

Use of a Case-specific Recommendation for Fruit and Vegetable Intake in Health Behavior Research



Betty L. Kaiser, PhD, RN

Center for Patient-Centered Interventions

Linda C. Baumann, PhD, ANP-BC



SCHOOL OF NURSING
University of Wisconsin-Madison

Presenter Disclosure

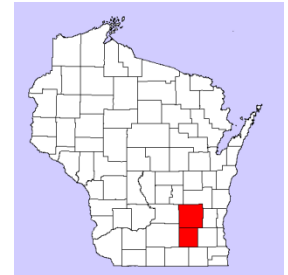
Betty L. Kaiser

The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:

No relationships to disclose

The Healthy Lifestyles Study

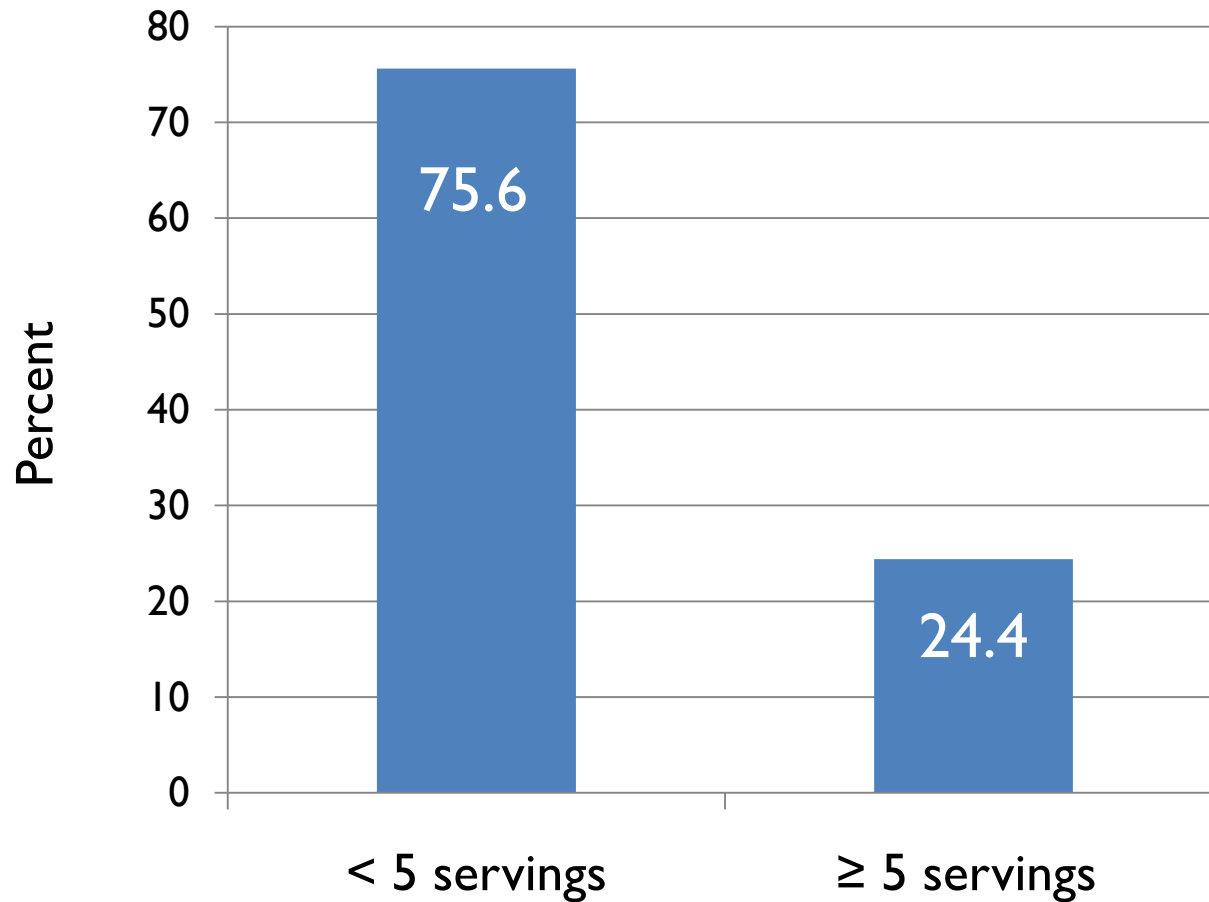
- **Aim:**
 - Describe perceived influences on diet, physical activity
- **Target population:**
 - Low-income adults in two rural WI counties
- **Data collection methods:**
 - Survey interviews, focus groups
- **Independent variables:**
 - Self-efficacy, barriers, social support, perceived environment
- **Outcome variables:**
 - Meets/does not meet recommendation



Road Map

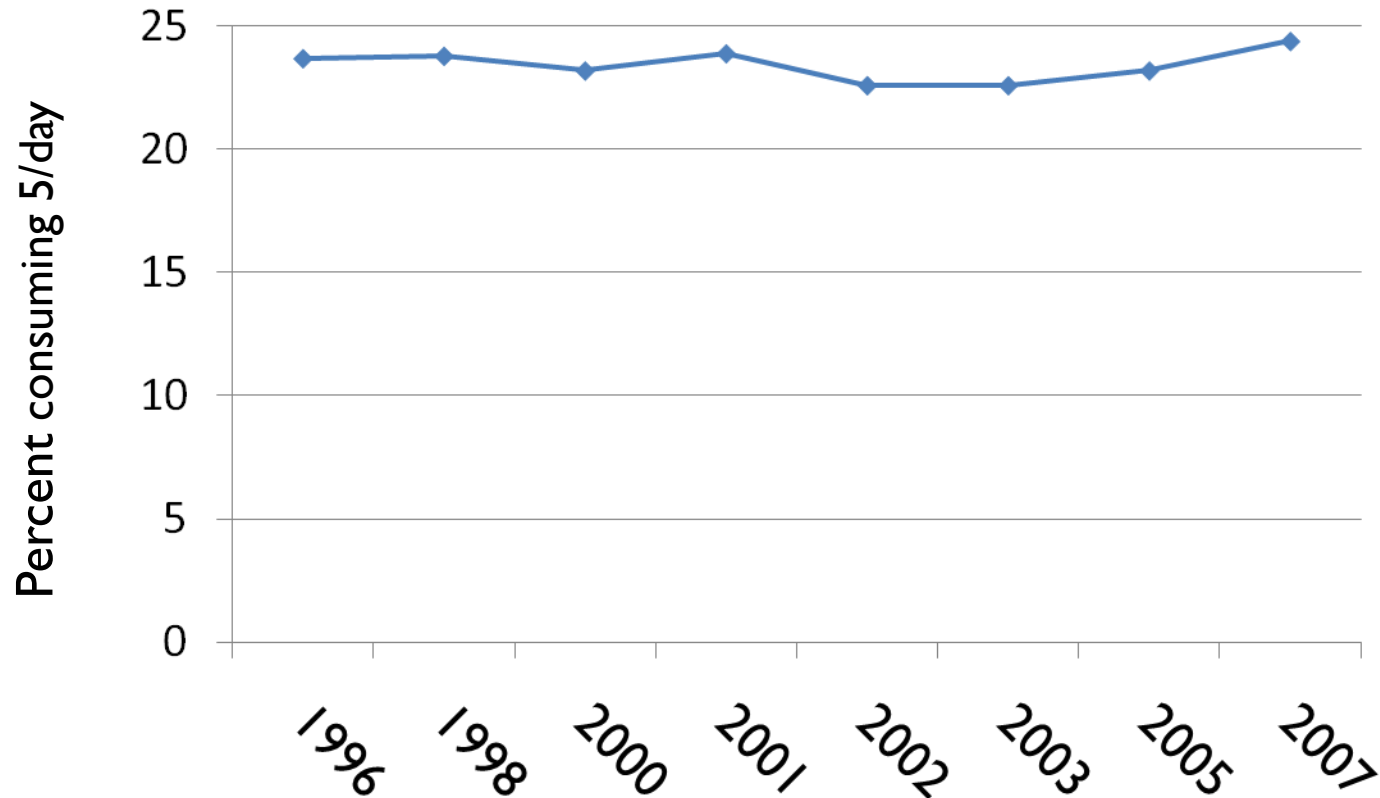
- Prevalence of “5-a-day” fruit and vegetable (FV) intake
- MyPyramid system and algorithms
- Case-specific FV recommendation
- Comparison of “5-a-day”, case-specific measure
- Concluding thoughts

5-a-day Intake of Fruits and Vegetables, Adults, Nationwide, 2007



BRFSS, 2007

5-a-day Intake of Fruits and Vegetables, Adults, Nationwide, 1996 - 2007

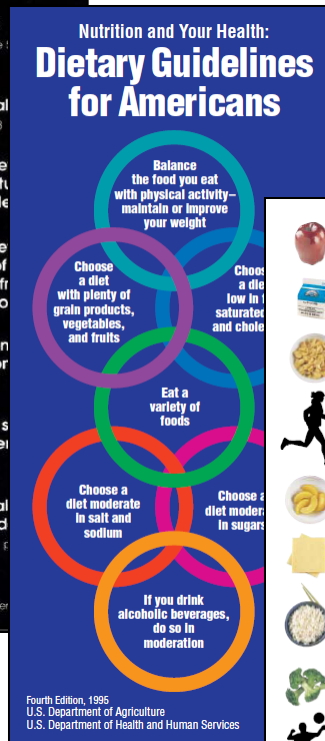


BRFSS, 2007

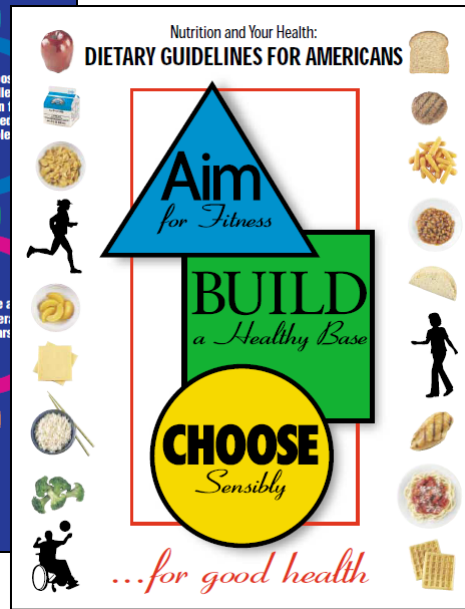
5-a-day Recommendation



1990



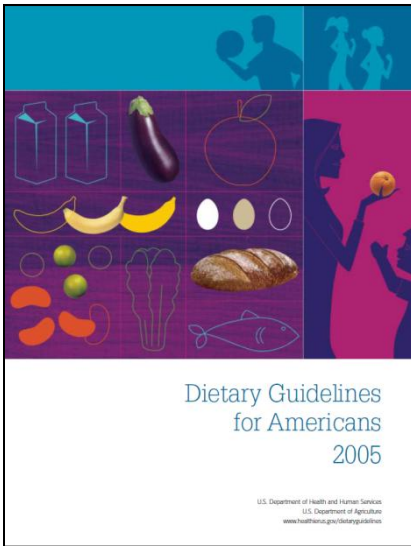
1995



2000



New Recommendation



MyPyramid Interface

USDA United States Department of Agriculture **MyPyramid.gov**

Home About Us News & Media Site Help Online Ordering Contact Us En Español

Affect your health... how you feel today, tomorrow, and in the future. For tips, follow MyPyramid on Twitter!

Search MyPyramid.gov

Subjects

- MyPyramid Basics
 - Inside the Pyramid
 - Tips & Resources
 - Print Materials
 - Got a Question?
- Interactive Tools
 - MyFoodapedia **NEW!**
 - MyPyramid Plan
 - Menu Planner
 - MyPyramid Tracker
 - Child Cost Calculator
 - Multimedia
 - Podcasts
 - PSAs
 - Animation
- Specific Audiences
 - Preschoolers (2-5y)
 - Kids (6-11y)
 - Pregnancy & Breastfeeding
 - General Population
 - For Professional Use
 - Steps to a Healthier Weight
 - Dietary Guidelines
 - Partnering with MyPyramid
 - Related Links

MyPyramid.gov
STEPS TO A HEALTHIER YOU

One size doesn't fit all. MyPyramid offers personalized eating plans and interactive tools to help you plan and assess your food choices based on the Dietary Guidelines for Americans.

Spotlights

- Inside the Pyramid**: Food groups, healthy eating tips, and more
- MyFoodapedia**: Quick access to food info - food groups, calories & comparisons
- 2010 Dietary Guidelines**: The basic guidelines for eating healthy
- 10 Tips Series**: High-quality, easy-to-follow nutrition education tips
- MyPyramid Menu Planner**: Plan menus to reach your personal goals
- Rate What YOU Ate**: Teach teens how to use the Menu Planner
- MyPyramid for Kids and Preschoolers**: Get your child's Plan today
- MyPyramid for Moms**: Start out right as a new mom or mom-to-be
- PSAs**: USDA-Danone partnership for nutrition education
- MyPyramid Tracker**: Get feedback on what you eat & your physical activity

Tip of the Day
Add color to salads by adding baby carrots, shredded red cabbage, or spinach leaves. Include in-season vegetables for variety through the year.

Follow MyPyramid on Twitter
Click here for more tips

THE WHITE HOUSE WASHINGTON

USDA Welcomes First Lady Michelle Obama

USDA United States Department of Agriculture **MyPyramid.gov**

Home About Us News & Media Site Help Online Ordering Contact Us En Español

You are here: Home / MyPyramid Plan

Search MyPyramid.gov

MyPyramid Plan

Want to know the amount of each food group you need daily? Enter your information below to find out and receive a customized food guide.

NOTE: MyPyramid food plans are designed for the general public ages 2 and over; they are not therapeutic diets. Those with a specific health condition should consult with a health care provider for a dietary plan that is right for them. More tailored MyPyramid Plans are available for preschoolers (2-5y) and women who are pregnant or breastfeeding.

Subjects

- MyPyramid Basics
 - Inside the Pyramid
 - Tips & Resources
 - Print Materials
 - Got a Question?
- Interactive Tools
 - MyPyramid Plan
 - Menu Planner
 - MyPyramid Tracker
 - Child Cost Calculator
- Multimedia
 - Podcasts
 - PSAs
 - Animation
- Specific Audiences
 - Preschoolers (2-5y)
 - Kids (6-11y)
 - Pregnancy & Breastfeeding
 - General Population
- For Professional Use
- Steps to a Healthier Weight
- Dietary Guidelines
- Partnering with MyPyramid
- Related Links

Age:

Sex: [Select] v

Weight: (optional) pounds Plans for children 2-8 are based on an average height and weight for their age and gender.

Height: (optional) feet inches

Physical Activity: Amount of moderate or vigorous activity (such as brisk walking, jogging, biking, aerobics, or yard work) you do in addition to your normal daily routine, most days.

[Select] v

SUBMIT

Last Modified: April 09, 2009 01:05 PM

Sample Food Intake Patterns

| Daily Amount of Food (cups) from Each Group | | | |
|---------------------------------------------|----------|------------|-----------|
| Calorie Level | 1600 | 2400 | 3200 |
| Fruits | 1.5 c. | 2 c. | 2.5 c. |
| Vegetables | 2 c. | 3 c. | 4 c. |
| Grains | 5 oz.-eq | 8 oz.-eq | 10 oz.-eq |
| Meat, Beans | 5 oz.-eq | 6.5 oz.-eq | 7 oz.-eq |
| Milk | 3 c. | 3 c. | 3 c. |
| Oils | 5 tsp | 7 tsp | 11 tsp |

c. = cups

oz.-eq = ounce equivalents

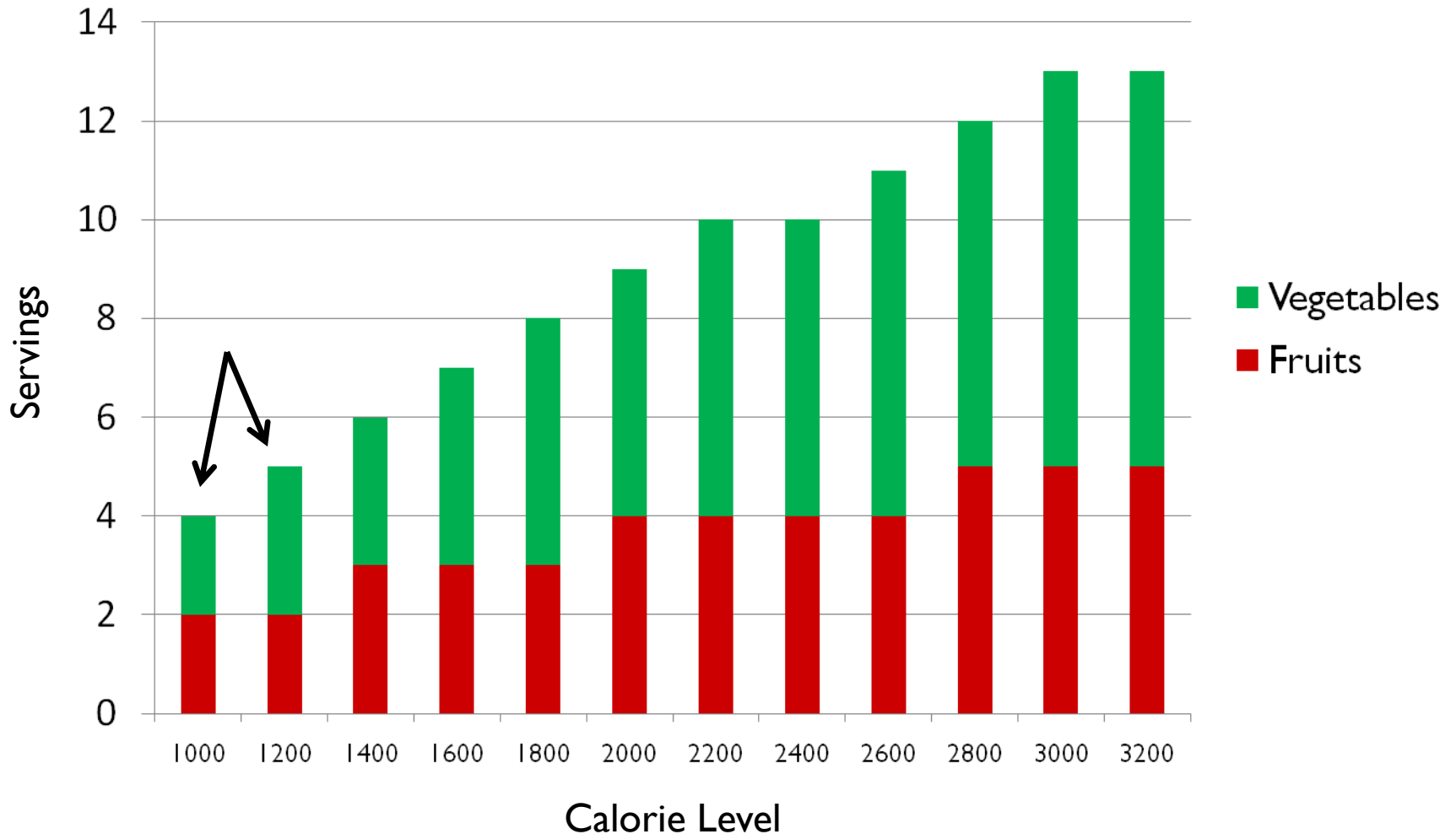
Daily *Cups* of Fruits and Vegetables, By Calorie Level

| Calorie Level | 1400 | 1600 | 1800 | 2000 | 2200 | 2400 | 2600 | 2800 | 3000 |
|-------------------|--------|--------|--------|--------|------|------|--------|--------|--------|
| Fruits | 1.5 c. | 1.5 c. | 1.5 c. | 2 c. | 2 c. | 2 c. | 2 c. | 2.5 c. | 2.5 c. |
| Vegetables | 1.5 c. | 2 c. | 2.5 c. | 2.5 c. | 3 c. | 3 c. | 3.5 c. | 3.5 c. | 4 c. |
| Total | 3 c. | 3.5 c. | 4 c. | 4.5 c. | 5 c. | 5 c. | 5.5 c. | 6 c. | 6.5 c. |

c. = cups

Britten, Marcoe, Yamini, & Davis, 2006; USDA, 2005

Daily Servings of Fruits and Vegetables, By Calorie Level



Survey Questions on FV Intake

- A serving of vegetables is a half-cup of any vegetable (not including potatoes) or 1 cup of salad greens. In the past week, how many average daily servings of vegetables did you usually eat?
- A serving of fruit is defined as one piece of fruit or 6 ounces of 100% fruit juice. In the past week, how many average daily servings of fruit did you eat, including 100% juices?

Outcome Variables for Healthy Diet

- 5-a-day standard
- Case-specific standard based on MyPyramid?

Healthy Eating Index

- Measure of adherence to 2005 guidelines
- 8 dietary components
- Total Score 0 – 100
- Scoring based on density: cups per 1000 kcal

Creating Case-specific Recommendation

- Calculate estimated energy requirements (EERs)
- Classify participants into food intake patterns
- Compare self-reported FV servings to recommended

EER equations

Women \geq 19 years $354 - (6.91 \times \text{age}) + \text{PA}(9.36 \times \text{weight} + 726 \times \text{height})$

Men \geq 19 years $662 - (9.53 \times \text{age}) + \text{PA}(15.91 \times \text{weight} + 539.6 \times \text{height})$

Physical activity (PA) coefficient

| | Sedentary ^a | Low active ^b | Active ^c |
|-----------------------|------------------------|-------------------------|---------------------|
| Women \geq 19 years | 1.00 | 1.12 | 1.27 |
| Men \geq 19 years | 1.00 | 1.11 | 1.25 |

^a Physical activity limited to activities of daily living

^b Equivalent of walking about 1.5 – 3 miles per day at 3 – 4 miles per hour

^c Equivalent of walking more than 3 miles per day at 3 – 4 miles per hour

Reprinted with permission from the National Academies Press, Copyright 2005, National Academy of Sciences

Example of Calculating “Healthy Diet” ratio

1. *Estimated Energy Requirements (EER) formula for female, age 19 or older*
 $EER = 354 - (6.91 * \text{age}) + PA \text{ coefficient}(9.36 * \text{weight} + 726 * \text{height})$
2. *EER for 54-year-old active female, weight 150 lb., height 5 ft. 4 in.*
 $EER = 354 - (6.91 * 54) + 1.27(9.36 * 68.18 + 726 * 1.63) = 2294 \text{ calories}$
3. *Fruit and vegetable recommendations for 2200-calorie dietary intake pattern*
Recommended daily intake = 2 c. fruit + 3 c. vegetables
4. *Conversion of cups to serving units*
 $(2 \text{ c. fruit} \times 2 \text{ servings/c.}) + (3 \text{ c. vegetables} \times 2 \text{ servings/c.}) = 10 \text{ servings}$
5. *Self-reported daily intake of fruits and vegetables*
2 servings fruit + 1 serving vegetables = 3 daily servings fruit and vegetables
6. *Healthy Diet ratio*
 $3 \text{ reported servings fruit and vegetables} / 10 \text{ recommended servings} = 0.30$

Demographics

| Characteristic | Total N = 137 | |
|-------------------------|--------------------------|----------|
| | <i>n</i> | % |
| Age | | |
| less than 30 | 39 | 28.5 |
| 30-49 | 53 | 38.7 |
| 50-69 | 32 | 23.4 |
| 70 or older | 13 | 9.5 |
| Gender | | |
| Female | 78 | 56.9 |
| Education | | |
| High school or more | 72 | 52.5 |
| Employment | | |
| Working | 69 | 50.3 |
| Health insurance | | |
| Any | 58 | 41.9 |
| None | 79 | 58.1 |

Daily FV Servings

Daily Servings

| | Fruits (n = 136) | Vegetables (n = 137) |
|--------|---------------------|-------------------------|
| Mean | 2.4 | 1.8 |
| Median | 2 | 2 |
| s.d. | 2.1 | 1.4 |
| Range | 0 – 9 | 0 - 7 |

“5-a-day” FV Consumption

Distribution of “5-a-day”

| | <i>n</i> | % |
|--------------|----------|-------|
| < 5 servings | 86 | 63.7 |
| ≥ 5 servings | 49 | 36.3 |
| Total | 135 | 100.0 |

MyPyramid FV Recommendations

Recommended Daily Servings

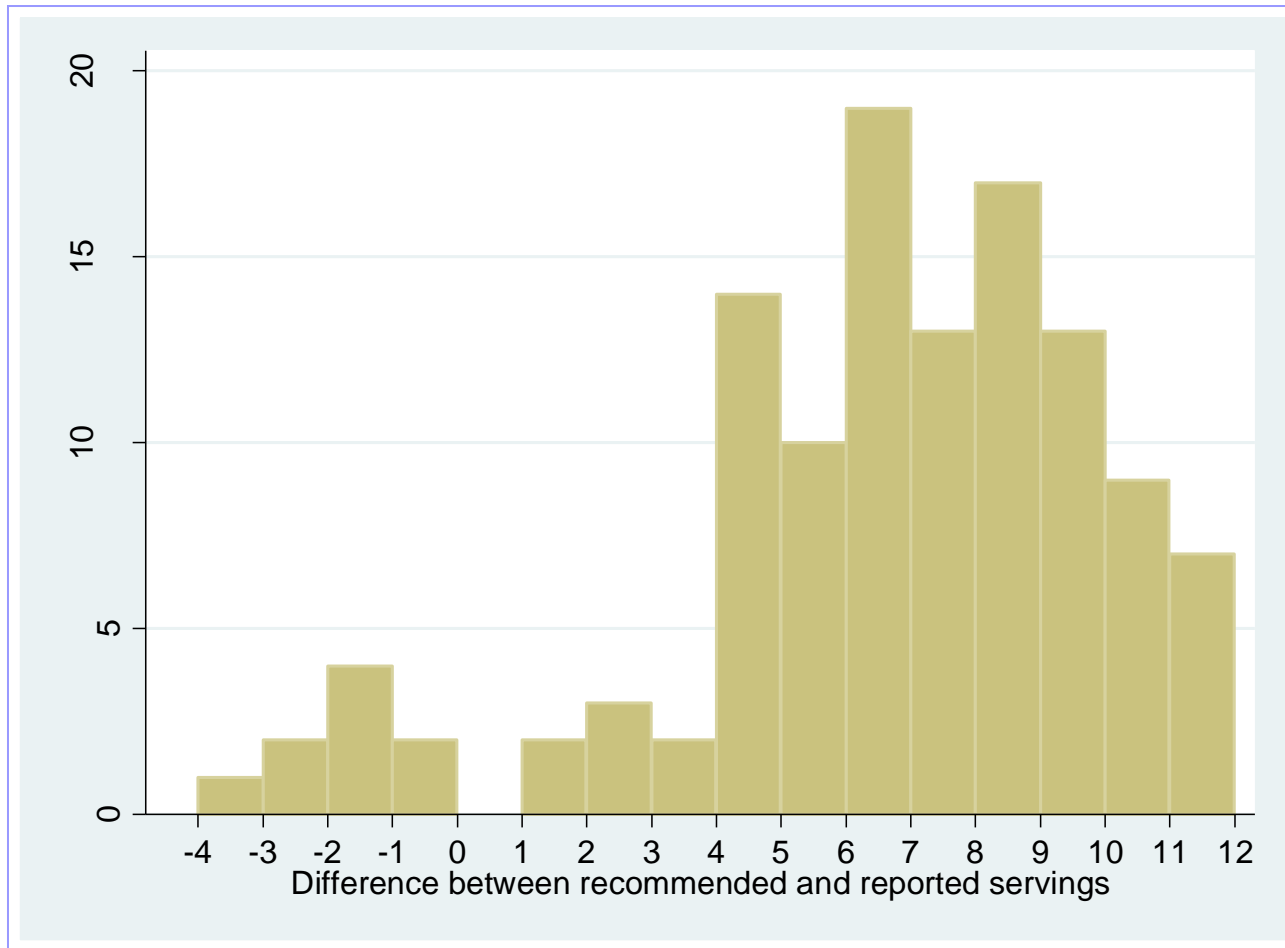
| | Fruits (n = 119) | Vegetables (n = 119) |
|--------|---------------------|-------------------------|
| Mean | 4.2 | 6.3 |
| Median | 4 | 6 |
| s.d. | 0.7 | 1.2 |
| Range | 2 – 5 | 3 - 8 |

MyPyramid Combined FV Recommendations

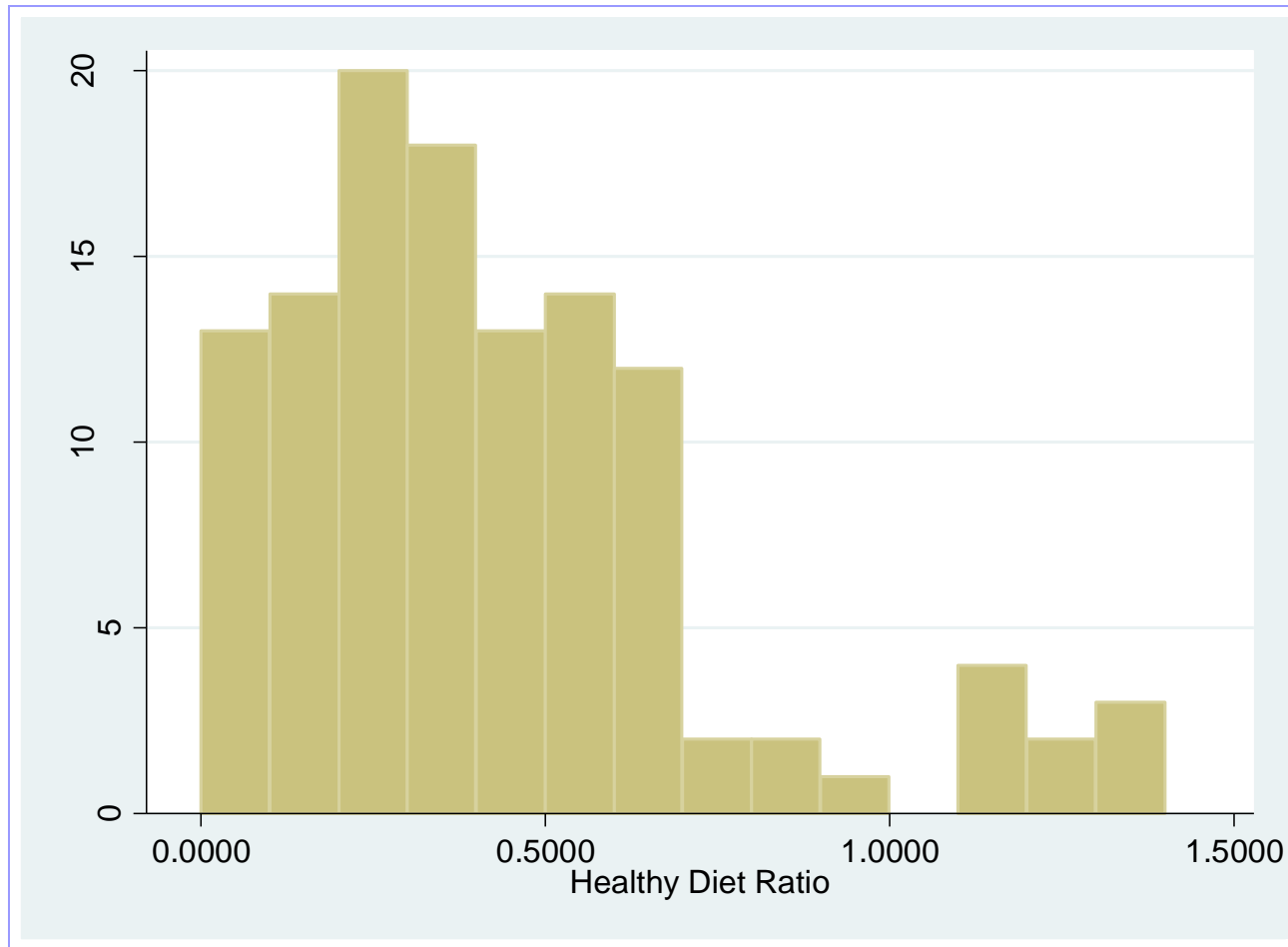
Total Recommended FV Servings (n = 119)

| | |
|--------|--------|
| Mean | 10.5 |
| Median | 10 |
| s.d. | 1.9 |
| Range | 5 – 13 |

Difference between Recommended and Self-reported Servings



Distribution of “Healthy Diet” Ratio (intake/recommended)

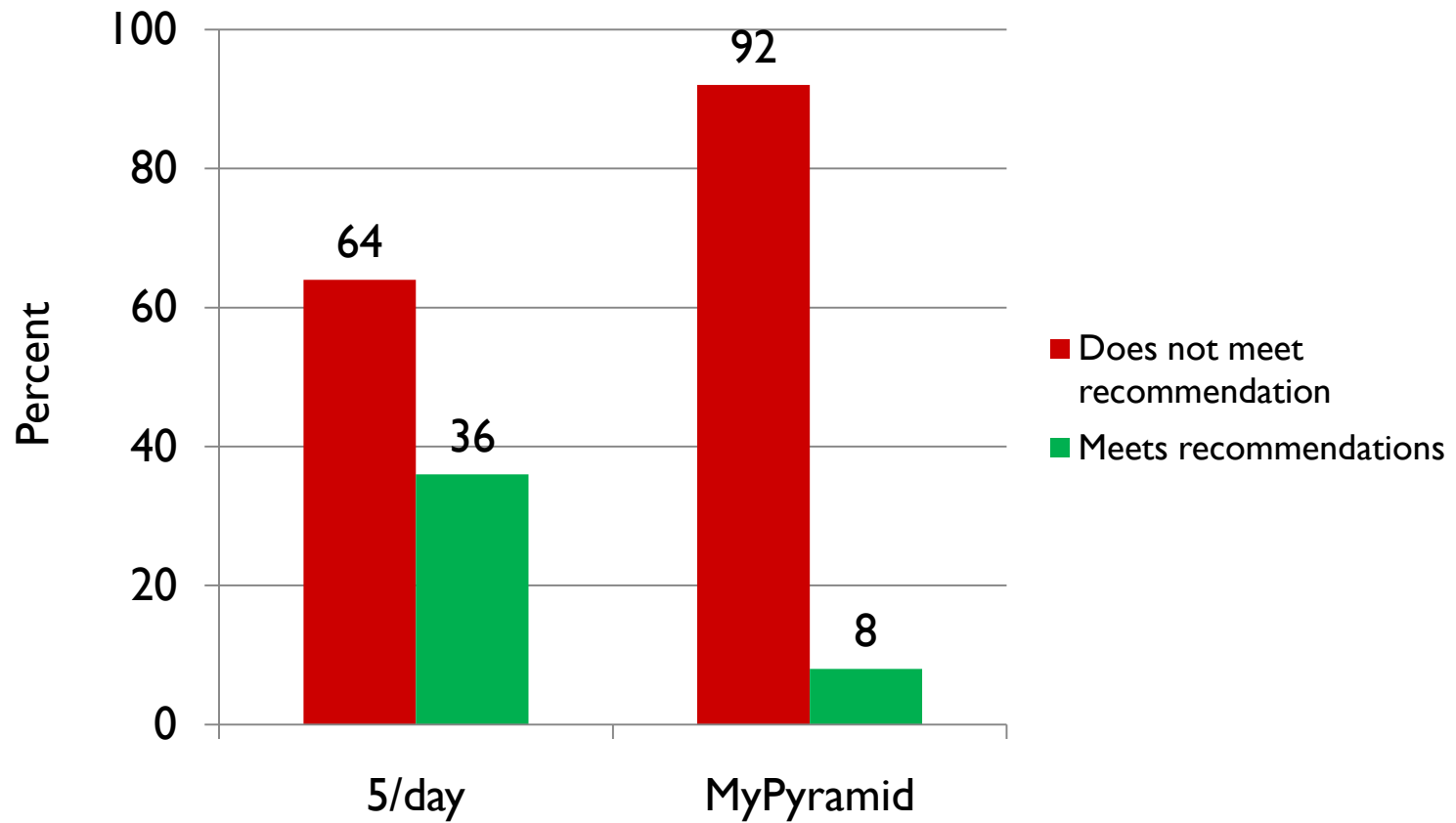


“Healthy Diet” Ratio (intake/recommended)

“Healthy Diet” ratio (n = 118)

| | |
|--------|---------|
| Mean | 0.41 |
| Median | 0.36 |
| s.d. | 0.31 |
| Range | 0 – 1.4 |

Comparison of Measures



Discussion

○ Limitations

- Reliability, validity not established
- Potential mis-estimation of FV intake, EERs
- Convenience sample

○ Advantages

- Up-to-date
- Interpretable
- Feasible
- Simple

Applications

- Create separate ratios for fruits and vegetables
- Apply process to other key food groups
- Use ratio in gender comparisons

Thank You



Acknowledgements:

- NINR T32 NR007102
- WI Partnership Program for a Healthy Future
- Dodge Jefferson Healthier Community Partnership



SCHOOL OF NURSING
University of Wisconsin-Madison