to < \$20,000	70%	26%	36%
\$20,000 +	30%	74%	64%
Number supported in household			
1 to 3 individuals	89%	85%	86%
4 or more individuals	11%	15%	14%
Sex			
Male	83%	76%	77%
Female	17%	24%	23%
Education *			
High school or less	78%	54%	60%
Some college	19%	24%	23%
College degree or higher	3%	22%	18%
Marital Status *			
Living with spouse or partner	41%	69%	62%
Living alone	59%	31%	38%
Health insurance coverage *			
None	15%	9%	10%
Private	17%	49%	41%
Government	61%	32%	39%
Multiple	7%	10%	9%
Tobacco use *			
Never smoked	2%	21%	16%
Former smoker	26%	32%	30%
Recently quit smoking	46%	22%	28%
Current smoker	26%	26%	26%
Alcohol Use			
Never drank alcohol	4%	13%	11%
Former alcohol drinker	39%	35%	36%
Recently quit drinking alcohol	37%	26%	28%

Demographic and Clinical Characteristics	African Americans (% of N = 54)	Non-Hisp. Whites (% of N = 168)	Total (% of N = 222)
Current alcohol drinker	20%	26%	25%
Body mass index (BMI)			
Underweight/Normal	46%	34%	37%
Overweight	28%	35%	33%
Obese	26%	32%	30%
Comorbid conditions (sum)			
0	50%	54%	53%
1+	50%	46%	47%
Cancer type			
Oral	39%	58%	53%
Laryngeal	46%	32%	36%
Pharyngeal	15%	10%	11%
Stage of cancer			
I	31%	25%	27%
II	9%	20%	18%
III	15%	13%	13%
IV	44%	42%	43%
Time from diagnosis to survey			
0 to 6 Months	87%	85%	86%
7 to 12 Months	9%	10%	10%
> 12 Months	4%	5%	5%
Lymph nodes			
No	74%	69%	70%
Yes	24%	30%	29%
Angiolymphatic invasion			
No	87%	78%	80%
Yes	9%	7%	7%
Missing	4%	15%	13%
Feeding tube			
No	74%	76%	76%
Yes	26%	24%	24%
Received radiation treatment			
No	22%	27%	26%
Yes	78%	73%	74%
Received Surgery			
No	52%	39%	42%
Yes	48%	61%	58%
Received Chemotherapy			
No	54%	60%	58%

Demographic and Clinical Characteristics	African Americans (% of N = 54)	Non-Hisp. Whites (% of N = 168)	Total (% of N = 222)
Yes	46%	40%	42%

Note:

* Statistically significant difference between African Americans and non-Hispanic whites, $p < .05$.

Table 2
Unadjusted mean scores and standard deviations (SD) for the FACT general and head and neck cancer specific subscales (n = 222).

Demographic or Clinical Characteristic	Physical Well-Being mean (SD)	Emotional Well-Being mean (SD)	Social Well-Being mean (SD)	Functional Well-Being mean (SD)	H&N Cancer mean (SD)
Race					
African American	19.15 (6.41)	19.87 (4.61)	21.67 (5.76)	16.09 (7.78)	20.87 (8.47)
Non-Hisp. White	19.38 (6.89)	18.50 (4.46)	23.43 (4.43)	17.03 (7.31)	21.07 (8.36)
Income					
\$0 to < \$20,000	17.98 (6.95)	18.47 (5.18)	21.57 (5.62)	14.81 (7.19)	20.21 (7.97)
\$20,000 +	20.10 (6.55)	19.04 (4.11)	23.82 (4.12)	17.94 (7.33)	21.49 (8.59)
Race x Income					
Af-Am * < \$20,000	19.57(6.07)	20.45(4.07)	21.31(6.40)	15.91(7.41)	22.35(7.61)
Af-Am * \$20,000	18.16(7.26)	18.50(5.60)	22.52(3.89)	16.50(8.84)	17.38(9.60)
White * < \$20,000	16.58(7.44)	16.72(5.46)	21.81(4.90)	13.84(6.92)	18.33(7.88)
White * \$20,000	20.34(6.44)	19.11(3.91)	23.98(4.13)	18.13(7.14)	22.01(8.35)
# supported in house					
1 to 3 individuals	19.70(6.80)	18.95(4.48)	23.03(5.02)	17.03(7.45)	21.51(8.44)
4 or more individ.	17.03(6.17)	18.13(4.84)	22.77(3.57)	15.42(7.15)	18.03(7.39)
Age (years)					
< 50	18.80 (6.67)	18.56 (4.82)	22.54 (3.98)	16.78 (7.25)	20.42 (8.76)
50-64	18.85 (7.11)	18.29 (4.66)	23.09 (5.31)	16.74 (7.66)	20.49 (8.66)
65-74	20.34 (6.24)	20.17 (3.95)	23.52 (3.55)	17.36 (7.09)	22.55 (7.54)
75+	21.31 (5.93)	19.48 (3.68)	22.17 (7.05)	15.58 (7.78)	22.01 (7.50)
Sex					
Male	19.45 (6.48)	18.96 (4.60)	23.00 (4.61)	16.50 (7.37)	20.54 (8.48)
Female	18.90 (7.71)	18.40 (4.28)	23.00 (5.60)	17.86 (7.55)	22.67 (7.84)
Education level					
High school or less	17.80 (7.11)	18.19 (5.04)	22.85 (4.97)	15.64 (7.55)	19.95 (8.29)
Some college	20.76 (6.05)	19.67 (3.86)	23.34 (4.71)	18.08 (7.13)	21.50 (8.39)
College degree +	22.69 (4.54)	19.95 (2.88)	23.06 (4.6)	19.13 (6.63)	24.08 (8.00)

Demographic or Clinical Characteristic	Physical Well-Being mean (SD)	Emotional Well-Being mean (SD)	Social Well-Being mean (SD)	Functional Well-Being mean (SD)	H&N Cancer mean (SD)
Marital Status			*		
Living w/spouse	19.71 (6.93)	18.83 (4.45)	23.84 (4.17)	17.00 (7.39)	21.38 (8.32)
Living alone	18.69 (6.46)	18.84 (4.68)	21.62 (5.51)	16.48 (7.49)	20.43 (8.47)
Health insurance	*			*	*
None	17.70 (6.49)	17.87 (4.87)	22.49 (4.30)	12.70 (7.21)	16.58 (8.55)
Private	20.48 (6.60)	18.99 (3.95)	23.63 (4.69)	18.94 (6.79)	22.41 (8.67)
Government	18.16 (6.93)	18.64 (5.12)	22.18 (5.24)	15.71 (7.27)	20.49 (7.94)
Multiple	20.97 (6.20)	20.05 (3.85)	24.24 (3.69)	16.45 (8.48)	22.05 (7.01)
Tobacco use	*	*		*	
Never smoked	22.69 (4.55)	20.06 (2.50)	23.53 (3.43)	18.70 (7.14)	23.22 (8.37)
Former smoker	20.46 (6.00)	19.84 (4.23)	23.67 (5.02)	18.53 (6.71)	21.73 (8.02)
Recently quit	17.87 (6.63)	18.36 (4.61)	22.82 (4.55)	15.94 (7.41)	20.03 (8.76)
Current smoker	17.44 (7.91)	17.40 (5.31)	22.06 (5.57)	14.51 (7.78)	19.88 (8.19)
Alcohol Use					*
Never drank	21.03 (7.64)	20.01 (3.75)	23.41 (4.03)	18.76 (8.22)	24.08 (7.95)
Former drinker	18.68 (6.63)	18.34 (4.65)	22.96 (4.94)	16.58 (7.36)	20.08 (7.71)
Recently quit	18.42 (6.81)	19.38 (4.35)	23.62 (3.70)	15.08 (7.17)	19.12 (8.33)
Current drinker	20.56 (6.35)	18.42 (4.81)	22.16 (6.01)	18.24 (7.12)	23.23 (8.87)
Body mass index					
Underwt./Normal	19.82 (6.24)	18.64 (4.73)	22.75 (4.83)	16.88 (6.86)	21.96 (9.10)
Overweight	18.75 (7.22)	18.88 (4.82)	23.47 (3.93)	16.26 (7.81)	20.74 (8.04)
Obesity	19.35 (6.92)	19.01 (3.97)	22.79 (5.69)	17.30 (7.71)	20.18 (7.78)
Comorbid condition					
0	19.34 (6.66)	18.41 (4.67)	22.43 (5.53)	16.29 (7.42)	21.10 (7.78)
1+	19.31 (6.91)	19.30 (4.34)	23.63 (3.84)	17.38 (7.41)	20.93 (9.02)
Cancer type		*	*	*	
Oral	20.28 (6.54)	19.53 (3.84)	23.68 (4.38)	17.88 (6.92)	21.69 (8.49)
Laryngeal	18.58 (7.09)	18.13 (5.30)	21.88 (5.43)	16.01 (8.15)	20.86 (8.15)
Pharyngeal	17.17 (6.19)	17.78 (4.52)	23.29 (4.41)	14.24 (6.53)	18.40 (8.29)

Demographic or Clinical Characteristic	Physical Well-Being mean (SD)	Emotional Well-Being mean (SD)	Social Well-Being mean (SD)	Functional Well-Being mean (SD)	H&N Cancer mean (SD)
Stage of cancer	*			*	*
I	22.56 (5.53)	19.65 (4.66)	23.27 (4.99)	20.61 (6.94)	27.21 (6.59)
II	19.46 (7.24)	17.97 (5.42)	24.00 (4.12)	17.26 (7.99)	22.36 (7.88)
III	15.68 (6.22)	17.81 (3.72)	21.33 (5.18)	12.52 (6.06)	16.83 (6.23)
IV	18.37 (6.66)	19.00 (4.21)	22.92 (4.84)	15.56 (6.82)	17.91 (7.83)
Time (dx. to survey)				*	
0 to 6 months	19.08 (6.89)	18.73 (4.51)	22.91 (4.93)	16.44 (7.21)	20.99 (8.38)
> 6 mo to 12 mo	22.09 (4.95)	20.45 (3.70)	23.26 (4.78)	21.00 (7.45)	21.77 (7.73)
> 12 months	17.80 (6.92)	17.20 (5.85)	24.10 (2.69)	14.50 (8.86)	20.00 (10.1)
Lymph nodes					
No	19.01 (6.98)	18.64 (4.66)	22.81 (4.84)	16.56 (7.60)	20.80 (8.39)
Yes	20.29 (6.05)	19.36 (4.22)	23.33 (4.86)	17.74 (6.80)	21.63 (8.48)
Angiolympatic invasion					
No	19.03 (6.82)	18.66 (4.71)	22.67 (5.06)	16.70 (7.38)	21.08 (8.19)
Yes	20.13 (6.18)	18.81 (4.32)	24.34 (3.66)	16.07 (8.41)	19.59 (11.1)
Missing	20.74 (6.72)	19.94 (3.23)	24.33 (3.46)	17.86 (7.27)	21.46 (8.06)
Feeding tube	*			*	*
No	20.93 (6.08)	18.99 (4.63)	23.09 (4.86)	18.42 (7.19)	23.47 (7.59)
Yes	14.33 (6.38)	18.36 (4.20)	22.71 (4.78)	11.76 (5.67)	13.41 (5.74)
Received radiation	*			*	*
No	23.43(4.88)	19.38(4.28)	23.70(4.66)	20.86(6.82)	27.84(6.44)
Yes	17.87(6.75)	18.64(4.61)	22.75(4.88)	15.37(7.10)	18.61(7.63)
Received surgery	*			*	*
No	16.94(6.97)	18.51(4.79)	22.49(4.96)	14.26(6.83)	18.14(7.64)
Yes	21.05(6.07)	19.07(4.33)	23.36(4.72)	18.64(7.30)	23.10(8.28)
Received chemo.	*			*	*
No	21.17(6.04)	18.92(4.80)	23.24(4.72)	18.84(7.31)	24.25(7.67)
Yes	16.77(6.90)	18.72(4.15)	22.66(4.99)	13.97(6.62)	16.55(7.20)

Note:

* indicates statistically significant differences among the groups ($p < .05$). High scores on all FACT subscales reflect better health-related quality of life.

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Table 3

Adjusted Mean FACT HRQOL Scores Stratified by Significant Predictors

Demographic or Clinical Characteristic	Physical Well-Being mean (se)	Emotional Well-Being mean (se)	Social Well-Being mean (se)	Functional Well-Being mean (se)	H&N Cancer mean (se)
Race[†]	*	**			
African American	23.10(1.37)	20.39(0.72)	22.32(0.73)	16.05(1.39)	20.34(1.21)
Non-Hisp. White	20.91(1.08)	18.17(0.49)	22.93(0.50)	16.10(1.12)	20.22(0.87)
Income			†		
\$0 to < \$20,000		19.34(0.59)	21.93(0.59)		20.85(1.06)
\$20,000 +		19.23(0.65)	23.31(0.61)		19.72(1.04)
Race x Income		**			*
Af-Am < \$20,000		21.43(0.79)			21.99(1.31)
Af-Am \$20,000		19.35(1.12)			18.68(1.72)
White < \$20,000		17.25(0.74)			19.70(1.23)
White \$20,000		19.10(0.51)			20.75(0.82)
# supported in house	*			†	*
1 to 3 individuals	23.36(1.05)			17.03(1.05)	21.57(0.81)
4 or more individ.	20.66(1.46)			15.12(1.51)	18.99(1.32)
Age (years)	*				
< 50	20.30(1.17)				
50–64	19.90(1.12)				
65–74	22.77(1.49)				
75+	25.07(1.94)				
Sex	<i>not a significant predictor</i>				
Education level	*				*
High school or less	20.29(1.21)				18.79(0.91)
Some college	22.75(1.32)				20.16(1.11)
College degree +	22.99(1.40)				21.89(1.37)
Marital Status			*		
Living alone			21.91(0.63)		

Demographic or Clinical Characteristic	Physical Well-Being mean (se)	Emotional Well-Being mean (se)	Social Well-Being mean (se)	Functional Well-Being mean (se)	H&N Cancer mean (se)
Living w/spouse			23.33(0.55)		
Health insurance				*	
None	†				
Private	23.39(1.69)			14.01(1.70)	
Government	23.27(1.38)			18.21(1.22)	
Multiple	20.37(1.15)			16.28(1.22)	
Tobacco use				15.79(1.79)	
Never smoked	†	*		*	
Former smoker	23.71(1.49)	20.36(0.89)		16.14(1.57)	
Recently quit	22.61(1.26)	19.98(0.69)		17.67(1.32)	
Current smoker	21.27(1.32)	18.68(0.65)		16.17(1.33)	
Alcohol Use				14.32(1.33)	
Never drank			†		
Former drinker			22.75(1.03)		
Recently quit			22.66(0.58)		
Current drinker			23.70(0.70)		
Body mass index			21.38(0.70)		
<i>not a significant predictor</i>					
Comorbid condition				*	*
0		†			
1+		19.87(0.57)	23.34(0.59)	17.24(1.20)	21.32(0.99)
Cancer type					
Oral		18.70(0.58)	21.90(0.56)	14.91(1.27)	19.24(1.01)
Laryngeal		†			
Pharyngeal		20.08(0.55)	22.86(0.55)		
Stage of cancer					
I		18.76(0.59)	21.50(0.59)		
II		19.02(0.92)	23.50(0.99)	*	**
III			23.31(0.71)	18.69(1.39)	23.62(1.18)
			24.35(0.88)	16.27(1.53)	20.28(1.36)
			20.62(0.89)	13.45(1.54)	18.76(1.37)

Demographic or Clinical Characteristic	Physical Well-Being mean (se)	Emotional Well-Being mean (se)	Social Well-Being mean (se)	Functional Well-Being mean (se)	H&N Cancer mean (se)
IV			22.20(0.58)	15.89(1.27)	18.46(1.05)
Time (dx. to survey)	*			*	
0 to 6 months	20.26(0.88)			14.49(0.90)	
> 6 mo to 12 mo	23.21(1.47)			18.77(1.58)	
> 12 months	22.55(2.06)			14.96(2.16)	
Lymph nodes	<i>not a significant predictor</i>				
Angiolympatic invasion	<i>not a significant predictor</i>				
Feeding tube	**			**	**
No	24.32(1.12)			17.97(1.15)	23.27(0.89)
Yes	19.70(1.33)			14.18(1.38)	17.29(1.20)
Received radiation	**			**	**
No	24.04(1.36)			17.85(1.42)	22.95(1.21)
Yes	19.97(1.06)			14.30(1.10)	17.62(0.86)
Received surgery	<i>not a significant predictor</i>				
Received chemo.	<i>not a significant predictor</i>				

Note: Adjusted mean scores are only provided for variables significantly related to the outcome measure (** $p < .01$, * $p < .05$, † $p < .10$). Final model was obtained based on backward variable selection procedure. Higherscores on all FACT scales represent better health-related quality of life.

‡ The race variable was kept in the model even if it was non-significant.

Table 4

Comparison of current HRQOL study unadjusted results with US general population reference scores and with published head and neck cancer studies.

	Physical Well-Being mean (SD)	Emotional Well-Being mean (SD)	Social Well-Being mean (SD)	Functional Well-Being mean (SD)	Head & Neck Cancer mean (SD)
Current study of H&N cancer					
-African Americans (n = 54)	19.2 (6.4)	19.9 (4.6)	21.7 (5.8)	16.1 (7.8)	20.9 (8.5)
-Whites (n = 168)	19.4 (6.9)	18.5 (4.5)	23.4 (4.4)	17.0 (7.3)	21.1 (8.4)
US, general population reference ²⁹	22.7 (5.4)	19.9 (4.8)	19.1 (6.8)	18.5 (6.8)	N.A.
Published H&N cancer studies					
-Llst et al (1996) ²⁷ study (n = 151)	21.6 (5.7)	16.9 (2.9)	21.6 (5.6)	17.9 (6.1)	19.2 (7.2)
-Pandey et al (2009) ² study (n = 123)	19.7 (7.0)	20.3 (4.2)	23.0 (4.3)	19.7 (6.4)	N.A.
-Rogers et al (2009) ³ study (n = 65)	21.7 (5.9)	19.6 (4.3)	20.9 (6.5)	18.1 (7.7)	N.A.

Note: N.A. is "Not Available" for 9-item Head & Neck Cancer scale. HRQOL = health-related quality of life.