

# ASSOCIATIONS OF NATIONALITY AND RACE WITH NUTRITIONAL STATUS DURING PERIMENOPAUSE: IMPLICATIONS FOR PUBLIC HEALTH PRACTICE

**Objective:** To examine associations of nationality and race with anthropometry, self-reported nutrient intakes, health history, and socioeconomic status (SES) of perimenopausal (age 40–55 years) Floridians.

**Design:** Interviewer conducted cross-sectional survey.

**Setting:** South Florida, 2000–2001.

**Participants:** Convenience sample of 109 Black (Caribbean [ $n=31$ ] and African-American [ $n=25$ ]), and White ( $n=53$ ) women with intact ovaries and uteri.

**Main Outcome Measures:** Nutrient intakes and anthropometry.

**Results:** Both races had similar mean age, education, SES, reported heavy menses, and physician-diagnosed iron deficiency anemia. Dietary reference intakes (DRIs) were unmet for calcium (67%) and iron (35%) and exceeded for energy (28%). A decade of decreased milk (61%) and red meat (69%) consumption, key micronutrient sources, was reported. Significantly more Blacks exceeded anthropometric recommendations ( $P=.01$ ); more African Americans exceeded energy DRIs even after controlling for body mass index ( $P=.006$ ). More Whites exceeded calcium DRIs ( $P=.04$ ) and reported self-diagnosed depression ( $P=.001$ ). More Caribbean-born ( $P<.05$ ) met fat, saturated fat, carbohydrate, and fiber recommendations.

**Conclusion:** Reported suboptimal iron and calcium intakes coupled with bone demineralization and heavier menses, characteristic of perimenopause, could heighten osteoporosis and anemia risks. Reports that more Whites were depressed and more Caribbean-born persons met dietary recommendations, even though anthropometrics and BMI-adjusted energy intakes among Blacks exceeded recommendations, have possible public health implications. As more “baby-boomers” reach this age, findings highlight the need for culturally appropriate interventions, eg, nutrition education that emphasizes relationships between nutrient and energy needs and the composition of foods consumed by various ethnicities. (*Ethn Dis.* 2006;16:201–206)

**Key Words:** Anthropometry, Caribbean, Nutrient Intakes, Perimenopause, Race

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## INTRODUCTION

Perimenopause, the period of a woman's life immediately preceding menopause, is a critical time for midlife women's nutrition as it relates to their food intakes, vitamin/mineral supplementation, and overall nutritional practices. However, scant information is available on this period.<sup>1–5</sup> Perimenopause is also an area of increasing interest spurred on by a series of factors. The historically large numbers of increasingly ethnically diverse baby boomers who enter perimenopause is one such factor.<sup>6,7</sup> Minority immigrants to the United States are particularly vulnerable to nutritional problems such as obesity since foods and habits from the new country may replace original, healthy food habits and lifestyles.<sup>8</sup>

This study describes the results of a cross-sectional survey of a convenience sample of perimenopausal-aged (40–55 years old) women residing in Florida, including minority immigrants from the English- and French-speaking Caribbean. The goal of the study was to assess associations between nationality

and/or race and nutrient intakes, anthropometric measures (body mass index [BMI]<sup>9</sup> and waist : hip ratios), self-reported health histories, and socioeconomic status (SES).

## METHODS

The institutional review board at Florida International University approved the study. A dual-phased study design was used to collect data to assess the health and nutritional status of a convenience sample of multiethnic, perimenopausal Florida women, aged 40 to 55 years, with intact ovaries and uteri. During phase II, the quantitative phase and the origin of the data for the present report, cross-sectional sociodemographic, nutritional and health status and practice data were collected.

During phase II, various strategies, including word-of-mouth, religious and civic organizations, and the Internet, were used to recruit and interview a convenience sample of 109 African-American, Caribbean, and White non-Hispanic American perimenopausal-aged women. Participants were interviewed at home or a central locale, eg, church hall or community center. Women were eligible to participate in the study if, at enrollment: they were 40 to 55 years and not pregnant; did not have amenorrhea for >11 consecutive months; resided in Florida for the prior 12 consecutive months; had intact ovaries and uteri; did not have any psychiatric illnesses, liver disease, breast or endometrial cancer, or history of substance abuse; and did not use psychotropic medications within the past year. Eligibility also depended on

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*The goal of the study was to assess associations between nationality and/or race and nutrient intakes, anthropometric measures (body mass index [BMI]<sup>9</sup> and waist:hip ratios), self-reported health histories, and socioeconomic status (SES).*

self-identification as belonging to one of the three target ethnic groups.

After obtaining the informed consent, a battery of six previously standardized questionnaires<sup>9-15</sup> was administered to collect sociodemographic, health status, health history, and dietary data. Anthropometric measurements were taken using standard procedures and equipment.<sup>9,10</sup> The 97-item validated, semiquantitative Food Frequency

Questionnaire (FFQ) has been used extensively in women's studies and validated in studies that included Black women.<sup>13,14</sup>

Data collected, with the exception of the dietary data, were entered into Epi Info Version 6, a word processing, database, and statistics program for public health,<sup>16</sup> and subsequently analyzed with the Statistical Packages for Social Sciences (SPSS Version 11).<sup>17</sup>

Descriptive and other summary statistics (eg, frequencies, percentages, means ± standard deviations) were calculated for sociodemographic variables and macro- and micronutrient intakes. Additionally, one-way analysis of variance (ANOVA) and analysis of covariance (ANCOVA) were used to compare group means of continuous variables with normal or approximately normal distributions (eg, nutrient and energy intakes) after adjusting for possible cofounders such as BMI. Pairwise comparisons were subsequently performed using Bonferroni correction for multiple comparisons. Chi-square analyses were used to compare propor-

tions and to assess associations between categorical variables (eg, nutrient and energy intake status). Results were considered as statistically significant if the corresponding *P* value was <.05.

## RESULTS

### Sociodemographic Characteristics

A total of 281 women met the age, ethnicity, and national origin eligibility criteria. Only 122 were eligible based on all criteria listed in the methods section. Of these, 109 completed the interview (a response rate of 89%). The three ethnic groups were similar with respect to age, education, employment status, marital status and access to health care (Table 1). Most (72%) of the 109 participants were born in the United States.

### Anthropometric Indices

Heights and weights were measured for 100 participants. The overall mean BMI was 29.9 ± 7.4 kg/m<sup>2</sup>. The mean

**Table 1. Overall and ethnic group-specific sociodemographic and health characteristics (mean ± SD\* or *n* [%]) at enrollment**

Characteristic	Total (n=109)	African American (n=25)	Caribbean (n=31)	White (n=53)
Age (years)	46.80 ± 4.40	46.20 ± 4.70	46.50 ± 4.70	47.30 ± 4.10
BMI <sup>†</sup>	29.90 ± 7.40	31.70 ± 8.10	31.00 ± 6.90	28.60 ± 7.20
Waist : hip <sup>‡</sup> ratio	0.81 ± 0.10	0.84 ± 0.11	0.83 ± 0.08	0.79 ± 0.10
High school graduate	105 (96)	24 (96)	28 (90)	53 (100)
Had health insurance	104 (95)	22 (88)	30 (97)	52 (98)
Married	58 (53)	12 (48)	17 (55)	29 (55)
Employed	99 (91)	22 (88)	28 (90)	49 (92)
Self-assessed health status at interview as good or better	101 (93)	22 (88)	28 (90)	51 (96)
Self determined health status over past year as same or better	93 (85)	22 (88)	25 (81)	46 (87)
Overweight or obese status <sup>§</sup>	72 (72)	17 (77)	25 (86)	30 (61)
Android waist : hip <sup>  </sup>	42 (51)	10 (63)	17 (71)	17 (40)
Diagnosis of iron-deficiency-anemia	32 (29)	11 (44)	8 (26)	13 (25)
Heavier periods (since age 35 years)	36 (33)	9 (36)	8 (26)	21 (40)
Irregular periods (since age 35 years)	49 (45)	7 (28)	11 (36)	29 (55)
Self-reported depression	42 (39)	9 (36)	5 (16)	28 (53)

\* SD=standard deviation.

† BMI=body mass index (kg/m<sup>2</sup>); n=100 participants as follows: African American=22, Caribbean=29, White=49.

‡ Waist : hip - n=83 participants used in calculation.

§ Overweight=BMI: 25.0-29.9 kg/m<sup>2</sup>; obese=BMI ≥30 kg/m<sup>2</sup>.

|| Android waist : hip indicates a waist : hip=0.8; n=83 as follows: African American=16, Caribbean=24, White=43.

**Table 2. Overall and ethnic group-specific dietary intake characteristics (mean  $\pm$  SD\* or n [%]) at enrollment**

Intake Characteristic	Total <sup>†</sup> (n=107)	African American (n=24)	Caribbean (n=31)	White (n=52)
Total energy intake kcal/day	1861.3 $\pm$ 611.7	2174.9 $\pm$ 725.8	1869.8 $\pm$ 516.2	1711.5 $\pm$ 60.5
Energy intake per kg	24.8 $\pm$ 10.3	27.4 $\pm$ 13.0	24.1 $\pm$ 9.0	24.1 $\pm$ 9.6
Energy intake as % predicted BMR <sup>‡</sup>	127.0 $\pm$ 44.8	142.8 $\pm$ 57.4	125.9 $\pm$ 38.8	120.7 $\pm$ 41.1
Energy intakes for normal-weight participants (n=26)	2017.5 $\pm$ 678.9	2991.7 $\pm$ 553.9	1906.3 $\pm$ 324.5	1825.8 $\pm$ 583.1
Protein (g, % energy)	82.0 $\pm$ 30.2 (18.0)	98.4 $\pm$ 40.0 (19.0)	79.5 $\pm$ 22.4 (17.0)	76.0 $\pm$ 26.6 (18.7)
Carbohydrate (g, % energy)	238.2 $\pm$ 92.8 (50.9)	254.5 $\pm$ 101.1 (48.6)	269.8 $\pm$ 86.3 (57.9)	211.9 $\pm$ 86.4 (50.1)
Fat (g, % energy)	59.7 $\pm$ 26.1 (28.8)	76.7 $\pm$ 34.7 (32.4)	50.7 $\pm$ 17.6 (24.7)	57.2 $\pm$ 22.3 (31.2)
Calcium (mg/day from food)	768.7 $\pm$ 418.8	793.7 $\pm$ 707.7	649.6 $\pm$ 279.3	704.7 $\pm$ 418.8
Calcium (mg/day food + supplements)	1081.7 $\pm$ 989.4	849.6 $\pm$ 433.0	1146.5 $\pm$ 544.1	1046.0 $\pm$ 651.5
Iron (mg/day from food)	14.7 $\pm$ 6.9	16.0 $\pm$ 10.5	15.6 $\pm$ 6.2	13.6 $\pm$ 4.9
Iron (mg/day food + supplements)	36.1 $\pm$ 39.5	45.5 $\pm$ 45.2	42.4 $\pm$ 45.6	27.9 $\pm$ 32.00
Vitamin D (mg/day from food + supplements)	12.2 $\pm$ 8.6	12.2 $\pm$ 11.8	11.9 $\pm$ 7.8	12.2 $\pm$ 7.3
Energy-DRI status <sup>§</sup>	30 (28)	12 (50)	9 (29)	9 (17)
Met calcium DRI (from food + supplements)	35 (33)	6 (25)	5 (16)	24 (56)
Met iron DRI with supplements	69 (65)	14 (58)	22 (71)	33 (63)
Met Vitamin D DRI (from food + supplements)	57 (53)	11 (46)	13 (42)	33 (63)
Decreased consumption of red meat <sup>  </sup>	68 (69)	16 (70)	23 (85)	29 (59)
Decreased consumption of milk <sup>¶</sup>	61 (61)	15 (65)	11 (39)	35 (71)

\* SD=standard deviation.

† Total participants=107 (2 outliers were excluded from dietary analysis).

‡ Predicted BMR=655 + (9.6  $\times$  weight [kg]) + (1.8  $\times$  height [cm]) - (4.7  $\times$  age [years]).<sup>18</sup>

§ Energy dietary reference intake (DRI) status &gt;calculated group mean energy DRI of 2208 kcal/day.

|| Red meat—decreased consumption over past 10 years (n=99 participants as follows: African American=23, Caribbean=27, White=49).

¶ Milk—decreased consumption over past 10 years (n=100 participants as follows: African American=23, Caribbean=28, White=49).

BMI for Blacks was slightly higher than that for Whites (31.3  $\pm$  7.4 vs 28.6  $\pm$  7.24 kg/m<sup>2</sup>,  $P=.06$ ). However, significantly ( $P=.011$ ) more Black participants were overweight (BMI: 25.0–29.9 kg/m<sup>2</sup>) or obese (BMI $\geq$ 30 kg/m<sup>2</sup>) than White participants (Table 1). Waist : hip ratios were obtained from 83 participants and averaged 0.81  $\pm$  0.10. The mean waist-to-hip ratio for Black women (0.83  $\pm$  0.08) was slightly but not significantly higher ( $P=.06$ ) than that of White non-Hispanic women (0.79  $\pm$  0.10), Table 1.

### Dietary Intake Parameters

The Harris-Benedict equation for estimating basal metabolic rate (BMR) for women was used to calculate predicted BMR: predicted BMR=655 + (9.56  $\times$  weight [kg]) + (1.8  $\times$  height [cm]) - (4.7  $\times$  age [years]).<sup>18</sup> Mean predicted BMR and energy intakes per kg of body weight for White partici-

pants were slightly but not significantly lower than for African-American and Caribbean participants. Reported energy intakes as a percent of predicted BMR were slightly but not significantly higher in African Americans (142.8  $\pm$  57.4) compared to Caribbean (125.9  $\pm$  38.8) and White (120.7  $\pm$  41.1) participants (Table 2).

Dietary intake profiles, eg, total energy intake (kcal/day), differed significantly among the ethnic groups (Table 2). On average, African Americans consumed the largest amount of energy, followed by Caribbean and then White women. The magnitude of the difference between the highest and lowest mean energy intakes was 309 kcal (African Americans vs Whites,  $P=.006$ ). This energy-intake disparity among ethnic groups was also supported when the women were compared based on whether or not they exceeded the energy dietary reference intake (DRI).

Significantly more African-American than White women exceeded energy DRI ( $P=.003$ ).

Comparison of reported energy intakes among ethnic groups suggested a significant relationship between ethnicity and energy intake ( $P=.021$ ), even after adjusting for BMI. Pairwise comparisons among adjusted mean energy intakes, using the Bonferroni procedure to control for type I error, found a significant difference between the African-American and White participants ( $P=.006$ ).

Also, comparison of reported energy intakes among normal-weight women based on ethnicity, albeit for a small sample (n=26), showed that intakes of African-American women (n=4) were significantly higher than those of both Caribbean (n=4,  $P=.028$ ) and White women (n=18,  $P=.002$ ).

The overall mean percentage intakes fell within the acceptable macronutrient

*This study highlights the pivotal role of ethnicity and culture on diet; significant energy-intake differences between African-American and White participants were observed even after controlling for BMI.*

distribution range (AMDR) for proteins, carbohydrates, and fats, respectively.<sup>11,12</sup> Saturated fat provided 9.5% ± 2.9% of total energy. However, the mean percentage saturated fat intakes for African American and White participants were significantly higher ( $P = .001$ ) than those of the Caribbean women. A similar pattern was seen for percent of energy from fat. Fat provided 28.8% ± 8.0% of total energy (within the AMDR of 20%–35% of total energy and the American Heart Association's (AHA) dietary recommendation of ≤30%).<sup>19,20</sup> However, the mean percent fat intakes of American-born (African American [ $P = .004$ ] and White [ $P = .003$ ]) participants were significantly higher than that of Caribbean participants (Table 2). The mean percentage carbohydrate intake for Caribbean participants (57.5 ± 7.0 g) was significantly higher than for African Americans (47.3 ± 11.6 g,  $P < .001$ ) and Whites (48.6 ± 9.2 g,  $P < .001$ ).

Cholesterol intakes ranged from 25.0 to 887.6 mg per day (mean ± SD: 252.2 ± 127.6); significantly more African Americans (48%) exceeded the 300 mg/day recommended by the American Heart Association<sup>19</sup> than Caribbean (23%;  $P = .014$ ) and White (21%;  $P = .015$ ) participants.

When participants' intakes were compared to the dietary recommendations for saturated fat, total fat, cholesterol (mg), carbohydrate, and fiber (g)

**Table 3. Overall and ethnic group specific frequency distribution of participants who met various dietary recommendations (n [%])**

Characteristic	Total (n=107)	Caribbean (n=31)	African American (n=24)	White (n=52)	Significance
≤30% fat kcal	63 (59)	25 (81)	11 (46)	27 (52)	*, †
≤10% saturated fat kcal	66 (62)	28 (90)	12 (50)	26 (50)	‡, §
<300 mg cholesterol	79 (74)	24 (77)	13 (54)	42 (81)	
<55% carbohydrates	36 (34)	19 (61)	5 (21)	12 (23)	¶, #
≥25 g fiber	35 (33)	17 (55)	5 (21)	13 (25)	**, ‡‡

\* Caribbean vs African Americans ( $P = .05$ ).

† Caribbean vs Whites ( $P = .009$ ).

‡ Caribbean vs African Americans ( $P = .001$ ).

§ Caribbean vs Whites ( $P = .001$ ).

|| Whites vs African Americans ( $P = .016$ ).

¶ Caribbean vs African Americans ( $P = .003$ ).

# Caribbean vs Whites ( $P < .001$ ).

\*\* Caribbean vs African Americans ( $P = .01$ ).

‡‡ Caribbean vs Whites ( $P = .006$ ).

intakes,<sup>19–21</sup> significantly more Caribbean participants had a healthier dietary intake pattern than did White and African-American participants (Table 3).

A total of 24 (22%) participants reported use of one or more “special diets.” Of these, 22 (92%) were self-prescribed. Reports of special diet use did not differ significantly among the three groups. Low-sodium and high-potassium diets were each reported by nine participants, and weight-reduction diets were reported by three. Energy intakes were slightly but not significantly higher for participants who did not report using “special diets.”

## DISCUSSION

This study provides information on an overall need to initiate culturally appropriate primary prevention to raise awareness and optimize perimenopausal women's health and nutritional status during this critical midlife period. Findings of more Blacks (Caribbean and African American) exceeding energy intake recommendations and being more overweight/obese, and suboptimal micronutrient intakes by many women from both racial groups are consistent with the literature.<sup>11,12</sup>

This study highlights the pivotal role of ethnicity and culture on diet; significant energy-intake differences between African-American and White participants were observed even after controlling for BMI. Our findings also suggest that, irrespective of ethnicity, diets of Caribbean-born and American-born participants differ markedly in macronutrient composition. Other lifestyle parameters such as physical activity need to be investigated so that culturally appropriate interventions could be implemented to achieve desired changes in nutritional status indicators.

The dietary pattern of Caribbean-born participants was, in many instances, significantly healthier than that of their American-born peers. However, more Blacks (Caribbean and African Americans) exceeded energy intake than did Whites, which may help explain why more Black participants were either overweight or obese. The lack of data on nutritional status of Caribbean migrants to the United States precludes comparisons to local data. However, similar studies in the Caribbean<sup>21</sup> and in the United Kingdom that included Caribbean migrants support this study's findings of higher percentage carbohydrate and lower percentage fat of the Caribbean diet.<sup>22</sup>

Dietary modification, in conjunction with increased physical activity, is critical for weight management, especially during perimenopause when muscle mass and metabolism decrease and body fat increases. Women need to adjust energy intake, nutrient density, and physical activity to maintain desirable body weight; the recommended 9% decrease in energy intake for women 40–55 years was not accompanied by a similar recommendation for micronutrient intake.<sup>11,12</sup>

Over the past two decades, health promotion messages have appropriately recommended “heart healthy diets” low in fat, saturated fat, cholesterol, and sugar but high in fruits, vegetables, whole grains, and fiber.<sup>19,20</sup> Participants were not specifically asked why their diets were modified over the past 10 years. However, unsolicited admissions offered when asked how diets were modified, coupled with this study’s findings, provide insight. They indicate that the existing body of nutrition information has not enabled women to make appropriate dietary changes/substitutions, eg, find alternatives for red meat and whole milk that contain less fat and cholesterol but similar amounts of other critical micronutrients (calcium and iron). Hence, women may have inadvertently reduced the consumption of calcium and iron. This hypothesis could explain, in part, why even though two thirds of participants reported using multivitamin/mineral supplements at the time of the interview, intakes for calcium or iron were unmet by as many as two thirds of participants and one third reported a physician diagnosis of iron-deficiency anemia. Any factor that could contribute to suboptimal iron and calcium intakes could exacerbate this vulnerable group’s osteoporosis and anemia risks. This could adversely affect their health at an inopportune time because both bone demineralization and heavier menses are characteristic of perimenopause.<sup>23,24</sup>

The proportion of women, including perimenopausal-aged “baby boomers,” in the American workforce continues to increase steadily and in 2000 composed >47% of the workforce, up from 45% in 1986.<sup>25</sup> During the early decades of this millennium, female baby boomers worldwide are slated to become perimenopausal aged (40–55 years) in record numbers.<sup>7</sup> Therefore, comprehensive, ethnic-specific studies to investigate dietary habits followed by targeted nutrition education as part of a comprehensive health promotion program for this diverse, pivotal group of midlife women could pay enormous public health dividends. In their many influential roles as employers, employees, teachers, wives, mothers, grandmothers, caregivers, and daughters, midlife women provide a unique opportunity to influence eating habits of a broad spectrum of the population, including themselves.

The inherent limitations of a convenience sample and the relatively small sample size limit the generalizability of this study’s findings but do not diminish their importance and implications for public health practice. Other potential biases include the lack of valid information on portion sizes for Caribbean immigrants to the United States. This could also contribute to underreporting, despite efforts to minimize the effect. Also, limitations inherent in dietary assessment methods used to measure habitual intake might result in underestimating/underreporting energy intakes.<sup>26,27</sup>

Underreporting is common in epidemiological studies.<sup>26–32</sup> This study’s findings are consistent with the literature with as many as half of participants, more of whom were overweight/obese and irrespective of ethnicity, categorized as underreporters.<sup>28</sup> Other contributors to underreporting include biases inherent in formulas used to calculate BMR<sup>33</sup> and participant characteristics, eg, ethnicity, BMI, and education.<sup>26–32</sup>

Collecting valid portion size data on all foods consumed is critical in order to assess diets of populations in order to manage diet related diseases, eg, anemia and diabetes. To maximize the accuracy of assessing diets of ethnically diverse populations using the same validated dietary instrument, the instrument should allow for the addition of foods not included on the FFQ. Additionally, the FFQ should be administered by culturally competent nutrition professionals so that appropriate probing could enable the interviewer to get accurate information about portion sizes consumed, ingredients in homemade dishes, and consumption of foods not included on the original FFQ. Appropriate allowances could then be made for individual and ethnic differences in dietary intakes on the completed FFQ.

Acquiring accurate habitual dietary intake data is critical in nutritional epidemiology and public health practice; therefore, a better understanding of underreporting and portion sizes consumed by ethnically diverse groups such as Caribbean immigrants to the United States is imperative.

## CONCLUSION

The findings and public health implications of reported suboptimal micronutrient (iron and calcium) intakes and other findings are equally troubling. Findings that more Caribbean-born participants met dietary recommendations yet anthropometrics and energy intakes for both Black groups exceeded recommendations have possible public health implications for obesity and other chronic diseases (eg, cardiovascular diseases) that increase in prevalence during perimenopause. As more baby-boomers enter perimenopause, the confluence of this study’s findings demonstrates the need for culturally appropriate intervention.

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