**Objective:** Improving quality of life is one of the goals of the *Healthy People 2010* objectives. Health-related quality of life (HRQOL) measures can be used to indicate unmet health needs and identify health disparity in population subgroups.

Setting and Participants: Data were gathered from the 2001–2002 Behavioral Risk Factor Surveillance System (BRFSS), a state based annual random-digit-dialed telephone survey of non-institutional adults aged  $\geq$ 18 years.

**Methods:** The 4-items Healthy Days questions and the 5-item Health Days Symptoms questions were compared among non-Hispanic Whites (White), non-Hispanic Blacks (Black), non-Hispanic Asians (Asian), non-Hispanic American Indian or Alaska Native (AIAN) and Hispanics. Logistic regression models were constructed to evaluate racial/ethnic differences in HRQOL measures after adjusting for confounding factors.

**Results:** After adjusting for confounders, Blacks were 40%, AIANs were 80%, and Hispanics were twice as likely to report fair or poor general health than Whites. Asians were less likely and AIANs were more likely to report frequent physical distress, mental distress, and activity limitations. After controlling for confounders, there were no racial or ethnic differences in the prevalence of frequent depressive symptoms; however, Blacks, Hispanics, and Asians were less likely to report frequent pain, frequent anxiety symptom, and frequent sleep insufficiency than Whites. Blacks, Asians, and AIANs were equally likely to report infrequent vitality as Whites.

**Conclusions:** Mental health status has a larger impact on health in certain race/ethnic groups. More public health efforts should address the mental health needs of Blacks, Hispanics, and AIANs. (*Ethn Dis.* 2008;18:483–487)

Key Words: BRFSS, Health Behavior, Ethnicity

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### INTRODUCTION

According to the World Health Organization (WHO) in 1984 "Health is a state of complete physical, mental, and social well-being-not merely absent of disease or infirmity." Traditional mortality and morbidity measures do not adequately measure dysfunction and disability associated with disease, illness or health problems<sup>1</sup>.Quality of life measures are added to those traditional measures to develop a composite measure of health. Quality of life is a subjective overall sense of well-being. Healthy People 2010 identified quality of life improvement as a central public health goal.<sup>2</sup> The measures of Health-Related Quality of Life (HRQOL) can demonstrate the impact of quality of life on health.<sup>1</sup> These measures are designed to determine perceived physical health, mental health, and function<sup>3,4</sup> and are useful for finding unmet health needs, determining the burden of preventable disease, injuries, and disability, and identifying disparity in population subgroups.

HRQOL is related to both selfreported chronic diseases and their risk factors.<sup>1</sup> Persons reporting frequent mental distress have been found to have a higher prevalence of smoking, heavy drinking, physical inactivity, and obesi-

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ty and often lack health-care coverage.<sup>5</sup> Persons with diabetes and mental distress are more likely than those without mental distress to have a poor cardiovascular risk factor profile.<sup>6</sup> People with pain-related activity difficulty7 or people with frequent sleep insufficiency<sup>8</sup> are more likely to have poor health behaviors and worse health-related quality of life. Few public health studies have examined HRQOL measures by race/ ethnic groups and most of these studies concentrated on only one measure of HRQOL. With an emphasis on eliminating health disparities by 2010 and increasing race/ethnic diversity in the US population,9 it is increasingly important to examine differences in HRQOL of minority populations. To our knowledge there have been no national population-based US studies examining the differences in HRQOL indicators by race or ethnicity, particularly after controlling for confounders. The purpose of our study was to compare the White, Non-Hispanics (White) with Black non-Hispanic (Black), Asian non-Hispanic (Asian), American Indian or Alaska Native non-Hispanic (AIAN), and Hispanic on nine indicators of HRQOL using data from Behavioral Risk Factor Surveillance System (BRFSS).

# METHODS

The BRFSS is a state-based, annual random-digit-dialed telephone survey of non-institutionalized adults  $\geq$ 18 years of age throughout the United States, District of Columbia (DC), Guam, Puerto Rico, and the US Virgin Islands.<sup>10</sup> The primary focus of BRFSS is to monitor health behaviors, health conditions and preventive services that

With an emphasis on eliminating health disparities by 2010 and increasing race/ ethnic diversity in the US population,<sup>9</sup> it is increasingly important to examine differences in HRQOL of minority populations.

are linked with the leading causes of death and injury.<sup>10</sup> Trained interviewers administer the survey to an independent probability sample of adults  $\geq 18$  years of age in households with telephones. Each sample is weighted to the respondent's probability of selection and to the age- and sex-specific population or age-, sex-, and race-specific population of each state.<sup>10</sup> The BRFSS questionnaire consists of three parts: 1) core questions; 2) optional supplemental modules, which are sets of questions on specific topics (eg, diabetes, healthy days symptom, arthritis); and 3) state-added questions. All 50 states, DC, Guam, Puerto Rico, and the Virgin Islands ask the same core questions but module and state-added questions are used at the states' discretion. Design, random sampling procedures, and validation of the BRFSS survey are described in detail elsewhere.<sup>10,11</sup>

BRFSS contains HRQOL indicators in core and module questions. The HRQOL core questions (Healthy Days) were first added in 1993 and module questions (Healthy Days Symptoms) were added during 1995.<sup>12</sup> Studies of non-institutionalized adults indicated that the BRFSS HRQOL measures had acceptable construct, criterion, and known-groups validity.<sup>13</sup> When compared with the Medical Outcomes Study Short Form 36 (SF-36), HRQOL measures were shown to have good measurement properties in several populations, languages, and settings.<sup>14</sup> We examined four-item Healthy Days core questions (referred to as core question) and the five-item Healthy Days Symptoms module questions (referred to as module question). We used 2001 data for the core questions and combined 2001 and 2002 BRFSS data for the item module questions.

The first core question asked respondents to rate their general health on a scale from excellent to poor. General health was dichotomized into good health (excellent, very good, or good health) and fair or poor health. The remaining three core questions and all five module questions asked about selfreported health in the past 30 days. The remaining core questions were: a) now thinking about your physical health, which includes physical illness or injury, for how many days during the past 30 days was your physical health not good? (physical distress); b) now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good? (mental distress); and c) during the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation? (activity limitation). The five module questions were a) during the past 30 days, for about how many days did pain make it hard for you to do your usual activities, such as self-care, work, or recreation? (pain symptom); b) during the past 30 days, for about how many days have you felt sad, blue, or depressed? (depressive symptom); c) during the past 30 days, for about how many days have you felt worried, tense, or anxious? (anxiety symptom); d) during the past 30 days, for about how many days have you felt you did not get enough rest or sleep? (sleep impairment); and e) during the past 30 days, for about how many days have you felt very healthy and full of energy? (vitality). Respondents were dichotomized into <14 days (infrequent) and  $\geq 14$  days (frequent) unhealthy days for each question.<sup>5,8,15</sup>

The demographic factors included were sex, education, marital status, and age. Education had four levels: not a high school graduate, high school graduate, some college/technical college, and college graduate. Marital status contained three levels: married (ie, married, member of an unmarried couple), previously married (ie, divorced, widowed, separated), and never married. Age had three categories: 18-44 years, 45-64 years, and 65 or more years. Respondents who did not have any health plan (including health insurance, prepaid plans such as HMOs, or government plans such as Medicare) were considered not to have a health plan.

Race/ethnicity had five categories: White non-Hispanic, Black non-Hispanic, Asian non-Hispanic, American Indian or Alaska Native non-Hispanic, and Hispanic. Respondents who reported that they were Hispanic or Latino were classified as Hispanic. Respondents who did not classify themselves as Hispanic and then reported themselves to be White, Black, Asian, and AIAN were classified as White non-Hispanic, Black non-Hispanic, Asian non-Hispanic and AIAN non-Hispanic respectively. In this study we will refer to the race/ ethnic groups as White, Black, Hispanic, Asian, and AIAN.

Respondents other than White, Black, Asian, AIAN, and Hispanic were excluded from the analyses. Respondents who did not answer or refused or answered, "do not know/not sure," to any demographic, race/ethnicity or any HRQOL questions were also excluded. We restricted our analyses to persons residing in the United States and District of Columbia (DC). All the states and DC asked core Healthy Days questions in 2001; after all exclusions, 187,336 responses were available for analyses. Only 23 states and DC asked the module questions in 2001 and

	White-NH	Black non-Hispanic	Asian non-Hispanic	AIAN* non-Hispanic	Hispanic n=12336	
	n=153290	n=14937	n=3842	n=2931		
Fair/poor general health						
% (95% Cl)	12.6 (12.3-12.8)	18.0 (17.0-19.0)	8.5 (6.8-10.5)	23.5 (20.0-27.4)	24.7 (23.3-26.2)	
UOR (95% CI)†	Referent	1.52 (1.42-1.63)	0.65 (0.51-0.82)	2.14 (1.74-2.64)	2.29 (2.11-2.48)	
AOR (95% CI)‡	Referent	1.40 (1.29–1.51)	1.13 (0.87–1.46)	1.82 (1.46-2.26)	1.92 (1.76-2.10)	
Frequent physical distress						
% (95% Cl)	9.9 (9.7-10.2)	10.6 (9.9-11.5)	4.7 (3.5-6.3)	18.0 (14.9-21.6)	10.5 (9.5-11.6)	
UOR (95% CI)†	Referent	1.08 (0.99-1.18)	0.44 (0.32-0.61)	1.99 (1.59–2.50)	1.06 (0.94-1.19)	
AOR (95% CI)‡	Referent	0.99 (0.90-1.09)	0.68 (0.49-0.95)	1.79 (1.41-2.26)	0.96 (0.85-1.08)	
Frequent mental distress						
% (95% Cl)	9.5 (9.3-9.8)	11.2 (10.4-12.0)	5.0 (3.7-6.8)	15.6 (12.9-18.6)	11.1 (10.0–12.3)	
UOR (95% CI)†	Referent	1.20 (1.10-1.31)	0.51 (0.37-0.70)	1.75 (1.41-2.18)	1.19 (1.06–1.34)	
AOR (95% CI)‡	Referent	0.93 (0.85-1.02)	0.58 (0.42-0.80)	1.36 (1.09–1.70)	0.87 (0.76-1.00)	
Frequent activity limitation						
% (95% Cl)	5.7 (5.5-5.9)	7.5 (6.9-8.2)	2.8 (1.9-4.1)	12.0 (9.6-14.9)	6.4 (5.6–7.3)	
UOR (95% CI)†	Referent	1.35 (1.21-1.50)	0.48 (0.33-0.71)	2.25 (1.75-2.90)	1.13 (0.97–1.31)	
AOR (95% CI)‡	Referent	1.16 (1.04–1.29)	0.71 (0.48-1.06)	1.86 (1.45-2.39)	0.94 (0.80-1.11)	

Table 1.	Healthy day	s (core questions)	indices b	y race/ethnicity,	BRFSS 2001
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\* AIAN= American Indian or Alaska native.

† Unadjusted odds ratio.

‡ Adjusted for demographic (sex, education, age, marital status) and health plan.

2002. If a state asked the module questions in both 2001 and 2002, we analyzed data from 2002 only. For module HRQOL questions, 15,891 of the 103,953 respondents were excluded due to missing data, yielding data from 88,062 respondents for analyses.

SUDAAN software (version 9.0.1; Research Triangle Institute, Research Triangle Park, NC) was used in the analyses to take into account the complex sample design and to calculate prevalence estimates with 95% confidence intervals (CIs), unadjusted odds ratios (OR) and adjusted odds ratios (AOR). Logistic regression models were constructed to compare Whites with Blacks, Asians, AIANs and Hispanics on each HRQOL measures. The first model was unadjusted and the second model was adjusted for demographic factors (sex, education, age, marital status) and healthcare coverage.

### RESULTS

Table 1 shows the four-item HRQOL core questions by race/ethnic groups. In general Hispanics (25%),

AIANs (24%), and Blacks (18%), were more likely to report fair or poor general health compared to Whites (13%) and Asians (9%). After adjusting for confounders, Blacks, AIANs and Hispanics reported significantly more fair or poor general health than Whites.

Our estimates indicate that Asians were significantly less likely and AIANs were significantly more likely to report frequent physical distress, frequent mental distress, and frequent activity limitations compared to Whites. Odds of reporting frequent mental distress were higher among Blacks and Hispanics compared to Whites; however when we adjusted for confounders, Blacks and Hispanics were equally likely to report frequent mental distress as Whites. Blacks were more likely to report frequent activity limitations as compared to Whites.

Table 2 displays the responses to five-item module questions by race/ ethnicity. Blacks, Asians and Hispanics were significantly less likely to report frequent pain than Whites; while AIANs were more likely to report pain. Asians (5%) had the lowest prevalence of frequent depressive symptoms compared to White (8%), Black (11%), AIAN (11%) and Hispanic (10%) populations. After controlling for confounding factors, we found no racial and ethnic differences in reporting frequent depressive symptoms. Asians, Blacks, and Hispanics were significantly less likely to report frequent anxiety symptoms compared to Whites after controlling for confounders. Asians (18%) and Hispanics (21%) were less likely to report frequent sleep insufficiency compared to Whites (27%), Blacks (28%) and AIANs (30%). After adjusting for confounding factors, Blacks were 12% less likely and Hispanics and Asian were 43% less likely to report frequent sleep insufficiency compared to Whites. Prevalence of infrequent vitality was similar among race and ethnic groups. But after controlling for confounders, Hispanics were 20% less likely to report infrequent vitality than Whites.

## DISCUSSION

Our study revealed a wide variation in HRQOL indices among race and ethnic

	White-NH	Black-non Hispanic	Asian -non Hispanic	AIAN† non-Hispanic	Hispanic		
	<i>n</i> =72107	n=7067	n=3243	n=1488	n=4157		
Frequent Pain							
% (95% CI)	9.4 (9.0-9.7)	7.5 (6.5-8.7)	3.2 (2.0-5.1)	15.1 (11.7–19.4)	7.3 (5.7-9.2)		
UOR (95% CI)‡	Referent	0.79 (0.67-0.93)	0.32 (0.19-0.52)	1.73 (1.28-2.34)	0.76 (0.59-0.98)		
AOR (95% CI)§	Referent	0.75 (0.63-0.88)	0.44 (0.27-0.73)	1.62 (1.19-2.21)	0.67 (0.52-0.87)		
Frequent depressive sy	mptoms						
% (95% CI)	7.9 (7.6-8.3)	10.6 (9.3-11.9)	4.6 (3.0-7.0)	11.1 (8.1–15.0)	9.7 (8.0-11.6)		
UOR (95% CI)‡	Referent	1.37 (1.19–1.59)	0.57 (0.36-0.88)	1.45 (1.03-2.05)	1.25 (1.01-1.53)		
AOR (95% CI)§	Referent	1.07 (0.92-1.24)	0.72 (0.46-1.12)	1.18 (0.83-1.68)	0.84 (0.67-1.05)		
Frequent anxiety sympt	oms						
% (95% CI)	15.3 (14.8-15.7)	15.0 (13.5–16.5)	9.0 (6.5-12.1)	19.3 (15.3-24.0)	14.1 (12.2–16.2)		
UOR (95% CI)‡	Referent	0.98 (0.86-1.11)	0.55 (0.39-0.77)	1.33 (1.00-1.76)	0.91 (0.77-1.08)		
AOR (95% CI)§	Referent	0.81 (0.71-0.92)	0.59 (0.42-0.83)	1.15 (0.86-1.52)	0.66 (0.55-0.78)		
Frequent sleep insuffici	ency						
% (95% CI)	27.1 (26.6-27.7)	27.9 (26.1-29.8)	18.2 (14.9-22.0)	29.7 (24.4-35.6)	21.4 (19.1-23.8)		
UOR (95% CI)‡	Referent	1.04 (0.94-1.15)	0.60 (0.47-0.76)	1.13 (0.86-1.48)	0.73 (0.63-0.84)		
AOR (95% CI)§	Referent	0.88 (0.79-0.97)	0.57 (0.45-0.73)	1.03 (0.79–1.35)	0.57 (0.49-0.66)		
Infrequent vitality							
% (95% CI)	30.6 (30.0-31.2)	31.3 (29.4-33.3)	30.1 (25.9-34.6)	34.2 (28.5-40.3)	29.2 (26.7-32.0)		
UOR (95% CI)‡	Referent	1.03 (0.94-1.14)	0.98 (0.79-1.20)	1.18 (0.90-1.53)	0.94 (0.82-1.07)		
AOR (95% CI)§	Referent	0.93 (0.84–1.02)	1.07 (0.87–1.33)	1.10 (0.84–1.43)	0.80 (0.70-0.92)		

Table 2.	Healthy	days syn	nptoms (r	nodule d	questions)	indices	by r	ace/ethnicity,	BRFSS	2001	and	2002*
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\* 5 states in 2001 and 18 states and District of Columbia participated in 2002.

† AIAN= American Indian or Alaska native.

‡ Unadjusted odds ratio.

§ Adjusted for demographic (sex, education, age, marital status) and health plan.

groups. To our knowledge, our study is the first study to examine nine HRQOL indicators among White, Black, Hispanic, Asian, and AIAN. Self-perceived health is strongly associated with a person's objective physical and mental health status<sup>4</sup> and is an independent predictor of mortality.<sup>16</sup> Our study indicates that Asians are less likely and AIANs are more likely to report frequent physical distress and frequent mental distress than Whites. The relationship is reflected in the general health status question, where AIANs are twice as likely and Asians are 35% less likely to report fair/poor general health than Whites. The situation is different in the Black and Hispanic populations. Our unadjusted estimates indicate that Hispanics and Blacks are equally likely to report physical distress and more likely to report frequent mental distress than Whites. When we look at self-perceived health, both Blacks and Hispanics are more likely to report fair/poor general health.

The amount of disability suffered by people with depression and anxiety is similar to disability suffered from chronic medical conditions like hypertension, diabetes and arthritis.<sup>17</sup> People with depression are more likely to be non-compliant with medical treatment.<sup>18</sup> Our unadjusted odds ratios indicate that Asians are less likely and Blacks, AIANs, and Hispanics are more likely to report frequent depressive symptoms suggesting a greater mental health burden for Blacks, AIANs and Hispanics and less burden for Asians. Anxiety decreases quality of life and people with anxiety tend to engage in poor health behaviors.<sup>19</sup> In keeping with previous research,<sup>20</sup> our study shows that Blacks and Hispanics are significantly less likely to report frequent anxiety symptoms.

Our study has few limitations. BRFSS is a telephone survey and it may exclude people of lower socioeconomic status who do not have a phone.

The people from a lower socioeconomic group are known to have lower HRQOL and higher mortality than the general population.<sup>21</sup> States commonly use only English or Spanish language surveys, persons who speak another primary language are excluded. Only 23 states and DC participated in the module questions, therefore our results are not necessarily representative of the US population. HRQOL measures have shown to be valid indicators of the perceived burden of common mental disorders, but they have not yet been tested as a screen for a diagnosable mental illness. Finally, as the questions in BRFSS are self-reported, this study is subject to recall bias.

Most public health efforts usually target physical health in terms of treatment and intervention. Our research suggests that mental health status has a larger impact on health in certain race/ethnic groups. Therefore, public health efforts should address the mental Asians, Blacks, and Hispanics were significantly less likely to report frequent anxiety symptoms compared to Whites after controlling for confounders.

health needs of minority populations, especially Blacks, Hispanics and AIANs.

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#### AUTHOR CONTRIBUTIONS

Design concept of study: Chowdhury, Balluz Acquisition of data: Chowdhury Data analysis and interpretation: Chowdhury, Balluz, Strine

Manuscript draft: Chowdhury, Strine Statistical expertise: Chowdhury, Strine Supervision: Balluz