

Assessment of Energy and Nutrient Intake: Three-Day Dietary Survey

The three-day dietary survey represents a relatively simple yet accurate method to determine the nutritional quality and total calories of food consumed daily. The key to successfully accomplish these goals requires a daily log of food intake for three days that represent your normal eating pattern (including at least one weekend).

Experiments have shown that calculations of caloric intake made from records of daily food consumption are usually within 10% of the number of calories actually consumed. For example, suppose a bomb calorimeter determined that your daily food intake equaled 2130 kCal. If you kept a three-day dietary history and estimated your calorie intake, the daily value would likely be within 10% of the actual value (1920 and 2350 kCal).

Use four items to measure food: (1) plastic ruler, (2) standard measuring cup, (3) measuring spoons, and (4) balance or weighing scale. Use Appendix A or consult one of several sources that list the nutritional content of foods including: Pennington JAT, Douglass JP. Bowes & Church's food values of portions commonly used. 18th ed. Baltimore: Lippincott Williams & Wilkins, 2005. You may also wish to consult the following URL: <http://nat.crgq.com/mainnat.html>.

Measure or weight each of the food items in your diet. This represents the only reliable way to obtain an accurate estimate of the size of a food portion. Be sure to do the following:

- List specific types, brands, and method of preparation.

<i>Example</i>	<i>List as:</i>
Milk	8 fl oz, 2% milk
1/2 chicken breast	3 oz breast, baked, without skin
Margarine	1 tsp. Fleischmann's Light Margarine
- Use these guidelines to estimate cooked portion sizes for these food categories:

Meat and Fish

Measure the portion of meat or fish by thickness, length, and width, or record weight on the scale.

Vegetables, Potatoes, Rice, Cereals, Salads

Measure the portion in a measuring cup or record weight on the scale.

Cream or Sugar Added to Coffee or Tea

Measure with measuring spoons before adding to the drink, or record weight on the scale.

Fluids and Bottled Drinks

Check the labels for volume or empty the container into the measuring cup. If you weigh the fluid, be sure to subtract the

weight of the cup or glass. Sugar-free soft drinks usually have kCal values listed on their labels.

Cookies, Cakes, Pies

Measure the diameter and thickness with a ruler, or weigh on the scale. Evaluate frosting or sauces separately.

Fruits

Cut them in half before eating and measure the diameters, or weight them on the scale. For fruits that must be peeled or have rinds or cores, be sure to subtract the weight of the non-edible portion from the total weight of the food. Do this for items such as oranges, apples, and bananas.

Jam, Salad Dressing, Catsup, Mayonnaise

Measure the condiment with the measuring spoon or weigh the portion on the scale.

Record all the foods you consume using the blank 3-day food logs on the pages of this appendix. We encourage you to keep the sheets with you and record the pertinent information about the foods as you consume them.

DIRECTIONS FOR COMPUTING YOUR THREE-DAY DIETARY SURVEY

- Step 1** Prepare a table (similar to Table C.1) indicating the intake of food items during a day. Include the amount (g or oz); caloric value; and carbohydrate, lipid, and protein content; the minerals Ca and Fe; and vitamins C, B₁ (thiamine), and B₂ (riboflavin); fiber; and cholesterol.
- Step 2** List each food you consume for breakfast, lunch, dinner, between-meal eating, and snacks. Include food items that are used in preparing the meal (e.g., butter, oils, margarine, bread crumbs, egg coating, etc.).
- Step 3** Weigh, measure or approximate the size of each portion of food that you eat. Record these values on your daily record chart (e.g., 3 oz of salad oil, 1/8 piece of 8" diameter apple pie, etc.).
- Step 4** Record your daily calorie and nutrient intake on a chart similar to Table C.1, which was recorded for a 21-year-old college student. Record the daily totals for the caloric and nutrient headings on the "Daily and Average Daily Summary Chart" (Table C.2). When you've completed your three-day survey, compute the three-day total by adding up the values for days 1, 2, and 3; then divide by 3 to determine the daily average of each nutrient category.

Step 5 Using each of the average daily nutrient values, calculate the percentage of the RDA consumed for that particular nutrient and graph your results as shown in Figure C.1 An example for calculating the percentage of the RDA is shown in Table C.3, along with the specific RDA values for men and women.

Step 6 Be as accurate and honest as possible. Do not include unusual or atypical days in your dietary survey (e.g., days that you are sick, special occasions such as birthdays, or eating out at restaurants unless that is normal for you).

Step 7 Remember that the protein RDA equals 0.8 g protein per kilogram of body mass (1 kg = 2.2 lb).

Step 8 Compute the percentage of your total calories supplied from carbohydrate, lipid, and protein.

For example, if total average daily caloric intake is 2450 kCal/day, and 1600 kCal are from carbohydrates, the daily percentage of total calories from carbohydrates equals: $1600/2450 \times 100 = 65\%$

Step 9 While there is no specific RDA for lipid or carbohydrate, a prudent recommendation is that lipid should not exceed more than 30% of your total caloric intake; for active men and women, carbohydrates should be approximately 60% of the total calories ingested.

For example, if 50% of your average daily calories comes from lipid, you are taking in 167% of the recommended value ("RDA") for this nutrient: $[50\% \text{ divided by } 30\% \text{ (recommended percentage)} \times 100 = 167\%]$

Step 10 As was the case for lipid and carbohydrate, no RDA exists for average daily caloric intake. Any recommendation for energy intake must consider body fat level and current daily energy expenditure. However, average values for daily caloric intake have been published for the typical young adult and equal about 2100 kCal for young women and 3000 kCal for young men. Thus, for graphing purposes in Figure C.1, you can evaluate your average daily caloric intake against the "average" values for your sex and age.

For example, if you are a 20-year-old female and you consume an average of 2400 kCal daily, your energy intake would equal 114% of the average ("RDA") for your age and sex. $[2400 \text{ kCal divided by } 2100 \text{ kCal (average)} \times 100 = 114\%]$. This does not mean that you need to go on a diet and reduce food intake to bring you in line with the average U.S. value. To the contrary, your higher-than-average caloric intake may be required to power your active lifestyle that contributes to maintaining a desirable body mass and body composition.

If you eat a food item not listed in Appendix A, try to make an intelligent guess as to its composition and amount consumed. It is better to overestimate the amount of food consumed than to underestimate or to make no estimation at all. If you go to a restaurant for dinner, or to a friend's house where it may be inappropriate to measure the food, then omit this day from the counting procedure and resume record keeping the following day.

Record-keeping for 3 days is extremely important so an accurate appraisal can be made of the average daily energy and nutrient intake. **Be sure to record everything you eat.** If you are not completely honest, you are wasting your time. Most people find it easier to keep accurate records if they record food items while preparing a meal or immediately afterwards when eating snack items.

TABLE C.1 Sample One-Day Caloric and Nutrient Intake for a 21-year-old College Student

Food Item	Amount	kCal	Protein (g)	CHO (g)	Lipid (g)	Ca (mg)	Fe (mg)	Fiber (g)	Cholesterol (mg)	Thiam ^a (mg)	Ribofl ^a (mg)
Breakfast											
Eggs, hard boiled	2 (2 oz ea)	160	14.1	1.4	11.2	55.2	1.9	0.0	452	0.06	0.53
Orange juice	8 oz	104	0.9	86.4	0.5	72.4	0.8	0.9	0.0	0.20	0.06
Corn flakes	1 cup/1 oz	110	2.3	24.4	0.5	1.0	1.8	0.6	0.0	0.37	0.42
Skim milk	8 oz	80	7.8	10.6	0.6	279.2	0.1	0.0	3.7	0.08	0.32
Snack											
None											
Lunch											
Tuna fish (oil pack)	2 oz	112	16.5	0.0	68.0	7.8	0.8	0.0	10.0	0.02	0.06
White bread (toast)	2 pieces	168	5.3	31.4	2.5	81.2	1.8	1.3	0.0	0.24	0.21
Mayonnaise	1 oz	203	0.3	0.8	22.6	5.7	0.2	0.0	16.8	0.01	0.01
Skim milk	8 oz	80	7.8	10.6	0.6	279.2	0.1	0.0	3.7	0.08	0.32
Plums	4 (2 oz ea)	128	1.8	29.5	1.4	10.3	0.2	4.4	0.0	0.10	0.22
Snack											
Chocolate milkshake	8 oz	288	7.7	46.4	8.4	256	0.7	0.3	29.6	0.13	0.55
Dinner											
Sirloin steak, lean	8 oz	456	64.8	0.0	20.2	18.6	5.8	0.0	173.6	0.21	0.47
French fries, veg. oil	6 oz	540	6.8	67.2	28.1	34.2	1.3	3.4	0.0	0.30	0.05
Cole slaw	4 oz	80	1.4	14.1	3.0	51.2	0.7	2.3	9.2	0.08	0.07
Italian bread	2 oz	156	5.1	32.0	1.0	9.4	1.5	0.9	0.0	0.23	0.13
Light beer	8 oz	96	0.6	8.8	0.0	11.2	0.1	0.5	0.0	0.02	0.06
Snack											
Yogurt, whole milk	6 oz	102	5.9	7.9	5.5	205.8	0.1	0.0	22.1	0.05	0.24
Daily Total		2863	149.1	371.5	174.1	1378.4	17.2	14.6	720.7	2.18	3.72

^aThiam, thiamin; Ribofl, riboflavin.

TABLE C.2 Daily and Average Summary Chart of the Intake of Calories and Specific Food Nutrients

Day	kCal	Protein ^a (g)	Lipid ^a (g)	CHO ^a (g)	Ca (mg)	Fe (mg)	Thiamine (mg)	Riboflavin (mg)	Fiber (g)	Cholesterol (mg)
#1										
#2										
#3										
Three-day total										
Average Daily Value ^b										

^aUse the following caloric transformations to convert your average daily grams of carbohydrate (CHO), lipid, and protein to average daily calories:

1 g CHO = 4 kCal

1 g Lipid = 9 kCal

1 g Protein = 4 kCal

^bUse the Average Daily Value to determine the percentage of the RDA for your graph. See Table 1 for sample calculations. Figure C.1 shows a bar graph for the nutrient values as a percentage of the average or recommended value for each item.

TABLE C.3 RDA Values for Selected Nutrients Including Sample Computations for Deriving the Percent of RDA from Your Dietary Survey. Values Listed in Table C.1 are 100% Values for Graphing your Dietary Survey

Men								
Age	kCal ^a	Protein (g/kg)	Ca (mg)	Fe (mg)	Thiamine (mg)	Riboflavin (mg)	Fiber ^a (g)	Cholesterol ^a (mg)
19–22	3000	0.8	1200	10	1.5	1.7	30	300
23–50	2700	0.8	800	10	1.5	1.7	30	300
Women								
Age	kCal ^a	Protein (g/kg)	Ca (mg)	Fe (mg)	Thiamine (mg)	Riboflavin (mg)	Fiber ^a (g)	Cholesterol ^a (mg)
19–22	2100	0.8	1200	15	1.1	1.3	30	300
23–50	2000	0.8	800	15	1.1	1.3	30	300

Source: Recommended Dietary Allowances, Revised 1989, Washington, DC: Food and Nutrition Board, National Academy of Sciences-National Research Council, 1989.

^aNo RDA exists for daily caloric intake or for the intake of fiber or cholesterol. Values for caloric intake represent an average for adult Americans, while fiber and cholesterol values are recommended as being prudent for maintaining good health.

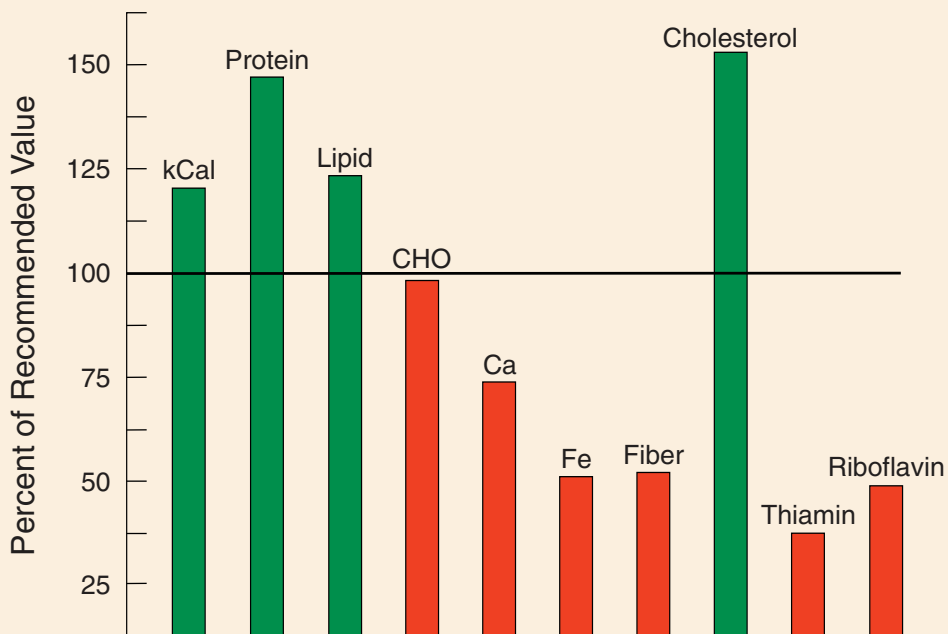
How to determine the percentage of the RDA from your dietary survey

Example #1: Percentage of RDA for protein for a 70-kg person
 Daily protein intake = 68 g
 RDA = (70 kg × 0.8 g/kg) = 56 g
 % of RDA = 56/68 × 100 = 121%

Example #2: Percentage of RDA for iron (female)
 Daily iron intake = 7.5 mg
 RDA = 15 mg
 % of RDA = 7.5/15 × 100 = 50%

Figure C.1

Example of a bar graph to illustrate the food and nutrient intake expressed as a percentage of recommended values.



100% Value Represents

- kCal: 3000 kCal for men age 19—22
 2700 kCal for men age 23—50
 2100 kCal for women age 19—22
 2000 kCal for women age 23—50
- Lipid: 30% of total calories
- CHO: 60% of total calories
- Fiber: 30 g
- Cholesterol: 300 mg

Sample Food Record				
Time	Place	Amount	Description (including preparation)	Comments/Questions
8 AM	Home	3/4 cup	Kellogg's Corn Flakes	Breakfast
		1/2 cup	Skim milk	
		1 large	Orange	
		8 fl. oz.	Coffee, black	
		2 tsp	White sugar	
11:30 AM	Away	1/2 cup	Tuna, water packed	Lunch
		2 Tbls	Mayonnaise, light	
		2 slices	White bread	
		1 cup	Campbell's tomato soup	
		4 rounds	Melba toast (crackers)	
		1 oz.	Potato chips, Lay's	
		1 piece	Apple pie	
3:00 PM	Away	1 large	Apple, red delicious	Snack
6:00 PM	Home	4 oz.	Chicken breast, baked, no skin	Dinner
		1 medium	Baked potato, flesh and skin	
		3 tsp	Light margarine	
		1 cup	Broccoli, steamed, plain	
		1 cup	Salad lettuce, romaine	
		3 whole	Cherry tomatoes	
		5 slices	Cucumber	1/4 inch each
		2 Tbls	Ranch dressing, regular	
		2 cups	Water	
8:30 PM	Home	3 cups	Popcorn, air popped, plain	Snack
		12 oz. can	Orange soda, regular	
		1	Donut, chocolate	Dunkin Donuts
10:00 PM		2 cups	Ice cream, chocolate	Rich but good
10:45 PM		4 oz.	Chocolate bar, regular	Hershey's
11:10 PM		1 large	Apple, Macintosh	
11:30 PM		6 oz.	Apple cider	Hot
11:35 PM		1 small	Cookie, chocolate chip	

