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HOW MUCH IS TOO MUCH? : APPENDIX B: VITAMIN AND MINERAL DEFICIENCIES IN THE U.S.

Some American adults get too little vitamin D, vitamin E, magnesium, calcium, vitamin A and vitamin C (Table B1). More than 40 percent of adults have dietary intakes of vitamin A, C, D and E, calcium and magnesium below the average requirement for their age and gender.

Inadequate intake of vitamins and minerals is most common among 14-to-18-year-old teenagers. Adolescent girls have lower nutrient intake than boys (Berner 2014; Fulgoni 2011). But nutrient deficiencies are rare among younger American children; the exceptions are dietary vitamin D and E, for which intake is low for all Americans, and calcium. Approximately one-fifth of 2-to-8-year-old children don't get enough calcium in their diets, compared to a half of adults and four-fifths of 14-to-18-year-old girls.

Table B1: Ranking of vitamins and minerals according to the degree of dietary inadequacy among adults. Nutrients from food alone include those that are naturally occurring; those used for mandatory enrichment of certain products, such as enriched flour and grain products; and those used for voluntary fortification.

Nutrient from food alone, ranked by the occurrence of dietary inadequacy among adults	Percentage of dietary intakes below the estimated average requirement for a specific population*			Naturally occurring sources of nutrient**
	2-to-8-year-old children	14-to-18-year-old girls	Adults 19 and older	
Vitamin D	81%	98%	95%	Fatty fish, mushrooms [<i>vitamin D is naturally formed in the body when skin is exposed to sunlight; vitamin D is added to fortified milk</i>]
Vitamin E	65%	99%	94%	Nuts, seeds, vegetable oils, green leafy vegetables
Magnesium	2%	90%	61%	Whole grains, wheat bran and wheat germ, green leafy vegetables, legumes, nuts, seeds
Vitamin A	6%	57%	51%	Preformed vitamin A: liver, fatty fish, milk, eggs; provitamin A

				carotenoids: carrots, pumpkins, tomatoes, leafy green vegetables
Calcium	23%	81%	49%	Milk, yogurt, cheese, kale, broccoli
Vitamin C	2%	45%	43%	All fruits and vegetables, particularly citrus fruits and tomatoes
Vitamin B6	0.1%	18%	15%	Many foods; highest levels in fish, beef, poultry, potatoes and other starchy vegetables, and fruit other than citrus
Folate	0.2%	19%	13%	Many foods; highest levels in spinach, liver, asparagus, Brussels sprouts [<i>mandatory, standardized addition to enriched flour and flour products</i>]
Zinc	0.2%	24%	12%	Red meat, poultry, beans, nuts, some seafood, whole grains
Iron	0.7%	12%	8%	Highest amounts in meat and seafood; lower levels in nuts and beans [<i>mandatory, standardized addition to enriched flour and flour products</i>]
Thiamin	0.1%	10%	7%	Whole grain products [<i>mandatory, standardized addition to enriched flour and flour products</i>]
Copper	0%	16%	5%	Shellfish, whole grains, beans, nuts, potatoes, organ meats (kidneys, liver)
Vitamin B12	0%	7%	4%	Animal products: fish, meat, poultry, eggs, milk
Riboflavin	0%	5%	2%	Milk and dairy products, eggs, meat, green leafy vegetables,

				legumes [<i>mandatory, standardized addition to enriched flour and flour products</i>]
Niacin	0.1%	4%	2%	Meat, fish, seeds and nuts, whole grains [<i>mandatory, standardized addition to enriched flour and flour products</i>]
Selenium	0%	2%	1%	Found in different plant and animal foods; highest levels in seafood and organ meats (kidneys, liver)

* Dietary intake information originally derived from the National Health and Nutrition Examination Survey (NHANES). For children and adolescents, data from Berner 2014. For adults, data from Fulgoni 2011. All percentages greater than 1 were rounded to a whole number. Phosphorus data were excluded. According to Fulgoni 2011, 17 percent of 2-to-18-year-old children and adolescents and 2 percent of adults have phosphorus deficiency. There are many hidden sources of phosphorus in American diet, such as food additives in processed food (Uribari and Calvo 2003). Berner 2014 and Fulgoni 2011 did not account for this hidden phosphorus because, according to a publication from the FDA Center for Food Safety and Applied Nutrition, nutrient content databases and software programs currently used in large population studies do not consider these additional sources (Calvo and Uribarri 2013).

** Information on the dietary sources of vitamins and minerals from the website of the National Institutes of Health Office of Dietary Supplements <http://ods.od.nih.gov/factsheets/list-all/>