FOOD FOR 9 BILLION

The Challenge of Feeding the World

The Mighty Micronutrients

Teacher Notes

Before You Start

Grade Level:
Grade 9-12, could be adapted for middle school

Concepts Covered:
Micronutrients, vitamins, minerals, nutrient deficiencies, Iron, Vitamin A, Vitamin D, Iodine, Folate, Zinc and Vitamin B-12

Time Frame:
Part 1 – Mighty Micronutrients, a jigsaw activity (one or two 50-minute classes)
Part 2 – Am I Getting All My Micros? Personal Intake and Micronutrient Analysis

- Introduction (20 minutes)
- Data collection (homework)
- Data analysis: computing RDI values and questions (50 minute class or homework)

Materials Needed:
Part 1: Mighty Micronutrients

- Copies of ***Mighty Micronutrient Instructions***, ***Mighty Micronutrients Data Sheets***
- ***Understanding My Micros*** worksheet
- Online or printed information about micronutrients

Part 2: Am I Getting All My Micros***?***

- Copies of ***Personal Intake Analysis*** worksheets and ***Personal Intake Analysis Log***
- Meter stick, scale, computer with internet access
- Printed copies of ***Reference DRI*** charts

Overview

Micronutrients are essential to human bodies, but are only needed in small amounts. Guide your students to a deeper understanding of these necessary nutrients by using the two activities in this lesson. In the first activity, a jigsaw exercise, students will learn about micronutrients: how our bodies obtain them, how much we need, and the effects of too many or too few micronutrients. Students will conduct individual research and then reconvene to teach their peers. Students will then track their food intake, compute their micronutrient intake, and compare their intake to US Recommended Daily Intakes.

Objectives

1. Students will read multiple sources for essential details, take notes, and teach their peers.
2. Students will explain what micronutrients, recommended daily allowances, and tolerable upper limits are and why they are important.
3. Students will describe the consequences of over- or under-consumption of macronutrients.
4. Students will collect data and analyze that data in reference to US dietary standards.
5. Students will evaluate the validity of their data collection methods.

Prior Knowledge

Students need to have a basic understanding of human body systems.

Teaching Tips/Activity Sequence

Part 1 – Mighty Micronutrients (Jigsaw Activity)

1. Introduce the activity. Provide some context for the activity and solicit students' prior knowledge about micronutrients, vitamins, and minerals.
2. Divide the class into 7 groups. Each group will become "the expert" on one micronutrient.
3. Hand out student ***Instruction Sheet*** and note-taking ***Data Sheet***. Review instructions.

4. Provide students access to resources (websites listed in the resources section or texts you have) and assist them as needed as they research.
5. Reorganize the students into mixed micronutrient groups so that every new group has at least one expert on each of the 7 micronutrients. Students should share what they have learned with the rest of their group.
6. Call the class together and discuss the students' findings and any questions they may have.
7. Allow students to work individually or in groups to complete the ***Understanding My Micros Questions***.

* Although this activity is designed as a jigsaw exercise, it could easily be made into individual work and/or presentations.

Part 2 – Am I Getting All My Micros? A Personal Micronutrient Analysis

A note before beginning: Please be very sensitive to issues concerning nutrition or health. The purpose of this exercise is simply to think about micronutrients in terms of one's personal nutrition, not to replace the advice of a physician.

1. Introduce the activity.
   - Briefly review micronutrients and their significance with the class. This lesson assumes that students have already learned what micronutrients are, and—to some extent—how they are used in the body. See the resources section below for websites that provide information about micronutrients.
   - Review instructions and expectations for collecting personal data. Demonstrate some examples of data collection.
2. Students should collect food intake data for two days. Encourage students to sample two weekdays rather than weekends, as the weekdays most likely provide a more accurate representation of what they eat.
   - Students can use intake data collected in macronutrient study if they have already completed that lesson.
   - Since most food labels do not provide information for each micronutrient they are studying, students will need to use an online database to collect this data. We suggest they use http://www.nal.usda.gov/fnic/cgi-bin/nut_search.pl or http://nat.crgq.com.
3. Students should calculate their recommended intake values, either working alone or in small groups. For this step, a meter stick or tape measure may be required if students do not know their heights.
   - The quickest way to calculate DRI is to use the USDA's online healthcare professional calculator at http://fnic.nal.usda.gov/interactiveDRI or to use the US DRI charts at the end of this document.
4. Students can work alone or in small groups to analyze their data and answer the questions.
   * If you want students to work on their graphing skills, have them create a graph that compares their various micronutrient recommendations and consumption. They will need to pay close attention to units.
5. Discuss students' findings as a group. Questions you may wish to ask include:
   - What did you find most surprising after you analyzed your micronutrient intakes?
   - Did you discover that you think you need to change about your diets? What & why?
   - Are there particular foods you consume that are micronutrient-rich or micronutrient-poor?
   - If a person seldom met the US recommended daily intake for a particular micronutrient, the person could develop a deficiency. What are the symptoms of deficiency for the micronutrients we looked at? (This is covered in the first part of the lesson, ***The Mighty Micronutrients***.)

Extensions

- Students could research other micronutrients, symptoms of micronutrient deficiency, and where micronutrient deficiencies are most prevalent in the world.

Resources

1. Background information about vitamins and minerals: http://www.cdc.gov/nutrition/everyone/basics/vitamins/index.html
2. ***You Are What You Eat*** activity has information on Vitamin A, Vitamin D, Calcium, and Phosphorous.
3. University of Maryland Medical Center: Vitamins – Introduction: http://www.umm.edu/patiented/articles/what_vitamins_000039_1.htm
4. Linus Pauling Institute at Oregon State University: http://lpi.oregonstate.edu/infocenter/contentnuts.html
5. Medline Plus:
   - Vitamins: http://www.nlm.nih.gov/medlineplus/vitamins.html
   - Minerals: http://www.nlm.nih.gov/medlineplus/minerals.html
   - Students can also search Medline Plus for other micronutrients
6. NIH Vitamin and Mineral Supplement Fact Sheets: http://ods.od.nih.gov/factsheets/list-VitaminsMinerals
7. For an in-depth explanation of RDA, AI, and UL, visit *Vitamins & Minerals: How Much Do You Need?*: http://www.webmd.com/vitamins-and-supplements/lifestyle-guide-11/vitamins-minerals-how-much-should-you-take
8. US DRI and UL tables for Vitamins and Minerals are available at http://fnic.nal.usda.gov/

Standards

National Science Education Standards *Grades 9-12*	*Common Core State Standards for Literacy in History / Social Studies, Science and Technical Subjects 6-12*
Life Science The Cell 1.2 Matter, energy, and organization in living things 5.2, 5.3, 5.6 Science in Personal and Social Perspectives Personal and Community Health 1.1, 1.2, 1.5	Reading Standards Key Ideas and Details RST1 Integration of Knowledge and Ideas RST7, RST9 Writing Standards Text Types and Purposes WHST2 Production and Distribution of Writing WHST4 Range of Writing WHST10

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Name: _____

Date: _____ Class:_____

The Mighty Micronutrients

Micronutrients: tiny, but powerful. So what are they?

Micronutrients are elements or substances—like minerals and vitamins—which are crucial in tiny amounts for normal growth and metabolism that humans must obtain from their diets. Micronutrients are different than carbohydrates, protein, and fats; your body needs *many* grams of those nutrients everyday, so they are called macronutrients.

Prefix Pause
Micro = small
Macro = large
Nutri = nourishment

Your task today is to learn more about the *mighty micronutrients*. Please understand that there are many micronutrients, but for this exercise we are going to focus on some of the most crucial ones: Iron, Vitamin A, Vitamin D, Iodine, Folate, Zinc, and Vitamin B-12. What are they? Why are they important? Is it possible to have too much? It's up to you to find out.

First: Become an expert

You will become an expert on at least one micronutrient that your teacher will assign you. Using the text and web resources that your teacher tells you about, answer the following questions about your specific micronutrient(s):

- What is it?
- Why is it important to humans?
- What is the US Recommended Daily Intake for this micronutrient?
- What are good sources of this micronutrient?
- What are the symptoms a person displays if he or she is deficient in this micronutrient?
- What interventions or treatments can be done if a person is deficient?
- What other interesting information can you find about this micronutrient?

Take notes about your micronutrient in the first column of the ***Mighty Micronutrients Data Sheet***. Work alone or with others who have been assigned the same micronutrient.

Second: Share what you know

Your teacher will reorganize your class into new groups with at least one student from every micronutrient group. Within your new groups, you will each share what you have learned about the different micronutrients. Be sure to take notes in the rest of the columns in the ***Mighty Micronutrient Data Sheet***.

Third: Apply your knowledge

With your group, complete the ***Understanding My Micros*** worksheet.

Name: _____

Date: _____ Class:_____

Mighty Micronutrients Data Sheet

I will become an expert on:

Micronutrient name			
What is it? (Vitamin or mineral? Type?)			
Why is it important to humans?			
US Recommended Daily Intake			
Sources of micronutrient			
Symptoms of deficiency			
Interventions if a person is deficient			
Consequences of over-consumption			
Other information			

Name: _____

Date: _____ Class:_____

Mighty Micronutrients Data Sheet

Micronutrient name				
What is it? (Vitamin or mineral? Type?)				
Why is it important to humans?				
US Recommended Daily Intake				
Sources of micronutrient				
Symptoms of deficiency				
Interventions if a person is deficient				
Consequences of over-consumption				
Other information				

Name: _____

Date: _____ Class:_____

Mighty Micronutrients Data Sheet

Micronutrient name	Iron	Vitamin A	Vitamin D
What is it? (Vitamin or mineral? Type?)	a mineral, an element in the metal group	a fat-soluble vitamin	a fat-soluble vitamin
Why is it important to humans?	part of many proteins and enzymes; part of proteins (hemoglobin & myoglobin) involved in oxygen transport	plays an important role in vision (particularly night vision), bone growth, reproduction, cell division, and cell differentiation; helps regulate the immune system; may help lymphocytes fight infections; promotes healthy surface linings of the eyes and the respiratory, urinary, and intestinal tracts so that infections cannot get into the body through those openings	promotes calcium absorption; maintains adequate blood calcium and phosphate concentrations; needed for bone growth; prevents rickets in children, osteomalacia (softening of the bones) and osteoporosis (loss of bone density); other roles in the body include modulation of cell growth, neuromuscular and immune function, and reduction of inflammation
US Recommended Daily Intake	males 14 – 18: 11 mg/day females 14 – 18: 15 mg /day* UL (both sexes): 45 mg/day *higher for women due to menstrual blood loss	males 14 -18: 900 μg RAE / 3,000 IU females 14-18: 700 μg RAE / 2,310 IU	males 14 – 18: 600 IU (15 μg) females 14 – 18:600 IU (15 μg)
Sources of micronutrient	red meat, fish, poultry, lentils, beans, fortified cereal, tofu, spinach	colorful fruits and vegetables (especially carrots, cantaloupes, sweet potatoes, and spinach), eggs, liver, whole milk, fortified food products	fatty fish and fish liver oil, fortified foods, produced when UV rays from sunlight strike the skin
Symptoms of deficiency	fatigue, decreased immunity, poor work performance, slow cognitive development, difficulty maintaining body temperature, glossitis (inflammation of the tongue)	blindness, night blindness, decreased immunity, increased respiratory and diarrheal infections	rickets (softening of the bones) in children, osteomalacia (softening of the bones), osteoporosis (loss of bone density)
Interventions if a person is deficient	change diet to include more iron or different forms of iron (ex. meat), take iron supplements	interventions depend on the seriousness of the condition; change diet, take supplements	carefully increase exposure to sun, change diet, take supplements; cod liver oil is used to treat rickets
Consequences of over-consumption	toxicity and death	birth defects, liver abnormalities, reduced bone mineral density, and central nervous system disorders; acute toxicity consequences include nausea and vomiting, headache, dizziness, blurred vision, and lack of muscular coordination	anorexia, weight loss, polyuria (increased amount of urine produced and passed through the body), and heart arrhythmias; can raise blood levels of calcium
Other information	There are two forms of dietary iron: heme and nonheme, depending on their chemical structure. Heme iron is from hemoglobin, the protein in red blood cells that carries iron. Heme iron is found in animal sources, and is the form the body absorbs best. Nonheme iron is in plant sources and is the form added to foods (fortified or enriched).	Vitamin A is found in different in plants and animals (animal source: preformed vitamin A, absorbed as retinol; plant source: pro-vitamin A carotenoid).	Vitamin D is biologically inert and must undergo two chemical steps (hydroxylations) in the body for activation. *Vitamin D is the only vitamin that the body can make, but it is not enough for the body's needs; therefore, getting Vitamin D from the diet is still necessary.

Name: _____

Date: _____ Class:_____

Mighty Micronutrients Data Sheet

Micronutrient Name	Iodine	Folate (Vitamin B-9)	Zinc	Vitamin B-12
What is it? (Vitamin or mineral? Type?)	a mineral, an element	a water soluble B vitamin, synthetic in form	a mineral, an element	a water-soluble vitamin, also called cobalamin
Why is it important to humans?	makes thyroid hormones that control the body's metabolism and other important functions…thyroid hormones are needed for proper bone and brain development during pregnancy and infancy	helps produce and maintain new cells (especially important for infants and pregnant women); needed to make DNA and RNA; helps prevent changes to DNA that may lead to cancer; makes normal red blood cells	helps immune system fight off invading bacteria and viruses; helps make proteins and DNA; important during pregnancy, infancy, and childhood; helps wounds heal; important for proper sense of taste and smell	required for proper red blood cell formation, neurological function, and DNA synthesis
US Recommended Daily Intake	teens 14–18 years: 150 μg	teens 14-18 years: 400 μg	males 14–18: 11 mg females 14–18: 9 mg	males & females ages 14+: 2.4 μg
Sources of micronutrient	iodized salt, fish, seaweed, shrimp, dairy products, grain products, fruits, vegetables (amount depends on iodine in soil and fertilizer)	leafy green vegetables, citrus fruits, dried beans, peas, fortified cereals, liver	oysters, red meat, poultry, seafood, fortified breakfast cereals, beans, nuts, whole grains, dairy products	fish, meat, poultry, eggs, milk and milk products, fortified breakfast cereals, some nutritional yeast products
Symptoms of deficiency	cannot make enough thyroid hormone; stunted growth, mental retardation, and delayed sexual development in a fetus; lower-than-average IQ in infants and children; decreased ability to work and think clearly in adults; goiter	If the mother was deficient during pregnancy, the infant can have neural tube defects (such as spina bifida, although others may result in death), low birth weight, premature birth, and slow overall growth rate. In children and adults, anemia and other subtle symptoms are prevalent.	slow growth in infants and children, delayed sexual development in adolescents, impotence in men, hair loss, diarrhea, eye and skin sores, loss of appetite, weight loss, problems with wound healing, decreased ability to taste food, lower alertness levels	fatigue, weakness, constipation, loss of appetite, weight loss, numbness and tingling in the hands and feet, difficulty maintaining balance, depression, confusion, dementia, poor memory, soreness of the mouth or tongue, megaloblastic anemia (stops DNA synthesis in red blood cells
Interventions if a person is deficient	take supplements	change diet, take supplements	change diet, take supplements	vitamin B-12 injections, change diet, take supplements
Consequences of over-consumption	some of the same symptoms as iodine deficiency including goiter; thyroid gland inflammation and thyroid cancer; burning of the mouth, throat, and stomach; fever; stomach pain; nausea; vomiting; diarrhea; weak pulse; coma	low risk of toxicity from folic acid intake from supplements and/or fortified foods	nausea, vomiting, loss of appetite, stomach cramps, diarrhea, headaches, low copper levels, lower immunity, low levels of HDL cholesterol	no adverse effects have been associated with excess vitamin B12 intake from food and supplements in healthy individuals
Other information	Nuclear accidents can release radioactive iodine into the environment.	Sufficient dietary folate before and after pregnancy is needed normal development of baby.		Large amounts of folic acid can mask a B-12 deficiency (but not correct neurological damage).

Name: _____

Date: _____ Class:_____

Understanding My Micros

If you need to review what micronutrients are, you can visit http://www.cdc.gov/nutrition/everyone/basics/vitamins/index.html and http://www.webmd.com/vitamins-and-supplements/lifestyle-guide-11/vitamins-minerals-how-much-should-you-take to read more.

1. Explain what micronutrients are and why they are important.

2. What units are used when talking about micronutrient consumption in humans? How big are those units?

3. What is the difference between a *vitamin* and a *mineral*?

4. Why has the United States (US) set Dietary Reference Intakes (DRI & AI) for micronutrients?

5. What is a Tolerable Upper Limit and why has the US set those limits for micronutrients?

6. In your opinion, which of the micronutrients you have learned about could pose the most significant problem if a person is deficient in that micronutrient? Why?

Name: TEACHER ANSWER KEY_____

Date: _____ Class:_____

Understanding My Micros

If you need to review what micronutrients are, you can visit http://www.cdc.gov/nutrition/everyone/basics/vitamins/index.html and http://www.webmd.com/vitamins-and-supplements/lifestyle-guide-11/vitamins-minerals-how-much-should-you-take to read more.

1. Explain what micronutrients are and why they are important.
   Micronutrients are nutrients that our bodies need in much smaller amounts than macronutrients (carbohydrates, fats, proteins). Micronutrients are not sources of energy, but they are involved in the body's metabolism, cell production, tissue repair, and other processes. Vitamins and minerals are both considered micronutrients. The human body cannot produce micronutrients on its own (exception: some Vitamin D from sunlight).

2. What units are used when talking about micronutrient consumption in humans? How big are those units?
   mg = milligram = 10^{-3} g
   mcg = μg = microgram = 10^{-6} g

3. What is the difference between a *vitamin* and a *mineral*?
   Vitamins are organic substances that your body needs. The 13 vitamins that humans need are A, C, D, E, K and the B vitamins (thiamine, riboflavin, niacin, pantothenic acid, biotin, vitamin B-6, vitamin B-12, and folate). Fat-soluble vitamins (A, D, E, and K) require dietary fat intake for absorption and metabolism and are stored in fatty adipose tissue. Excess amount of fat-soluble vitamins are not easily excreted, leading to possible toxicity. Water-soluble vitamins (C and B vitamins) are dissolved easily in water, excreted when consumed in excess amounts, and consistently required as part of one's daily intake.

   Living things cannot make minerals; minerals are elements that originate in the Earth, are absorbed by plants, and passed through the food chain. The minerals we need most include calcium, phosphorus, magnesium, sodium, potassium, chloride, sulfur, iron, manganese, copper, iodine, zinc, cobalt, fluoride, and selenium.

4. Why has the United States (US) set Dietary Reference Intakes (DRI & AI) for micronutrients?
   The US set basic intake guidelines –the RDA (Recommended Dietary Allowance) and the AI (Adequate Intake). These guidelines specify the amount of various vitamins and minerals needed to stay healthy and avoid nutritional deficiencies. The guidelines are specific to women, men, and different age groups.

5. What is a Tolerable Upper Limit and why has the US set those limits for micronutrients?
   Some micronutrients are toxic when over consumed. The US set UL (Tolerable Upper Intake Level) guidelines so people know the maximum amount of daily vitamins and minerals they can safely consume without risking overdose or serious side effects.

6. In your opinion, which of the micronutrients you have learned about could pose the most significant problem if a person is deficient in that micronutrient? Why?
   Student answers will vary. Accept all reasonable and well-developed answers.

Name: _____

Date: _____ Class:_____

Am I Getting All My Micros?

Am I Getting All My Micros? A Personal Micronutrient Analysis

We need the *mighty micronutrients*; we only need them in small amounts, but they are crucial to metabolism and development. Are you getting the micronutrients you need? Or are you getting too much? In this exercise, you will track your food consumption over two days and then analyze your food to determine your intake levels of 6 micronutrients: Vitamin A, Vitamin D, Vitamin B-12, Folate, Iron, Iodine, and Zinc.

First: Track your food consumption for two days

Use the Personal Food Intake Log provided to keep track of your food intake. You will compile a list of everything you consume for 2 days and then determine the micronutrient composition for each item. Try to eat as you usually do; do not consciously change your pattern for better or for worse. Include water as well as any other beverages in your log.

- Record each item you eat or drink and how much you had. Note the serving size, if that information is available on the label. Then record either the number of servings you ate or the amount you ate in teaspoons, cups, grams, number of items, etc.

- If you eat a packaged food with a nutrition label, you can gather this nutritional information directly from the package.

- Complex items, such as a salad can be difficult to record. You should try to separate the salad into the various main components as best you can: lettuce, spinach, celery, carrots, dressing, etc.

- If your food doesn't have a nutritional label, you will have to use an online database to get its micronutrient data. We suggest you use http://www.nal.usda.gov/fnic/cgi-bin/nut_search.pl.

Name: _____

Date: _____ Class:_____

Am I Getting All My Micros?

Second: Calculate your Recommended Daily Intakes

Calculate your Recommended Daily Intakes for the micronutrients. You can do this online (1) or by using the tables your teacher provides (2).

1. Go online to http://fnic.nal.usda.gov/interactiveDRI/, type your information into the online calculator, check the appropriate micronutrients (Vitamin A, Vitamin B-12, Vitamin D, Folate, Iodine, Iron, Zinc) and then press Submit. Your results will appear.

2. Use the US DRI and UL tables to determine your Recommended Intake and Tolerable Upper Levels. Be sure to read the table carefully to find your age.

   Record your data in the chart below.

My Recommended Daily Intakes for Select Micronutrients:

Micronutrient	Recommended Intake/day	Tolerable Upper Level Intake/day	Total Intake on Day 1	Total Intake on Day 2
Vitamin A				
Vitamin B-12				
Vitamin D				
Folate				
Iodine				
Iron				
Zinc				

Name: _____

Date: _____ Class:_____

Am I Getting All My Micros?

Third: Analyze your food consumption and micronutrient intake

If you need to review what micronutrients are and why they are important, you can visit http://www.cdc.gov/nutrition/everyone/basics/vitamins/index.html to read more.

1. In general, what are vitamins and minerals? Why are they important to humans?

2. Analyze your micronutrient intake for each of the vitamins and minerals you tracked. For those two days, did you meet, exceed, or fall short of the US Recommended Daily Intakes for those micronutrients?

3. Which foods in your diet provide a wealth of micronutrients? Which foods provide very few micronutrients?

4. Based upon what you learned about your micronutrient intake, do you need to make any changes to your diet? If so, what types of changes do you need to make?

5. Discuss the validity (representativeness) of your data collection. Is sampling (collecting information) only two days a fair and accurate way to gather data about your micronutrient consumption? Why or why not?

Name: TEACHER ANSWER KEY_____

Date: _____ Class:_____

Am I Getting All My Micros?

The recommended intake levels in the chart to the below are for teens ages 14 – 18. For younger or older students, please consult the US DRI charts.

Females ages 14 – 18, not pregnant or lactating *Males ages 14 -18*

Micronutrient	Recommended Intake per day	Tolerable Upper Level Intake per day	Micronutrient	Recommended Intake per day	Tolerable Upper Level Intake per day
Vitamin A	700 µg / day	2800 µg / day	**Vitamin A**	900 µg / day	2800 µg / day
Vitamin B-12	2.4 µg / day	ND	**Vitamin B-12**	2.4µg / day	ND
Vitamin D	15 µg / day	100 µg / day	**Vitamin D**	15 µg / day	100 µg / day
Folate	400 µg / day	800 µg / day	**Folate**	400 µg / day	800 µg / day
Iodine	150 µg / day	900 µg / day	**Iodine**	150 µg / day	900 µg / day
Iron	11 mg/day	45 mg/day	**Iron**	15 mg/day	45 mg/day
Zinc	9 mg/day	34 mg/day	**Zinc**	11 mg/day	34 mg/day

1. In general, what are vitamins and minerals? Why are they important to humans?
   Vitamins and minerals are both considered micronutrients. Micronutrients are nutrients that our bodies need in much smaller quantities than macronutrients (carbohydrates, fats, proteins) and are substances our bodies cannot produce. Micronutrients are not sources of energy, but they are involved in the body's metabolism, cell production, tissue repair, and other processes. Vitamins are organic compounds; minerals are inorganic elements.

2. Analyze your micronutrient intake for each of the vitamins and minerals you tracked. For those two days, did you meet, exceed, or fall short of the US Recommended Daily Intakes for those micronutrients?
   Student answers will vary. Evaluate answers in terms of students' data.

3. Which foods in your diet provide a wealth of micronutrients? Which foods provide very few micronutrients?
   Student answers will vary. Evaluate answers in terms of students' data.

4. Based upon what you learned about your micronutrient intake, do you need to make any changes to your diet? If so, what types of changes do you need to make?
   Student answers will vary. Evaluate answers in terms of students' data.

5. Discuss the validity (representativeness) of your data collection. Is sampling (collecting data) only two days a fair and accurate way to gather data about your micronutrient consumption? Why or why not?
   Student answers will vary based upon how well their 2-day sampling represents their longer-term diet. Accept all reasonable and well-supported answers.

Name: _____

Date: _____ Class:_____

FOOD FOR 9 BILLION

Personal Intake Analysis Log - Day 1

Meal (M) or Snack (S)	Description	Amount or # of servings	Vitamin A *total*	Vitamin D *total*	Iron *total*	Iodine *total*	Zinc *total*	Folate *total*	Vitamin B-12 *total*
	TOTALS								

Name: _____

Date: _____ Class:_____

FOOD FOR 9 BILLION

Personal Intake Analysis Log - Day 2

Meal (M) or Snack (S)	Description	Amount or # of servings	Vitamin A *total*	Vitamin D *total*	Iron *total*	Iodine *total*	Zinc *total*	Folate *total*	Vitamin B-12 *total*
TOTALS									

Name: _____

Date: _____ Class:_____

Reference DRI

Dietary Reference Intakes (DRIs): Recommended Dietary Allowances and Adequate Intakes, Vitamins
Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Vitamin A (µg/d)[a]	Vitamin C (mg/d)	Vitamin D (µg/d)[b,c]	Vitamin E (mg/d)[d]	Vitamin K (µg/d)	Thiamin (mg/d)	Riboflavin (mg/d)	Niacin (mg/d)[e]	Vitamin B_6 (mg/d)	Folate (µg/d)[f]	Vitamin B_{12} (µg/d)	Pantothenic Acid (mg/d)	Biotin (µg/d)	Choline (mg/d)[g]
Infants														
0 to 6 mo	400*	40*	10	4*	2.0*	0.2*	0.3*	2*	0.1*	65*	0.4*	1.7*	5*	125*
6 to 12 mo	500*	50*	10	5*	2.5*	0.3*	0.4*	4*	0.3*	80*	0.5*	1.8*	6*	150*
Children														
1–3 y	**300**	**15**	**15**	**6**	30*	**0.5**	**0.5**	**6**	**0.5**	**150**	**0.9**	2*	8*	200*
4–8 y	**400**	**25**	**15**	**7**	55*	**0.6**	**0.6**	**8**	**0.6**	**200**	**1.2**	3*	12*	250*
Males														
9–13 y	**600**	**45**	**15**	**11**	60*	**0.9**	**0.9**	**12**	**1.0**	**300**	**1.8**	4*	20*	375*
14–18 y	**900**	**75**	**15**	**15**	75*	**1.2**	**1.3**	**16**	**1.3**	**400**	**2.4**	5*	25*	550*
19–30 y	**900**	**90**	**15**	**15**	120*	**1.2**	**1.3**	**16**	**1.3**	**400**	**2.4**	5*	30*	550*
31–50 y	**900**	**90**	**15**	**15**	120*	**1.2**	**1.3**	**16**	**1.3**	**400**	**2.4**	5*	30*	550*
51–70 y	**900**	**90**	**15**	**15**	120*	**1.2**	**1.3**	**16**	**1.7**	**400**	**2.4**[h]	5*	30*	550*
> 70 y	**900**	**90**	**20**	**15**	120*	**1.2**	**1.3**	**16**	**1.7**	**400**	**2.4**[h]	5*	30*	550*
Females														
9–13 y	**600**	**45**	**15**	**11**	60*	**0.9**	**0.9**	**12**	**1.0**	**300**	**1.8**	4*	20*	375*
14–18 y	**700**	**65**	**15**	**15**	75*	**1.0**	**1.0**	**14**	**1.2**	**400**[i]	**2.4**	5*	25*	400*
19–30 y	**700**	**75**	**15**	**15**	90*	**1.1**	**1.1**	**14**	**1.3**	**400**[i]	**2.4**	5*	30*	425*
31–50 y	**700**	**75**	**15**	**15**	90*	**1.1**	**1.1**	**14**	**1.3**	**400**[i]	**2.4**	5*	30*	425*
51–70 y	**700**	**75**	**15**	**15**	90*	**1.1**	**1.1**	**14**	**1.5**	**400**	**2.4**[h]	5*	30*	425*
> 70 y	**700**	**75**	**20**	**15**	90*	**1.1**	**1.1**	**14**	**1.5**	**400**	**2.4**[h]	5*	30*	425*
Pregnancy														
14–18 y	**750**	**80**	**15**	**15**	75*	**1.4**	**1.4**	**18**	**1.9**	**600**[j]	**2.6**	6*	30*	450*
19–30 y	**770**	**85**	**15**	**15**	90*	**1.4**	**1.4**	**18**	**1.9**	**600**[j]	**2.6**	6*	30*	450*
31–50 y	**770**	**85**	**15**	**15**	90*	**1.4**	**1.4**	**18**	**1.9**	**600**[j]	**2.6**	6*	30*	450*
Lactation														
14–18 y	**1,200**	**115**	**15**	**19**	75*	**1.4**	**1.6**	**17**	**2.0**	**500**	**2.8**	7*	35*	550*
19–30 y	**1,300**	**120**	**15**	**19**	90*	**1.4**	**1.6**	**17**	**2.0**	**500**	**2.8**	7*	35*	550*
31–50 y	**1,300**	**120**	**15**	**19**	90*	**1.4**	**1.6**	**17**	**2.0**	**500**	**2.8**	7*	35*	550*

NOTE: This table (taken from the DRI reports, see www.nap.edu) presents Recommended Dietary Allowances (RDAs) in **bold type** and Adequate Intakes (AIs) in ordinary type followed by an asterisk (*). An RDA is the average daily dietary intake level; sufficient to meet the nutrient requirements of nearly all (97-98 percent) healthy individuals in a group. It is calculated from an Estimated Average Requirement (EAR). If sufficient scientific evidence is not available to establish an EAR, and thus calculate an RDA, an AI is usually developed. For healthy breastfed infants, an AI is the mean intake. The AI for other life stage and gender groups is believed to cover the needs of all healthy individuals in the groups, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.

[a] As retinol activity equivalents (RAEs). 1 RAE = 1 µg retinol, 12 µg β-carotene, 24 µg α-carotene, or 24 µg β-cryptoxanthin. The RAE for dietary provitamin A carotenoids is two-fold greater than retinol equivalents (RE), whereas the RAE for preformed vitamin A is the same as RE.

[b] As cholecalciferol. 1 µg cholecalciferol = 40 IU vitamin D.

[c] Under the assumption of minimal sunlight.

[d] As α-tocopherol. α-Tocopherol includes *RRR*-α-tocopherol, the only form of α-tocopherol that occurs naturally in foods, and the *2R*-stereoisomeric forms of α-tocopherol (*RRR*-, *RSR*-, *RRS*-, and *RSS*-α-tocopherol) that occur in fortified foods and supplements. It does not include the *2S*-stereoisomeric forms of α-tocopherol (*SRR*-, *SSR*-, *SRS*-, and *SSS*-α-tocopherol), also found in fortified foods and supplements.

[e] As niacin equivalents (NE). 1 mg of niacin = 60 mg of tryptophan; 0–6 months = preformed niacin (not NE).

[f] As dietary folate equivalents (DFE). 1 DFE = 1 µg food folate = 0.6 µg of folic acid from fortified food or as a supplement consumed with food = 0.5 µg of a supplement taken on an empty stomach.

[g] Although AIs have been set for choline, there are few data to assess whether a dietary supply of choline is needed at all stages of the life cycle, and it may be that the choline requirement can be met by endogenous synthesis at some of these stages.

[h] Because 10 to 30 percent of older people may malabsorb food-bound B_{12}, it is advisable for those older than 50 years to meet their RDA mainly by consuming foods fortified with B_{12} or a supplement containing B_{12}.

[i] In view of evidence linking folate intake with neural tube defects in the fetus, it is recommended that all women capable of becoming pregnant consume 400 µg from supplements or fortified foods in addition to intake of food folate from a varied diet.

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Reference DRI

Dietary Reference Intakes (DRIs): Recommended Dietary Allowances and Adequate Intakes, Elements
Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Calcium (mg/d)	Chromium (µg/d)	Copper (µg/d)	Fluoride (mg/d)	Iodine (µg/d)	Iron (mg/d)	Magnesium (mg/d)	Manganese (mg/d)	Molybdenum (µg/d)	Phosphorus (mg/d)	Selenium (µg/d)	Zinc (mg/d)	Potassium (g/d)	Sodium (g/d)	Chloride (g/d)
Infants															
0 to 6 mo	200*	0.2*	200*	0.01*	110*	0.27*	30*	0.003*	2*	100*	15*	2*	0.4*	0.12*	0.18*
6 to 12 mo	260*	5.5*	220*	0.5*	130*	**11**	75*	0.6*	3*	275*	20*	**3**	0.7*	0.37*	0.57*
Children															
1–3 y	**700**	11*	**340**	0.7*	**90**	**7**	**80**	1.2*	**17**	**460**	**20**	**3**	3.0*	1.0*	1.5*
4–8 y	**1,000**	15*	**440**	1*	**90**	**10**	**130**	1.5*	**22**	**500**	**30**	**5**	3.8*	1.2*	1.9*
Males															
9–13 y	**1,300**	25*	**700**	2*	**120**	**8**	**240**	1.9*	**34**	**1,250**	**40**	**8**	4.5*	1.5*	2.3*
14–18 y	**1,300**	35*	**890**	3*	**150**	**11**	**410**	2.2*	**43**	**1,250**	**55**	**11**	4.7*	1.5*	2.3*
19–30 y	**1,000**	35*	**900**	4*	**150**	**8**	**400**	2.3*	**45**	**700**	**55**	**11**	4.7*	1.5*	2.3*
31–50 y	**1,000**	35*	**900**	4*	**150**	**8**	**420**	2.3*	**45**	**700**	**55**	**11**	4.7*	1.5*	2.3*
51–70 y	**1,000**	30*	**900**	4*	**150**	**8**	**420**	2.3*	**45**	**700**	**55**	**11**	4.7*	1.3*	2.0*
> 70 y	**1,200**	30*	**900**	4*	**150**	**8**	**420**	2.3*	**45**	**700**	**55**	**11**	4.7*	1.2*	1.8*
Females															
9–13 y	**1,300**	21*	**700**	2*	**120**	**8**	**240**	1.6*	**34**	**1,250**	**40**	**8**	4.5*	1.5*	2.3*
14–18 y	**1,300**	24*	**890**	3*	**150**	**15**	**360**	1.6*	**43**	**1,250**	**55**	**9**	4.7*	1.5*	2.3*
19–30 y	**1,000**	25*	**900**	3*	**150**	**18**	**310**	1.8*	**45**	**700**	**55**	**8**	4.7*	1.5*	2.3*
31–50 y	**1,000**	25*	**900**	3*	**150**	**18**	**320**	1.8*	**45**	**700**	**55**	**8**	4.7*	1.5*	2.3*
51–70 y	**1,200**	20*	**900**	3*	**150**	**8**	**320**	1.8*	**45**	**700**	**55**	**8**	4.7*	1.3*	2.0*
> 70 y	**1,200**	20*	**900**	3*	**150**	**8**	**320**	1.8*	**45**	**700**	**55**	**8**	4.7*	1.2*	1.8*
Pregnancy															
14–18 y	**1,300**	29*	**1,000**	3*	**220**	**27**	**400**	2.0*	**50**	**1,250**	**60**	**12**	4.7*	1.5*	2.3*
19–30 y	**1,000**	30*	**1,000**	3*	**220**	**27**	**350**	2.0*	**50**	**700**	**60**	**11**	4.7*	1.5*	2.3*
31–50 y	**1,000**	30*	**1,000**	3*	**220**	**27**	**360**	2.0*	**50**	**700**	**60**	**11**	4.7*	1.5*	2.3*
Lactation															
14–18 y	**1,300**	44*	**1,300**	3*	**290**	**10**	**360**	2.6*	**50**	**1,250**	**70**	**13**	5.1*	1.5*	2.3*
19–30 y	**1,000**	45*	**1,300**	3*	**290**	**9**	**310**	2.6*	**50**	**700**	**70**	**12**	5.1*	1.5*	2.3*
31–50 y	**1,000**	45*	**1,300**	3*	**290**	**9**	**320**	2.6*	**50**	**700**	**70**	**12**	5.1*	1.5*	2.3*

NOTE: This table (taken from the DRI reports, see www.nap.edu) presents Recommended Dietary Allowances (RDAs) in **bold type** and Adequate Intakes (AIs) in ordinary type followed by an asterisk (*). An RDA is the average daily dietary intake level; sufficient to meet the nutrient requirements of nearly all (97-98 percent) healthy individuals in a group. It is calculated from an Estimated Average Requirement (EAR). If sufficient scientific evidence is not available to establish an EAR, and thus calculate an RDA, an AI is usually developed. For healthy breastfed infants, an AI is the mean intake. The AI for other life stage and gender groups is believed to cover the needs of all healthy individuals in the groups, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.

SOURCES: *Dietary Reference Intakes for Calcium, Phosphorous, Magnesium, Vitamin D, and Fluoride* (1997); *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B_6, Folate, Vitamin B_{12}, Pantothenic Acid, Biotin, and Choline* (1998); *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids* (2000); and *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc* (2001); *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and* Sulfate (2005); and *Dietary Reference Intakes for Calcium and Vitamin D* (2011). These reports may be accessed via www.nap.edu.

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FOOD FOR 9 BILLION

Reference DRI

Dietary Reference Intakes (DRIs): Tolerable Upper Intake Levels, Vitamins
Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Vitamin A (µg/d)[a]	Vitamin C (mg/d)	Vitamin D (µg/d)	Vitamin E (mg/d)[b,c]	Vitamin K	Thiamin	Riboflavin	Niacin (mg/d)[c]	Vitamin B_6 (mg/d)	Folate (µg/d)[c]	Vitamin B_{12}	Pantothenic Acid	Biotin	Choline (g/d)	Carotenoids[d]
Infants															
0 to 6 mo	600	ND[e]	25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6 to 12 mo	600	ND	38	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Children															
1–3 y	600	400	63	200	ND	ND	ND	10	30	300	ND	ND	ND	1.0	ND
4–8 y	900	650	75	300	ND	ND	ND	15	40	400	ND	ND	ND	1.0	ND
Males															
9–13 y	1,700	1,200	100	600	ND	ND	ND	20	60	600	ND	ND	ND	2.0	ND
14–18 y	2,800	1,800	100	800	ND	ND	ND	30	80	800	ND	ND	ND	3.0	ND
19–30 y	3,000	2,000	100	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
31–50 y	3,000	2,000	100	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
51–70 y	3,000	2,000	100	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
> 70 y	3,000	2,000	100	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
Females															
9–13 y	1,700	1,200	100	600	ND	ND	ND	20	60	600	ND	ND	ND	2.0	ND
14–18 y	2,800	1,800	100	800	ND	ND	ND	30	80	800	ND	ND	ND	3.0	ND
19–30 y	3,000	2,000	100	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
31–50 y	3,000	2,000	100	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
51–70 y	3,000	2,000	100	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
> 70 y	3,000	2,000	100	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
Pregnancy															
14–18 y	2,800	1,800	100	800	ND	ND	ND	30	80	800	ND	ND	ND	3.0	ND
19–30 y	3,000	2,000	100	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
31–50 y	3,000	2,000	100	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
Lactation															
14–18 y	2,800	1,800	100	800	ND	ND	ND	30	80	800	ND	ND	ND	3.0	ND
19–30 y	3,000	2,000	100	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
31–50 y	3,000	2,000	100	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND

NOTE: A Tolerable Upper Intake Level (UL) is the highest level of daily nutrient intake that is likely to pose no risk of adverse health effects to almost all individuals in the general population. Unless otherwise specified, the UL represents total intake from food, water, and supplements. Due to a lack of suitable data, ULs could not be established for vitamin K, thiamin, riboflavin, vitamin B_{12}, pantothenic acid, biotin, and carotenoids. In the absence of a UL, extra caution may be warranted in consuming levels above recommended intakes. Members of the general population should be advised not to routinely exceed the UL. The UL is not meant to apply to individuals who are treated with the nutrient under medical supervision or to individuals with predisposing conditions that modify their sensitivity to the nutrient.

[a] As preformed vitamin A only.

[b] As α-tocopherol; applies to any form of supplemental α-tocopherol.

[c] The ULs for vitamin E, niacin, and folate apply to synthetic forms obtained from supplements, fortified foods, or a combination of the two.

[d] β-Carotene supplements are advised only to serve as a provitamin A source for individuals at risk of vitamin A deficiency.

[e] ND = Not determinable due to lack of data of adverse effects in this age group and concern with regard to lack of ability to handle excess amounts. Source of intake should be from food only to prevent high levels of intake.

SOURCES: *Dietary Reference Intakes for Calcium, Phosphorous, Magnesium, Vitamin D, and Fluoride* (1997); *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B_6, Folate, Vitamin B_{12}, Pantothenic Acid, Biotin, and Choline* (1998); *Dietary Reference Intakes for Vitamin C, Vitamine E, Selenium, and Carotenoids* (2000); *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic,*

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Reference DRI

Dietary Reference Intakes (DRIs): Tolerable Upper Intake Levels, Elements
Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Arsenic[a]	Boron (mg/d)	Calcium (mg/d)	Chromium	Copper (µg/d)	Fluoride (mg/d)	Iodine (µg/d)	Iron (mg/d)	Magnesium (mg/d)[b]	Manganese (mg/d)	Molybdenum (µg/d)	Nickel (mg/d)	Phosphorus (g/d)	Selenium (µg/d)	Silicon[c]	Vanadium (mg/d)[d]	Zinc (mg/d)	Sodium (g/d)	Chloride (g/d)
Infants																			
0 to 6 mo	ND[e]	ND	1,000	ND	ND	0.7	ND	40	ND	ND	ND	ND	ND	45	ND	ND	4	ND	ND
6 to 12 mo	ND	ND	1,500	ND	ND	0.9	ND	40	ND	ND	ND	ND	ND	60	ND	ND	5	ND	ND
Children																			
1–3 y	ND	3	2,500	ND	1,000	1.3	200	40	65	2	300	0.2	3	90	ND	ND	7	1.5	2.3
4–8 y	ND	6	2,500	ND	3,000	2.2	300	40	110	3	600	0.3	3	150	ND	ND	12	1.9	2.9
Males																			
9–13 y	ND	11	3,000	ND	5,000	10	600	40	350	6	1,100	0.6	4	280	ND	ND	23	2.2	3.4
14–18 y	ND	17	3,000	ND	8,000	10	900	45	350	9	1,700	1.0	4	400	ND	ND	34	2.3	3.6
19–30 y	ND	20	2,500	ND	10,000	10	1,100	45	350	11	2,000	1.0	4	400	ND	1.8	40	2.3	3.6
31–50 y	ND	20	2,500	ND	10,000	10	1,100	45	350	11	2,000	1.0	4	400	ND	1.8	40	2.3	3.6
51–70 y	ND	20	2,000	ND	10,000	10	1,100	45	350	11	2,000	1.0	4	400	ND	1.8	40	2.3	3.6
> 70 y	ND	20	2,000	ND	10,000	10	1,100	45	350	11	2,000	1.0	3	400	ND	1.8	40	2.3	3.6
Females																			
9–13 y	ND	11	3,000	ND	5,000	10	600	40	350	6	1,100	0.6	4	280	ND	ND	23	2.2	3.4
14–18 y	ND	17	3,000	ND	8,000	10	900	45	350	9	1,700	1.0	4	400	ND	ND	34	2.3	3.6
19–30 y	ND	20	2,500	ND	10,000	10	1,100	45	350	11	2,000	1.0	4	400	ND	1.8	40	2.3	3.6
31–50 y	ND	20	2,500	ND	10,000	10	1,100	45	350	11	2,000	1.0	4	400	ND	1.8	40	2.3	3.6
51–70 y	ND	20	2,000	ND	10,000	10	1,100	45	350	11	2,000	1.0	4	400	ND	1.8	40	2.3	3.6
> 70 y	ND	20	2,000	ND	10,000	10	1,100	45	350	11	2,000	1.0	3	400	ND	1.8	40	2.3	3.6
Pregnancy																			
14–18 y	ND	17	3,000	ND	8,000	10	900	45	350	9	1,700	1.0	3.5	400	ND	ND	34	2.3	3.6
19–30 y	ND	20	2,500	ND	10,000	10	1,100	45	350	11	2,000	1.0	3.5	400	ND	ND	40	2.3	3.6
61–50 y	ND	20	2,500	ND	10,000	10	1,100	45	350	11	2,000	1.0	3.5	400	ND	ND	40	2.3	3.6
Lactation																			
14–18 y	ND	17	3,000	ND	8,000	10	900	45	350	9	1,700	1.0	4	400	ND	ND	34	2.3	3.6
19–30 y	ND	20	2,500	ND	10,000	10	1,100	45	350	11	2,000	1.0	4	400	ND	ND	40	2.3	3.6
31–50 y	ND	20	2,500	ND	10,000	10	1,100	45	350	11	2,000	1.0	4	400	ND	ND	40	2.3	3.6

NOTE: A Tolerable Upper Intake Level (UL) is the highest level of daily nutrient intake that is likely to pose no risk of adverse health effects to almost all individuals in the general population. Unless otherwise specified, the UL represents total intake from food, water, and supplements. Due to a lack of suitable data, ULs could not be established for vitamin K, thiamin, riboflavin, vitamin B_{12}, pantothenic acid, biotin, and carotenoids. In the absence of a UL, extra caution may be warranted in consuming levels above recommended intakes. Members of the general population should be advised not to routinely exceed the UL. The UL is not meant to apply to individuals who are treated with the nutrient under medical supervision or to individuals with predisposing conditions that modify their sensitivity to the nutrient.

[a] Although the UL was not determined for arsenic, there is no justification for adding arsenic to food or supplements.

[b] The ULs for magnesium represent intake from a pharmacological agent only and do not include intake from food and water.

[c] Although silicon has not been shown to cause adverse effects in humans, there is no justification for adding silicon to supplements.

[d] Although vanadium in food has not been shown to cause adverse effects in humans, there is no justification for adding vanadium to food and vanadium supplements should be used with caution. The UL is based on adverse effects in laboratory animals and this data could be used to set a UL for adults but not children and adolescents.

[e] ND = Not determinable due to lack of data of adverse effects in this age group and concern with regard to lack of ability to handle excess amounts. Source of intake should be from food only to prevent high levels of intake.

SOURCES: *Dietary Reference Intakes for Calcium, Phosphorous, Magnesium, Vitamin D, and Fluoride* (1997); *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B_6, Folate, Vitamin B_{12}, Pantothenic Acid, Biotin, and Choline* (1998); *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids* (2000); *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc* (2001); *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate* (2005); and *Dietary Reference Intakes for Calcium and Vitamin D* (2011). These reports may be accessed via www.nap.edu.