

# Anthropometric, Dietary and Psychosocial Characteristics of Under-Reporters of Energy; A Study Among Middle-Class, African American Women



Hannah Hollandsworth *Allendale, MI*; Yeni Nieves *Allendale, MI*; Sandra Gomez *Chicago, IL*; Christina Beaudoin, Debbie Lown *Allendale, MI*



Department of Biomedical Science: Grand Valley State University

## Introduction

Energy mis-reporting in studies is an issue that effects the accuracy of associations between dietary data and chronic disease. Identification of characteristics of energy mis-reporters has been suggested to discover a method which corrects the implausible diet reports in analysis.

Studies focused on energy under-reporting in African American women are limited. In a large-scale study, African-American women were significantly more likely to underreport energy than Caucasian women with the greatest underreporting in obese African-American women.<sup>1,2</sup> However, it is unclear if this was due to the greater BMI and lower education in the African American women as compared to the Caucasian women.

The few studies focusing solely on African American women have been conducted in older, overweight African American women<sup>3</sup> and those with Type 2 diabetes.<sup>4,5</sup> These studies found underreporting as high as 89% in the older African American women and 50% in African American women with Type 2 diabetes. In African American women with Type 2 diabetes, the characteristics associated in underreporting were higher BMI, greater waist circumference, sedentary life style, low literacy and siblings with diabetes.<sup>4,5</sup>

The purpose of this study was to determine the degree of under-reporting and the anthropometric, dietary and psychosocial characteristics of under-reporters in middle-class African American women.

## Materials and Methods

### Study population

Study participants (n=53) were recruited in the Grand Rapids area from local universities, churches, and sororities.

### Measures

Questionnaires were used to obtain demographic information, body discrepancy, restrictive feeding practices (TFEQ-R18) and dieting/smoking status.

Physical activity level (PAL) was measured over a 7-day period by accelerometer and subjects were assigned 1 of 3 PAL values from the Institute of Medicine (IOM).

Energy intake (EI) was determined by three 24-hour recalls using a multiple pass approach. Predicted energy requirements (pER) was derived from the DRI equation from the IOM.

Mis-reporters of energy intake were determined using the Goldberg equation.<sup>6</sup> Under-reporters were those with an EI ≤ 78% of the pER.

## Results

**Table 1 Subject characteristics in total energy under-reporters and plausible reporters (n=52)<sup>a</sup>**

Variable	Under-reporters of energy (n=39) <sup>b</sup>	Plausible reporters of energy (n=13)	P
Mean age (SD)	51 (14)	44 (15.7)	n.s.
BMI <sup>c</sup> (kg/m <sup>2</sup> ) (SD)	32.9 (7.2)	28.1 (5.5)	<0.05
Marital status (%)			n.s.
Married	56.4	66.7	n.s.
Single	23.0	25	n.s.
Widowed	15.4	8.3	n.s.
Unknown	5.2	0.0	n.s.
Education (%)			n.s.
High school	10.3	8.3	n.s.
One year of college	43.6	16.7	n.s.
4-years of college	17.9	33.3	n.s.
Post-graduate	28.2	41.7	n.s.
Dieting (%)	87	23	<0.0001

<sup>a</sup>Note one subject was an over-reporter and data is not shown

<sup>b</sup>Energy Intake ≤ 78% of the predicted energy requirements

<sup>c</sup>Body Mass Index

Abbreviation: n.s., not significant (p>0.05)

**Table 2 Mean reported intakes, and eating behaviors and percent of low and moderate physical activity levels in total energy under-reporters and plausible reporters<sup>a</sup>**

Variable	Under-reporters of energy (n=39) <sup>b</sup>	Plausible reporters of energy (n=13)	P
Total calorie intake (kcal/day) (SD)	1415.6 (300.7)	2008.1 (298.6)	<0.0001
rEI/pER <sup>c</sup> (%) (SD)	57% (1.3)	87% (.83)	<0.0001
Percentage dietary protein (SD)	18.4 (4.7)	14.4 (2.9)	n.s.
Percentage dietary carbohydrate	48.2 (8.1)	52.2 (6.6)	n.s.
Percentage dietary fat	33.4 (7.4)	33.5 (5.7)	n.s.
Physical activity level <sup>d</sup>			
Low (%)	79.5	84.6	n.s.
Moderate (%)	20.5	15.4	n.s.
Vigorous	0.0	0.0	
Eating behaviors <sup>e</sup>			
Mean Cognitive restraint	44.7 (12.9)	43.6 (21.7)	n.s.
Mean Emotional eating	38.0 (27.8)	30.8 (23.2)	n.s.
Mean Uncontrolled eating	27.9 (16.1)	25.9 (11.2)	n.s.

<sup>a</sup>Note one subject was an over-reporter and data is not shown

<sup>b</sup>Energy Intake ≤ 78% of the predicted energy requirements

<sup>c</sup>Ratio of reported energy intake from three 24-hour recalls to predicted energy requirements from the DRI equation from the Institute of Medicine.

<sup>d</sup>Measured over a 7-day period with accelerometers and determined using values from the Institute of Medicine

<sup>e</sup>Eating behaviors measured with the Three Factor Eating Questionnaire-R18

Abbreviation: n.s., not significant (p>0.05)

**Table 3 Diet Quality Index Revised (DQI-R) Scores (SD) in total energy under-reporters and plausible reporters<sup>a</sup>**

Variable	Under-reporters of energy (n=39) <sup>b</sup>	Plausible reporters of energy (n=13)	P
Total fat ≤ 30% energy intake	5.5 (3.8)	5.0 (2.9)	n.s.
Saturated fat ≤ 10% energy intake	5.3 (3.8)	6.2 (3.6)	n.s.
Dietary cholesterol < 300 mg/day	9.0 (2.9)	8.8 (2.2)	n.s.
2-4 servings fruit per day	1.9 (3.2)	3.1 (3.8)	n.s.
3-5 servings vegetables per day	2.6 (3.2)	1.9 (2.5)	n.s.
6-11 serving grains per day	4.5 (3.2)	8.4 (2.4)	<0.001
Calcium intake as % AI <sup>c</sup> for age	3.1 (3.0)	3.6 (2.4)	n.s.
Iron intake as % 1989 RDA <sup>d</sup> for age	7.1 (3.8)	8.5 (2.4)	n.s.
Dietary diversity score <sup>e</sup>	4.8 (1.3)	4.9 (1.2)	n.s.
Dietary moderation score <sup>f</sup>	8.7 (1.1)	7.6 (1.1)	<0.01
DQI-R score (0-100)	50.7 (14.6)	56.5 (12.2)	n.s.

<sup>a</sup>Note one subject was an over-reporter and data is not shown

<sup>b</sup>Energy Intake ≤ 78% of the predicted energy requirements

<sup>c</sup>Adequate intake value

<sup>d</sup>Recommended Dietary Allowance

<sup>e</sup>≥ 3/4 serving of the foods within each subgroup

<sup>f</sup>Added sugars, discretionary fat, sodium intake and alcohol intake

**Table 4 Spearman partial correlations between the percentage of under-reporting of total energy and demographic, dietary and eating behaviors in under-reporters (n=39)**

Variables	Under-reporting of total energy	P
Age	0.11	n.s.
Education	-0.21	n.s.
Body mass index	-0.33	P < 0.05
Body discrepancy score <sup>b</sup>	-0.30	n.s.
Physical activity <sup>c</sup>	0.27	n.s.
Discretionary fat	-0.20	n.s.
Percentage of protein intake	-0.1	n.s.
Percentage of carbohydrate intake	0.08	n.s.
Cognitive Restraint <sup>d</sup>	0.45	P < 0.01
Uncontrolled eating <sup>d</sup>	-0.22	n.s.
Emotional eating <sup>d</sup>	-0.12	n.s.

<sup>a</sup>Energy Intake ≤ 78% of the predicted energy requirements

<sup>b</sup>Current body shape score minus ideal body shape score

<sup>c</sup>Measured over a 7-day period with accelerometers and determined using values from the Institute of Medicine

<sup>d</sup>Eating behaviors measured with the Three Factor Eating Questionnaire-R18

## Conclusions

Our findings indicate a high rate (75%) of under-reporting of total calories in middle-class African American women. Under-reporters had a significantly greater BMI and reported “trying to lose weight”. Under-reporters were more likely to report consuming less energy, less servings of grains, less discretionary fat and sodium. The only eating behavior correlated with under-reporting of total calories was cognitive restraint such that greater cognitive restraint was associated with less under-reporting of total calories. Our results indicate that dietary studies in middle-class African American women should include some method to independently validate dietary intake as there is a high rate of under-reporting. Further research in a larger sample of middle-class African American women is indicated to further investigate and characterize under-reporters.

## Literature cited

1. Neuhouser ML, Tinker L, Shaw PA, et al. Use of recovery biomarkers to calibrate nutrient consumption self-reports in the Women's Health Initiative. *Am J Epidemiol* 2008;167:1247-59.
2. Hebert JR, Patterson RE, Gorfine M, Ebbeling CB, St Jeor ST, Chlebowski RT. Differences between estimated caloric requirements and self-reported caloric intake in the women's health initiative. *Ann Epidemiol* 2003;13:629-37.
3. Yanek LR, Moy TF, Raqueno JV, Becker DM. Comparison of the effectiveness of a telephone 24-hour dietary recall method vs an in-person method among urban African-American women. *J Am Diet Assoc* 2000;100:1172-7; quiz 1155-6.
4. Amend A, Melkus GD, Chyun DA, Galasso P, Wylie-Rosett J. Validation of dietary intake data in black women with type 2 diabetes. *J Am Diet Assoc* 2007;107:112-7.
5. Samuel-Hodge CD, Fernandez LM, Henriquez-Roldan CF, Johnston LF, Keyserling TC. A comparison of self-reported energy intake with total energy expenditure estimated by accelerometer and basal metabolic rate in African-American women with type 2 diabetes. *Diabetes Care* 2004;27:663-9.
6. Goldberg GR, Black AE, Jebb SA, et al. Critical evaluation of energy intake data using fundamental principles of energy physiology: 1. Derivation of cut-off limits to identify under-reporting. *Eur J Clin Nutr* 1991;45:569-81.

## Acknowledgements

Grand Valley State University Statistical Consulting Center

For further information contact Debbie Lown, Ph.D., R.D. at [lownde@gvsu.edu](mailto:lownde@gvsu.edu)