

Effects of Weight History, Resource Cycling, and Fast Food on Overall Diet Quality and Health
in Low-Income Louisiana Women

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Project Overview: The objectives of this proposal were to confirm and extend our previous results on diet and health of food stamp recipients: by measuring the psychosocial effects of obesity, including a history of obesity; investigating temporal patterns of food insecurity, diet, and diet quality over the monthly food resource cycle, as related to obesity, including abdominal obesity in low-income individuals; investigating reliance on and availability of fast foods; and conducting nutrient-to-cost analyses of food purchased by low-income individuals as related to food resources and obesity in low-income individuals. Findings of the study will aid policy makers, nutrition educators, and the women themselves understand more fully the relationship between income, food choices, and past and present weight.

Objectives: The goal of this project was to investigate the short term and long term physical and psychosocial outcomes associated with obesity in low-income women, with emphasis on the role of resource cycling and reliance on fast foods in producing obesity. There were four objectives related to this goal: **Objective 1:** To measure the psychosocial effects of obesity, including a history of obesity, in low-income individuals. **Objective 2:** To investigate temporal patterns of food insecurity, diet, and diet quality over the monthly food resource cycle, as related to obesity in low-income individuals. **Objective 3:** To investigate fast food habits and availability, as related to obesity in low-income individuals. **Objective 4:** To conduct nutrient-to-cost analyses of food purchased by low-income individuals as related to food resources and obesity in low-income individuals.

A convenience sample of 72 female food-stamp recipients was interviewed for this study; however, eight were excluded from weight and diet analysis: five were pregnant, two were older than 70 years, and one reported an energy intake of >13,000 kcals. Thus, there were 64 study participants (94% African-American [AA], and 6% Euro-Americans [EA]) used for all aspects of the study. Because of the small number of Euro-Americans, no attempt was made to analyze the effect of race on the study parameters. It should be noted that in the South, diet and health are similar in AA and EA. A modified version of the USDA short form was used to determine food security status: food secure (FS), food insecure (FIS), and food insecure with hunger (FISH), using the criteria outlined by Nord.

Table 1. Study demographics: race, age, work status, type or absence of medical insurance, and whether the participant had every participated in any type of nutrition class (note that the number in this table include the full study population, i.e. the participants that were excluded from the weight and diet components).

Food Security Status	N	Race	Work Status	Medical Ins	Nutrition Class
FS	34	32 AA	No: 25 PT: 4 FT: 4	No: 13 Medicaid: 12 Medicare: 5 Employer: 3 Spouse: 1	No: 16 Yes (type not stated): 4 Clinical Class: 4 EFNEP/FNP 4 School: 1 Other: 5

FIS	29	27 AA	No: 20 PT: 2 FT: 7	No: 13 Medicaid: 13 Medicare: 1 Employer: 2 Spouse:	No: 15 Yes (type not stated): 5 Clinical Class: 1 EFNEP/FNP: 7 School: 1 Other:
FISH	9	9 AA	No: 7 PT: 0 FT: 2	No: 3 Medicaid: 4 Medicare: 1 Employer: 1 Spouse:	No: 6 Yes (type not stated): Clinical Class: EFNEP: 2 School: Other: 1

Approximately 48.6% (n=35) of the total population reported having had some type of nutrition education. In the FS group, 47% reported nutrition education; and in the FIS group 51.7% reported some—but it was the FISH group that reported the lowest incidence of nutrition education—33%. The phrase “clinical class” refers to education received either through in-patient or out-patient counseling for a chronic disease, such as type 2 diabetes mellitus. The Expanded Food and Nutrition Education Program (EFNEP) was used to recruit participants, hence the relatively high percentage of participants who stated they had participated in this program. No one mentioned, however, that they had completed the EFNEP program series. The unexpected result of this question, was that only two people mentioned the Food Stamp Education Program (Family Nutrition Program [FNP] in Louisiana)—neither of the participants actually mentioned the program by name.

It did become clear when talking with these women that what nutrition education information they had was not delivered as a cogent whole—much of it was sporadic and much depended on the individual agency. For example, several women mentioned Women, Infants, and Children (WIC)—which has a nutrition education mandate. However, there was clear variability in the nutrition information distributed to participants, apparently ranging from a fairly extensive program to printed information to none at all. It’s also important to note that despite many women having attended WIC, no one associated this program with providing nutrition education. Women receiving nutrition education through “clinical classes” also varies greatly. No attempt was made to describe further the nutrition class or education that participants had or had not had.

Weight: With the exception of the aforementioned exclusions, all subjects were weighed and their waist circumference (WC) was taken; using a stated height, body mass index (BMI) was calculated. The mean of triplicate measurements \pm standard deviation are presented. Study demographics related to weight status are presented in Table 2. There was no difference among ages, weights, BMIs, or WC among the three food security status groups. It should be noted that the mean BMI for FS and FISH was within the range of Class I obesity, and for FISH was within the range of Class II obesity. Mean WC for all three groups is higher than the 35 inches recommended for women to help reduce their risk of chronic disease.

Table 2. Study demographics: weight (wt), body mass index (BMI), and waist circumference (WC).

Data are presented \pm standard deviation.

Food Security Status	N	Race	Age (yrs)	Wt (pounds)	BMI	WC (inches)
FS	29	27 AA	43.41 \pm 15.3	203 \pm 69.5	34.58 \pm 11.7	39.36 \pm 7.4
FIS	26	24 AA	38.97 \pm 13.82	211 \pm 71	36.35 \pm 12.9	42.0 \pm 10.5
FISH	9	9 AA	37.67 \pm 14.41	207.3 \pm 72.9	34.7 \pm 10.4	43.5 \pm 12.6

Of perhaps greatest concern is the number of individuals who fall into Class III obesity—that is they have a BMI greater than 40 (Table 3). The highest BMI calculated was 74.

Table 3. Breakout of weight status, using National Institutes of Health criteria, by food security status.

	Underweight BMI <18.5	Normal 18.5-24.9	Overweight 25-29.9	Class I Obesity 30-34.9	Class II Obesity 35-39.9	Class III Obesity >40
FS	2 (6.9%)	4 (13.8%)	5 (17.2%)	6 (20.7%)	4 (13.8%)	8 (27.6%)
FIS	1 (3.8%)	4 (15.4%)	6 (23.1)	5 (19.2%)	2 (7.7%)	8 (30.8%)
FISH	–	–	3 (33.3%)	4 (44.4%)	–	2 (22.2%)

Table 4 shows the perception of BMI compared with the actual BMI in groups of study participants grouped by food security status. The mean BMI for all groups was within the obese range, as defined by the National Institutes of Health criteria. For individuals who were FIS, the mean BMI was within the range for Class II obesity. All groups significantly underestimated their BMI. The FIS group had the highest total body size underestimation (-8.74 kg/m²). All groups perceived their BMI to be within the overweight range and all groups desired a BMI in the normal range—in fact, the desired BMI was relatively low. Individuals who were FISH were the least likely to identify themselves as obese (33%), as compared with 44% of FS and 53% of FIS individuals who were able to correctly identify their weight status. It is not surprising to find an underestimation of body size since it has been reported that African American women are prone to underrate their body size. It has also been reported previously that as income levels decrease, the proportion of African Americans who perceive themselves as overweight also decreases.

Table 4. Perception of BMI versus actual BMI in food secure, food insecure, and food insecure with hunger; data are presented as mean \pm standard deviation.

	FS	FIS	FISH
Actual BMI	34.28 \pm 11.56 ^a	37.07 \pm 13.18 ^b	34.66 \pm 10.44 ^c
Perceived BMI	28.28 \pm 7.59 ^a	28.32 \pm 7.9 ^b	29.37 \pm 4.74 ^c
Difference between Actual & Perceived BMI	-6 \pm 7.64	-8.74 \pm 7.69	-5.28 \pm 6.99
Desired BMI	22.77 \pm 3.56	22.21 \pm 3.28	23.11 \pm 2.77

^a p = 0.0002, ^b p = 0.00001, ^c p = 0.05

There were several caveats to this aspect of the study. First, the figures clearly depicted

Europeans or Euro-Americans, rather than African Americans, suggesting the need for more culturally specific material. Second, the heaviest figure depicted an individual with a BMI of 45.4, whereas, seven study participants had BMI values higher than this value. Some of the heaviest women in the study selected the figure with the highest BMI and mentioned that they felt they were heavier. Some of these women, however, selected BMI values that depicted slimmer figures.

Table 5. Perceived body mass index: weight as a child, teen, highest adult weight, and lowest adult weight; data presented as mean ± standard deviation.

	Child	Teen	Highest Adult Wt	Lowest Adult Wt
FS	20.45±5.43	20.41±2.84	29.83±7.94	22.49±4.53
FIS	21.81±5.96	22.87±6.26	30.11±8.15	23.21±5.55
FISH	20.89±6.66	22.47±6.20	31.87±6.18	23.82±6.19

Data presented in Table 5 suggest that this population perceived that they became heavier with age. This finding is supported by Bogalusa Heart Study data which suggests that AA girls are similar in weight to their EA counterparts until they are about 8 years old; at that time, there is a separation in weight and the AAs become statistically heavier. The data in Table 5 also suggest that the highest adult weight of the FISH group is slightly higher than the others (NS); the sample size (n=9) is very small and this may account for the lack of statistical significance.

Overweight in this population is not a unique problem. The alarming spread of obesity in the United States cuts across all demographic groups. However, severe obesity is more likely among persons with limited education and income. These are also the individuals with the highest risk of obesity-related health problems.

Perception of Teasing Scale: To assess more fully the psychosocial aspects of the history of overweight, the perception of teasing scale was administered to the study participants. Virtually none of the participants stated that they had been teased because of their weight as a child.

Herbs, Herbals, and Botanicals: Only five people stated that they took herbal medications. Two reported taking green tea, one lecithin, one Echinacea, and one rose hips with evening primrose oil. Because of the surprisingly small number taking herbals, no attempt was made to evaluate this further.

Self-rated mental and physical health: Participants self-rated their mental and physical health at present and over the past 5 years using a Likert-type scale.

Table 6. Self-rated physical health at present by food security status

	Poor	Fair	Good	Excellent
Food Secure	4	12	15	3
Food Insecure	4	15	8	2
Food Insecure Hungry	1	4	3	1

Table 7. Percentage of self-rated physical health at present by

food security status and weight status

	Poor	Fair	Good	Excellent
FS	11.8	20.9	21	7.7
FIS	13.8	51.7	27.6	6.9
FISH	11.1	44.4	33.3	11.1
Normal	9.1	54.5	27.3	9.1
Overweight	23.1	23.1	23.1	30.8
Obese	10.3	51.3	35.9	2.6

When categorized by food security status, the majority of the population rated their physical health as fair or good. A slightly higher percentage of FS individuals rated their health as good or excellent (52.9%), when compared with either FIS (34.5%) or FISH (44.4%). This trend was not unexpected since FS individuals should experience somewhat better physical health than their FIS or FISH counterparts. It's important to note, that when the same individuals were re-categorized by weight, a nearly equal number of normal (includes underweight) weight and obese subjects characterized their health as fair. Virtually none of the obese (2.6%) felt their current health was excellent. This was not unexpected; however, it was surprising that only 9.1% of normal weight individuals rated their health as excellent. What was surprising was that only 9% of normal weight individuals rated their health as excellent, whereas almost 31% of the overweight subjects did.

A high percentage of participants ranked their health as “fair” or “poor.” This has been demonstrated previously, and has lead Tarasuk to suggest that chronic and severe FIS predisposes individuals to poor health. Moreover, these women are, on average, obese, and are more likely to experience obesity related diseases, including hypertension, type 2 diabetes mellitus, coronary artery disease, and osteoarthritis. These illnesses reduce the individual's quality of life, which may have been reflected in these responses. It appears that the combination of food insecurity and obesity may lead to poorer self-ratings of physical health.

Table 8. Self-rated physical health over the past 5 years

	Poor	Fair	Good	Excellent
Food Secure	4	11	12	7
Food Insecure	9	7	10	2
Food Insecure Hungry	2	4	3	0

Table 8 shows the self-rated physical health over the past 5 years. More people rated their physical health as excellent over that time period than did at present.

Table 9. Self-rated mental health at present

	Poor	Fair	Good	Excellent
Food Secure	1	9	14	10
Food Insecure	4	8	10	7
Food Insecure Hungry	1	3	2	3

Table 10. Self-rated mental health over the past 5 years

	Poor	Fair	Good	Excellent	Don't Know
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Food Secure	2	8	14	10	
Food Insecure	1	5	13	7	1
Food Insecure Hungry	1	2	5	1	

The mental health ratings over the past 5 years are somewhat higher than at present. This isn't surprising since study participants may have had difficulty recalling personal historic information. A poor recollection of events may be compounded by the fact, that unlike physical health, mental health may be a more difficult evaluation for this population, who as a majority, are not well educated and may be receiving substandard medical care. They may also find it easier to remember and understand a concrete physical occurrence, such as a heart attack or cancer, as opposed to a more complex psychological disturbance.

Self-rated Eating Habits and Nutrition Knowledge: Likert-type questions were used to self-assess eating habits, nutritional quality of their diet, daily energy intake, & nutritional knowledge.

Table 11 shows the self-rated eating habits study participants. On average, and as discussed below, the eating habits of this population are very poor—low in fruits, vegetables, and dairy, and high in sodium and saturated fat. Although self-rated assessment is not necessarily a strong indicator of the actual diet, it underscores the difference between what people think about and what they actually do. It also points out the tremendous need for nutrition education in this group—many of the participants think that their eating habits are good or excellent—this is clearly not borne out by their actual dietary intake or their ability to plan a healthy meal. This is also true for the individuals in the Class III obesity range, only 53% believed that their eating habits were poor or fair, the remaining 47% categorized their eating habits as good or excellent. The individuals within the Class III obesity range did report the highest percentage of individuals rating their eating habits as poor (37%); however, nearly half reported their eating habits were good or excellent.

Table 11. Self-rated eating habits of the participants by weight status

	Poor	Fair	Good	Excellent
Normal	2	3	4	2
Overweight	3	6	3	1
Obese I	1	6	3	1
Obese II	1	3	2	3
Obese III	7	3	5	4

Table 12. Self-rated eating habits by food security group

	Poor	Fair	Good	Excellent	Don't Know
FS	7	10	4	8	0
FIS	4	10	11	1	0
FISH	3	1	3	2	0

A high percentage of FIS participants felt that their self-rated eating habits were good or excellent (56%), followed by 38% who felt their habits were fair; only 1 person (4%) felt their habits were excellent. The figure depicting the nutritional quality of the diet suggests that the majority of people in all groups thought the nutritional quality of their diet was poor or fair (55% FS; and 59% FIS and 44% FISH) felt their diet was poor.

Again, it should be remembered that these are self-ratings, and do not actually reflect dietary

quality. It may have been that their interpretation of what was meant by the different categories was unclear. For example, perhaps participants interpreted “excellent” eating habits as having enough to eat.

We asked a slightly different question, albeit still self-rated—How would you rate the nutritional quality of your diet?

Table 13. Self-rated nutritional quality of diet by food security status

	Poor	Fair	Good	Excellent
FS	5	13	7	4
FIS	6	11	7	2
FISH	5	2	2	—

	Poor	Fair	Good	Excellent
Normal	1 (9)	5 (45)	4 (36)	1 (9)
Overweight	6 (46)	5 (38)	1 (8)	1 (8)
Obese Class I	2 (18)	4 (36)	4 (36)	1 (9)
Obese Class II	2 (22)	3 (33)	2 (22)	2 (22)
Obese Class III	5 (26)	9 (47)	4 (21)	1 (5)

The numbers in each category are small; however, it’s interesting to note that the lowest rankings of diet came from participants who were overweight rather than obese.

When the data were divided by food security groupings, the majority of the FS felt that they ate a “somewhat high” amount of energy (38.5%), followed by “just about right” (34.6%). The FIS, felt that they ate “somewhat low” (32%), with “just about right” and “somewhat high” both (24%). The majority of FISH (67%) felt that they ate “somewhat high” or “much too high” amounts of energy. This may be significant since highest percentage (55%) of FISH were Class III obese. As can be seen in Figure 1, the obese are much more likely than the other groups to feel that they ate either “somewhat high” or “much too high” amounts of energy. No other group felt that they ate “much too high” energy, where as 12% of overweight individuals thought they ate “somewhat high” amounts of energy.

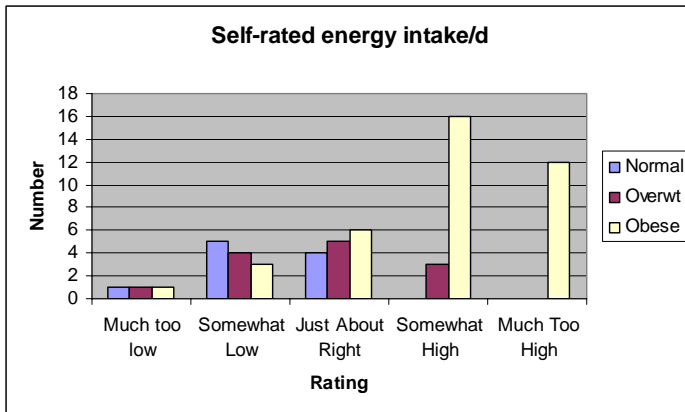


Figure 1. Self-rated energy intake by weight status.

	Day 1	Day 2
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Obesity Class I	1813 ₊₈₀₀	1982 ₊₁₀₂₅
Obesity Class II	1717 ₊₉₁₇	1633 ₊₉₂₁
Obesity Class III	1694 ₊₁₀₈₅	1429 ₊₇₈₁

The data presented in Table 15 suggest that, on average, individuals with Class III obesity consume fewer kcals than individuals with either Class I or Class II obesity; however, these differences were not significant. These data suggest that women, especially those with Class III obesity, are underreporting energy intake.



Figure 2. Self-rated nutrition knowledge by food security status.

Self-rated nutrition knowledge for FS, resembled a bell curve, with the highest percentage (43%) of respondents answering “good.” The FIS group appeared to have a more modest assessment of their ability with 61.5% responding that they had a fair knowledge, and only one (3.8%) believing that they had an excellent knowledge. The FISH group had the most modest assessment, with 55.5% rating their knowledge as “poor” and none marking “excellent.” As seen in Table 16, the self-rated nutrition knowledge based on weight showed a similar distribution. These data suggest strongly that the food-stamp recipients in this study lack adequate nutrition education.

	Poor	Fair	Good	Excellent
Normal	2 (18)	3 (27)	5 (45)	1 (9)
Overweight	4 (31)	5 (38)	3 (23)	1 (8)
Obese Class I	0	6 (55)	5 (45)	0
Obese Class II	1 (11)	4 (44)	3 (33)	1 (11)
Obese Class III	2 (11)	8 (42)	7 (37)	2 (11)

Our previous study suggested that many of the study participants ate fast food meals. Therefore, in this study, we asked the frequency in which participants ate at fast food restaurants. We did not define the term “fast food restaurants.” Interview information suggested that study participants also ate other “convenience meals”—such as “box meals” prepared at local grocery stores. Table 17 shows the self-reported frequency of fast food meals eaten by study

participants.

Table 17. Self-reported frequency of eating at fast food restaurants—by food security status.

	Rarely	Several Times Monthly	Several Times Weekly	Daily	Most Meals
FS	14	7	6	1	1
FIS	11	11	4	0	0
FISH	3	3	2	1	0

Recently, the Louisiana Cooperative Extension Service has been developing a “Fast Food Module” to add to their nutrition education program—in part, this is the result of our earlier findings.

To assess diet more fully, we:

1. Obtained 24 hour recalls at the beginning of the month (Day 1) and at the end of the month (Day 2) (CSFII multiple pass method)
2. Evaluated Food Guide Pyramid servings from the combined days on which the recalls were taken
3. Asked people to define a healthy meal, which was then evaluated based on their self-reported knowledge
4. Asked people to save and return their grocery store receipts (this was an experiment that met with limited success—but, some information is provided below).

There was no difference between mean energy intake for Day 1 or Day 2 for FS, FIS, or FISH groups (Table 18); the FISH group approached statistical significance (0.067). The small sample size (n=9) of the FISH group probably accounted for the lack of statistical significance, since numerically there was an average 716 kcal drop in energy over the two days for that group. There was no difference among the differences for energy intake on Day 1 or Day 2 in these groups. When the data from all groups were combined, Day 1 energy intake was 1926±1167 kcals compared with Day 2 energy intake of 1701±970 kcals (NS).

Table 18 also shows the mean % energy for the macronutrients for Days 1 and 2. The only significant difference was an increase shown for % energy from carbohydrate (CHO) in the FIS group (p=0.002), which was done at the expense of both protein (PRO) and FAT. The overall breakdown of mean percentages of macronutrients was within current dietary recommendations.

Table 18. Mean energy intake (kcals) ± standard deviation, and percent energy from macronutrients for Days 1 and 2 for study participants who were Food Secure, Food Insecure, and

Food Insecure with Hunger.

	Intake (kcal) Day 1	Intake (kcal) Day 2	Day 1 % Energy from PRO	Day 2 % Energy from PRO	Day 1 % Energy from CHO	Day 2 % Energy from CHO	Day 1 % Energy from Total FAT	Day 2 % Energy from Total FAT
FS	1839±1100	1630±1021	15.8±4.6	17.5±5.6	50.48±11.2	50.93±9.2	33±12.8	31.59±8.47
FIS	1994±1372	1921±905	17.44±5	15.03±4.3	48.89±11.42	55.3±9.5	33.65±9.73	29.67±9
FISH	2027±762	1311±914	20.33±12.55	20.8±14.83	47.11±19	50.42±21.36	32.58±12.3	28.79±10.5

Table 19 shows that the majority of people in the FS and FIS group met or exceeded % energy from protein and carbohydrates on Day 1 and Day 2. This was true despite the decrease in the percentage meeting estimated protein requirements for protein and carbohydrate on Day 2—in the FISH group, this dipped below 50%. The majority of the FISH group met these recommendations for Day 1, but less than half met them for Day 2. Even using the new guidelines for total fat (up to 35% of energy) and cholesterol (<200mg), many individuals exceeded fat and cholesterol recommendations; however, for these nutrients, the number of people in the FS and FISH groups exceeding the recommendations dropped. The percentage of people exceeding the recommendations for cholesterol is high in all groups—especially the two food insecure groups.

Table 19. Meeting/exceeding macronutrients and cholesterol for Food Secure, Food Insecure, and Food Insecure with Hunger over their resource cycle.

	Day 1				Day 2			
	% meeting PRO	% meeting CHO	% over total FAT ¹	% over total CHOL	% meeting PRO	% meeting CHO	% over total FAT	% over total CHOL
FS	72	86	41	55	62	69	24	59
FIS	77	73	38	77	69	85	19	81
FISH	89	89	44	78	44	44	44	44

When study participants were categorized by BMI (under/normal wt [n=11], overweight [n=13], obese [39]), rather than food security status, there was a significant difference in energy intake for Day 1 (p=0.001) with the likely difference coming from the higher reported energy intake of the under/normal wt individuals, mean energy intake 3086±1745 kcals, as compared with 1665±585 kcals, and 1733±952 kcals for overweight and obese individuals respectively. Day 2

¹ Total fat and total cholesterol were determined using the new DRI recommendations of 35% of energy in diet, and 200 mg cholesterol respectively. PRO = protein, CHO = carbohydrate, CHOL = cholesterol.

did not show this relationship. There were no linear relationships between BMI and energy intake for under/normal wt, overweight, or obese categories.

Table 20 shows the break down of macronutrients by % energy, when the population was divided into three weight classes. The only significant difference observed was under/normal weight participants for percent intake of CHO ($p=0.0208$).

Table 20. Break down of macronutrients by % energy when the population was divided into three weight classes.

	Day 1 % Energy from PRO	Day 2 % Energy from PRO	Day 1 % Energy from CHO	Day 2 % Energy from CHO	Day 1 % Energy from FAT	Day 2 % Energy from FAT
Underweight/ Normal Weight	15.22±4.8	15.47±2.6	44±12.03	53.77±10.12	38.57±15.67	30.75±10.66
Overweight	20.31±10.64	15.99±3.73	51.95±11.54	55.69±9.17	27.73±7.67	28.31±7.57
Obese	16.51±4.77	17.59±8.92	50±12.98	51.12±12.93	33.5±11.72	31.3±9.159

The obese were classified further to Class I (30-34.9) (n=11), Class II (35-39.9) (n=9), and Class III (≥ 40) (n=19). None of the groups showed a difference in energy intake between days 1 and 2. Mean energy levels from subjects categorized by the three levels of obesity showed a dose response, with subjects with class one obesity having the highest mean energy intake (1813±800 kcals), and with class III the lowest intake (1694±1085kcals) ($p=0.05$). Day 2 did not show this, and the difference among the groups was not different for energy intake. When percent intake for macronutrients was compared for these three groups, only those individuals with Class II obesity showed a difference between the days for CHO ($p=0.034$) and Fat ($p=0.055$).

Table 21. Breakdown of macronutrients by % energy, when the obese population was further divided into Class I, Class II, and Class III obesity.

	Day 1 % Energy from PRO	Day 2 % Energy from PRO	Day 1 % Energy from CHO	Day 2 % Energy from CHO	Day 1 % Energy from FAT	Day 2 % Energy from FAT
Obesity Class I	16±126.7	17.24±5.08	49.01±10.94	54.64±6.8	35.01±9.88	31.12±5.79
Obesity Class II	17.66±4.89	15.07±3.88	49.36±18.8	56.37±12.12	32.98±15.26	25.57±8.98
Obesity Class III	16.26±5.23	18.99±11.9	50.83±11.41	46.91±14.45	32.9±11.4	34.12±9.89

Table 22. Mean intake of total fat (g), saturated fatty acid (SFA) % energy, cholesterol, and sodium (mg); data are presented as mean ± standard deviation.

	Day 1			Day 2		
	% SFA	Cholesterol* (mg)	Sodium (mg)	% SFA	Cholesterol* (mg)	Sodium (mg)
FS	11.10±5.46	340.98±399.8	3227±3278	10.88±3.69	352.82±268.6	3352±2554
FIS	11.28±4.44 ^a	410.58±577.63	4043±2960	9.39±3.78 ^a	329.19±234.11	3571±1888
FISH	10.60±6.31	656.86±578.39 ^b	3667±3144	13.60±8.84	157.87±95.69 ^b	2803±2994

^a FIS % SFA p=0.027 Day 1 Day 2; ^b FISH Cholesterol = 0.0352 Day 1 Day 2; Difference in the cholesterol level from Day 1 to Day 2 p= 0.031

There were minimal differences between Day 1 and Day 2 in the FIS group and FISH group for % energy from SFA and cholesterol, respectively. None the less, with the exception of cholesterol for FISH individuals on Day 2, means of % energy from SFA, cholesterol, and sodium greatly exceed the current recommendation of <7% energy from SFA (+trans fats), <200 mg cholesterol, and 2,400 mg. This is of concern since this population is at high risk for coronary artery disease and hypertension and diets high in SFA, cholesterol, and sodium increase risk and exacerbate current disease. Clearly, this population needs further nutrition education to help reduce the intake of these nutrients and cholesterol. Intake of fast foods, processed foods, and fatty meats—common in the diets of these women should be reduced. They would also benefit from changing the seasonings of favorite foods from salt pork and salt mixes to leaner meats and herbs. Programs including EFNEP and FNP are ideally suited to conduct this education.

Table 23. Intake of Potassium, Vitamin C, Folate, and Dietary Fiber for Food Secure, Food Insecure, and Food Insecure with Hunger over their resource cycle; data are presented as mean ± standard deviation.

	Day 1				Day 2			
	Potassium (mg)	Vitamin C (mg)	Folate ^a (µg)	Dietary Fiber (g)	Potassium (mg)	Vitamin C (mg)	Folate ^a (µg)	Dietary Fiber (g)
FS	1870± 1274.7	77.40± 73.94	315.15± 280.46	11.20± 6.98	1726.06± 1187.4	52.28± 49.52	347.85± 353.23	12.98± 10.39
FIS	2101.95± 1595.70	76.78± 77.81	334.34± 369.78	15.80± 14.9	1752.12± 1030.30	71.09± 64.72	212± 274.28	15.66± 10.96
FISH	1914.85± 1409.16	80.22± 68.48	192.27± 121.30	8.18± 7.70	1262.91± 943.59	49.92± 70.23	216.16± 196.15	12.34± 13.66

^a Differences between the days among the three groups p = 0.0006. For FS the difference in Vitamin C intake from Day 1 to Day 2 approached statistical significance p=0.065.

Table 23 illustrates micronutrients and dietary fiber which are associated with fruit and vegetable intake. There were no differences between Day 1 and Day 2 for any of the groups; the difference in folate intake was the only micronutrient that was significantly different among the three groups. Mean potassium intake failed to meet the recommendation of 4.1 g/day—possibly as a result of the low fruit and vegetable, and dairy intake; mean vitamin C intake met the recommended levels on Day 1, but not Day 2; folate intake was low—especially since the

majority of the population were women of child bearing potential; and mean dietary fiber intake failed to meet recommended levels. As seen in Table * in the evaluation of the Food Guide Pyramid serving recommendations, fruit and vegetable intake was very low in this population.

Table 24. Intake of Calcium (mg), Iron (mg), and Zinc (mg) for the population—presented as mean ± standard deviation

	Day 1 Calcium (mg)	Day 2 Calcium (mg)	Day 1 Iron (mg)	Day 2 Iron (mg)	Day 1 Zinc (mg)	Day 2 Zinc (mg)
FS	487.13 ± 352.54 ^a	617.54 ± 436.43 ^a	14.19 ± 15.47 ^b	20.23 ± 23.34 ^b	8.84 ± 7.02	8.25 ± 6.31
FIS	665.96 ± 535.37	625.93 ± 372.51	21.02 ± 22.83	28.41 ± 27.29	10.75±10.13	7.19±4.74
FISH	594.01 ± 419.11	484.65 ± 533.26	18.85 ± 20.71	19.20 ± 36.19	8.24±6.55	5.48±3.75

^a p = 0.047; ^b p = 0.04

Table 25. Number and (percent) of the population meeting the DRI for Calcium, Iron, and Zinc

	Day 1 Calcium	Day 2 Calcium	Day 1 Iron	Day 2 Iron	Day 1 Zinc	Day 2 Zinc
FS	2 (6)	5 (16)	8 (26)	14 (45)	12 (39)	13 (50)
FIS	5 (19)	4 (15)	9 (35)	13 (50)	10 (39)	9 (35)
FISH	1 (11)	1 (11)	3 (33)	1 (11)	3 (33)	2 (22)

The percent of women meeting the DRI for calcium was very low. This is the direct result of the low intake of dairy foods. There was no difference in calcium intake among the three groups of women. With the exception of Day 1 for the FS population, the mean intake of iron met the DRI; however, the majority of the population failed to meet the DRI for iron on either Day 1 or Day 2 of the resource cycle. This is most notable for Day 2 in the FISH population, where only 1 individual met the DRI for iron. With the exception of Day 2 for the FIS and FISH groups, mean zinc intake met the DRI for women. The number of individuals meeting the DRI for iron or zinc was low, especially in the two food insecure groups. The percentage of women meeting the DRI for iron and zinc was somewhat surprising, since the majority of women met the recommended intake for protein—however, it should be noted that, on average, the women ate only one half of the recommended servings of meat per day.

Table 26. Food Guide Pyramid Servings from the combined days on which the recalls were taken. Data are presented as mean serving number ± standard deviation; there were no significant differences among the groups.

	FS	FIS	FISH
Grain	5.06+3.46	4.62+1.45	3.22+1.74
Vegetables	1.68+1.35	1.62+1.21	1.11+0.99
Fruit	0.59+0.65	0.85+1.00	0.25+0.66
Dairy	0.79+0.77	0.77+0.69	0.47+0.44
Meat	3.02+2.23	3.67+3.79	3.39+2.3

Total Fats/Sugars	17.05+14.35	16.04+11.98	17.42+4.17
Total Fats	3.68+3.29	3.26+3.20	2.03+2.04
Sugars	13.07+12.83	12.88+11.04	15.28+16.25

The Food Guide Pyramid complements the US Dietary Guidelines by “translating” the recommendations of the Guidelines into a format that the public can use. The recommendations for serving number and size promulgated by the pyramid are consistent with other recommendations for diet and health, for example Healthy People 2010 and the National Cancer Institute. Since the above figures, show the total from two days, it’s very clear that the population failed to meet the recommended number of servings from grain, vegetables, fruit, dairy, and meat. Although the population, as a whole, identified vegetables, fruit, and meat as parts of a healthy meal, they clearly do not comply with the advice. Meat was identified by virtually all the women as part of a healthy meal, however, even here they do not meet the guidelines of 2-3 servings a day. The number of servings of total fats was surprisingly low; however, sugars—principally in the form of added sugars contributed heavily to intake.

It is apparent that these food stamp recipients are choosing low cost, nutrient-deficient foods, as opposed to fruits, vegetables, and low-fat dairy, to sustain themselves and their families. Thus, these individuals may lack key antioxidant and anticarcinogenic compounds which may help protect them from disease. For example, high dietary fat and total energy, coupled with low consumption of fruit and vegetables, increases the risk for certain cancers and other chronic diseases. Low fat dairy protects against osteoporosis, and may help with weight loss and to control hypertension, as part of a DASH-type diet.

Because of the high average intake of total sugars indicated by the Food Guide Pyramid analysis, intake of total sugar, fructose, and sucrose was evaluated (Table 27).

Table 27. Intake of Sugars for Food Secure, Food Insecure, and Food Insecure with Hunger over their resource cycle; data are presented as mean + standard deviation.

	Day 1			Day 2		
	Total Sugars (g)	Fructose (g)	Sucrose (g)	Total Sugars (g)	Fructose (g)	Sucrose (g)
FS	104.94±74.61	8.43±9.24	11.31±14.13	76.05±57.51	5.78±5.32	10.85±17.97
FIS	85.14±66.04	7.62±8.09	9.64±9.43	91.85±59.38	6.51±7.48	9.86±11.59
FISH	104.75±69.25	7.32±9.05	26.76±33.57	66.57±67.04	2.67±5.42	17.29±36.67

For FS, the intake of total sugars from Day 1 to Day 2 approached statistical significance p=0.065.

Definition of a healthy meal: Study participants were asked for their perception of a healthy meal (Tables 28a and 28b).

Table 28 a. Description of healthy meals by FS participants dichotomized into subjects responding 1/2 (poor/fair) or 3/4 (good/excellent) to the question about nutrition knowledge.

FS 1/2 (n=18)	FS 3/4 (n=16)
<ul style="list-style-type: none"> • Meat, beans, rice, salad, soda, juice • No fried foods, cream, or gravy • Chicken breast, broccoli, lettuce salad, fruit, and milk • Meat, rice, beans; or rice, beans, greens • Meat, veg, salad, brown bread • Broiled chicken, salad, string beans • Pig salt meat, side meat, rice, beans • Meat, 1 or 2 veg, 1 serving bread/cereal, 1 milk serving • Veg, bread, country rice & gravy • Meat, veg, rice & potatoes, stay away from cereals • A variety of foods, Food Guide Pyramid, fruits, grains • Meat, vegetables, rice • Meat, vegetables, bread or dinner rolls, mashed potatoes • Everyday, eat 3x/day • Meat, vegetables, fruit, starch, juice • Rice, green stuff—greens, string beans, stewed chicken 	<ul style="list-style-type: none"> • Fruit/vegetables, baked instead of fried, not a lot of starch • A healthy meal • Meat (chicken), veg, rice • Buying stuff that usually eat and having enough of it • Food for children • Necessary food that supposed to have: 6 oz OJ, 1 piece toast, 5 oz cereal, 2 oz milk • Breakfast, lunch, dinner • Complete meal, meat, veg, salad, rice, sweets if want • Meat, veg, fruit, bread, milk, OJ • 5 food groups—pasta, ice cream (dairy and fat), tomatoes, bananas • Healthy food • Good nutrition; rice & gravy with chicken and corn • Being full, whole hearted meal: fried chicken, collard greens, creamed cauliflower • Meat, veg, starch • Varied: beans & rice, spinach & cornbread • Very nutritious, healthy meals, very few times have junk foods

Table 28 b. Description of healthy meals by FS, and FIS + FISH participants dichotomized into subjects responding 1/2 (poor/fair) or 3/4 (good/excellent) to the question about nutrition knowledge.

FIS + FISH 1/2 (n=20)	FIS + FISH 3/4 (n=14)
<ul style="list-style-type: none"> • Food Groups: meats, veg, starches • Meat, veg, rice • Meat, rice, fruits, veg • Pork chops, rice, vegetables, fruit, juice or milk • Veg, fruits, oatmeal/grits, eggs • Meat, potatoes, greens • Chicken & rice, corn or green beans • Meat, veg, salad x 3 • Meat & rice; anything but cereal and bread • Meat, green beans, rice • Meat, veg, starch, maybe dessert; might do without starches • Meat, beans, veg, fruit, milk • 3 meals a day, red beans & rice, pigtailed, fried chicken, mac and cheese; “eat a lot” • Healthy, beans (not rice), wheat bread, grapefruit juice, fruit • Eating healthy, greens, apples, orange juice, baked pork chop • Something from the food groups • Meat, vegetables, bread or dinner rolls, mashed potatoes • Main meal is lunch: morning–grits and sausage, salad, baked fish or chicken, night–snack of vanilla wafers • 3 meals a day, pork chops, green beans, mac and cheese • Meat everything on food group, vegetable, fruit, bread 	<ul style="list-style-type: none"> • Healthy food: meat, starch, vegetables, not a lot of desserts • Broiled foods v fried • Red beans, chicken, cornbread • Little portions, salad, cereal & banana, OJ, chicken, turkey • From the five food groups • Certain meats or fish–baked, F/V, seafood, chicken • Meat, veg, starches • No fried food, beans & rice • Meat, veg everyday; no starch • Stewed chicken, green stuff, rice • Rice, smothered chicken, fresh red beans • Baked fish, corn, fruit cocktail, roll, milk • Nutrition–something from each food group • Basic food groups–meat, vegetables, starches

Regardless of whether the participant was FS or FIS (+FISH); professed a poor, fair, good, or excellent knowledge of nutrition; or had attended any type of nutrition class, the responses were remarkably similar in all four groups. There were threads that could be picked up and developed into a healthy meal, but almost no one was able to include all the elements of a healthy meal. Dairy was one of the principal food groups missing from these meals–excluding the woman who mentioned ice-cream as part of the dairy group, only 6 people mentioned it. The lack of dairy in the idealized menus paralleled the women’s actual intake. Many answers were vague, and didn’t really let the interviewer know if the person understood the concepts of a healthy meal, for example “the food groups.” Virtually every meal included meat/chicken/fish–some fried, but most was not.

These findings suggest that nutrition education is needed by this population to clearly explain what constitutes a healthy diet, and how to provide healthy choices that this population can purchase and enjoy.

Grocery Store Receipts

Women were asked to save grocery store receipts and mail them back to us, so that we might evaluate the menu items purchased and the cost. This was the first time we had attempted this. Some women did not comply; others removed the food names and mailed back only the amount of money spent. The following is presented as an example of the foods purchased by one of the participants. This list was randomly chosen and is representative of those from other individuals.

Foods that are not nutrient dense are marked in yellow. This, along with the others, suggests there should be a revision of allowable purchases with food stamps. Money management and food purchasing should also be taught in programs such as EFNEP and FNP.

Table 29. Sample Grocery Store Receipt

Date Purchased	Place Purchased	Food Product	Amount	Cost	Non-food Product	Amount	Co
5/12/2004	Winn-Dixie	3 Musketeers Bar	1	0.59			
5/12/2004	Winn-Dixie	Reese's Peanut Butter Cup	1	0.59			
5/12/2004	Winn-Dixie	Bluebird Honey Bun	1	0.37			
5/12/2004	Winn-Dixie	Chips Ahoy	1	3.39			
5/12/2004	Winn-Dixie	Butter Biscuit	1	1.25			
5/13/2004	Super 1 Foods	Rodeo Hot Dogs	1	0.83			
5/13/2004	Super 1 Foods	Pineapple Tidbits	1	1.88			
5/13/2004	Super 1 Foods	Chips Ahoy	1	2.5			
5/13/2004	Super 1 Foods	Orange Soda	1	2			
5/13/2004	Super 1 Foods	Fruit Punch Soda	1	2			
5/13/2004	Super 1 Foods	Del Monte Golden Corn	4	2.36			
5/13/2004	Super 1 Foods	Van Camp Pork n Beans	10	5.8			
5/13/2004	Super 1 Foods	McCormick Season All	1	0.99			
5/13/2004	Super 1 Foods	Vegetable Oil	2	8.92			
5/13/2004	Super 1 Foods	Del Monte Golden Cream Corn	6	3.54			
5/13/2004	Super 1 Foods	Nabisco Easy Cheese	1	2.5			
5/13/2004	Super 1 Foods	Trappy's Jalapeno	1	0.6			
5/13/2004	Super 1 Foods	Pasta and Sauce	4	3.88			
5/13/2004	Super 1 Foods	Bonus Blend Coffee	1	1.77			
5/13/2004	Super 1 Foods	Sugar	1	1.56			
5/13/2004	Super 1 Foods	Camelia Red Kidney Beans	2	1.36			
5/13/2004	Super 1 Foods	Camelia Great Nor	1	0.65			
5/13/2004	Super 1 Foods	Kellog's Corn Pops	1	3.48			
5/13/2004	Super 1 Foods	Chicken Thighs	1	2.7			
5/13/2004	Super 1 Foods	HoneyDew Melon	1	2.5			
5/13/2004	Super 1 Foods	Cajun Rice	2	11.98			
5/13/2004	Winn-Dixie	Lux Spagetti	2	1.98			
5/13/2004	Winn-Dixie	Texas Toast	1	1.29			
5/13/2004	Winn-Dixie	Ground Beef	2	7.75			
5/13/2004	Winn-Dixie	Fryer Drumettes	1	2.98			
5/13/2004	Winn-Dixie	Tyson Hot & Spicy Wings	1	4.29			
5/13/2004	Winn-Dixie	Fryer Drumettes	2	5.73			
5/13/2004	Winn-Dixie	Hormel Chili	1	1.5			
5/13/2004	Winn-Dixie	Mountain Dew 20oz.	1	1.09			

5/13/2004	Winn-Dixie	2 Liter Coke Classic	1	1.19		
5/13/2004	Winn-Dixie	2 Liter Sprite	1	1.19		
5/13/2004	Winn-Dixie	Hunt's Tomato Sauce	4	1.3		
5/13/2004	Winn-Dixie	Blue Bell Ice Cream	2	4		
5/13/2004	Winn-Dixie	Ham & Cheese	1	2.5		
5/13/2004	Winn-Dixie	Broccoli & Chicken	1	2.5		
5/14/2004	Wal-Mart	CC THN CHOP	1	4.62		
5/14/2004	Wal-Mart	Beef Cube Steak	1	2.75		
5/14/2004	Wal-Mart	American Singles	2	2.14		
5/14/2004	Wal-Mart	Nesquick	1	0.98		
5/14/2004	Wal-Mart	Crinkle Cut Fries	1	1.78		
5/14/2004	Wal-Mart	JAK VAN WFR	1	1.68		
5/14/2004	Wal-Mart	Grape Juice	1	1.97		
5/14/2004	Wal-Mart	Great Value Oatmeal Cookies	1	0.88		
5/14/2004	Wal-Mart	Bryan Wiener	1	1.84		
5/14/2004	Wal-Mart	Hi-C	1	1.84		
5/14/2004	Wal-Mart	Gum	1	0.2		
5/14/2004	Wal-Mart	FA CH Chip	1	2		
5/14/2004	Wal-Mart	Great Value Hot Dog Buns	1	0.82		
5/14/2004	Wal-Mart	King Size Candy Bar	3	2.34		
5/15/2004	Winn-Dixie	Lemon Razz Cream	1	2.5		
5/15/2004	Winn-Dixie	2 Liter Coke Classic	1	1.19		
5/15/2004	Winn-Dixie	DM Cherry Mix	1	0.99		
5/15/2004	Winn-Dixie	Nerds Grape/Strawberry	1	0.55		
5/16/2004	Winn-Dixie	Blue Bell Ice Cream	1	2		
5/16/2004	Winn-Dixie	Lifesavers	2	2		
5/16/2004	Winn-Dixie	Hot Pocket Strawberry Pastry	1	2.5		
5/16/2004	Winn-Dixie	Winn-Dixie Sandwich Bread	1	0.99		
5/16/2004	Winn-Dixie	Nesquick Double Chocolate	1	1.25		
5/16/2004	Winn-Dixie	2 Liter Coke Classic	1	1.19		
5/16/2004	Winn-Dixie	Black Forest Gummy Bears	1	1		
5/16/2004	Winn-Dixie	Banquet Chicken Nugget Meal	3	3		
5/16/2004	Wal-Mart				Angel Soft 1	2
5/16/2004	Wal-Mart				Sun Mountain 1	2
					Detergent	
5/16/2004	Wal-Mart				Great Value Bleach 1	0
5/16/2004	Wal-Mart	Pizza	1	4.98		
5/16/2004	Wal-Mart	Cheddar Chips	1	1		
5/16/2004	Wal-Mart	24Ct Variety	1	5.97		
5/17/2004	Wal-Mart	Lunchmaker	3	2.94		
5/17/2004	Wal-Mart	Chocolate Bar	1	0.48		
5/17/2004	Wal-Mart	Gum	1	0.97		
5/17/2004	Wal-Mart	Cajun Smoke	1	2.98		
5/17/2004	Wal-Mart	Vitamin D Milk	1	2.35		
5/17/2004	Super 1 Foods	Picante Pickle	1	0.89		
5/17/2004	Super 1 Foods				Alcohol 1	0
5/17/2004	Super 1 Foods	Nabisco Oreo Mini	1	1.67		
5/17/2004	Super 1 Foods	Ring Pop	4	1.32		
5/17/2004	Super 1 Foods	Nabisco Oreos	1	2.5		
5/17/2004	Super 1 Foods	Nabisco Nutter Butters	1	1.67		

5/17/2004	Super 1 Foods Jumbo Biscuit	2	1.98
5/17/2004	Super 1 Foods DM Peach/Str	1	1.88
5/17/2004	Super 1 Foods Boudin	1	2.59
5/17/2004	Super 1 Foods Sugar Wafers	1	0.5
5/17/2004	Super 1 Foods DelMonte Fruit Cocktail	1	1.07
5/17/2004	Super 1 Foods K-Aid Kool Burst	1	0.99
5/17/2004	Super 1 Foods Chewy Spree	3	0.99
5/17/2004	Super 1 Foods MM Cherry Limeaid	1	1.4
5/17/2004	Super 1 Foods Lemon Thins	1	1.09
5/17/2004	Super 1 Foods S/1 FPK Drumsticks	1	2.87
5/20/2004	Winn-Dixie Jolly Rancher Passion Fruit	1	0.74
5/20/2004	Winn-Dixie Mentos (4 pack)	1	0.99
5/20/2004	Winn-Dixie ECK SMK Link Sausage	1	2.99
5/20/2004	Winn-Dixie Juicy Fruit	2	1.98
5/20/2004	Winn-Dixie		Sunlight G/A Liquid 1
5/20/2004	Winn-Dixie Morton Salt	2	0.99

Application of the Research Results: Findings from this research will be made available to policymakers considering re-authorization of and modifications in the PRWORA, especially as they relate to participation in food assistance programs by families transitioning off welfare. On a more immediate level, the research will be useful in training service providers, community leaders, and volunteers in how to help low-income families gain access to and participate fully in available food assistance programs, emphasizing nutrient dense food choices and decreased reliance on fast food. Such programs will be more effective as trainers gain a better understanding of the psychosocial context of past overweight and obesity in these women.

Manuscripts:

Monroe PA, Blalock L, Tiller V, O’Neil CE. “We make our ends meet good” Coping Strategies of Former Welfare Reliant Women. Submitted to: *Stress, Trauma, and Crisis: An International Journal*.