



Back to the Basics



Nutritious foods and clean water are the foundations of good health. Malnutrition weakens the immune system, making it hard to ward off or recover from disease. Water, too, is fundamental. But drinking contaminated water can be life threatening rather than life sustaining. Providing people with healthy food and clean drinking water is an essential step in improving global health.

ACTIVITY AT A GLANCE

PURPOSE: To analyze different diets to understand the nutrients needed to maintain health and to identify nutrient deficiencies that lead to specific diseases

OVERVIEW: Students use the U.S. Department of Agriculture (USDA)'s MyPyramid Tracker to analyze their diets. They learn about the nutrients contained in food, identify what these nutrients do in the body, and describe the health risks posed by a deficiency of these nutrients. Next, they analyze four nutrient-deficient diets and learn about the diseases associated with these deficiencies. Students conclude the activity by devising a strategy to supplement the diet of a malnourished population to prevent four nutrient-related diseases.

LEVEL: Grades 7–12

TIME: 2–3 class periods

CORE CONCEPTS

- Healthy diets contain adequate amounts of each kind of nutrient (i.e., carbohydrates, proteins, fats, vitamins, and minerals).
- Nutrients play specific roles in the body.
- Some foods contain high quantities of particular nutrients.
- A diet with inadequate amounts of nutrients can lead to disease and diminished health.

MATERIALS/PREPARATION

- Prior to beginning the activity, have each student record everything he or she ate on one day.
- Computers with Web access for each student or pair of students. Access to a computer

lab that can accommodate the entire class is preferable. To save time, have students register for an account for in advance. See Step 4 of the procedure for details.

- Student sheet for each student
- *Nutrient-Deficient Diets* information sheet for each pair of students

STANDARDS CONNECTION

Life Science

- 5–8: Structure and Function in Living Systems; Regulation and Behavior
- 9–12: The Cell; Matter and Energy, and Organization in Living Systems

Science in Personal and Social Perspectives

- 5–8: Personal Health
- 9–12: Personal and Community Health

Health

- Standard 1: Comprehend concepts related to health promotion and disease prevention.
- Standard 2: Access valid health information and health-promoting products and services.
- Standard 3: Practice health-enhancing behaviors and reduce health risks.
- Standard 4: Analyze the influence of culture, media, technology, and other factors on health.
- Standard 5: Use interpersonal communication skills to enhance health.
- Standard 6: Use goal-setting and decision-making skills to enhance health.
- Standard 7: Advocate for personal, family, and community health.

PROGRAM CONNECTION

Nutritious foods and clean water are the foundations of good health. “Back to the Basics” examines the connections between nutrition and health, how our understanding of these connections has developed, and the challenges to providing healthy diets and clean water across the globe. The program begins with stories about diseases—past and present—caused by poor nutrition, nutrient deficiencies, and obesity. The use of food as medicine, from fortifying it with vitamins and minerals to treating malnourished people, completes this picture. Water, too, is fundamental to life. But water contaminated with disease-causing organisms, such as cholera, can be life threatening rather than life sustaining. The program looks at the complex problem of water-borne disease and examines strategies to provide everyone clean water.

In this lesson, students use the United States Department of Agriculture (USDA)’s MyPyramid tracker to analyze different kinds of diets and understand the role nutrients play in maintaining good health and the health risks related to nutrient deficiencies.

BEFORE WATCHING

- Discuss the following questions:
 - What does the term, *nutrient*, mean? What are the general categories of nutrients?
Nutrients are chemical compounds the body uses for energy or growth. The main nutrient categories are fats, proteins, carbohydrates, vitamins, and minerals. Carbohydrates and fats are the body’s main source of energy. Proteins are primarily used in the body’s growth and development, as are vitamins and minerals. Vitamins and minerals are also important in cellular chemistry.
 - In what ways does the body benefit from eating a healthy diet?
A healthy diet provides sufficient nutrients to meet the body’s energy and growth needs.
 - What are some consequences of eating an unhealthy diet over a long period of time?
Malnutrition is one result of eating an unhealthy diet. Malnourished people lack one or more necessary nutrients—there can be too few calories, too little protein, or not enough of an essential vitamin or mineral. Obesity is another result of eating an unhealthy diet. People who overeat are prone to health risks associated with obesity, including high blood pressure, diabetes, and coronary heart disease. Encourage students to distinguish between nutrition problems characterized by deficiencies versus excess.
- Collect nutrition labels from food containers. Have students note the components of food—fats, proteins, carbohydrates, vitamins, and minerals—and the recommended levels for each component. Ask how often students’ food choices are influenced by the guidelines on nutrition labels.

AFTER WATCHING

- List some of the challenges to improving the nutrition of a malnourished population. Identify which ones have solutions that could be implemented immediately.
- What are challenges to improving the safety of the water supply? Identify which ones have solutions that could be implemented immediately.
- “Back to the Basics” explores the challenges individuals and populations face to maintain a healthy diet. Good nutrition is complex. The amounts of calories, proteins, carbohydrates, fats, vitamins, and minerals need to be balanced. Too much or too little of a nutrient can interfere with critical processes within the body, which can lead to disease. Have students write a paragraph about how viewing the show has affected how they think about the foods they eat, the water they drink, and their diet in general.

FOR MORE INFORMATION

pbs.org/rxforsurvival



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PROCEDURE

1. Prior to beginning the activity, have each student list the foods and amounts he or she ate over the course of one day. This can be an actual list or estimated one of typical foods. Alternatively, you can prepare a daily diet in advance for students to analyze. The MyPyramid database of foods includes items from school lunch menus, fast food restaurants, and prepared food brands. In addition, sample menus are provided in the *Tips and Resources* area. (mypyramid.gov/tips_resources/menus.html)
2. Distribute the student sheet describing Part 1. To elicit student ideas of the relationship between nutrition and health, have groups discuss the five questions in step 1. After 10 minutes, discuss these questions as a class. See the Assessment section for answers to the questions and for key discussion points.
3. Have students answer questions 2 and 3 on the student sheet. After five minutes, discuss these questions as a class.
4. To complete the rest of the activity, students need to use a computer with Web access and, ideally, an account. The MyPyramid (mypyramidtracker.gov/) tools can be used without registering for an account, using the *Check It Out* option. However, this option does not allow students to save data, an important capability for this multi-day activity. Registering for an account lets students save the information they have entered, which they can then access on a subsequent day or from any computer connected to the Web. Registering also enables students to work on the activity at home, at a library, in class, or in the computer lab. To save time, have students register for an account in advance.
5. Distribute the student sheet describing Part 2. Following the steps in steps 3–7, have students analyze how well their diets comply with the USDA recommendations.
6. Discuss student answers to questions 3–7. The Assessment section has answers to the questions and key discussion points. On the board, list the nutrient deficiencies identified by the class, the role these nutrients play in the body, and the health risks associated with deficiencies. What are the most common nutrient deficiencies found in the daily diets of the class? What kinds of foods would address these deficiencies?
7. Distribute the student sheet describing Part 3 and the Nutrient-Deficient Diets Information sheet. So that all four diets on the sheet will be analyzed, make sure that at least one student or student pair analyzes each diet. Each diet is deficient in one particular nutrient and corresponds to one of the four diseases listed on the sheet. The student sheet guides students through determining which nutrient is missing from a diet and identifying the disease a person regularly consuming this diet may acquire.
8. In a class discussion, have students share their analysis of the nutrient-deficient diets, including their strategy for remedying the diet. List their recommendations on the board and discuss which ones can reasonably be implemented.
9. Have students summarize their findings by preparing a poster or brief presentation. Step 10 outlines the elements that should be part of this presentation.

Complete the initial session as a class to orient students and address their questions. With students in front of a computer, have them use MyPyramid to analyze their own (or the provided) diets by completing steps 4 and 5 on the student sheet. Step 5 describes how to log in, enter foods, and identify a food's nutritional components. Students may need assistance finding foods in the MyPyramid database and determining serving sizes. Prior to class, do your own trial run so you will be prepared to answer questions that might arise.

The screenshot shows the MyPyramid Tracker website interface. At the top, it says "USDA - CNPP - MyPyramid Tracker" and "http://www.mypyramidtracker.gov/intake.aspx". Below that is the "United States Department of Agriculture Center for Nutrition Policy and Promotion" logo. A navigation bar includes links for Home, Information, Update Profile, Food Intake Entry, Analyze Your Food Intake, Diet & Health Information, Physical Activity Entry, Energy Balance, and Center for Nutrition Policy & Promotion. A message reads: "Here is the food displayed for Check It Out user on 8/25/2005". Below this is a table for entering food items:

Foods Consumed	Select Serving Size	Number of Servings (Enter a number (e.g. 1.5))
MILK, 1%	<Please select a serving size>	<input type="text"/>
YOGURT	<Please select a serving size>	<input type="text"/>
HUMMUS	<Please select a serving size>	<input type="text"/>
BEAN SOUP	<Please select a serving size>	<input type="text"/>
ROLL	<Please select a serving size>	<input type="text"/>
ENGLISH MUFFIN	<Please select a serving size>	<input type="text"/>
LASAGNA, MEATLESS	<Please select a serving size>	<input type="text"/>
ORANGE JUICE	<Please select a serving size>	<input type="text"/>

Below the table, there is a small text box with instructions: "serving sizes and specify how many servings you consumed for each. When you are done, click **Save & Analyze** to save your food entry and to analyze your food intake. If you want to make more than one day's food entry, click **Return to Login** to save a day's food entry, inform another day's food entry, for a record of today's food entry, click **Print Food Record** prior to saving food entry. To return to initial values, click **es**. To add or remove food items, click **Enter Foods**."

GOING FURTHER

- Use MyPyramid's list of typical daily diets to analyze other kinds of diets. Examples of diets that might interest students include weight-loss diets, low-carbohydrate diets, fast-food restaurant meals, prison diets, and diets that use indigenous foods from geographically unique areas, such as the traditional diet of the Inuit.
- Analyze the nutritional makeup of rations that relief organizations distribute. Three of the Web sites in the Resource section provide detailed descriptions of rations.
- Play the following classroom games to explore the health conditions around the world and some of the issues related to delivering health care.

Download these free games at pbs.org/wgbh/rxforsurvival/campaign/givetime/index.html.

- *How Hard Can It Be to Carry Water?* What would it be like if you had no running water in your house? Carry a container filled with water for a short distance and see that carrying water to supply a family's needs is no trivial matter. (Activity type: Hands-on challenge. Duration: 2 minutes. Requires a small area. Preparation time: 5 minutes.)



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- *Is the Water Clean Yet?* How hard can it be to clean dirty water? Find out by designing, constructing, and testing a water filter. (Activity type: Engineering challenge. Duration: 30 minutes. Preparation time: 30 minutes.)
- *Investing Your Money Wisely:* If you were advising a government on how to spend its limited healthcare budget, how would you keep the largest possible number of people healthy? In this game, you decide which public health measures should be put in place first. (Activity type: Debate. Duration: 30 minutes. Requires a table. Preparation time: 15 minutes.)
- *Growing Up Healthy:* How easy is it for a child to grow up healthy without an adequate public health care system? Find out how challenging it can be! (Activity type: Board game. Duration: 10 minutes. Requires tabletop. Preparation time: 15 minutes.)
- *Unfair Race:* How much of an impact does where you live have on your health? Players assume the roles of different countries and examine the extent to which one's country can help or hinder one's health. (Activity type: Group experience. Duration: 15 minutes. Requires a large room or outdoor space. Preparation time: 20 minutes.)

ASSESSMENT

Students' responses to the questions on the student sheet should incorporate the points discussed in the answers (included in this section). In addition, consider the following when assessing student work:

- Supported the team by contributing to the discussion, listening to others' ideas, discussing a variety of views, and helping the team develop a consensus.
- Followed directions and asked appropriate questions about entering data on MyPyramid.
- Explained what nutrients do in the body and described the health risks posed by a deficiency of these nutrients.
- Wrote thoughtful responses to student sheet questions and based conclusions on MyPyramid data.
- Devised a thoughtful strategy to supplement the diet of a malnourished population to prevent nutrient-related diseases.
- Demonstrated an understanding of the connections between nutrition and health and the challenges associated with providing nutritious diets and clean water to all people.

Part 1: Entering your own diet into MyPyramid

1. Brainstorm answers to the following questions with your group. Be prepared to share your ideas in a class discussion.

- What makes a food healthy? Unhealthy?
Healthy food provides the nutrients needed by the body.
- What does having healthy eating habits mean?
Healthy eating habits involve getting the proper balance of nutrients and the amount of calories required to meet one's needs.
- Name some of the major categories of nutrients found in food.
Carbohydrates, protein, fat, vitamins, and minerals.
- What might be some health consequences of a diet that lacks a few nutrients considered essential?
One might become susceptible to diseases related to nutrient deficiencies.
- How can eating too much of something—even if it is healthy for you—be as much of a problem as not eating enough?
Eating too much vitamin A can lead to birth defects and consuming too much iron can lead to hemochromatosis. Overeating can lead to obesity.

Part 2: Analyzing your own diet

The answers in Part 2 will vary, depending on the foods the students enter into MyPyramid.

Part 3: Analyzing nutrient-deficient diets

1. There are many complex reasons why an individual might not eat a healthy diet. In some parts of the world, entire populations are unable to eat a healthy diet. Eating a poor diet over a long period of time leads to malnutrition. With your group, list some reasons why people might be malnourished.

Answers may include: Not enough money to purchase sufficient food; crop failure due to drought, disease, or pests; pollution; disruption of agriculture and/or trade due to war, corruption, or economic factors; lack of availability of a sufficient diversity of foods; and lack of education or understanding about nutrition.

6. The diets on the Nutrient-Deficient Diets sheet are deficient in either vitamin C, vitamin A, niacin, or protein. Compare the amount in *Your Intake* to the recommended amounts.

The “Foods that keep well” diet is deficient in vitamin C, which can lead to scurvy. The “Only one grain and no meat” diet is deficient in niacin, which can lead to pellagra. The “Rice-based” diet is deficient in vitamin A, which can lead to night blindness. The “Fresh Produce” diet is deficient in protein, which can lead to kwashiorkor.

7. On MyPyramid’s *Nutrient Intakes* page, click on the link to the nutrient you identified in Step 6 as the most deficient in the diet you analyzed. What foods are good sources of this nutrient?

Foods rich in vitamin C include cantaloupe, strawberries, tomatoes, broccoli, cabbage, and citrus fruits, such as oranges. Foods rich in vitamin A include eggs, milk, apricots, nectarines, cantaloupe, carrots, sweet potatoes, and spinach. Foods containing niacin include foods rich in protein, such as meat, fish, peanuts and other nuts, and whole grains (with exception of tryptophan-poor grains like corn). Foods rich in protein include meat, fish, nuts, and beans.

8. Choose a food to supplement the nutrient-deficient diet. Return to MyPyramid’s *Food Intake Entry* page and add this food to the diet.

- How easy would it be for a malnourished population to get this food? Explain.

Answers will vary. However, many of the foods listed in MyPyramid that contain the nutrients necessary to correct the nutrient deficiencies in a diet may be unavailable or, if available, unaffordable to people needing them. For example, protein can be expensive and fresh fruit and vegetables are seasonal and can spoil. Thus, it may not be easy to identify foods that are easily available to the people consuming these diets.

- Describe a strategy for making this food to available to a malnourished population.

Answers will vary. However, answers may include short-term solutions, such as delivering foods to those who need them or providing nutritional supplements. Long-term solutions include developing local food sources, educating people about the importance of a balanced diet, and improving the standard of living so people can afford to buy the foods they need.

RESOURCES

RELATED RX FOR SURVIVAL WEB SITE FEATURES (see pbs.org/rxforsurvival)

Why Global Health Matters: Learn why we should all be involved in global health initiatives.

Global Health Atlas: Examine the health profiles of nations.

Deadly Diseases: Learn about some of the diseases that are humanity's most feared killers.

Global Health Champions: Learn about men and women who have profoundly changed global health outcomes and saved lives in many parts of the world.

Ask the Experts: Post a question about the value of international aid for health.

Get Involved: Find meaningful ways to take action.

Dispatches from the Field: Hear first-person accounts from people on the frontlines of health care.

LINKS

Bread for the World
bread.org

Get the facts and practical ideas for joining the fight against hunger and raising awareness.

Food Ration Report
cbc.ca/news/background/refugeecamp

Description of life in a refugee camp, including a description of the 2,100-calorie rations that are designed to meet cultural diets.

Frontline: Fat
pbs.org/wgbh/pages/frontline/shows/fat

Find articles, discussions, and lesson plans on body image, nutrition, and health that reveal our complex relationship with food and fat.

NOVA: Dying to be Thin
pbs.org/wgbh/nova/thin
Explore the disturbing trend of individuals risking their health, or even lives, in order to have the "perfect" body.

United Nations Educational Scientific and Cultural Organization: Water Portal
unesco.org/water

Learn what various organizations are doing in the area of freshwater development, and the challenges they face worldwide.

United States Defense Department
archives.cnn.com/2001/WORLD/asiapcf/south/10/11/ret.aid.agencies

Learn about the 2,200-calorie meal packaged in yellow plastic pouches and airdropped by the U.S. military to assist Afghan civilians.

World Food Programme
wfp.org

Learn how the WFP addresses malnutrition and hunger in the world today. The site also includes a description of the basic and complementary food items in their ration packets.

BOOKS

Ending World Hunger Nathan Aaseng. New York: Watts, 1991.

Take part in a discussion of one of the world's most complex questions: in the twenty-first century, why is there still hunger in the world, and what can we do about it?

Food and You: A Guide to Healthy Habits for Teens Marjolijn Bijlefeld and Sharon K. Zoumbaris. Westport: Greenwood Press, 2001.

Show teens how they can take responsibility for their health now and for the rest of their lives.

The Atlas of Food: Who Eats What, Where and Why Erik Millstone and Tim Lang. New York: Penguin, 2003. Discover how history, politics, and economics influence the foods we eat.

High-Tech Harvest Elizabeth L. Marshall. London: Franklin Watts, 1999.

Delve into the science and politics of genetically engineered foods and consider the impact this new agricultural revolution has had and will continue to have on global health.

Nutrition and Well-Being A to Z Delores C. S. James, ed. Detroit: Macmillan Reference, 2004.

Explore almost any nutritional health topic in this comprehensive food-science encyclopedia.

Obesity Charlene Akers. San Diego: Lucent Books, 2000.

Examine the physical, social, and emotional consequences of obesity and its connections to heart disease, changing ideals of beauty, and rise of the multi-billion dollar diet industry.



Back to the Basics

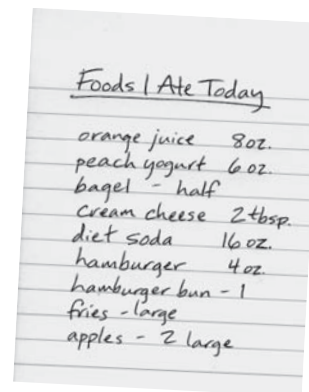


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Part 1: Entering your own diet into *MyPyramid*

1. Brainstorm answers to the following questions with your group. Be prepared to share your ideas in a class discussion.

- What makes a food healthy? Unhealthy?
- What does having healthy eating habits mean?
- Name some of the major categories of nutrients found in food.
- Name some health consequences of a diet that lacks some nutrients considered essential.
- How can eating too much of something—even if it is healthy for you—be as much of a problem as not eating enough?



2. After the class discusses the above questions, write two questions you have about your own diet.

- (a) _____
- (b) _____

3. Assess the quality of your own diet. Review the list of foods you ate over the course of a day (or the diet provided by your teacher). How healthy do you think this diet is? Are there foods or nutrients that you think you get too little of? Too much of? Explain.

4. Analyze your diet with MyPyramid, which calculates the amounts of the nutrients in your diet and lets you evaluate the quality of your diet. Enter your diet in MyPyramid by following steps a–h below.

- (a) Go to mypyramidtracker.gov/ and log in with your username and password.
- (b) Fill in your age, gender, height, and weight on the Personal Profile page. Click on *Save Today's Changes*, then click on *Proceed to Food Intake*.
- (c) Type the first item from your food list into Enter Food Item. Then, click *Search*.
- (d) The search results may display several food options. Choose the one that is most similar to the food you typed in, then click the *Add* button next to the food you selected. If no foods listed in the search results match the one you entered, try again with a different name for that food or with its main ingredient until you find a reasonable match.

Check It Out!

Check It Out Profile

Welcome! Enter your age, gender, weight, and height. This information is used to give you accurate results about your diet and physical activity status. You will need to change the date of entry if other than the date that is displayed. Once you have entered all information, click "Save." The information you provide here will be valid only during this visit and will not be stored for future use.

Age:

Gender: <<Choose Gender>>

Entry Date Month/Day/Year: 8/25/2005

Height: feet inches

Weight: pounds

Enter Food Item for more detailed error information [click here](#).

Enter a choice of food in the text box, then click "Search." To choose a food, click on it from the list. Repeat until you have included all foods and beverages eaten in the last 24 hours. [How does it work?](#)

How does the [Frequently Used Foods List](#) work?

[Frequently Used Foods](#)

continued

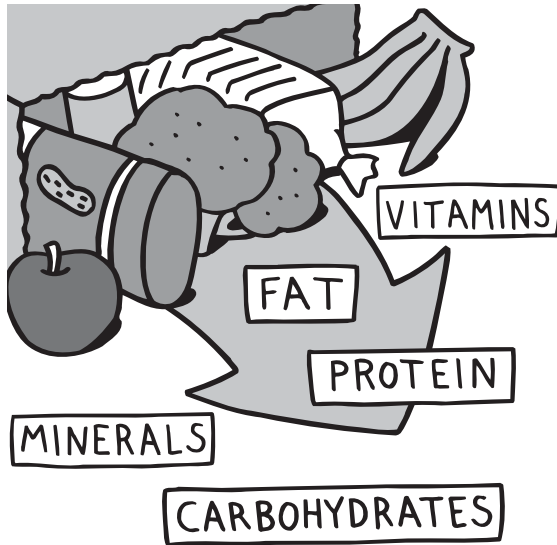
(e) Repeat steps c and d until all the foods in your list appear in the Here Are Foods list.

(f) Click *Select Quantity*.

(g) For each food you enter, select a serving size and a number of servings. Let's say you had a half of a cup of cereal on your list. There is no "half-cup" option. So, to designate half a cup, choose "one cup" as the Serving Size and 0.5 as the Number of Servings. Click *Save & Analyze* after entering all the foods on your list.

(h) On the Analyze Food Intake page, click *Calculate Nutrient Intakes from Foods*.

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Part 2: Analyzing your own diet

1. Go to mypyramidtracker.gov/ and log in with your username and password.
2. Once you access your account, open the Calculate Nutrient Intakes from Foods page.
3. The Your Intake column lists the total amounts of nutrients in the foods you entered. The U.S. Department of Agriculture (USDA)'s recommended amounts are listed in the Recommendation or Acceptable Range column. Look through the list of nutrients, comparing the amount in the Your Intake column to the recommended amounts. Find nine nutrients and fill in the following three tables, according to whether you fall short of, match, or exceed the USDA recommendations.

Intake is much less than the recommendation

Nutrient	Your Intake	USDA recommendation

Intake closely or exactly matches the recommendation

Nutrient	Your Intake	USDA recommendation

Intake is much higher than the recommendation

Nutrient	Your Intake	USDA recommendation

4. For each nutrient for which Your Intake is much less than the recommendation, click on the name of the nutrient. For these nutrients, answer the following three questions and be prepared to share your data with the class.

	Nutrient #1	Nutrient #2	Nutrient #3
Nutrient Name			
What role does this nutrient play in the body?			
What health problems might result if you always eat too little of this nutrient?			
What foods are good sources of this nutrient?			

DID YOU KNOW?

Although their average income is lower, a smaller percentage of the population is malnourished in Sweden, Australia, the Netherlands, and Belgium than in the United States.

5. Based on your analysis, choose one food to add to your diet to make it a healthier one. For suggestions, click on *Analyze Your Food Intake* and then click *MyPyramid Recommendation*.

What food did you add? _____

6. When you have selected a food in step 5, use the following steps to see what kind of difference adding this food makes.

- (a) Click *Food Intake Entry* and add this food to your list.
- (b) Click *Select Quantity* and enter the quantity.
- (c) Click *Save & Analyze* to return to the Analyze Your Food Intake page.
- (d) Click on *Calculate Nutrient Intakes from Foods* to see the revised list of nutrients.

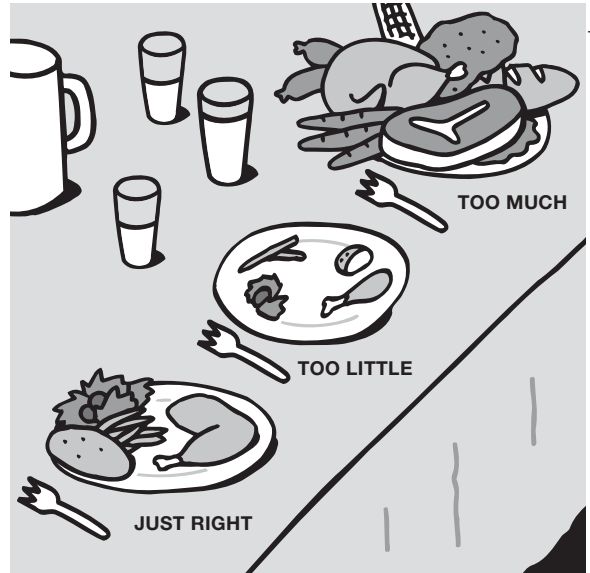
7. How well did the new food make up the deficiency that you had found? Explain. _____

DID YOU KNOW?

Many people do not have access to arable land or enough income to buy food.

Part 3: Analyzing nutrient-deficient diets

- There are many complex reasons why an individual might not eat a healthy diet. In some parts of the world, entire populations are unable to eat a healthy diet. Eating a poor diet over a long period of time leads to malnutrition. With your group, list some reasons why people might be malnourished.



Stephen Schudlich ©WGBH Educational Foundation

- Go to mypyramidtracker.gov/ and log in with your username and password.
- Open the Update Profile page.
- The diets you will use in Part 3 contain the recommended number of calories for a five foot five inch tall teenager weighing 115 pounds, but not the recommended amount of nutrients. In MyPyramid, click *Update Profile* and change the personal information so the height is five feet five inches and the weight is 115 pounds. If you are doing Part 3 on the same day as you analyzed your own diet, change the date to the next day.
- Choose one of the four diets described on the Nutrient-Deficient Diets Information sheet. Click *Proceed to Food Intake* and enter the foods from this diet, following the same process you used when you entered the foods from your diet into MyPyramid. Use *Calculate Nutrient Intakes from Foods* to view the list of nutrients and recommended amounts.
- The diets on the Nutrient-Deficient Diets Information sheet are deficient in either vitamin C, vitamin A, niacin, or protein. Use the table below to compare the amount in Your Intake to the recommended amounts.

Diet Name _____

	Your Intake from the Nutrient-Deficient Diet	MyPyramid Recommendation	Percent of Recommendation (Intake / Recommendation x 100)
Vitamin A			
Vitamin C			
Niacin			
Protein			

(a) In which nutrient is this diet most deficient? _____

(b) If you regularly ate this diet, what disease would you be at risk of getting?

DID YOU KNOW?

The USDA recommends 2300–3000 calories per day for men and 1900–2200 calories per day for women. The average calorie consumption per day in the United States is between 3400 and 3800 calories.

7. On MyPyramid's Nutrient Intakes page, click on the link to the nutrient you identified in step 6 as the most deficient in the diet you analyzed. What foods are good sources of this nutrient?

8. Choose a food to supplement the nutrient-deficient diet. Return to MyPyramid's Food Intake Entry page and add this food to the diet.

- How well does the food you chose correct the deficiency? _____
- What is the percentage of the recommended amount before adding new food? _____
- What is the percentage of the recommended amount after adding new food? _____
- How easy would it be for a malnourished population to get this food? Explain.

- Describe a strategy for making this food to available to a malnourished population. Use a separate sheet of paper, if necessary.

DID YOU KNOW?

850 million people in the world—36 million of them in the United States—suffer from hunger and malnourishment.

9. Using the Nutrient Intakes page, find two or three other foods that can correct the deficiency.

10. Prepare a poster or brief presentation on your findings. Include:

- The region in which people are likely to eat this kind of diet
- The contents of the diet
- The nutrient(s) in which the diet is most deficient
- How these missing nutrients are used in the body
- The disease a person who regularly eats this diet is at a high risk of getting
- Your recommendation for supplying foods that will reduce the risk of someone getting the disease

DID YOU KNOW?

There is enough food in the world to feed everyone if it were properly distributed.

Nutrient-Deficient Diets Information

These diets contain foods typical of regions in which malnutrition is a possibility, should food supplies run low. They contain the recommended number of calories for a five foot five inch tall teen weighing 115 pounds but are deficient in either vitamin C, vitamin A, niacin, or protein. Your task is to analyze a diet and identify the disease to which a person consuming it over a long time is susceptible.



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DIET 1: FOODS THAT KEEP WELL *

Keeping food from spoiling is a concern in many parts of the world. Food that can be stored and transported is important when people need to travel or when providing emergency food supplies.

The daily diet of a traveling refugee might include a stew made from dried beef or fish cooked with dried peas and a bit of cheese and a dried biscuit. Enter the following into MyPyramid to approximate this diet:

- 1.5 cups of beef jerky pieces
- 1 oz of salt cod, dried, boneless
- 1 cup of cooked split peas
- 2 whole wheat biscuits, 4" diameter
- 3 1-oz slices of American/cheddar processed cheese

DIET 2: FRESH PRODUCE *

Fruits, vegetables, and greens contain a wealth of carbohydrates, vitamins, and minerals but little protein, which the body needs for growth.

A daily diet might consist of a piece of cassava bread and a fresh papaya in the morning, a snack of nuts and avocado, and an evening meal of a cassava stew with fish and greens. Enter the following into MyPyramid to approximate this diet, which people living in Africa and South and Central America might eat.

- 1 piece of cassava bread (casaba)
- 1 large fresh papaya
- 0.25 cup of brazil nuts
- 2 slices of fresh avocado
- 1.5 cups of cooked cassava
- 2 sardines
- 0.5 cups of cooked turnip greens w/roots

DIET 3: ONLY ONE GRAIN AND NO MEAT *

In some parts of the world, only one kind of grain is widely available for making such foods as porridge or bread. Also, meat is scarce because animals are kept for their production of eggs and milk rather than for consumption.

A daily diet might consist of fried eggs for breakfast, with a maize (corn) porridge. Milk and snack of dried fruit during the day, and a dinner of a corn and bean stew, with some carrots and a little butter. Enter the following into MyPyramid to approximate this diet that people living in South and Central America might eat.

- 2 fried eggs
- 3 cups cooked corn
- 1 half of a dried apricot
- 1.5 cups whole milk
- 1 cup cooked lima beans
- 1 cup cooked sliced carrots
- 1 pat of butter

DIET 4: RICE-BASED DIET *

In some areas, people eat primarily rice-based dishes with a limited number of ingredients and flavorings added.

Rice-based dishes may be flavored with onion, pepper, and lime and may contain lentils, bitter melon, and a bit of fish. A bit of chicken and a snack of dates from a market are treats, and tea is a common daily beverage. Enter the following into MyPyramid to approximate this diet, which people living in Asia might eat.

- 2 cups long-grain cooked white rice
- 1 tablespoon canola oil
- 1 cup cooked onion
- 1 chili pepper
- 1 cup cooked lentils
- 1 wedge of fresh lime
- 0.5 cups of cooked bittermelon
- 0.25 of a small perch
- 1 thick slice of chicken breast
- 6 dates

* MyPyramid does not contain all of the foods that populations at risk of nutrient-deficient diseases typically eat. As a result, these diets contain some substitutions with foods found in MyPyramid's database.

Nutrient Deficiency Diseases Associated with the Nutrient-Deficient Diets

SCURVY

Scurvy is caused by a diet deficient in vitamin C. It is characterized by general weakness, anemia, gum disease (gingivitis), and skin hemorrhages.

Humans and guinea pigs are vulnerable to scurvy. They are the only two mammals that cannot produce their own Vitamin C. Prior to 1747, scurvy caused up to 75 percent of deaths on lengthy sea voyages. Then, in 1747, Dr. James Lind discovered the cure—vitamin C, which is abundant in citrus fruits. He conducted what some consider to be the first controlled clinical trial in the annals of medicine. Surprisingly, it still took about 50 years for the British navy's medical bureaucracy to make regular use of vitamin C. When it did, the scourge of scurvy was finally ended. Because many sailors at the time ate limes to ward off scurvy, people nicknamed them "limeys." Still today, people who do not eat enough fruits or vegetables are vulnerable to scurvy.

NIGHT-BLINDNESS

Night-blindness is caused by a diet deficient in vitamin A. It is characterized by poor vision in dim light. A lack of vitamin A also makes one susceptible to infectious diseases.

Traditionally, doctors treat children with night blindness by injecting vitamin A. Dr. Alfred Sommer wondered if he could get the same results by giving drops of vitamin A orally. From 1976–1980, he tested the idea with a small group of children. Most were cured by the very next day! He also noticed that night-blind children died at an alarming rate from such illnesses as measles and diarrhea. A vitamin A deficiency weakens the lining around the body's organs. Germs can breach this natural barrier and attack organs that would otherwise be protected. In this way, a mild illness can become fatal. Sommer realized that two cents worth of vitamin A not only saved children's sight but also saved lives, as well.

PELLAGRA

Pellagra is caused by a diet deficient in niacin (a B-vitamin) or the amino acid, tryptophan. It is characterized by scaly skin sores, diarrhea, inflamed mucous membranes, and mental confusion and delusions.

In the early twentieth century, pellagra was widespread in the United States and around the world. Initially, doctors thought it was an infectious disease. However, in 1914, Dr. Joseph Goldberger noticed that the staff in a hospital in Mississippi where he was working never contracted the disease while the patients typically did. He also noticed that the staff ate high-quality meals and that the patients' meals were of lower quality. These observations led him to make a connection between the disease and diet. Foods containing niacin include foods rich in protein, such as meat, fish, peanuts and other nuts, and whole grains (with exception of tryptophan-poor grains like corn).

KWASHIORKOR

Kwashiorkor is caused by a diet with adequate calories but deficient in protein. It is characterized by fatigue, irritability, and lethargy. As protein deprivation continues, growth failure, loss of muscle mass, generalized swelling (edema), and decreased immunity occurs. A large, protuberant belly is common. Skin conditions (such as dermatitis, changes in pigmentation, thinning of hair, and vitiligo) are seen frequently. Shock and coma precede death.

The term *kwashiorkor* originated in Ghana to describe the sickness that developed soon after a child stopped breastfeeding. When cut off from a regular source of protein, such as breastmilk, children can become malnourished. If this continues, they can develop kwashiorkor. To treat kwashiorkor, aid agencies distribute fortified grain rations. For severely malnourished babies, they give out small foil pouches of Plumpy Nut, a highly enriched peanut butter, which is fed to babies a little bit at a time. Plumpy Nut keeps well, needs no refrigeration, and can be used to treat 10 children for what it costs to treat one child with the more common liquid baby formula.



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