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Iron, Zinc, Copper, Manganese, Selenium, and Iodine in Foods from the United States Total Diet Study

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Data on the concentrations of iron, zinc, copper, manganese, selenium, and iodine in the 234 foods of the United States Total Diet Study from 1982 to 1989 were summarized per 100 g and per typical serving portion. Foods highest in these elements per serving were ready-to-eat cereals, mixed dishes, and meats for iron; meat, mixed dishes, and ready-to-eat cereals for zinc; meat, nuts, mixed dishes, and beans/peas for copper; ready-to-eat cereals, nuts, and beans/peas for manganese; fish, meat, poultry, and mixed dishes for selenium; and ready-to-eat cereals, dairy desserts, mixed dishes, fish, and dairy products for iodine. Coefficients of variation for the microelements in the top 20 food sources per serving averaged 28% for iron, 20% for zinc, 26% for copper, 25% for manganese, 32% for selenium, and 104% for iodine. In addition to genetic, environmental, processing, and analytic variables, causes for variability of these microelements in foods most likely include inconsistent and varying levels of fortification with microelements and food additives containing microelements.

INTRODUCTION

The objectives and organizational plan of the Total Diet Study have been described in a preceding paper which presents the levels of the macroelements sodium, potassium, calcium, phosphorus, and magnesium in Total Diet Study foods (Pennington and Young, 1990). This paper presents information on the concentration and variation of the microelements iron, zinc, copper, manganese, selenium, and iodine in the 234 Total Diet Study foods from 1982 to 1989.

METHODS AND MATERIALS

The collection and preparation of the foods and preparation of composites for analysis have been previously discussed (Pennington and Young, 1990). Salt added to foods according to recipe or package instructions was not iodized. Discretionary salt was not included. Iron, zinc, copper, and manganese were determined by inductively coupled plasma atomic emission spectrometry (Marts and Meloan, 1982); selenium was determined by atomic absorption spectrometry with rapid hydride evolution (Fiorino *et al.*, 1980); and iodine was determined by a colorimetric method (Luchtefeld, 1974). The 234 test portions of food were analyzed in series with 15–30 portions per series. For each element being determined, the series analysis included two reagent blanks, duplicate analysis of at least one test portion, at least one spiked recovery analysis, and at least one standard reference material (SRM) from the National Institute of Standards and Technology (NIST).

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TABLE 1

LIMITS OF QUANTITATION (L_q) FOR IRON, ZINC, COPPER, MANGANESE, SELENIUM, AND IODINE IN TOTAL DIET STUDY FOODS

Element	L_q (mg/100 g)
Fe	0.010
Zn	0.010
Cu	0.005
Mn	0.002
Se	0.005
I	0.002

The limits of quantitation for the analytical methodology for the six microelements (Table 1) were based on repetitive analyses of blank solutions (Keith *et al.*, 1983). Values below the limits of quantitation were reported as zeros. Values for iron and zinc were carried to two decimal places; values for copper, manganese, selenium, and iodine were carried to three decimal places.

TABLE 2

QUALITY CONTROL EVALUATION OF TOTAL DIET STUDY DATA

	Spiked	SRM[a]
	percent recovery ± SD (n)	percent recovery ± SD (n)
Fe	100.9 ± 7.6 (456)	97.8 ± 8.1 (226)
Zn	105.6 ± 8.9 (456)	95.5 ± 5.7 (226)
Cu	103.3 ± 8.7 (456)	99.3 ± 7.2 (226)
Mn	104.3 ± 9.3 (456)	99.5 ± 7.2 (226)
Se	96.3 ± 9.2 (491)	80.8 ± 10.1 (245)
I	85.2 ±14.0 (668)	83.2 ± 17.8 (244)

[a] NIST oyster tissue was used as the Standard Reference Material for iron, zinc, copper, manganese, and iodine. NIST rice flour was used as the Standard Reference Material for selenium.

TABLE 3

IRON, ZINC, COPPER, MANGANESE, SELENIUM, AND IODINE CONTENT OF TOTAL DIET STUDY FOODS IN mg PER 100 g[a]

Food	Water[b] (%)	Iron Median	Iron Mean±sd(n)	Zinc Median	Zinc Mean±sd(n)	Copper Median	Copper Mean±sd(n)	Manganese Median	Manganese Mean±sd(n)	Selenium Median	Selenium Mean±sd(n)	Iodine Median	Iodine Mean±sd(n)
Vegetables, leafy													
Spinach, fresh/ frozen, boiled	93.3	3.44	4.99± 3.83(28)	0.43	0.45±0.16(28)	0.073	0.078± 0.026(28)	0.449	0.522±0.227(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Spinach, canned	96.7	1.67	1.68± 0.37(28)	0.39	0.41±0.11(28)	0.074	0.074± 0.017(28)	0.685	0.688±0.178(28)	0.000	0.000±0.002(28)	0.005	0.005± 0.005(28)
Collards, fresh/ frozen, boiled	93.0	1.12	1.19± 0.42(28)	0.24	0.24±0.08(28)	0.037	0.039± 0.013(28)	0.446	0.503±0.328(28)	0.000	0.000±0.001(28)	0.000	0.001± 0.002(28)
Lettuce, crisp-head, raw	96.9	0.31	0.36± 0.17(28)	0.17	0.16±0.05(28)	0.023	0.027± 0.015(28)	0.130	0.134±0.039(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Cabbage, fresh, boiled	95.9	0.16	0.17± 0.05(28)	0.09	0.09±0.03(28)	0.010	0.012± 0.008(28)	0.101	0.117±0.063(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Coleslaw w/ dressing, homemade	74.5	0.39	0.40± 0.08(28)	0.18	0.18±0.06(28)	0.020	0.019± 0.011(28)	0.145	0.160±0.067(28)	0.000	0.000±0.000(28)	0.002	0.005± 0.008(28)
Sauerkraut, canned	92.9	0.60	1.14± 1.17(28)	0.14	0.24±0.22(28)	0.020	0.021± 0.013(28)	0.124	0.122±0.031(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Vegetables, stem/flower													
Broccoli, fresh/ frozen, boiled	93.1	0.49	0.53± 0.16(28)	0.25	0.25±0.08(28)	0.033	0.033± 0.012(28)	0.211	0.207±0.050(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Cauliflower, fresh/frozen, boiled	93.4	0.31	0.32± 0.07(28)	0.17	0.17±0.03(28)	0.018	0.018± 0.009(28)	0.127	0.132±0.024(28)	0.000	0.000±0.001(28)	0.000	0.001± 0.001(28)
Asparagus, fresh/frozen, boiled	92.6	0.60	0.71± 0.31(28)	0.42	0.41±0.08(28)	0.113	0.112± 0.021(28)	0.148	0.150±0.029(28)	0.000	0.001±0.004(28)	0.000	0.000± 0.001(28)
Celery, raw	95.4	0.15	0.18± 0.10(28)	0.11	0.14±0.12(27)	0.025	0.035± 0.037(28)	0.096	0.101±0.042(28)	0.000	0.000±0.001(28)	0.000	0.001± 0.002(28)
Vegetables, beans/peas													
Pinto beans, boiled	70.1	2.21	2.21± 0.45(28)	1.02	1.03±0.13(28)	0.247	0.253± 0.049(27)	0.540	0.533±0.068(28)	0.007	0.006±0.004(28)	0.004	0.019± 0.041(28)
Cowpeas (black-eyed peas), boiled	70.5	2.16	2.14± 0.31(28)	1.43	1.43±0.20(28)	0.264	0.271± 0.040(27)	0.510	0.513±0.078(28)	0.000	0.001±0.002(28)	0.006	0.033± 0.071(28)
Navy beans, boiled	76.0	2.38	2.45± 0.41(28)	1.00	1.02±0.15(28)	0.263	0.259± 0.052(27)	0.660	0.663±0.111(28)	0.000	0.002±0.004(28)	0.005	0.035± 0.068(28)
Red beans, boiled	71.6	2.19	2.19± 0.36(28)	1.01	1.00±0.13(28)	0.244	0.244± 0.038(27)	0.525	0.515±0.084(28)	0.000	0.000±0.001(28)	0.005	0.027± 0.048(28)
Pork and beans, canned	73.8	1.58	1.62± 0.18(28)	1.43	1.49±0.46(28)	0.188	0.191± 0.024(27)	0.364	0.376±0.049(28)	0.000	0.002±0.003(28)	0.003	0.006± 0.008(28)
Lima beans, immature, frozen, boiled	71.2	1.79	1.79± 0.35(28)	0.73	0.75±0.22(28)	0.167	0.162± 0.030(27)	0.620	0.641±0.120(28)	0.000	0.000±0.000(28)	0.006	0.038± 0.085(28)
Lima beans, mature, boiled	75.2	1.59	1.64± 0.29(28)	0.88	0.88±0.12(28)	0.193	0.202± 0.039(27)	0.475	0.499±0.094(28)	0.000	0.002±0.005(28)	0.002	0.012± 0.023(28)
Green peas, frozen, boiled	62.5	1.45	1.47± 0.27(28)	0.64	0.65±0.16(28)	0.101	0.100± 0.021(27)	0.272	0.274±0.062(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.007(28)
Green peas, canned	82.7	1.22	1.30± 0.33(28)	0.71	0.74±0.13(28)	0.100	0.102± 0.038(27)	0.219	0.223±0.031(28)	0.000	0.000±0.001(28)	0.000	0.004± 0.014(28)
Vegetables, root/tuber													
Carrot, raw	90.1	0.27	0.28± 0.07(28)	0.25	0.25±0.05(28)	0.049	0.052± 0.019(28)	0.144	0.154±0.061(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Beets, canned	91.9	0.62	0.74± 0.33(28)	0.31	0.34±0.10(28)	0.043	0.044± 0.011(28)	0.422	0.433±0.113(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Radishes, raw	95.8	0.22	0.29± 0.20(28)	0.18	0.18±0.07(28)	0.017	0.014± 0.008(28)	0.041	0.046±0.016(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Onion, raw	90.3	0.21	0.22± 0.07(28)	0.17	0.18±0.05(28)	0.041	0.041± 0.015(28)	0.150	0.151±0.044(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.004(28)
Onion rings, breaded, fried, frozen, heated	44.6	0.96	0.96± 0.21(28)	0.43	0.43±0.07(28)	0.080	0.086± 0.027(28)	0.340	0.346±0.063(28)	0.000	0.002±0.003(28)	0.018	0.033± 0.055(28)
Sweetpotato w/ peel, baked	76.4	0.82	0.80± 0.21(28)	0.31	0.31±0.09(28)	0.184	0.178± 0.070(28)	0.482	0.581±0.319(28)	0.000	0.000±0.000(28)	0.002	0.003± 0.003(28)
Sweetpotato, candied, homemade	60.6	1.00	1.01± 0.33(28)	0.27	0.26±0.06(28)	0.136	0.146± 0.039(27)	0.296	0.359±0.187(28)	0.000	0.000±0.000(28)	0.008	0.017± 0.024(28)
Potato w/ peel, baked	77.4	1.24	1.48± 0.68(28)	0.36	0.35±0.08(28)	0.099	0.105± 0.044(27)	0.229	0.234±0.059(28)	0.000	0.000±0.000(28)	0.008	0.036± 0.066(28)
Potato w/o peel, boiled	81.1	0.33	0.35± 0.11(28)	0.21	0.22±0.08(28)	0.068	0.069± 0.030(28)	0.121	0.127±0.032(28)	0.000	0.000±0.000(28)	0.001	0.007± 0.023(28)
Potatoes, mashed, from instant	79.6	0.32	0.33± 0.09(28)	0.22	0.22±0.04(28)	0.048	0.051± 0.017(28)	0.073	0.075±0.016(28)	0.000	0.000±0.000(28)	0.032	0.064± 0.100(28)
French fries, frozen, heated	65.4	0.76	0.77± 0.14(28)	0.39	0.40±0.08(28)	0.154	0.154± 0.059(28)	0.222	0.225±0.051(28)	0.000	0.000±0.000(28)	0.006	0.024± 0.040(28)
Potatoes, scalloped, homemade	76.6	0.34	0.38± 0.12(28)	0.33	0.34±0.07(28)	0.050	0.055± 0.028(27)	0.109	0.116±0.026(28)	0.000	0.000±0.000(28)	0.012	0.022± 0.020(28)
Potato chips	1.0	1.55	1.62± 0.37(28)	1.10	1.11±0.22(28)	0.344	0.345± 0.080(27)	0.425	0.457±0.134(28)	0.000	0.004±0.005(28)	0.003	0.006± 0.010(28)
Vegetables, other													
Tomato, raw	94.9	0.22	0.23± 0.06(28)	0.12	0.13±0.03(28)	0.054	0.058± 0.016(28)	0.100	0.101±0.020(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.006(28)
Tomatoes, canned	95.2	0.54	0.62± 0.33(28)	0.14	0.14±0.04(28)	0.070	0.070± 0.018(28)	0.075	0.075±0.017(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.003(28)
Tomato juice, canned/bottled	94.5	0.39	0.46± 0.22(28)	0.14	0.15±0.04(28)	0.066	0.064± 0.013(28)	0.072	0.071±0.009(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Tomato sauce, canned/bottled	91.8	0.64	0.99± 1.01(28)	0.19	0.18±0.03(28)	0.099	0.112± 0.036(28)	0.099	0.101±0.017(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Snap green beans, fresh/ frozen, boiled	90.2	0.61	0.65± 0.15(28)	0.23	0.25±0.06(28)	0.050	0.057± 0.024(28)	0.277	0.285±0.086(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Snap green beans, canned	94.4	1.06	1.11± 0.41(28)	0.24	0.27±0.09(28)	0.038	0.038± 0.016(28)	0.188	0.206±0.066(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.005(28)

TABLE 3—*Continued*

Food	Water[b] (%)	Iron		Zinc		Copper		Manganese		Selenium		Iodine	
		Median	Mean±sd(n)	Median	Mean±sd(n)	Median	Mean±sd(n)	Median	Mean±sd(n)	Median	Mean±sd(n)	Median	Mean±sd(n)
Green, sweet pepper, raw	95.2	0.32	0.34± 0.08(28)	0.13	0.14±0.05(28)	0.069	0.074± 0.028(28)	0.120	0.126±0.050(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Summer squash, fresh/frozen, boiled	87.8	0.34	0.37± 0.15(28)	0.21	0.22±0.06(28)	0.055	0.062± 0.022(28)	0.156	0.156±0.040(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Winter squash, hubbard/acorn, fresh/frozen, boiled	88.7	0.30	0.31± 0.12(28)	0.23	0.26±0.11(28)	0.046	0.050± 0.020(28)	0.163	0.167±0.075(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Cucumber, pared, raw	97.0	0.17	0.17± 0.05(28)	0.12	0.13±0.03(28)	0.030	0.032± 0.012(28)	0.079	0.086±0.026(28)	0.000	0.000±0.000(28)	0.000	0.005± 0.023(28)
Pickle, dill	93.9	0.37	0.39± 0.14(28)	0.09	0.11±0.06(28)	0.037	0.035± 0.012(27)	0.044	0.048±0.022(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.007(28)
Avocado, raw	77.5	0.50	0.49± 0.19(28)	0.65	0.67±0.23(28)	0.228	0.232± 0.074(28)	0.163	0.160±0.059(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.004(28)
Corn, fresh/ frozen, boiled	71.9	0.46	0.44± 0.09(28)	0.60	0.61±0.17(28)	0.045	0.047± 0.016(27)	0.157	0.158±0.046(28)	0.000	0.000±0.000(28)	0.002	0.007± 0.017(28)
Corn, canned	77.3	0.36	0.37± 0.11(28)	0.39	0.41±0.07(28)	0.030	0.029± 0.011(27)	0.081	0.085±0.023(28)	0.000	0.000±0.000(28)	0.004	0.009± 0.010(28)
Cream style corn, canned	81.1	0.32	0.33± 0.11(28)	0.52	0.58±0.19(28)	0.027	0.023± 0.010(27)	0.069	0.071±0.016(28)	0.000	0.000±0.001(28)	0.002	0.013± 0.033(28)
Mixed vegetables, canned	93.0	0.65	0.77± 0.31(28)	0.33	0.35±0.10(28)	0.041	0.042± 0.012(28)	0.116	0.120±0.022(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.003(28)
Mushrooms, canned	91.8	0.77	0.89± 0.52(28)	0.68	0.69±0.17(28)	0.236	0.249± 0.058(28)	0.047	0.056±0.040(28)	0.000	0.001±0.002(28)	0.000	0.005± 0.018(28)
Fruit, fruit juices													
Apple, red, raw	85.1	0.12	0.14± 0.09(28)	0.02	0.02±0.02(28)	0.029	0.029± 0.011(28)	0.035	0.034±0.007(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Applesauce, sweetened, canned	81.1	0.36	0.60± 0.98(28)	0.01	0.02±0.02(28)	0.029	0.028± 0.007(28)	0.020	0.023±0.007(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Apple juice, canned/bottled	89.5	0.38	0.44± 0.26(28)	0.04	0.04±0.02(28)	0.010	0.011± 0.006(28)	0.131	0.161±0.106(28)	0.000	0.000±0.000(28)	0.002	0.003± 0.005(28)
Banana, raw	74.1	0.28	0.31± 0.08(28)	0.17	0.18±0.05(28)	0.121	0.124± 0.032(28)	0.258	0.255±0.116(28)	0.000	0.000±0.001(28)	0.000	0.002± 0.009(28)
Pear, raw	84.0	0.13	0.14± 0.05(28)	0.10	0.11±0.05(28)	0.082	0.086± 0.018(28)	0.067	0.068±0.019(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Pear in heavy syrup, canned	83.8	0.36	0.39± 0.20(28)	0.05	0.07±0.09(28)	0.039	0.040± 0.009(28)	0.027	0.025±0.006(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.003(28)
Fruit cocktail in heavy syrup, canned	81.9	0.31	0.36± 0.21(28)	0.06	0.05±0.02(28)	0.059	0.061± 0.017(28)	0.095	0.100±0.031(28)	0.000	0.000±0.000(28)	0.035	0.035± 0.013(28)
Orange, navel/ valencia, raw	88.1	0.15	0.14± 0.07(28)	0.05	0.06±0.03(28)	0.044	0.043± 0.010(28)	0.029	0.030±0.008(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.003(28)
Orange juice, frozen, reconstituted	89.2	0.10	0.10± 0.04(28)	0.03	0.03±0.02(28)	0.029	0.028± 0.010(28)	0.026	0.026±0.008(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Grapefruit, raw	89.9	0.10	0.11± 0.09(28)	0.05	0.05±0.03(28)	0.034	0.033± 0.010(28)	0.020	0.021±0.009(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Grapefruit juice, frozen, reconstituted	91.5	0.11	0.15± 0.09(28)	0.04	0.04±0.02(28)	0.029	0.029± 0.009(28)	0.017	0.018±0.005(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Pineapple in juice, canned	85.5	0.23	0.24± 0.09(28)	0.08	0.08±0.03(28)	0.049	0.053± 0.011(28)	1.070	1.026±0.302(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Pineapple juice, canned/bottled	86.8	0.23	0.23± 0.07(28)	0.08	0.08±0.02(28)	0.034	0.035± 0.015(28)	1.145	1.146±0.314(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.002(28)
Grapes, purple/ green, raw	83.1	0.34	0.38± 0.18(28)	0.05	0.05±0.04(28)	0.097	0.124± 0.078(28)	0.061	0.071±0.035(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Grape juice, canned/bottled	85.8	0.17	0.19± 0.14(28)	0.07	0.07±0.02(28)	0.012	0.012± 0.007(28)	0.318	0.305±0.141(28)	0.000	0.000±0.002(28)	0.000	0.001± 0.002(28)
Peach, raw	89.4	0.24	0.29± 0.14(28)	0.14	0.14±0.05(28)	0.064	0.065± 0.018(28)	0.059	0.061±0.011(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.003(28)
Peach in heavy syrup, canned	84.6	0.27	0.34± 0.25(28)	0.06	0.05±0.02(28)	0.033	0.034± 0.011(28)	0.029	0.028±0.005(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.003(28)
Plums, purple, raw	88.7	0.18	0.19± 0.06(28)	0.09	0.09±0.03(28)	0.049	0.052± 0.018(28)	0.061	0.062±0.014(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Strawberries, raw	91.5	0.55	0.56± 0.22(28)	0.13	0.16±0.11(28)	0.041	0.046± 0.023(28)	0.466	0.485±0.215(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.009(28)
Sweet cherries, raw	80.8	0.33	0.35± 0.11(28)	0.08	0.09±0.07(28)	0.091	0.093± 0.027(28)	0.076	0.084±0.038(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Cantaloupe, raw	91.4	0.20	0.20± 0.06(28)	0.18	0.18±0.05(28)	0.045	0.044± 0.014(28)	0.045	0.043±0.012(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.006(28)
Watermelon, raw	93.2	0.19	0.20± 0.04(28)	0.07	0.07±0.03(28)	0.030	0.027± 0.009(28)	0.028	0.032±0.019(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Raisins, dried	8.3	1.91	1.96± 0.36(28)	0.21	0.21±0.05(28)	0.313	0.319± 0.040(28)	0.330	0.325±0.041(28)	0.000	0.000±0.000(28)	0.003	0.003± 0.004(28)
Prunes, dried	23.4	1.00	1.06± 0.35(28)	0.45	0.47±0.13(28)	0.297	0.292± 0.063(28)	0.273	0.279±0.045(28)	0.000	0.000±0.000(28)	0.003	0.040± 0.097(28)
Prune juice, bottled	88.2	0.60	0.62± 0.18(28)	0.14	0.20±0.16(28)	0.020	0.020± 0.006(28)	0.178	0.201±0.125(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.005(28)
Grain products, cooked grains													
White rice, enriched, cooked	77.2	1.28	1.31± 0.38(28)	0.56	0.58±0.15(28)	0.079	0.072± 0.025(27)	0.520	0.520±0.128(28)	0.007	0.007±0.004(28)	0.015	0.064± 0.111(28)
Oatmeal, cooked	87.3	0.85	0.95± 0.47(28)	0.66	0.67±0.13(28)	0.082	0.085± 0.020(27)	0.805	0.838±0.138(28)	0.008	0.007±0.004(28)	0.001	0.010± 0.018(28)
Farina, enriched, cooked	88.4	4.69	4.21± 1.77(28)	0.14	0.15±0.06(28)	0.024	0.026± 0.012(27)	0.134	0.138±0.054(28)	0.005	0.005±0.005(28)	0.000	0.008± 0.019(28)
Corn grits (hominy grits), enriched, cooked	84.9	0.88	1.07± 0.72(28)	0.12	0.14±0.06(28)	0.012	0.014± 0.013(27)	0.031	0.036±0.018(28)	0.000	0.001±0.002(28)	0.009	0.034± 0.051(28)
Popcorn, popped in oil	2.4	2.50	2.70± 0.65(28)	2.67	2.77±0.80(28)	0.198	0.202± 0.063(27)	0.858	0.903±0.202(28)	0.005	0.006±0.007(28)	0.004	0.028± 0.056(28)

The data were evaluated for outliers by means of the Grubbs extreme deviation test (Grubbs, 1969). Mean and median concentrations of the six elements in the 234 foods were then determined per 100 g and per typical serving portion. The concentrations of the elements by food groups were also determined. Coefficients of variation (CVs) were determined for the individual foods highest in each element.

TABLE 3—*Continued*

Food	Water[b] (%)	Iron Median	Iron Mean±sd(n)	Zinc Median	Zinc Mean±sd(n)	Copper Median	Copper Mean±sd(n)	Manganese Median	Manganese Mean±sd(n)	Selenium Median	Selenium Mean±sd(n)	Iodine Median	Iodine Mean±sd(n)
Grain products, ready-to-eat cereals													
Corn flakes	1.8	11.00	11.13± 4.79(28)	0.17	0.18±0.06(28)	0.050	0.052± 0.012(28)	0.080	0.084±0.028(28)	0.000	0.002±0.003(28)	0.002	0.121± 0.442(28)
Crisped rice cereal	2.4	8.15	9.11± 3.13(28)	1.39	1.42±0.42(28)	0.189	0.199± 0.036(28)	1.360	1.353±0.152(28)	0.011	0.012±0.008(28)	0.005	0.077± 0.128(28)
Oat ring cereal	3.3	22.10	25.85± 9.48(28)	3.04	3.03±0.29(28)	0.389	0.400± 0.049(28)	4.000	4.039±0.385(28)	0.037	0.037±0.011(28)	0.009	0.043± 0.059(28)
Shredded wheat cereal	4.4	3.45	3.47± 0.49(28)	2.90	2.97±0.51(28)	0.464	0.456± 0.046(28)	2.770	2.764±0.508(28)	0.000	0.003±0.005(28)	0.008	0.034± 0.054(28)
Raisin bran cereal	7.5	31.50	34.68±16.63(28)	9.15	9.15±3.13(28)	0.520	0.512± 0.070(28)	3.380	3.452±0.639(28)	0.006	0.005±0.004(28)	0.003	0.019± 0.053(28)
Fruit-flavored, sweetened cereal	2.7	18.25	18.45± 2.81(28)	14.35	13.49±2.73(28)	0.110	0.112± 0.014(28)	0.745	0.751±0.086(28)	0.007	0.006±0.003(28)	0.015	1.699± 3.155(28)
Granola w/ raisins	2.9	3.69	4.81± 3.01(28)	2.34	2.51±0.91(28)	0.389	0.406± 0.135(28)	2.705	2.709±0.790(28)	0.018	0.020±0.009(28)	0.012	0.029± 0.083(28)
Grain products, bread, rolls, pasta, etc.													
White bread, enriched	36.4	3.19	3.29± 0.54(28)	0.70	0.73±0.14(28)	0.118	0.111± 0.021(27)	0.422	0.432±0.059(28)	0.021	0.025±0.010(28)	0.074	0.095± 0.089(28)
Whole wheat bread	38.8	3.32	3.39± 0.38(28)	2.00	1.98±0.28(28)	0.263	0.261± 0.033(27)	2.275	2.246±0.317(28)	0.031	0.033±0.009(28)	0.040	0.065± 0.080(28)
Rye bread	38.4	3.16	3.15± 0.67(28)	1.19	1.19±0.17(28)	0.173	0.181± 0.034(27)	0.860	0.875±0.170(28)	0.031	0.033±0.010(28)	0.035	0.055± 0.052(28)
Soft white roll, enriched	31.1	3.43	3.49± 0.63(28)	0.89	0.93±0.18(28)	0.129	0.128± 0.021(27)	0.466	0.470±0.056(28)	0.025	0.027±0.008(28)	0.047	0.087± 0.094(28)
Baking powder biscuit, enriched, baked from refrigerated dough	31.0	3.57	3.76± 0.89(28)	0.49	0.48±0.07(28)	0.092	0.091± 0.020(27)	0.376	0.390±0.065(28)	0.017	0.018±0.006(28)	0.011	0.035± 0.047(28)
Muffin, blueberry/plain	33.0	1.68	1.63± 0.61(28)	0.43	0.49±0.17(28)	0.071	0.074± 0.025(27)	0.413	0.501±0.285(28)	0.010	0.011±0.006(28)	0.020	0.065± 0.091(28)
Cornbread, southern style, homemade	37.1	2.22	2.30± 0.59(28)	0.63	0.66±0.14(28)	0.057	0.054± 0.018(27)	0.177	0.187±0.040(28)	0.009	0.010±0.003(28)	0.019	0.070± 0.105(28)
Pancake, from mix	42.2	1.90	1.88± 0.36(28)	0.77	0.79±0.16(28)	0.068	0.069± 0.018(28)	0.339	0.367±0.126(28)	0.009	0.010±0.003(28)	0.024	0.061± 0.082(28)
Saltine crackers	3.6	5.35	5.28± 0.92(28)	0.75	0.75±0.08(28)	0.147	0.143± 0.020(27)	0.730	0.724±0.094(28)	0.010	0.010±0.007(28)	0.008	0.037± 0.056(26)
Flour tortilla	27.8	3.61	3.58± 0.66(28)	0.61	0.63±0.11(27)	0.124	0.126± 0.018(26)	0.467	0.472±0.067(28)	0.019	0.020±0.011(28)	0.012	0.060± 0.103(28)
Corn chips	0.5	1.33	1.39± 0.27(28)	1.52	1.57±0.39(28)	0.119	0.112± 0.020(28)	0.414	0.409±0.075(28)	0.000	0.003±0.004(28)	0.003	0.039± 0.091(28)
Egg noodles, enriched, cooked	71.0	1.66	1.68± 0.41(28)	0.65	0.64±0.15(28)	0.084	0.086± 0.025(28)	0.286	0.274±0.065(28)	0.022	0.023±0.007(28)	0.004	0.010± 0.011(28)
Macaroni, enriched, cooked	71.1	1.33	1.36± 0.33(28)	0.47	0.49±0.12(28)	0.091	0.094± 0.020(28)	0.275	0.269±0.051(28)	0.021	0.020±0.007(28)	0.004	0.024± 0.053(28)
Nuts													
Peanuts, dry roasted, salted	1.1	1.83	1.85± 0.23(28)	3.24	3.30±0.27(28)	0.614	0.640± 0.094(27)	2.180	2.167±0.279(28)	0.000	0.004±0.007(28)	0.007	0.007± 0.006(28)
Peanut butter, creamy	0.1	1.95	2.00± 0.27(27)	3.00	3.04±0.35(28)	0.552	0.569± 0.070(27)	1.835	1.854±0.251(28)	0.000	0.003±0.004(28)	0.003	0.004± 0.006(28)
Pecans, packaged, unsalted	3.3	2.43	2.46± 0.34(28)	5.65	5.44±0.65(28)	1.150	1.144± 0.193(27)	4.320	4.283±0.861(28)	0.000	0.002±0.004(28)	0.002	0.009± 0.028(28)
Eggs													
Soft boiled egg	70.9	2.14	2.11± 0.32(28)	1.47	1.49±0.23(28)	0.066	0.065± 0.019(27)	0.030	0.029±0.006(28)	0.023	0.025±0.007(28)	0.038	0.050± 0.042(28)
Fried egg	65.4	2.06	2.06± 0.30(28)	1.50	1.56±0.30(28)	0.063	0.065± 0.010(27)	0.029	0.028±0.006(28)	0.025	0.027±0.007(28)	0.049	0.055± 0.033(28)
Scrambled egg, milk and fat added	75.1	1.64	1.68± 0.24(28)	1.22	1.28±0.18(28)	0.050	0.050± 0.011(27)	0.025	0.027±0.010(28)	0.020	0.021±0.007(28)	0.035	0.048± 0.037(28)
Dairy products													
Whole milk	89.1	0.01	0.02± 0.03(28)	0.37	0.37±0.06(28)	0.005	0.003± 0.003(28)	0.000	0.001±0.003(28)	0.000	0.000±0.000(28)	0.023	0.023± 0.007(28)
Lowfat milk, 2% fat	89.2	0.01	0.02± 0.01(28)	0.42	0.41±0.07(28)	0.000	0.002± 0.003(28)	0.000	0.002±0.003(28)	0.000	0.000±0.002(28)	0.025	0.024± 0.009(28)
Skim milk	91.2	0.01	0.03± 0.06(28)	0.41	0.40±0.07(28)	0.000	0.003± 0.003(28)	0.000	0.001±0.002(28)	0.000	0.000±0.000(28)	0.021	0.022± 0.009(28)
Buttermilk	89.9	0.02	0.02± 0.02(28)	0.43	0.43±0.05(28)	0.000	0.002± 0.003(28)	0.000	0.002±0.003(28)	0.000	0.000±0.001(28)	0.024	0.025± 0.009(28)
Chocolate milk	84.0	0.17	0.17± 0.07(28)	0.43	0.43±0.05(28)	0.029	0.029± 0.012(28)	0.028	0.030±0.007(28)	0.000	0.000±0.000(28)	0.024	0.026± 0.016(28)
Evaporated milk, canned	67.3	0.13	0.13± 0.08(28)	0.86	0.86±0.07(28)	0.009	0.007± 0.008(28)	0.003	0.005±0.005(28)	0.000	0.000±0.001(28)	0.025	0.038± 0.051(28)
Lowfat plain yogurt	86.2	0.04	0.04± 0.02(28)	0.61	0.61±0.06(28)	0.002	0.004± 0.005(28)	0.000	0.003±0.004(28)	0.000	0.000±0.000(28)	0.032	0.033± 0.009(28)
Lowfat strawberry yogurt	77.9	0.10	0.09± 0.05(28)	0.44	0.45±0.06(28)	0.007	0.006± 0.004(28)	0.027	0.026±0.011(28)	0.000	0.000±0.001(28)	0.013	0.016± 0.009(28)
Creamed cottage cheese, 4% fat	80.7	0.08	0.09± 0.06(28)	0.42	0.45±0.08(28)	0.017	0.016± 0.012(28)	0.000	0.006±0.010(28)	0.007	0.006±0.004(28)	0.025	0.026± 0.014(28)
Cheddar cheese, sharp/mild	37.2	0.35	0.37± 0.17(28)	4.00	4.05±0.52(28)	0.037	0.039± 0.016(28)	0.025	0.029±0.017(28)	0.013	0.013±0.004(28)	0.039	0.047± 0.040(28)
American cheese	40.7	0.37	0.39± 0.16(28)	3.39	3.35±0.40(28)	0.037	0.038± 0.022(28)	0.022	0.020±0.009(28)	0.013	0.013±0.004(28)	0.036	0.051± 0.081(28)
Animal flesh, fish													
Cod/haddock fillet, fresh/frozen, baked	76.5	0.22	0.27± 0.16(28)	0.57	0.57±0.11(28)	0.033	0.035± 0.017(28)	0.015	0.023±0.020(28)	0.037	0.038±0.009(28)	0.127	0.132± 0.092(28)

RESULTS

Results of the quality control measures are shown in Table 2. There were 12–20 spiked recoveries per collection for iron, zinc, copper, and manganese; 14–26 spiked

TABLE 3—*Continued*

Food	Water[b] (%)	Iron Median	Iron Mean±sd(n)	Zinc Median	Zinc Mean±sd(n)	Copper Median	Copper Mean±sd(n)	Manganese Median	Manganese Mean±sd(n)	Selenium Median	Selenium Mean±sd(n)	Iodine Median	Iodine Mean±sd(n)
Tuna, canned in oil, drained	63.9	1.32	1.35± 0.28(28)	0.79	0.79±0.22(28)	0.048	0.047± 0.015(28)	0.012	0.012±0.008(28)	0.083	0.081±0.015(28)	0.019	0.022± 0.013(28)
Fish sticks, frozen, heated	41.2	0.83	0.85± 0.20(28)	0.48	0.50±0.07(27)	0.060	0.062± 0.022(27)	0.175	0.185±0.056(28)	0.015	0.016±0.005(28)	0.052	0.070± 0.059(28)
Shrimp, fresh/ frozen, breaded, fried	59.0	1.50	1.48± 0.40(28)	1.44	1.45±0.27(28)	0.201	0.220± 0.085(28)	0.146	0.147±0.038(28)	0.039	0.040±0.012(28)	0.023	0.046± 0.055(28)
Animal flesh, poultry													
Chicken, baked	65.1	1.07	1.13± 0.37(28)	1.70	1.81±0.40(28)	0.056	0.065± 0.035(28)	0.021	0.021±0.010(28)	0.023	0.024±0.009(28)	0.015	0.017± 0.011(28)
Chicken breast and drumstick, breaded, fried	51.1	1.10	1.11± 0.22(28)	1.63	1.70±0.33(28)	0.052	0.065± 0.048(28)	0.033	0.034±0.013(28)	0.020	0.022±0.007(28)	0.013	0.019± 0.019(28)
Turkey breast, baked	65.7	0.51	0.51± 0.08(28)	1.61	1.62±0.17(28)	0.041	0.043± 0.009(28)	0.011	0.011±0.005(28)	0.035	0.030±0.011(28)	0.011	0.016± 0.020(28)
Animal flesh, meat													
Ground beef patty, pan fried	52.4	2.50	2.54± 0.41(28)	5.90	5.87±0.55(28)	0.080	0.079± 0.010(28)	0.011	0.011±0.006(28)	0.018	0.019±0.005(28)	0.011	0.016± 0.015(28)
Meatloaf, baked	63.9	2.35	2.34± 0.29(28)	4.12	4.22±0.72(28)	0.090	0.089± 0.011(27)	0.055	0.057±0.017(28)	0.014	0.015±0.003(28)	0.012	0.047± 0.108(28)
Beef chuck roast, baked	57.8	2.95	2.92± 0.42(28)	8.12	8.23±1.35(28)	0.104	0.097± 0.020(28)	0.010	0.009±0.006(28)	0.022	0.024±0.011(28)	0.009	0.017± 0.035(28)
Beef round steak, stewed	55.3	2.60	2.68± 0.37(28)	6.20	6.33±0.75(28)	0.111	0.109± 0.016(28)	0.011	0.009±0.005(28)	0.026	0.028±0.008(28)	0.012	0.020± 0.019(28)
Beef loin/ sirloin steak, pan fried	56.0	2.96	2.92± 0.37(28)	5.70	5.67±0.68(28)	0.111	0.115± 0.038(28)	0.011	0.013±0.011(28)	0.023	0.024±0.007(28)	0.010	0.014± 0.011(28)
Veal cutlet, breaded, pan fried	45.7	1.26	1.31± 0.28(28)	3.07	3.22±0.62(28)	0.088	0.097± 0.029(28)	0.048	0.054±0.026(28)	0.013	0.014±0.003(28)	0.017	0.017± 0.011(28)
Pork chop, pan fried	47.0	1.14	1.17± 0.17(28)	3.11	3.10±0.39(28)	0.093	0.098± 0.019(28)	0.011	0.011±0.007(28)	0.036	0.035±0.014(28)	0.007	0.007± 0.005(28)
Pork roast loin, baked	53.6	1.20	1.20± 0.22(28)	3.09	3.27±0.82(28)	0.097	0.101± 0.031(28)	0.011	0.012±0.008(28)	0.034	0.035±0.016(28)	0.007	0.013± 0.013(28)
Ham, cured, baked	65.5	0.97	1.03± 0.18(28)	2.61	2.69±0.40(28)	0.077	0.080± 0.019(28)	0.011	0.011±0.007(28)	0.024	0.025±0.008(28)	0.012	0.013± 0.010(28)
Lamb chop, pan fried	44.3	2.38	2.43± 0.35(28)	5.40	5.42±0.91(28)	0.150	0.155± 0.027(28)	0.012	0.013±0.003(28)	0.022	0.021±0.009(28)	0.008	0.011± 0.011(28)
Beef/calf liver, fried	56.4	6.82	7.09± 1.15(28)	5.55	5.59±1.12(28)	5.700	7.069± 3.616(28)	0.382	0.384±0.039(28)	0.058	0.057±0.013(28)	0.022	0.027± 0.025(28)
Animal flesh, breakfast/luncheon meat													
Pork sausage, pan fried	43.6	1.45	1.47± 0.28(28)	3.15	3.14±0.52(28)	0.085	0.087± 0.018(28)	0.024	0.029±0.018(28)	0.018	0.018±0.006(28)	0.014	0.022± 0.020(28)
Pork bacon, pan fried	8.5	0.99	0.97± 0.24(28)	2.71	2.60±0.54(28)	0.093	0.093± 0.023(28)	0.012	0.013±0.008(28)	0.020	0.023±0.013(28)	0.011	0.018± 0.030(28)
Frankfurter, boiled	51.7	1.60	1.76± 0.60(28)	2.75	2.79±0.35(28)	0.049	0.050± 0.017(28)	0.031	0.030±0.010(28)	0.010	0.010±0.002(28)	0.010	0.012± 0.010(28)
Bologna	53.9	1.13	1.14± 0.22(28)	1.93	1.96±0.29(28)	0.048	0.050± 0.016(28)	0.028	0.029±0.012(28)	0.011	0.011±0.003(28)	0.017	0.024± 0.023(28)
Salami	37.4	1.87	2.03± 0.56(28)	2.17	2.32±0.66(28)	0.109	0.114± 0.029(28)	0.062	0.089±0.104(28)	0.014	0.015±0.003(28)	0.017	0.029± 0.026(28)
Mixed dishes													
Cheese pizza, frozen, heated	42.9	1.76	1.75± 0.48(28)	1.55	1.53±0.23(28)	0.111	0.116± 0.014(27)	0.307	0.309±0.039(28)	0.021	0.021±0.006(28)	0.016	0.112± 0.260(28)
Macaroni and cheese, from box mix	67.8	1.02	1.09± 0.23(28)	0.51	0.50±0.08(28)	0.062	0.063± 0.013(27)	0.224	0.220±0.043(28)	0.015	0.015±0.004(28)	0.023	0.035± 0.030(28)
Spaghetti and tomato sauce, canned	80.8	0.68	0.78± 0.24(28)	0.51	0.51±0.16(28)	0.059	0.064± 0.016(27)	0.135	0.133±0.033(28)	0.010	0.010±0.004(28)	0.006	0.027± 0.051(28)
Spaghetti and meatsauce, homemade	71.0	1.43	1.42± 0.35(28)	0.89	0.97±0.32(28)	0.106	0.107± 0.018(27)	0.177	0.176±0.029(28)	0.010	0.011±0.005(28)	0.012	0.018± 0.018(28)
Lasagna, homemade	70.6	1.23	1.38± 0.64(28)	1.67	1.65±0.35(28)	0.109	0.107± 0.018(27)	0.153	0.152±0.021(28)	0.013	0.014±0.004(28)	0.024	0.029± 0.018(28)
Beef and vegetable stew, homemade	80.1	0.99	1.04± 0.29(28)	2.14	2.13±0.81(28)	0.069	0.067± 0.023(27)	0.104	0.110±0.034(28)	0.006	0.005±0.004(28)	0.007	0.019± 0.031(28)
Chili con carne w/ beans, canned	72.5	1.80	1.78± 0.19(28)	1.24	1.24±0.16(28)	0.145	0.150± 0.020(27)	0.270	0.270±0.030(28)	0.000	0.000±0.001(28)	0.007	0.021± 0.043(28)
1/4 lb hamburger on white roll w/ garnish, fast food	53.7	2.42	2.40± 0.29(28)	2.69	2.71±0.37(28)	0.095	0.093± 0.013(27)	0.178	0.177±0.023(28)	0.016	0.015±0.004(28)	0.011	0.020± 0.026(28)
Pork chow mein, homemade	84.6	0.54	0.59± 0.15(28)	0.74	0.78±0.19(28)	0.061	0.063± 0.014(27)	0.063	0.068±0.025(28)	0.006	0.006±0.005(28)	0.003	0.010± 0.019(28)
Chicken noodle casserole, homemade	69.7	0.85	0.82± 0.23(28)	0.93	1.00±0.31(28)	0.054	0.053± 0.016(27)	0.140	0.137±0.038(28)	0.012	0.013±0.004(28)	0.010	0.028± 0.061(28)
Chicken potpie, frozen, heated	63.0	1.24	1.24± 0.28(28)	0.52	0.52±0.06(28)	0.055	0.055± 0.012(27)	0.198	0.200±0.041(28)	0.007	0.007±0.004(28)	0.026	0.041± 0.057(28)
Frozen dinner - fried chicken, mashed potatoes, cornbread and/ or veg, heated	55.8	0.96	0.94± 0.23(28)	0.72	0.72±0.12(28)	0.072	0.074± 0.017(27)	0.167	0.167±0.037(28)	0.011	0.010±0.003(28)	0.017	0.027± 0.040(28)
Soups													
Tomato soup, canned, reconstituted w/ whole milk	82.8	0.34	0.48± 0.43(28)	0.31	0.32±0.12(28)	0.043	0.043± 0.015(27)	0.065	0.071±0.019(28)	0.000	0.000±0.000(28)	0.010	0.011± 0.012(28)

recoveries per collection for selenium; and 16–32 for iodine. Mean recoveries were about 85% for iodine and from 96 to 106% for the other microelements. SRM recoveries were 81% for selenium, 83% for iodine, and 96–99.5% for the other microelements.

TABLE 3—*Continued*

Food	Water[b] (%)	Iron Median	Iron Mean±sd(n)	Zinc Median	Zinc Mean±sd(n)	Copper Median	Copper Mean±sd(n)	Manganese Median	Manganese Mean±sd(n)	Selenium Median	Selenium Mean±sd(n)	Iodine Median	Iodine Mean±sd(n)
Beef bouillon, canned, reconstituted w/ water	98.4	0.11	0.14± 0.12(28)	0.40	0.40±0.16(28)	0.000	0.002± 0.003(27)	0.010	0.012±0.008(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.006(28)
Vegetable beef soup, canned, reconstituted w/ water	91.1	0.37	0.41± 0.17(28)	0.80	0.88±0.41(28)	0.021	0.023± 0.013(27)	0.052	0.058±0.031(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.006(28)
Chicken noodle soup, canned, reconstituted w/ water	91.8	0.27	0.28± 0.10(28)	0.32	0.33±0.15(28)	0.010	0.012± 0.010(27)	0.050	0.052±0.021(28)	0.000	0.001±0.002(28)	0.000	0.005± 0.014(28)
Desserts, dairy-based													
Chocolate ice cream	58.4	0.89	0.99± 0.37(28)	0.54	0.56±0.11(28)	0.122	0.136± 0.040(28)	0.134	0.142±0.031(28)	0.000	0.000±0.000(28)	0.035	0.046± 0.051(28)
Chocolate milk-shake, fast food	73.3	0.35	0.40± 0.15(28)	0.47	0.47±0.10(28)	0.085	0.091± 0.047(28)	0.050	0.054±0.012(28)	0.000	0.000±0.000(28)	0.025	0.060± 0.101(28)
Ice cream sandwich	42.7	1.34	1.37± 0.31(28)	0.45	0.46±0.05(28)	0.066	0.065± 0.012(28)	0.207	0.214±0.033(28)	0.000	0.001±0.002(28)	0.030	0.050± 0.041(28)
Vanilla ice milk	62.7	0.09	0.10± 0.06(28)	0.39	0.45±0.18(28)	0.010	0.011± 0.008(28)	0.008	0.006±0.008(28)	0.000	0.000±0.001(28)	0.028	0.030± 0.013(28)
Chocolate pudding, made w/ whole milk from instant mix	71.1	0.46	0.50± 0.14(28)	0.52	0.54±0.17(28)	0.059	0.067± 0.022(28)	0.080	0.084±0.017(28)	0.000	0.000±0.000(28)	0.024	0.039± 0.047(28)
Desserts, grain-based													
Chocolate cake w/ chocolate icing, ready-to-eat/frozen	23.6	1.99	2.12± 0.48(28)	0.66	0.67±0.14(28)	0.234	0.240± 0.052(28)	0.302	0.317±0.067(28)	0.000	0.000±0.001(28)	0.011	0.020± 0.023(28)
Yellow cake w/ white icing, from mix	28.7	1.06	1.09± 0.25(28)	0.24	0.25±0.07(28)	0.035	0.034± 0.010(28)	0.094	0.095±0.018(28)	0.000	0.000±0.001(28)	0.012	0.058± 0.136(28)
Coffeecake, ready-to-eat/ frozen	18.8	1.90	1.96± 0.48(28)	0.74	0.79±0.18(28)	0.121	0.124± 0.029(28)	0.409	0.442±0.120(28)	0.016	0.017±0.005(28)	0.012	0.035± 0.053(27)
Doughnut, cake type, plain	17.5	2.26	2.13± 0.39(28)	0.59	0.60±0.10(28)	0.098	0.099± 0.019(28)	0.356	0.348±0.056(28)	0.008	0.008±0.004(28)	0.011	0.025± 0.033(28)
Danish pastry/ sweet roll	24.1	1.99	1.96± 0.53(28)	0.71	0.72±0.15(28)	0.099	0.102± 0.024(28)	0.353	0.371±0.091(28)	0.016	0.017±0.005(28)	0.017	0.052± 0.083(28)
Chocolate chip cookies	2.8	3.04	3.07± 0.61(28)	0.69	0.70±0.13(28)	0.256	0.263± 0.059(28)	0.469	0.481±0.055(28)	0.000	0.001±0.002(28)	0.006	0.048± 0.111(28)
Chocolate cookies w/ white creme filling	1.7	4.27	4.49± 1.64(28)	0.76	0.75±0.13(28)	0.316	0.300± 0.069(28)	0.535	0.546±0.072(28)	0.000	0.001±0.002(28)	0.005	0.073± 0.138(28)
Desserts, other													
Apple pie, frozen, heated	48.4	0.44	0.53± 0.27(28)	0.15	0.16±0.05(28)	0.048	0.048± 0.011(28)	0.179	0.190±0.034(28)	0.000	0.000±0.000(28)	0.020	0.040± 0.077(28)
Pumpkin pie, frozen, heated	43.4	0.73	0.83± 0.24(28)	0.45	0.46±0.12(28)	0.054	0.051± 0.010(28)	0.246	0.248±0.031(28)	0.000	0.000±0.001(28)	0.028	0.037± 0.027(28)
Milk chocolate candy	0.7	1.46	1.52± 0.39(28)	1.49	1.48±0.19(28)	0.441	0.455± 0.064(28)	0.329	0.337±0.047(28)	0.000	0.001±0.003(28)	0.041	0.041± 0.014(28)
Caramel candy	10.0	0.12	0.14± 0.07(28)	0.56	0.52±0.14(28)	0.013	0.015± 0.013(28)	0.011	0.011±0.015(28)	0.000	0.000±0.001(28)	0.033	0.038± 0.026(28)
Strawberry gelatin dessert, from mix	80.6	0.03	0.03± 0.02(28)	0.00	0.00±0.01(28)	0.000	0.003± 0.004(28)	0.002	0.003±0.003(28)	0.000	0.000±0.000(28)	0.000	0.015± 0.024(28)
Sweeteners													
White, granulated sugar	0.2	0.02	0.03± 0.02(28)	0.00	0.00±0.01(28)	0.012	0.010± 0.009(27)	0.000	0.001±0.003(28)	0.000	0.000±0.000(28)	0.004	0.006± 0.006(24)
Pancake syrup	25.4	0.11	0.13± 0.09(27)	0.10	0.14±0.12(27)	0.000	0.004± 0.009(27)	0.078	0.089±0.061(27)	0.000	0.000±0.000(27)	0.007	0.018± 0.026(27)
Honey	13.3	0.31	0.39± 0.27(28)	0.16	0.23±0.22(28)	0.012	0.017± 0.012(28)	0.058	0.072±0.055(28)	0.000	0.000±0.000(28)	0.013	0.014± 0.015(28)
Grape jelly	28.2	0.17	0.21± 0.16(28)	0.04	0.03±0.02(28)	0.014	0.015± 0.008(28)	0.132	0.135±0.071(28)	0.000	0.000±0.000(28)	0.020	0.105± 0.154(28)
Catsup	56.2	0.52	0.54± 0.08(28)	0.21	0.21±0.05(28)	0.180	0.192± 0.054(28)	0.124	0.134±0.024(28)	0.000	0.000±0.000(28)	0.003	0.006± 0.006(28)
Sweetened chocolate powder for hot/cold milk	1.0	3.46	3.48± 0.78(27)	1.48	1.47±0.18(27)	0.770	0.764± 0.102(27)	0.790	0.784±0.115(27)	0.000	0.000±0.001(27)	0.002	0.010± 0.027(27)
Fats and sauces													
Corn oil	0.0	0.03	0.06± 0.10(28)	0.01	0.02±0.03(28)	0.000	0.004± 0.007(27)	0.000	0.002±0.005(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.003(28)
Margarine, stick type	16.7	0.04	0.04± 0.03(28)	0.00	0.02±0.03(28)	0.000	0.004± 0.007(27)	0.000	0.002±0.005(28)	0.000	0.000±0.000(28)	0.000	0.004± 0.015(28)
Butter	17.0	0.05	0.05± 0.04(28)	0.05	0.06±0.04(28)	0.000	0.006± 0.010(27)	0.000	0.004±0.007(28)	0.000	0.001±0.006(28)	0.003	0.003± 0.004(28)
Mayonnaise	11.7	0.22	0.21± 0.10(28)	0.17	0.14±0.09(28)	0.011	0.009± 0.010(27)	0.005	0.013±0.035(28)	0.000	0.000±0.002(28)	0.002	0.004± 0.006(28)
Italian salad dressing	53.4	0.06	0.08± 0.07(28)	0.02	0.03±0.04(28)	0.000	0.005± 0.007(27)	0.011	0.013±0.015(28)	0.000	0.000±0.001(28)	0.000	0.001± 0.003(28)
Half & half cream	75.5	0.03	0.03± 0.04(28)	0.35	0.35±0.08(28)	0.000	0.004± 0.008(27)	0.000	0.003±0.008(28)	0.000	0.000±0.000(28)	0.013	0.018± 0.012(28)
Powdered cream substitute	2.8	0.22	0.24± 0.19(28)	0.15	0.14±0.05(28)	0.000	0.005± 0.009(27)	0.011	0.009±0.008(28)	0.000	0.000±0.000(28)	0.005	0.009± 0.010(27)
Brown gravy, from mix	89.5	0.19	0.21± 0.09(28)	0.06	0.06±0.03(28)	0.007	0.007± 0.007(27)	0.051	0.050±0.021(28)	0.000	0.000±0.000(28)	0.003	0.003± 0.004(28)
White sauce, medium, homemade	72.4	0.38	0.38± 0.10(28)	0.40	0.40±0.09(28)	0.011	0.019± 0.030(27)	0.046	0.047±0.013(28)	0.000	0.000±0.002(28)	0.015	0.021± 0.014(28)

Twenty-eight test portions of each food were analyzed for each element; however, suspected copper contamination of samples or blanks from the third collection resulted in the omission of 98 values for this element. An evaluation for outliers resulted in the omission of two sets of results (one of pancake syrup and one of chocolate powder

TABLE 3—*Continued*

Food	Water[a] (%)	Iron Median	Iron Mean±sd(n)	Zinc Median	Zinc Mean±sd(n)	Copper Median	Copper Mean±sd(n)	Manganese Median	Manganese Mean±sd(n)	Selenium Median	Selenium Mean±sd(n)	Iodine Median	Iodine Mean±sd(n)
Beverages													
Tap water	100.0	0.00	0.01± 0.02(28)	0.00	0.01±0.02(28)	0.002	0.005± 0.007(28)	0.000	0.000±0.001(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.005(28)
Lemonade, frozen, reconstituted	88.1	0.04	0.06± 0.05(28)	0.01	0.01±0.01(28)	0.002	0.003± 0.003(28)	0.002	0.003±0.003(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.002(28)
Orange drink, canned	87.6	0.11	0.11± 0.06(28)	0.01	0.01±0.02(28)	0.002	0.003± 0.003(28)	0.003	0.006±0.010(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.002(28)
Cherry drink, from powder	93.0	0.01	0.02± 0.03(28)	0.00	0.00±0.00(28)	0.000	0.001± 0.002(28)	0.000	0.000±0.001(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.003(28)
Carbonated lemon-lime soda	90.2	0.00	0.01± 0.02(28)	0.00	0.01±0.01(28)	0.000	0.001± 0.002(28)	0.000	0.001±0.001(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Carbonated cola	88.6	0.00	0.01± 0.03(28)	0.00	0.00±0.01(28)	0.000	0.001± 0.002(28)	0.000	0.000±0.001(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Carbonated diet cola	99.7	0.01	0.03± 0.10(28)	0.01	0.01±0.01(28)	0.000	0.000± 0.001(28)	0.000	0.001±0.002(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Coffee, from instant	98.0	0.07	0.09± 0.06(28)	0.00	0.00±0.01(28)	0.000	0.001± 0.001(28)	0.028	0.039±0.026(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Decaffeinated coffee, from instant	98.2	0.07	0.08± 0.04(28)	0.00	0.00±0.01(28)	0.000	0.001± 0.001(28)	0.032	0.035±0.018(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Tea, made from tea bag	98.2	0.01	0.01± 0.01(28)	0.01	0.01±0.01(28)	0.006	0.006± 0.004(28)	0.254	0.260±0.130(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.011(28)
Beer, canned	96.3	0.00	0.00± 0.01(28)	0.00	0.00±0.01(28)	0.005	0.004± 0.003(28)	0.010	0.010±0.004(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Table wine	98.9	0.33	0.35± 0.10(28)	0.06	0.07±0.02(28)	0.009	0.010± 0.009(28)	0.114	0.132±0.071(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Whisky, 80-proof	100.0	0.00	0.01± 0.01(28)	0.00	0.00±0.00(28)	0.016	0.017± 0.008(28)	0.002	0.003±0.002(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.000(28)
Strained/junior vegetables													
Creamed spinach	89.0	3.72	0.82± 0.24(28)	0.51	0.51±0.10(28)	0.059	0.058± 0.014(27)	0.554	0.526±0.122(28)	0.000	0.000±0.000(28)	0.010	0.011± 0.005(28)
Peas	79.1	1.05	1.01± 0.19(28)	0.49	0.49±0.11(28)	0.081	0.086± 0.025(27)	0.242	0.248±0.061(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Green beans	92.1	0.70	0.74± 0.23(28)	0.22	0.23±0.06(28)	0.049	0.051± 0.013(27)	0.275	0.326±0.156(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.003(28)
Carrots	89.4	0.21	0.23± 0.07(28)	0.16	0.17±0.04(28)	0.040	0.039± 0.013(27)	0.124	0.151±0.087(28)	0.000	0.000±0.001(28)	0.000	0.001± 0.002(28)
Sweetpotato/ yellow squash	76.7	0.29	0.32± 0.10(28)	0.16	0.16±0.03(28)	0.084	0.085± 0.022(27)	0.181	0.204±0.076(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Creamed corn	83.3	0.17	0.19± 0.06(28)	0.28	0.29±0.05(28)	0.020	0.023± 0.007(27)	0.115	0.104±0.031(28)	0.000	0.000±0.001(28)	0.003	0.003± 0.003(28)
Mixed/garden vegetables	89.5	0.36	0.38± 0.11(28)	0.21	0.21±0.06(28)	0.046	0.046± 0.012(27)	0.193	0.198±0.048(28)	0.000	0.000±0.000(28)	0.001	0.002± 0.003(28)
Strained/junior fruits and fruit juices													
Orange juice	88.4	0.10	0.12± 0.05(28)	0.04	0.04±0.02(28)	0.033	0.035± 0.009(27)	0.035	0.057±0.041(28)	0.000	0.000±0.000(28)	0.002	0.002± 0.002(28)
Applesauce	83.1	0.11	0.12± 0.04(28)	0.02	0.02±0.02(28)	0.023	0.029± 0.012(27)	0.043	0.053±0.025(28)	0.000	0.000±0.001(28)	0.000	0.001± 0.001(28)
Apple juice	87.0	0.18	0.21± 0.09(28)	0.02	0.02±0.01(28)	0.011	0.013± 0.009(27)	0.161	0.150±0.069(28)	0.000	0.000±0.000(28)	0.002	0.004± 0.007(28)
Dutch apple/ apple betty	80.1	0.08	0.09± 0.06(28)	0.02	0.02±0.02(28)	0.018	0.017± 0.011(27)	0.026	0.027±0.012(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Banana and pineapple	84.0	0.14	0.14± 0.03(28)	0.05	0.05±0.03(28)	0.034	0.033± 0.009(27)	0.230	0.227±0.061(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Peaches	85.2	0.14	0.18± 0.08(28)	0.08	0.08±0.03(28)	0.049	0.053± 0.015(27)	0.048	0.053±0.018(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Pears	82.6	0.14	0.14± 0.04(28)	0.08	0.09±0.03(28)	0.078	0.078± 0.011(27)	0.080	0.085±0.043(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Prunes/plums	80.0	0.23	0.25± 0.08(28)	0.09	0.09±0.03(28)	0.066	0.064± 0.022(27)	0.075	0.078±0.023(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Fruit dessert	83.5	0.14	0.17± 0.06(28)	0.04	0.04±0.03(28)	0.029	0.030± 0.014(27)	0.158	0.169±0.088(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Strained/junior cereals													
Mixed cereal prepared w/ whole milk	60.1	11.85	12.00± 2.92(28)	0.65	0.58±0.22(28)	0.053	0.059± 0.016(27)	0.451	0.445±0.106(28)	0.002	0.003±0.003(28)	0.010	0.019± 0.036(28)
Oatmeal w/ applesauce and bananas	80.1	7.00	6.96± 0.81(28)	0.28	0.29±0.04(28)	0.050	0.056± 0.015(27)	0.418	0.422±0.052(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Infant formulas													
Milk-based formula plus iron, canned, ready-to-serve	83.7	1.40	1.55± 0.41(28)	0.71	0.74±0.19(28)	0.078	0.081± 0.022(27)	0.012	0.017±0.021(28)	0.000	0.000±0.000(28)	0.009	0.010± 0.004(28)
Milk-based formula, canned, ready-to-serve	87.4	0.21	0.24± 0.10(28)	0.76	0.78±0.19(28)	0.079	0.085± 0.023(27)	0.010	0.015±0.024(28)	0.000	0.000±0.000(28)	0.009	0.010± 0.004(28)
Strained/junior meat/poultry													
Beef	79.9	1.70	1.70± 0.17(28)	3.61	3.56±0.34(28)	0.043	0.046± 0.009(27)	0.000	0.006±0.007(28)	0.000	0.003±0.004(28)	0.004	0.011± 0.018(28)
Pork	78.8	0.98	1.00± 0.15(28)	2.34	2.34±0.26(28)	0.059	0.058± 0.009(27)	0.005	0.005±0.006(28)	0.013	0.013±0.003(28)	0.005	0.009± 0.013(28)
Chicken/turkey	81.0	1.19	1.24± 0.18(28)	1.56	1.63±0.38(28)	0.049	0.050± 0.011(27)	0.018	0.018±0.010(28)	0.013	0.013±0.002(28)	0.017	0.031± 0.039(28)
Strained/junior dinners													
Beef and vegetables	86.5	0.82	0.83± 0.12(28)	1.52	1.49±0.29(28)	0.044	0.045± 0.011(27)	0.108	0.110±0.019(28)	0.000	0.001±0.003(28)	0.004	0.024± 0.061(28)
Ham and vegetables	86.2	0.61	0.62± 0.08(28)	1.04	1.05±0.17(28)	0.056	0.057± 0.013(27)	0.107	0.106±0.014(28)	0.007	0.006±0.003(28)	0.000	0.010± 0.040(28)
Chicken/turkey and vegetables	86.6	0.76	0.80± 0.19(28)	0.94	0.91±0.16(28)	0.040	0.042± 0.009(27)	0.106	0.109±0.023(28)	0.006	0.005±0.003(28)	0.020	0.037± 0.053(28)

for milk) and the omission of one value for iron, three values for zinc, one value for copper, and eight values for iodine. Thus, of 39,214 analyses, results for 25 (0.06%) were judged to be outliers.

TABLE 3—*Continued*

Food	Water (%)	Iron		Zinc		Copper		Manganese		Selenium		Iodine	
		Median	Mean±sd(n)	Median	Mean±sd(n)	Median	Mean±sd(n)	Median	Mean±sd(n)	Median	Mean±sd(n)	Median	Mean±sd(n)
Vegetables w/ beef	86.3	0.41	0.43± 0.08(28)	0.43	0.43±0.10(28)	0.043	0.045± 0.011(27)	0.143	0.139±0.045(28)	0.000	0.000±0.001(28)	0.000	0.001± 0.002(28)
Vegetables w/ bacon/ham	88.0	0.33	0.34± 0.06(28)	0.27	0.28±0.07(28)	0.049	0.050± 0.012(27)	0.156	0.150±0.030(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.003(28)
Vegetables w/ chicken/turkey	87.5	0.29	0.32± 0.14(28)	0.35	0.35±0.06(28)	0.033	0.036± 0.010(27)	0.138	0.137±0.025(28)	0.000	0.000±0.002(28)	0.006	0.005± 0.004(28)
Tomatoes, beef, and macaroni	86.4	0.46	0.47± 0.08(28)	0.39	0.38±0.07(28)	0.050	0.052± 0.010(27)	0.130	0.133±0.027(28)	0.000	0.001±0.002(28)	0.002	0.003± 0.003(28)
Chicken and noodles	87.2	0.38	0.39± 0.07(28)	0.32	0.34±0.10(28)	0.034	0.037± 0.011(27)	0.123	0.129±0.026(28)	0.000	0.001±0.002(28)	0.010	0.009± 0.004(28)
Turkey and rice	87.9	0.33	0.34± 0.07(28)	0.39	0.39±0.07(28)	0.033	0.034± 0.010(27)	0.117	0.122±0.023(28)	0.000	0.000±0.001(28)	0.004	0.007± 0.018(28)
Strained/junior dessert													
Pudding/custard	80.5	0.16	0.18± 0.06(28)	0.24	0.22±0.06(28)	0.011	0.015± 0.013(27)	0.010	0.028±0.032(28)	0.000	0.000±0.000(28)	0.008	0.009± 0.007(28)

[a] Values below the limits of quantitation are reported as "0." See Table 1 for the limits of quantitation for the individual analytes.
[b] Water values are from analyses of the January 1989 collection except that the water value for cherries is from the U.S. Department of Agriculture Handbook No. 8-9 (Gebhardt et al., 1982).

Table 3 presents the means and standard deviations and the medians for the microelements in the 234 foods per 100 g of table-ready, edible food; Table 4 presents the average levels of the elements per serving of the 234 foods; and Table 5 presents the average levels of the elements per serving by food groups. Food groups highest in the microminerals were ready-to-eat cereals, mixed dishes, and meat for iron; meat, mixed dishes, and ready-to-eat cereals for zinc; meat, nuts, mixed dishes, and beans/peas for copper; ready-to-eat cereals, nuts, and beans/peas for manganese; fish, meat, poultry, and mixed dishes for selenium; and ready-to-eat cereals, dairy desserts, mixed dishes, fish, and dairy products for iodine. Of the seven strained/junior food groups, cereals were highest in iron; meat/poultry were highest in zinc; vegetables were highest in copper; vegetables and cereals were highest in manganese; meat/poultry were highest in selenium; and the dessert, meat/poultry, and dinners were highest in iodine.

The 20 foods (excluding the strained/junior foods) highest in iron (2.5–19.4 mg/serving) included seven breakfast cereals, five meats, fresh/frozen boiled spinach, four mixed dishes, and three types of cooked beans. The CVs for these products averaged 28% and ranged from 11% for pork and beans to 77% for spinach. Higher CVs for oat ring cereal (CV = 37%), farina (CV = 42%), corn flakes (CV = 43%), crisped rice cereal (CV = 34%), raisin bran cereal (CV = 48%), and granola (CV = 63%) most likely reflect inconsistent and varying levels of iron fortification in these products.

The 20 foods highest in zinc (2.3–5.1 mg/serving) included two ready-to-eat cereals, 11 meats, and seven mixed dishes. The CVs for the zinc in these products averaged 20% and ranged from 9% for ground beef to 38% for beef and vegetable stew. CVs for the 11 meats averaged 16% and ranged from 9 to 25%; CVs for the seven mixed dishes were a bit higher (as would be expected with variable zinc levels of ingredients), averaging 24% and ranging from 14 to 38%. The variability of zinc in fruit-flavored cereal (CV = 20%) and raisin bran cereal (CV = 34%) most likely reflects inconsistency in zinc fortification of these products.

The 20 foods highest in copper (0.187–6.009 mg/serving) included liver, three mixed dishes, pecans, raisin bran cereal, fast food chocolate milkshake, granola, six cooked beans, avocado, raisins, baked sweet potato, grapes, chocolate cake, and fried shrimp. Higher levels of copper in grapes are most likely responsible for the higher levels in raisins and raisin bran cereal. Liver is clearly the most concentrated source of copper; it contains 16 times as much of this element as the second ranking food (chili con carne with 0.383 mg/serving). The average CV for the top 20 foods was 26% (range 12–62%). Foods with higher CVs included grapes (CV = 62%), liver (CV = 51%),

TABLE 4

IRON, ZINC, COPPER, MANGANESE, SELENIUM, AND IODINE CONTENT OF TOTAL DIET STUDY FOODS IN mg PER SERVING[a]

Food serving[b]	Weight of serving (g)	Iron Median	Iron Mean±sd(n)	Zinc Median	Zinc Mean±sd(n)	Copper Median	Copper Mean±sd(n)	Manganese Median	Manganese Mean±sd(n)	Selenium Median	Selenium Mean±sd(n)	Iodine Median	Iodine Mean±sd(n)
Vegetables, leafy													
Spinach, fresh/ frozen, boiled 1/2 cup	90	3.10	4.49± 3.44(28)	0.39	0.41±0.14(28)	0.066	0.070± 0.023(28)	0.405	0.470±0.205(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Spinach, canned 1/2 cup	107	1.79	1.80± 0.40(28)	0.42	0.44±0.12(28)	0.080	0.080± 0.019(28)	0.733	0.737±0.190(28)	0.000	0.000±0.002(28)	0.005	0.006± 0.005(28)
Collards, fresh/ frozen, boiled 1/2 cup	95	1.06	1.13± 0.40(28)	0.23	0.23±0.08(28)	0.036	0.037± 0.013(28)	0.424	0.478±0.312(28)	0.000	0.000±0.001(28)	0.000	0.001± 0.002(28)
Lettuce, crisphead, raw 4 leaves (1 cup)	80	0.25	0.29± 0.13(28)	0.14	0.13±0.04(28)	0.019	0.022± 0.012(28)	0.104	0.107±0.031(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Cabbage, fresh, boiled - 2/3 cup	100	0.16	0.17± 0.05(28)	0.09	0.09±0.03(28)	0.010	0.012± 0.008(28)	0.101	0.117±0.063(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Coleslaw w/ dressing, homemade - 1 cup	120	0.47	0.48± 0.09(28)	0.22	0.22±0.07(28)	0.024	0.023± 0.013(28)	0.175	0.192±0.081(28)	0.000	0.000±0.000(28)	0.002	0.006± 0.010(28)
Sauerkraut, canned 1/2 cup	118	0.71	1.34± 1.37(28)	0.17	0.28±0.26(28)	0.024	0.025± 0.016(28)	0.146	0.144±0.037(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Vegetables, stem/flower													
Broccoli, fresh/ frozen, boiled 2/3 cup	104	0.51	0.55± 0.17(28)	0.26	0.26±0.09(28)	0.035	0.034± 0.012(28)	0.219	0.215±0.052(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Cauliflower, fresh/ frozen, boiled 2/3 cup	83	0.26	0.26± 0.06(28)	0.14	0.14±0.03(28)	0.015	0.015± 0.007(28)	0.106	0.109±0.020(28)	0.000	0.000±0.001(28)	0.000	0.000± 0.001(28)
Asparagus, fresh/ frozen, boiled 6 spears	90	0.54	0.64± 0.28(28)	0.38	0.37±0.07(28)	0.102	0.101± 0.018(28)	0.133	0.135±0.026(28)	0.000	0.001±0.004(28)	0.000	0.000± 0.001(28)
Celery, raw - 2 stalks 7 1/2" long	80	0.12	0.15± 0.08(28)	0.09	0.11±0.10(27)	0.020	0.028± 0.029(28)	0.077	0.081±0.034(28)	0.000	0.000±0.001(28)	0.000	0.001± 0.001(28)
Vegetables, beans/peas													
Pinto beans, boiled 1/2 cup	85	1.88	1.88± 0.38(28)	0.87	0.88±0.11(28)	0.210	0.215± 0.042(27)	0.459	0.453±0.057(28)	0.006	0.005±0.004(28)	0.004	0.016± 0.035(28)
Cowpeas (blackeyed peas), boiled 1/2 cup	86	1.86	1.84± 0.27(28)	1.23	1.23±0.17(28)	0.227	0.233± 0.035(27)	0.439	0.441±0.067(28)	0.000	0.000±0.002(28)	0.005	0.028± 0.061(28)
Navy beans, boiled 1/2 cup	91	2.17	2.23± 0.37(28)	0.91	0.93±0.14(28)	0.239	0.236± 0.047(27)	0.601	0.603±0.101(28)	0.000	0.002±0.003(28)	0.005	0.032± 0.062(28)
Red beans, boiled 1/2 cup	92	2.01	2.02± 0.33(28)	0.93	0.92±0.12(28)	0.224	0.225± 0.035(27)	0.483	0.474±0.078(28)	0.000	0.000±0.001(28)	0.005	0.024± 0.044(28)
Pork and beans, canned - 1/2 cup	126	2.00	2.05± 0.23(28)	1.81	1.88±0.58(28)	0.237	0.241± 0.031(27)	0.459	0.473±0.062(28)	0.000	0.003±0.004(28)	0.004	0.007± 0.010(28)
Lima beans, immature, frozen, boiled 1/2 cup	91	1.63	1.63± 0.32(28)	0.66	0.68±0.20(28)	0.152	0.148± 0.027(27)	0.564	0.583±0.109(28)	0.000	0.000±0.000(28)	0.005	0.035± 0.077(28)
Lima beans, mature, boiled - 1/2 cup	94	1.50	1.54± 0.27(28)	0.83	0.83±0.11(28)	0.181	0.190± 0.036(27)	0.446	0.469±0.089(28)	0.000	0.002±0.005(28)	0.002	0.011± 0.021(28)
Green peas, frozen, boiled - 1/2 cup	80	1.16	1.17± 0.22(28)	0.52	0.52±0.13(28)	0.081	0.080± 0.017(27)	0.218	0.219±0.050(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.005(28)
Green peas, canned 1/2 cup	85	1.04	1.10± 0.28(28)	0.60	0.63±0.11(28)	0.085	0.087± 0.033(27)	0.187	0.190±0.026(28)	0.000	0.000±0.001(28)	0.000	0.004± 0.012(28)
Vegetables, root/tuber													
Carrot, raw 7 1/2" long	72	0.19	0.20± 0.05(28)	0.18	0.18±0.04(28)	0.035	0.038± 0.014(28)	0.104	0.111±0.044(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Beets, canned 1/2 cup slices	85	0.53	0.63± 0.28(28)	0.27	0.29±0.09(28)	0.037	0.037± 0.009(28)	0.359	0.368±0.096(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Radishes, raw 1/2 cup slices	58	0.13	0.17± 0.12(28)	0.10	0.10±0.04(28)	0.010	0.008± 0.004(28)	0.024	0.027±0.009(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Onion, raw 1/2 cup chopped	80	0.17	0.18± 0.05(28)	0.14	0.14±0.04(28)	0.033	0.032± 0.012(28)	0.120	0.121±0.035(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.003(28)
Onion rings, breaded, fried, frozen, heated - 7 rings	70	0.67	0.67± 0.15(28)	0.30	0.30±0.05(28)	0.056	0.060± 0.019(28)	0.238	0.242±0.044(28)	0.000	0.002±0.002(28)	0.013	0.023± 0.038(28)
Sweetpotato w/ peel, baked - 5" long, 2" diameter	114	0.93	0.91± 0.24(28)	0.36	0.35±0.11(28)	0.210	0.203± 0.080(28)	0.549	0.663±0.364(28)	0.000	0.000±0.000(28)	0.002	0.003± 0.004(28)
Sweetpotato, candied, homemade - 1/2 cup	100	1.00	1.01± 0.33(28)	0.27	0.26±0.06(28)	0.136	0.146± 0.039(27)	0.296	0.359±0.187(28)	0.000	0.000±0.000(28)	0.008	0.017± 0.024(28)
Potato w/ peel, baked 1 5/6" diameter	101	1.25	1.50± 0.69(28)	0.36	0.36±0.08(28)	0.100	0.106± 0.044(27)	0.231	0.237±0.060(28)	0.000	0.000±0.000(28)	0.009	0.037± 0.067(28)
Potato w/o peel, boiled 2 1/2" diameter	135	0.45	0.47± 0.14(28)	0.28	0.29±0.11(28)	0.092	0.093± 0.041(28)	0.163	0.172±0.044(28)	0.000	0.000±0.000(28)	0.001	0.010± 0.031(28)
Potatoes, mashed, from instant 1/2 cup	100	0.32	0.33± 0.09(28)	0.22	0.22±0.04(28)	0.048	0.051± 0.017(28)	0.073	0.075±0.016(28)	0.000	0.000±0.000(28)	0.032	0.064± 0.100(28)
French fries, frozen, heated - 20 pieces	100	0.76	0.77± 0.14(28)	0.39	0.40±0.08(28)	0.154	0.154± 0.059(28)	0.222	0.225±0.051(28)	0.000	0.000±0.000(28)	0.006	0.024± 0.040(28)
Potatoes, scalloped, homemade - 1/2 cup	122	0.42	0.47± 0.14(28)	0.41	0.42±0.08(28)	0.061	0.068± 0.034(27)	0.133	0.141±0.032(28)	0.000	0.000±0.000(28)	0.015	0.026± 0.025(28)
Potato chips 20 chips	40	0.62	0.65± 0.15(28)	0.44	0.44±0.09(28)	0.138	0.138± 0.032(27)	0.170	0.183±0.054(28)	0.000	0.002±0.002(28)	0.001	0.002± 0.004(28)
Vegetables, other													
Tomato, raw 2 3/5" diameter	123	0.27	0.29± 0.08(28)	0.15	0.16±0.04(28)	0.067	0.071± 0.019(28)	0.123	0.124±0.025(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.008(28)
Tomatoes, canned 1/2 cup	120	0.65	0.75± 0.39(28)	0.17	0.17±0.05(28)	0.084	0.084± 0.021(28)	0.091	0.090±0.020(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.004(28)
Tomato juice, canned/ bottled - 4 fl oz	122	0.48	0.56± 0.27(28)	0.17	0.18±0.05(28)	0.081	0.079± 0.016(28)	0.088	0.086±0.011(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Tomato sauce, canned/ bottled - 1/2 cup	122	0.78	1.21± 1.23(28)	0.23	0.22±0.03(28)	0.121	0.136± 0.044(28)	0.121	0.124±0.021(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)

TABLE 4—*Continued*

Food serving[b]	Weight of serving (g)	Iron Median	Iron Mean±sd(n)	Zinc Median	Zinc Mean±sd(n)	Copper Median	Copper Mean±sd(n)	Manganese Median	Manganese Mean±sd(n)	Selenium Median	Selenium Mean±sd(n)	Iodine Median	Iodine Mean±sd(n)
Snap green beans, fresh/frozen, boiled 1 cup	125	0.77	0.81± 0.19(28)	0.29	0.31±0.87(28)	0.063	0.0072±0.030(28)	0.347	0.356±0.107(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.003(28)
Snap green beans, canned - 1 cup	136	1.44	1.51± 0.56(28)	0.33	0.37±0.12(28)	0.052	0.051± 0.021(28)	0.256	0.280±0.090(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.007(28)
Green, sweet pepper, raw - 1/2 cup	50	0.16	0.17± 0.04(28)	0.07	0.07±0.02(28)	0.034	0.037± 0.014(28)	0.060	0.063±0.025(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Summer squash, fresh/ frozen, boiled 1/2 cup slices	90	0.31	0.33± 0.13(28)	0.19	0.20±0.06(28)	0.050	0.056± 0.020(28)	0.140	0.140±0.036(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Winter squash, hubbard/acorn, fresh/frozen, boiled - 1/2 cup	102	0.31	0.32± 0.12(28)	0.23	0.26±0.12(28)	0.047	0.051± 0.020(28)	0.166	0.171±0.076(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Cucumber, pared, raw 1/2 cup slices	52	0.09	0.09± 0.03(28)	0.06	0.07±0.01(28)	0.016	0.016± 0.006(28)	0.041	0.045±0.014(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.012(28)
Pickle, dill 3 3/4" long	65	0.24	0.26± 0.09(28)	0.06	0.07±0.04(28)	0.024	0.023± 0.008(27)	0.029	0.031±0.015(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.005(28)
Avocado, raw 1/2 of 3" diameter	100	0.50	0.49± 0.19(28)	0.65	0.67±0.23(28)	0.228	0.232± 0.074(28)	0.163	0.160±0.059(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.004(28)
Corn, fresh/frozen, boiled - 1/2 cup	82	0.38	0.36± 0.08(28)	0.50	0.50±0.14(28)	0.037	0.039± 0.013(27)	0.129	0.130±0.038(28)	0.000	0.000±0.000(28)	0.002	0.006± 0.014(28)
Corn, canned 1/2 cup	82	0.30	0.31± 0.09(28)	0.32	0.34±0.06(28)	0.025	0.024± 0.009(27)	0.066	0.070±0.019(28)	0.000	0.000±0.000(28)	0.004	0.007± 0.008(28)
Cream style corn, canned - 1/2 cup	128	0.42	0.42± 0.14(28)	0.67	0.74±0.24(28)	0.035	0.030± 0.013(27)	0.088	0.091±0.020(28)	0.000	0.000±0.001(28)	0.003	0.016± 0.042(28)
Mixed vegetables, canned - 1/2 cup	82	0.54	0.63± 0.25(28)	0.27	0.29±0.09(28)	0.034	0.034± 0.010(28)	0.096	0.099±0.018(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.002(28)
Mushrooms, canned 1/2 cup	78	0.60	0.69± 0.40(28)	0.53	0.54±0.13(28)	0.184	0.194± 0.046(28)	0.037	0.044±0.031(28)	0.000	0.000±0.001(28)	0.000	0.004± 0.014(28)
Fruit, fruit juices													
Apple, red, raw 2 3/4" diameter	138	0.17	0.20± 0.12(28)	0.03	0.03±0.02(28)	0.040	0.041± 0.015(28)	0.048	0.047±0.010(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.003(28)
Applesauce, sweetened, canned 1/2 cup	122	0.45	0.73± 1.20(28)	0.01	0.02±0.02(28)	0.035	0.034± 0.009(28)	0.024	0.028±0.009(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Apple juice, canned/ bottled - 4 fl oz	124	0.48	0.54± 0.33(28)	0.05	0.05±0.03(28)	0.012	0.013± 0.008(28)	0.163	0.200±0.131(28)	0.000	0.000±0.000(28)	0.002	0.004± 0.006(28)
Banana, raw 8 3/4" long	114	0.32	0.35± 0.10(28)	0.19	0.21±0.06(28)	0.138	0.141± 0.036(28)	0.295	0.290±0.132(28)	0.000	0.000±0.001(28)	0.000	0.003± 0.011(28)
Pear, raw 3 1/2" long	166	0.22	0.23± 0.08(28)	0.17	0.18±0.09(28)	0.137	0.142± 0.030(28)	0.111	0.112±0.032(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.003(28)
Pear in heavy syrup, canned - 2 halves	158	0.57	0.62± 0.32(28)	0.08	0.11±0.14(28)	0.062	0.063± 0.014(28)	0.043	0.040±0.010(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.004(28)
Fruit cocktail in heavy syrup, canned 1/2 cup	128	0.40	0.47± 0.27(28)	0.08	0.07±0.03(28)	0.076	0.078± 0.022(28)	0.122	0.129±0.040(28)	0.000	0.000±0.000(28)	0.045	0.045± 0.017(28)
Orange, navel/ valencia, raw 2 5/8" diameter	131	0.20	0.19± 0.10(28)	0.07	0.08±0.04(28)	0.058	0.057± 0.013(28)	0.039	0.040±0.011(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.003(28)
Orange juice, frozen, reconstituted 4 fl oz	124	0.12	0.13± 0.04(28)	0.04	0.04±0.03(28)	0.037	0.035± 0.012(28)	0.032	0.033±0.009(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Grapefruit, raw 1/2 medium	118	0.12	0.14± 0.10(28)	0.06	0.06±0.03(28)	0.041	0.039± 0.012(28)	0.024	0.025±0.010(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Grapefruit juice, frozen, reconstituted - 4 fl oz	123	0.14	0.18± 0.11(28)	0.05	0.05±0.03(28)	0.036	0.036± 0.011(28)	0.022	0.022±0.007(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Pineapple in juice, canned - 1/2 cup	125	0.29	0.30± 0.11(28)	0.10	0.10±0.03(28)	0.062	0.066± 0.014(28)	1.337	1.283±0.377(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Pineapple juice, canned/bottled 4 fl oz	125	0.29	0.29± 0.08(28)	0.10	0.10±0.02(28)	0.043	0.043± 0.019(28)	1.431	1.433±0.392(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.003(28)
Grapes, purple/green, raw - 1 cup	160	0.54	0.60± 0.29(28)	0.08	0.08±0.06(28)	0.156	0.199± 0.124(28)	0.098	0.114±0.057(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Grape juice, canned/ bottled - 4 fl oz	125	0.21	0.24± 0.17(28)	0.09	0.08±0.03(28)	0.015	0.015± 0.008(28)	0.397	0.382±0.176(28)	0.000	0.000±0.002(28)	0.000	0.002± 0.003(28)
Peach, raw 2 1/2" diameter	87	0.21	0.26± 0.12(28)	0.12	0.12±0.04(28)	0.056	0.056± 0.016(28)	0.052	0.053±0.009(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.003(28)
Peach in heavy syrup, canned - 1/2 cup	128	0.35	0.44± 0.32(28)	0.08	0.07±0.03(28)	0.042	0.043± 0.014(28)	0.037	0.035±0.007(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.004(28)
Plums, purple, raw 2 plums, 2 1/8" diameter	132	0.24	0.25± 0.08(28)	0.12	0.11±0.04(28)	0.065	0.069± 0.023(28)	0.081	0.082±0.018(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Strawberries, raw 1 cup	149	0.83	0.83± 0.33(28)	0.19	0.24±0.16(28)	0.062	0.069± 0.035(28)	0.695	0.723±0.320(28)	0.000	0.000±0.000(28)	0.000	0.005± 0.014(28)
Sweet cherries, raw 15 cherries	102	0.34	0.36± 0.11(28)	0.08	0.09±0.07(28)	0.093	0.095± 0.027(28)	0.078	0.085±0.038(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.001(28)
Cantaloupe, raw 1 cup chunks	160	0.32	0.32± 0.10(28)	0.29	0.29±0.08(28)	0.072	0.070± 0.023(28)	0.073	0.069±0.019(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.010(28)
Watermelon, raw 1 cup chunks	160	0.31	0.32± 0.06(28)	0.11	0.11±0.05(28)	0.048	0.043± 0.014(28)	0.045	0.051±0.030(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Raisins, dried 1/2 cup	73	1.40	1.43± 0.26(28)	0.15	0.15±0.03(28)	0.228	0.233± 0.029(28)	0.241	0.237±0.030(28)	0.000	0.000±0.000(28)	0.002	0.002± 0.003(28)
Prunes, dried 3 prunes	25	0.25	0.27± 0.09(28)	0.11	0.12±0.03(28)	0.074	0.073± 0.016(28)	0.068	0.070±0.011(28)	0.000	0.000±0.000(28)	0.001	0.010± 0.024(28)
Prune juice, bottled 4 fl oz	128	0.77	0.80± 0.23(28)	0.18	0.26±0.21(28)	0.026	0.026± 0.008(28)	0.228	0.258±0.160(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.006(28)
Grain products, cooked grains													
White rice, enriched, cooked - 1/2 cup	102	1.31	1.33± 0.38(28)	0.58	0.59±0.15(28)	0.081	0.073± 0.025(27)	0.530	0.530±0.130(28)	0.008	0.007±0.005(28)	0.015	0.065± 0.114(28)
Oatmeal, cooked 1/2 cup	117	1.00	1.12± 0.55(28)	0.77	0.78±0.16(28)	0.096	0.099± 0.023(27)	0.942	0.980±0.162(28)	0.009	0.009±0.004(28)	0.002	0.011± 0.022(28)
Farina, enriched, cooked - 1/2 cup	116	5.44	4.88± 2.05(28)	0.17	0.17±0.07(28)	0.028	0.030± 0.014(27)	0.156	0.160±0.062(28)	0.006	0.006±0.006(28)	0.000	0.010± 0.022(28)

milkshake (CV = 51%), sweet potato (CV = 39%), shrimp (CV = 39%), and french fries (CV = 35%). Liver is a storage organ, and the amount of copper and other nutrients/substances stored there is often dependent upon the age and diet of the animals.

TABLE 4—*Continued*

Food serving[b]	Weight of serving (g)	Iron Median	Iron Mean±sd(n)	Zinc Median	Zinc Mean±sd(n)	Copper Median	Copper Mean±sd(n)	Manganese Median	Manganese Mean±sd(n)	Selenium Median	Selenium Mean±sd(n)	Iodine Median	Iodine Mean±sd(n)
Corn grits (hominy grits), enriched, cooked - 1/2 cup	121	1.07	1.30± 0.88(28)	0.15	0.17±0.08(28)	0.015	0.017± 0.016(27)	0.038	0.044±0.022(28)	0.000	0.001±0.003(28)	0.011	0.042± 0.061(28)
Popcorn, popped in oil - 2 cups	18	0.45	0.49± 0.12(28)	0.48	0.50±0.14(28)	0.036	0.036± 0.011(27)	0.155	0.163±0.036(28)	0.001	0.001±0.001(28)	0.001	0.005± 0.010(28)
Grain products, ready-to-eat cereals													
Corn flakes 1 cup	25	2.75	2.78± 1.20(28)	0.04	0.05±0.02(28)	0.012	0.013± 0.003(28)	0.020	0.021±0.007(28)	0.000	0.000±0.001(28)	0.001	0.030± 0.111(28)
Crisped rice cereal 1 cup	28	2.28	2.55± 0.88(28)	0.39	0.40±0.12(28)	0.053	0.056± 0.010(28)	0.381	0.379±0.042(28)	0.003	0.003±0.002(28)	0.002	0.022± 0.036(28)
Oat ring cereal 1 cup	25	5.52	6.46± 2.37(28)	0.76	0.76±0.07(28)	0.097	0.100± 0.012(28)	1.000	1.010±0.096(28)	0.009	0.009±0.003(28)	0.002	0.011± 0.015(28)
Shredded wheat cereal 1 biscuit	24	0.83	0.83± 0.12(28)	0.70	0.71±0.12(28)	0.111	0.110± 0.011(28)	0.665	0.663±0.122(28)	0.000	0.001±0.001(28)	0.002	0.008± 0.013(28)
Raisin bran cereal 1 cup	56	17.64	19.42± 9.31(28)	5.12	5.12±1.75(28)	0.291	0.287± 0.039(28)	1.893	1.933±0.358(28)	0.003	0.003±0.002(28)	0.002	0.011± 0.030(28)
Fruit-flavored, sweetened cereal 1 cup	30	5.47	5.54± 0.84(28)	4.30	4.05±0.82(28)	0.033	0.034± 0.004(28)	0.223	0.225±0.026(28)	0.002	0.002±0.001(28)	0.005	0.510± 0.947(28)
Granola w/ raisins 1/2 cup	61	2.25	2.93± 1.83(28)	1.43	1.53±0.56(28)	0.237	0.248± 0.083(28)	1.650	1.652±0.482(28)	0.011	0.012±0.005(28)	0.008	0.018± 0.051(28)
Grain products, bread, rolls, pasta, etc.													
White bread, enriched 1 slice	23	0.73	0.76± 0.13(28)	0.16	0.17±0.03(28)	0.027	0.026± 0.005(27)	0.097	0.099±0.014(28)	0.005	0.006±0.002(28)	0.017	0.022± 0.020(28)
Whole wheat bread 1 slice	23	0.76	0.78± 0.09(28)	0.46	0.46±0.06(28)	0.060	0.060± 0.008(27)	0.523	0.517±0.073(28)	0.007	0.008±0.002(28)	0.009	0.015± 0.018(28)
Rye bread 1 slice	25	0.79	0.79± 0.17(28)	0.30	0.30±0.04(28)	0.043	0.045± 0.008(27)	0.215	0.219±0.043(28)	0.008	0.008±0.003(28)	0.009	0.014± 0.013(28)
Soft white roll, enriched - 1 roll	28	0.96	0.98± 0.18(28)	0.25	0.26±0.05(28)	0.036	0.036± 0.006(27)	0.130	0.132±0.016(28)	0.007	0.006±0.002(28)	0.013	0.024± 0.026(28)
Baking powder biscuit, enriched, baked from refrigerated dough 1 biscuit	28	1.00	1.05± 0.25(28)	0.14	0.13±0.02(28)	0.026	0.025± 0.006(27)	0.105	0.109±0.018(28)	0.005	0.005±0.002(28)	0.003	0.010± 0.013(28)
Muffin, blueberry/ plain - 1 muffin	40	0.67	0.65± 0.25(28)	0.17	0.20±0.07(28)	0.028	0.030± 0.010(27)	0.165	0.200±0.114(28)	0.004	0.004±0.002(28)	0.008	0.026± 0.036(28)
Cornbread, southern style, homemade 2 1/2x2 1/2x1 3/8"	55	1.22	1.27± 0.33(28)	0.35	0.36±0.08(28)	0.031	0.030± 0.010(27)	0.097	0.103±0.022(28)	0.005	0.005±0.002(28)	0.011	0.038± 0.058(28)
Pancake, from mix 6" diameter	73	1.39	1.37± 0.26(28)	0.56	0.58±0.12(28)	0.050	0.050± 0.013(28)	0.248	0.268±0.092(28)	0.007	0.007±0.002(28)	0.018	0.044± 0.060(28)
Saltine crackers 10 crackers	28	1.50	1.48± 0.26(28)	0.21	0.21±0.02(28)	0.041	0.040± 0.005(27)	0.204	0.203±0.026(28)	0.003	0.003±0.002(28)	0.002	0.010± 0.016(26)
Flour tortilla 6" diameter	30	1.08	1.07± 0.20(28)	0.18	0.19±0.03(27)	0.037	0.038± 0.005(26)	0.140	0.141±0.020(28)	0.006	0.006±0.003(28)	0.004	0.018± 0.031(28)
Corn chips 1 oz	28	0.37	0.39± 0.08(28)	0.43	0.44±0.11(28)	0.033	0.031± 0.005(28)	0.116	0.115±0.021(28)	0.000	0.001±0.001(28)	0.001	0.011± 0.025(28)
Egg noodles, enriched, cooked - 1/2 cup	80	1.33	1.35± 0.33(28)	0.52	0.51±0.12(28)	0.067	0.069± 0.020(28)	0.229	0.219±0.052(28)	0.018	0.018±0.006(28)	0.003	0.008± 0.009(28)
Macaroni, enriched, cooked - 1/2 cup	70	0.93	0.95± 0.23(28)	0.33	0.34±0.08(28)	0.064	0.066± 0.014(28)	0.192	0.188±0.036(28)	0.015	0.014±0.005(28)	0.003	0.017± 0.037(28)
Nuts													
Peanuts, dry roasted, salted - 1 oz	28	0.51	0.52± 0.06(28)	0.91	0.92±0.08(28)	0.172	0.179± 0.026(27)	0.610	0.607±0.078(28)	0.000	0.001±0.002(28)	0.002	0.002± 0.002(28)
Peanut butter, creamy 2 T	32	0.62	0.64± 0.09(27)	0.96	0.97±0.11(28)	0.177	0.182± 0.022(27)	0.587	0.593±0.080(28)	0.000	0.001±0.001(28)	0.001	0.001± 0.002(28)
Pecans, packaged, unsalted - 1 oz	28	0.68	0.69± 0.09(28)	1.58	1.52±0.18(28)	0.322	0.320± 0.054(27)	1.210	1.199±0.241(28)	0.000	0.001±0.001(28)	0.001	0.003± 0.008(28)
Eggs													
Soft boiled egg 1 medium egg	50	1.07	1.05± 0.16(28)	0.74	0.75±0.11(28)	0.033	0.032± 0.010(27)	0.015	0.015±0.003(28)	0.011	0.013±0.003(28)	0.019	0.025± 0.021(28)
Fried egg 1 medium egg	46	0.95	0.95± 0.14(28)	0.69	0.72±0.14(28)	0.029	0.030± 0.004(27)	0.014	0.013±0.003(28)	0.012	0.012±0.003(28)	0.023	0.025± 0.015(28)
Scrambled egg, milk and fat added 1 medium egg	64	1.05	1.07± 0.15(28)	0.78	0.82±0.11(28)	0.032	0.032± 0.007(27)	0.016	0.017±0.006(28)	0.013	0.013±0.004(28)	0.023	0.031± 0.024(28)
Dairy products													
Whole milk 8 fl oz	244	0.02	0.04± 0.06(28)	0.90	0.90±0.15(28)	0.012	0.007± 0.008(28)	0.000	0.003±0.008(28)	0.000	0.000±0.000(28)	0.056	0.055± 0.018(28)
Lowfat milk, 2% fat 8 fl oz	244	0.04	0.04± 0.04(28)	1.04	0.99±0.18(28)	0.000	0.005± 0.007(28)	0.000	0.004±0.008(28)	0.000	0.001±0.004(28)	0.061	0.058± 0.021(28)
Skim milk 8 fl oz	246	0.02	0.07± 0.16(28)	1.01	0.99±0.16(28)	0.000	0.006± 0.008(28)	0.000	0.002±0.004(28)	0.000	0.000±0.000(28)	0.052	0.055± 0.022(28)
Buttermilk 8 fl oz	245	0.05	0.05± 0.06(28)	1.07	1.05±0.12(28)	0.000	0.006± 0.008(28)	0.000	0.006±0.009(28)	0.000	0.001±0.003(28)	0.059	0.062± 0.021(28)
Chocolate milk 8 fl oz	250	0.44	0.44± 0.17(28)	1.07	1.07±0.13(28)	0.072	0.072± 0.029(28)	0.070	0.074±0.019(28)	0.000	0.000±0.000(28)	0.060	0.065± 0.040(28)
Evaporated milk, canned - 4 fl oz	126	0.17	0.17± 0.10(28)	1.09	1.08±0.09(28)	0.011	0.009± 0.010(28)	0.004	0.006±0.007(28)	0.000	0.000±0.002(28)	0.032	0.048± 0.065(28)
Lowfat plain yogurt 1 cup	227	0.09	0.09± 0.04(28)	1.38	1.38±0.13(28)	0.006	0.009± 0.010(28)	0.000	0.006±0.008(28)	0.000	0.000±0.000(28)	0.073	0.075± 0.021(28)
Lowfat strawberry yogurt - 1 cup	227	0.23	0.21± 0.12(28)	1.01	1.02±0.14(28)	0.016	0.014± 0.010(28)	0.061	0.058±0.026(28)	0.000	0.000±0.003(28)	0.031	0.037± 0.021(28)
Creamed cottage cheese, 4% fat 1 cup	225	0.18	0.19± 0.14(28)	0.94	1.00±0.18(28)	0.039	0.036± 0.028(28)	0.000	0.013±0.023(28)	0.016	0.014±0.009(28)	0.056	0.060± 0.032(28)
Cheddar cheese, sharp/mild - 1 oz	28	0.10	0.10± 0.05(28)	1.12	1.13±0.14(28)	0.010	0.011± 0.005(28)	0.007	0.008±0.005(28)	0.004	0.004±0.001(28)	0.011	0.013± 0.011(28)
American cheese 1 oz	28	0.10	0.11± 0.05(28)	0.95	0.94±0.11(28)	0.010	0.011± 0.006(28)	0.006	0.006±0.003(28)	0.004	0.004±0.001(28)	0.010	0.014± 0.023(28)

The top 20 foods for manganese (0.478–1.933 mg/serving) included five breakfast cereals, three nuts, two leafy vegetables, three fruits, two legumes, baked sweet potato, white rice, whole-wheat bread, and two mixed dishes. The average CV for these products was 25% (range 11–65%) with the higher CVs for collards (CV = 65%), sweet potato (CV = 55%), and strawberries (CV = 44%).

TABLE 4—*Continued*

Food serving[b]	Weight of serving (g)	Iron Median	Iron Mean±sd(n)	Zinc Median	Zinc Mean±sd(n)	Copper Median	Copper Mean±sd(n)	Manganese Median	Manganese Mean±sd(n)	Selenium Median	Selenium Mean±sd(n)	Iodine Median	Iodine Mean±sd(n)
Animal flesh, fish													
Cod/haddock fillet, fresh/frozen, baked 3 oz	85	0.19	0.23± 0.13(28)	0.48	0.49±0.09(28)	0.028	0.030± 0.014(28)	0.013	0.020±0.017(28)	0.031	0.032±0.007(28)	0.108	0.112± 0.078(28)
Tuna, canned in oil, drained - 3 oz	85	1.12	1.15± 0.23(28)	0.68	0.67±0.19(28)	0.041	0.040± 0.013(28)	0.010	0.011±0.007(28)	0.071	0.069±0.013(28)	0.017	0.019± 0.011(28)
Fish sticks, frozen, heated - 3 sticks	84	0.70	0.72± 0.17(28)	0.40	0.42±0.06(28)	0.050	0.052± 0.019(27)	0.147	0.159±0.047(28)	0.013	0.014±0.004(28)	0.044	0.058± 0.050(28)
Shrimp, fresh/frozen, breaded, fried 3 oz	85	1.27	1.26± 0.34(28)	1.22	1.23±0.23(28)	0.171	0.187± 0.073(28)	0.124	0.125±0.033(28)	0.033	0.034±0.010(28)	0.020	0.039± 0.047(28)
Animal flesh, poultry													
Chicken, baked 3 oz	85	0.91	0.96± 0.32(28)	1.44	1.54±0.34(28)	0.048	0.056± 0.029(28)	0.018	0.018±0.009(28)	0.020	0.021±0.008(28)	0.013	0.015± 0.009(28)
Chicken breast and drumstick, breaded, fried - 3 oz	85	0.94	0.94± 0.19(28)	1.39	1.44±0.28(28)	0.044	0.055± 0.041(28)	0.028	0.029±0.011(28)	0.017	0.019±0.006(28)	0.011	0.016± 0.016(28)
Turkey breast, baked 3 oz	85	0.43	0.43± 0.06(28)	1.37	1.38±0.14(28)	0.035	0.036± 0.008(28)	0.009	0.009±0.004(28)	0.030	0.026±0.009(28)	0.009	0.013± 0.017(28)
Animal flesh, meat													
Ground beef patty, pan fried 3 oz patty	85	2.12	2.16± 0.34(28)	5.01	4.99±0.46(28)	0.068	0.067± 0.008(28)	0.009	0.010±0.005(28)	0.015	0.016±0.004(28)	0.009	0.014± 0.013(28)
Meatloaf, baked 3 oz slice	85	2.00	1.99± 0.24(28)	3.51	3.59±0.61(28)	0.076	0.076± 0.009(27)	0.047	0.049±0.015(28)	0.012	0.013±0.003(28)	0.010	0.040± 0.092(28)
Beef chuck roast, baked - 3 oz slice	85	2.51	2.48± 0.36(28)	6.91	7.00±1.15(28)	0.089	0.082± 0.017(28)	0.008	0.008±0.005(28)	0.019	0.020±0.009(28)	0.008	0.015± 0.030(28)
Beef round steak, stewed - 3 oz	85	2.21	2.28± 0.32(28)	5.27	5.38±0.63(28)	0.094	0.093± 0.014(28)	0.009	0.007±0.004(28)	0.023	0.024±0.006(28)	0.011	0.017± 0.016(28)
Beef loin/sirloin steak, pan fried 3 oz	85	2.52	2.48± 0.32(28)	4.84	4.82±0.58(28)	0.094	0.098± 0.032(28)	0.009	0.011±0.009(28)	0.020	0.020±0.006(28)	0.009	0.012± 0.009(28)
Veal cutlet, breaded, pan fried 3 oz piece	85	1.07	1.11± 0.24(28)	2.61	2.74±0.52(28)	0.075	0.083± 0.024(28)	0.041	0.046±0.022(28)	0.011	0.012±0.003(28)	0.014	0.015± 0.009(28)
Pork chop, pan fried 3 oz chop	85	0.97	1.00± 0.15(28)	2.65	2.64±0.33(28)	0.079	0.084± 0.017(28)	0.009	0.010±0.006(28)	0.031	0.030±0.012(28)	0.006	0.006± 0.004(28)
Pork roast loin, baked 3 oz slice	85	1.02	1.02± 0.19(28)	2.63	2.78±0.69(28)	0.082	0.086± 0.026(28)	0.009	0.010±0.006(28)	0.029	0.030±0.014(28)	0.006	0.011± 0.011(28)
Ham, cured, baked 3 oz slice	85	0.82	0.87± 0.15(28)	2.22	2.29±0.34(28)	0.065	0.068± 0.016(28)	0.009	0.009±0.006(28)	0.021	0.022±0.007(28)	0.010	0.011± 0.009(28)
Lamb chop, pan fried 3 oz chop	85	2.02	2.07± 0.30(28)	4.59	4.61±0.77(28)	0.128	0.132± 0.023(28)	0.010	0.011±0.003(28)	0.019	0.018±0.008(28)	0.007	0.009± 0.009(28)
Beef/calf liver, fried 3 oz	85	5.80	6.03± 0.98(28)	4.72	4.75±0.95(28)	4.845	6.009± 3.073(28)	0.325	0.327±0.033(28)	0.050	0.048±0.011(28)	0.019	0.023± 0.021(28)
Animal flesh, breakfast/luncheon meat													
Pork sausage, pan fried - 1 oz	28	0.41	0.41± 0.08(28)	0.88	0.88±0.15(28)	0.024	0.024± 0.005(28)	0.007	0.008±0.005(28)	0.005	0.005±0.002(28)	0.004	0.006± 0.006(28)
Pork bacon, pan fried 3 slices	19	0.19	0.18± 0.05(28)	0.51	0.49±0.10(28)	0.018	0.018± 0.004(28)	0.002	0.002±0.001(28)	0.004	0.004±0.002(28)	0.002	0.003± 0.006(28)
Frankfurter, boiled 1 frank	57	0.91	1.00± 0.34(28)	1.57	1.59±0.20(28)	0.028	0.028± 0.010(28)	0.018	0.017±0.006(28)	0.006	0.006±0.001(28)	0.006	0.007± 0.006(28)
Bologna 1 oz	28	0.32	0.32± 0.06(28)	0.54	0.55±0.08(28)	0.014	0.014± 0.004(28)	0.008	0.008±0.003(28)	0.003	0.003±0.001(28)	0.005	0.007± 0.006(28)
Salami 1 oz	28	0.52	0.57± 0.16(28)	0.61	0.65±0.19(28)	0.031	0.032± 0.008(28)	0.017	0.025±0.029(28)	0.004	0.004±0.001(28)	0.005	0.008± 0.007(28)
Mixed dishes													
Cheese pizza, frozen, heated - 1/3 of 10" diameter	114	2.01	1.99± 0.54(28)	1.77	1.74±0.26(28)	0.127	0.132± 0.016(27)	0.351	0.352±0.044(28)	0.024	0.024±0.007(28)	0.018	0.128± 0.296(28)
Macaroni and cheese, from box mix 1 cup	200	2.05	2.17± 0.45(28)	1.02	1.00±0.16(28)	0.124	0.126± 0.027(27)	0.448	0.441±0.087(28)	0.030	0.030±0.008(28)	0.047	0.070± 0.061(28)
Spaghetti and tomato sauce, canned 1 cup	250	1.71	1.94± 0.59(28)	1.29	1.28±0.39(28)	0.147	0.159± 0.041(27)	0.337	0.332±0.082(28)	0.025	0.025±0.009(28)	0.016	0.067± 0.126(28)
Spaghetti and meat-sauce, homemade 1 cup	248	3.55	3.52± 0.86(28)	2.21	2.40±0.79(28)	0.263	0.266± 0.044(27)	0.440	0.438±0.073(28)	0.025	0.028±0.012(28)	0.030	0.044± 0.045(28)
Lasagna, homemade 1 serving	170	2.09	2.34± 1.10(28)	2.85	2.81±0.60(28)	0.185	0.183± 0.031(27)	0.261	0.258±0.036(28)	0.023	0.023±0.008(28)	0.041	0.049± 0.030(28)
Beef and vegetable stew, homemade 1 cup	245	2.44	2.54± 0.72(28)	5.24	5.23±1.99(28)	0.169	0.164± 0.057(27)	0.256	0.270±0.083(28)	0.015	0.012±0.009(28)	0.017	0.046± 0.076(28)
Chili con carne w/ beans, canned 1 cup	255	4.59	4.54± 0.49(28)	3.17	3.15±0.41(28)	0.370	0.383± 0.051(27)	0.688	0.690±0.075(28)	0.000	0.001±0.003(28)	0.018	0.053± 0.110(28)
1/4 lb hamburger on white roll w/ garnish, fast food 1 sandwich	174	4.21	4.18± 0.50(28)	4.69	4.72±0.65(28)	0.165	0.161± 0.023(27)	0.310	0.308±0.040(28)	0.028	0.027±0.007(28)	0.019	0.035± 0.046(28)
Pork chow mein, homemade - 1 cup	250	1.36	1.48± 0.38(28)	1.85	1.95±0.47(28)	0.152	0.158± 0.036(27)	0.159	0.169±0.062(28)	0.015	0.016±0.012(28)	0.007	0.025± 0.047(28)
Chicken noodle casserole, homemade 1 cup	240	2.05	1.97± 0.55(28)	2.24	2.39±0.75(28)	0.130	0.127± 0.037(27)	0.337	0.329±0.091(28)	0.029	0.031±0.009(28)	0.024	0.068± 0.146(28)
Chicken potpie, frozen, heated 1 individual potpie	227	2.83	2.81± 0.63(28)	1.18	1.19±0.14(28)	0.125	0.125± 0.026(27)	0.449	0.454±0.094(28)	0.016	0.016±0.010(28)	0.059	0.092± 0.129(28)

The top 20 foods for selenium (0.02–0.069 mg/serving) included three fish, two poultry, seven meats, and eight mixed dishes. CVs ranged from 19 to 47% and averaged 32%. Major sources of this element were animal flesh and mixed dishes that contained animal flesh or cheese. The average CV for selenium was higher than that for iron, zinc, copper, or manganese. The variation of selenium in animal tissues most likely reflects the variable amounts of this element consumed by the animals. Plant materials

TABLE 4—*Continued*

Food serving[b]	Weight of serving (g)	Iron Median	Iron Mean±sd(n)	Zinc Median	Zinc Mean±sd(n)	Copper Median	Copper Mean±sd(n)	Manganese Median	Manganese Mean±sd(n)	Selenium Median	Selenium Mean±sd(n)	Iodine Median	Iodine Mean±sd(n)
Frozen dinner - fried chicken, mashed potatoes, cornbread and/or veg, heated													
11 oz dinner	325	3.12	3.06± 0.75(28)	2.36	2.34±0.39(28)	0.234	0.239± 0.057(27)	0.544	0.542±0.120(28)	0.036	0.034±0.010(28)	0.055	0.089± 0.131(28)
Soups													
Tomato soup, canned, reconstituted w/ whole milk													
1 cup	248	0.86	1.19± 1.06(28)	0.78	0.79±0.29(28)	0.107	0.107± 0.036(27)	0.161	0.176±0.047(28)	0.000	0.000±0.000(28)	0.025	0.027± 0.030(28)
Beef bouillon, canned, reconstituted w/ water													
1 cup	24	0.27	0.34± 0.30(28)	0.96	0.97±0.38(28)	0.000	0.005± 0.007(27)	0.024	0.030±0.018(28)	0.000	0.000±0.000(28)	0.000	0.006± 0.014(28)
Vegetable beef soup, canned, reconstituted w/ water													
1 cup	244	0.91	1.00± 0.42(28)	1.95	2.14±1.01(28)	0.051	0.056± 0.032(27)	0.128	0.142±0.076(28)	0.000	0.000±0.001(28)	0.000	0.007± 0.016(28)
Chicken noodle soup, canned, reconstituted w/ water													
1 cup	241	0.66	0.68± 0.25(28)	0.77	0.79±0.37(28)	0.024	0.029± 0.023(27)	0.120	0.126±0.052(28)	0.000	0.002±0.006(28)	0.000	0.011± 0.034(28)
Desserts, dairy-based													
Chocolate ice cream													
1 cup	133	1.18	1.31± 0.49(28)	0.72	0.74±0.14(28)	0.163	0.181± 0.054(28)	0.178	0.189±0.041(28)	0.000	0.000±0.000(28)	0.047	0.062± 0.068(28)
Chocolate milkshake, fast food													
1 average	283	1.00	1.14± 0.42(28)	1.33	1.33±0.27(28)	0.242	0.259± 0.132(28)	0.141	0.152±0.035(28)	0.000	0.000±0.000(28)	0.072	0.169± 0.286(28)
Ice cream sandwich													
1 bar	62	0.83	0.85± 0.19(28)	0.28	0.29±0.03(28)	0.041	0.040± 0.007(28)	0.129	0.133±0.020(28)	0.000	0.000±0.001(28)	0.019	0.031± 0.025(28)
Vanilla ice milk													
1 cup	131	0.12	0.13± 0.08(28)	0.51	0.59±0.23(28)	0.013	0.014± 0.010(28)	0.010	0.008±0.010(28)	0.000	0.000±0.001(28)	0.037	0.039± 0.017(28)
Chocolate pudding, made w/ whole milk from instant mix													
1/2 cup	130	0.60	0.64± 0.18(28)	0.68	0.70±0.22(28)	0.077	0.087± 0.029(28)	0.104	0.109±0.023(28)	0.000	0.000±0.000(28)	0.031	0.051± 0.061(28)
Desserts, grain-based													
Chocolate cake w/ chocolate icing, ready-to-eat/frozen													
1/6 of 18 oz cake	85	1.69	1.80± 0.41(28)	0.57	0.57±0.12(28)	0.199	0.204± 0.044(28)	0.257	0.270±0.057(28)	0.000	0.000±0.001(28)	0.009	0.017± 0.019(28)
Yellow cake w/ white icing, from mix													
1/12 of 39 oz cake	92	0.98	1.00± 0.23(28)	0.23	0.23±0.06(28)	0.032	0.031± 0.009(28)	0.087	0.088±0.017(28)	0.000	0.000±0.001(28)	0.011	0.054± 0.126(28)
Coffeecake, ready-to-eat/frozen													
2 5/8x2 3/4x1 1/4"	72	1.37	1.41± 0.34(28)	0.54	0.57±0.13(28)	0.087	0.089± 0.021(28)	0.295	0.318±0.086(28)	0.012	0.012±0.004(28)	0.009	0.025± 0.038(27)
Doughnut, cake type, plain													
3 1/4" diameter	42	0.95	0.89± 0.16(28)	0.25	0.25±0.04(28)	0.041	0.042± 0.008(28)	0.150	0.146±0.023(28)	0.003	0.004±0.002(28)	0.005	0.010± 0.014(28)
Danish pastry/sweet roll													
4 1/4" diameter	65	1.29	1.28± 0.34(28)	0.46	0.47±0.10(28)	0.065	0.066± 0.016(28)	0.229	0.241±0.059(28)	0.010	0.011±0.003(28)	0.011	0.034± 0.054(28)
Chocolate chip cookies - 2 cookies	21	0.64	0.64± 0.13(28)	0.15	0.15±0.03(28)	0.054	0.055± 0.012(28)	0.099	0.101±0.011(28)	0.000	0.000±0.000(28)	0.001	0.010± 0.023(28)
Chocolate cookies w/ white creme filling													
2 cookies	20	0.85	0.90± 0.33(28)	0.15	0.15±0.03(28)	0.063	0.060± 0.014(28)	0.107	0.109±0.014(28)	0.000	0.000±0.000(28)	0.001	0.015± 0.028(28)
Desserts, other													
Apple pie, frozen, heated - 1/6 of													
19 1/2 oz pie	92	0.40	0.49± 0.25(28)	0.14	0.15±0.05(28)	0.045	0.044± 0.010(28)	0.165	0.175±0.031(28)	0.000	0.000±0.000(28)	0.019	0.037± 0.071(28)
Pumpkin pie, frozen, heated - 1/6 of													
32 oz pie	152	1.12	1.26± 0.36(28)	0.68	0.70±0.19(28)	0.082	0.077± 0.016(28)	0.375	0.377±0.047(28)	0.000	0.001±0.002(28)	0.043	0.056± 0.041(28)
Milk chocolate candy													
1 oz	28	0.41	0.43± 0.11(28)	0.42	0.41±0.05(28)	0.124	0.127± 0.018(28)	0.092	0.094±0.013(28)	0.000	0.000±0.001(28)	0.012	0.011± 0.004(28)
Caramel candy													
1 oz	28	0.03	0.04± 0.02(28)	0.16	0.15±0.04(28)	0.004	0.004± 0.004(28)	0.003	0.003±0.004(28)	0.000	0.000±0.000(28)	0.009	0.011± 0.007(28)
Strawberry gelatin dessert, from mix													
1/2 cup	120	0.04	0.03± 0.02(28)	0.00	0.01±0.01(28)	0.000	0.004± 0.005(28)	0.003	0.004±0.004(28)	0.000	0.000±0.000(28)	0.000	0.018± 0.029(28)
Sweeteners													
White, granulated sugar - 1 T	12	0.00	0.00± 0.00(28)	0.00	0.00±0.00(28)	0.001	0.001± 0.001(27)	0.000	0.000±0.000(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(24)
Pancake syrup													
1 T	20	0.02	0.03± 0.02(27)	0.02	0.03±0.02(27)	0.000	0.001± 0.002(27)	0.016	0.018±0.012(27)	0.000	0.000±0.000(27)	0.001	0.004± 0.005(27)
Honey													
1 T	21	0.07	0.08± 0.06(28)	0.03	0.05±0.05(28)	0.003	0.004± 0.002(28)	0.012	0.015±0.011(28)	0.000	0.000±0.000(28)	0.003	0.003± 0.003(28)
Grape jelly													
1 T	18	0.03	0.04± 0.03(28)	0.01	0.01±0.00(28)	0.003	0.003± 0.002(28)	0.024	0.024±0.013(28)	0.000	0.000±0.000(28)	0.004	0.019± 0.028(28)
Catsup													
1 T	15	0.08	0.08± 0.01(28)	0.03	0.03±0.01(28)	0.027	0.029± 0.008(28)	0.019	0.020±0.004(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Sweetened chocolate powder for hot/cold milk - 1 hp T	22	0.76	0.77± 0.17(27)	0.33	0.32±0.04(27)	0.169	0.168± 0.023(27)	0.174	0.172±0.025(27)	0.000	0.000±0.000(27)	0.000	0.002± 0.006(27)
Fats and sauces													
Corn oil													
1 T	14	0.00	0.01± 0.01(28)	0.00	0.00±0.00(28)	0.000	0.001± 0.001(27)	0.000	0.000±0.001(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.000(28)
Margarine, stick type													
1 T	14	0.01	0.01± 0.00(28)	0.00	0.00±0.00(28)	0.000	0.001± 0.001(27)	0.000	0.000±0.001(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)

(although generally low in selenium) take up amounts available from soils, and soils are quite variable in selenium content.

The top 20 foods highest in iodine (0.055–0.510 g/serving) included fruit-flavored cereal, two dairy desserts, six mixed dishes, two fish items, seven dairy products, mashed potatoes,

TABLE 4—*Continued*

Food serving[b]	Weight of serving (g)	Iron Median	Iron Mean±sd(n)	Zinc Median	Zinc Mean±sd(n)	Copper Median	Copper Mean±sd(n)	Manganese Median	Manganese Mean±sd(n)	Selenium Median	Selenium Mean±sd(n)	Iodine Median	Iodine Mean±sd(n)
Butter													
1 T	14	0.01	0.01± 0.01(28)	0.01	0.01±0.01(28)	0.000	0.001± 0.001(27)	0.000	0.001±0.001(28)	0.000	0.000±0.001(28)	0.000	0.000± 0.001(28)
Mayonnaise													
1 T	14	0.03	0.03± 0.01(28)	0.02	0.02±0.01(28)	0.002	0.001± 0.001(27)	0.001	0.002±0.005(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
Italian salad dressing													
1 T	15	0.01	0.01± 0.01(28)	0.00	0.00±0.01(28)	0.000	0.001± 0.001(27)	0.002	0.002±0.002(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.000(28)
Half & half cream													
1 T	15	0.00	0.01± 0.01(28)	0.05	0.05±0.01(28)	0.000	0.001± 0.001(27)	0.000	0.000±0.001(28)	0.000	0.000±0.000(28)	0.002	0.003± 0.002(28)
Powdered cream substitute - 1 T	6	0.01	0.01± 0.01(28)	0.01	0.01±0.00(28)	0.000	0.000± 0.001(27)	0.001	0.001±0.000(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(27)
Brown gravy, from mix													
1 T	16	0.03	0.03± 0.01(28)	0.01	0.01±0.01(28)	0.001	0.001± 0.001(27)	0.008	0.008±0.003(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.001(28)
White sauce, medium, homemade - 1 T	16	0.06	0.06± 0.02(28)	0.06	0.06±0.01(28)	0.002	0.003± 0.005(27)	0.007	0.008±0.002(28)	0.000	0.000±0.000(28)	0.002	0.003± 0.002(28)
Beverages													
Tap water													
8 fl oz	240	0.00	0.02± 0.04(28)	0.00	0.03±0.05(28)	0.006	0.013± 0.017(28)	0.000	0.001±0.002(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.012(28)
Lemonade, frozen, reconstituted													
8 fl oz	248	0.10	0.15± 0.11(28)	0.02	0.03±0.02(28)	0.006	0.008± 0.008(28)	0.005	0.008±0.007(28)	0.000	0.000±0.000(28)	0.000	0.004± 0.005(28)
Orange drink, canned													
8 fl oz	248	0.27	0.27± 0.15(28)	0.02	0.03±0.04(28)	0.005	0.008± 0.007(28)	0.007	0.015±0.024(28)	0.000	0.000±0.000(28)	0.000	0.004± 0.005(28)
Cherry drink, from powder - 8 fl oz	262	0.03	0.06± 0.08(28)	0.00	0.01±0.01(28)	0.000	0.003± 0.005(28)	0.000	0.000±0.001(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.008(28)
Carbonated lemon-lime soda - 12 fl oz	368	0.00	0.03± 0.06(28)	0.00	0.02±0.03(28)	0.000	0.003± 0.008(28)	0.000	0.003±0.004(28)	0.000	0.000±0.000(28)	0.000	0.005± 0.008(28)
Carbonated cola													
12 fl oz	370	0.00	0.04± 0.11(28)	0.00	0.02±0.03(28)	0.000	0.004± 0.007(28)	0.000	0.001±0.004(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.006(28)
Carbonated diet cola													
12 fl oz	355	0.04	0.09± 0.35(28)	0.04	0.03±0.03(28)	0.000	0.002± 0.004(28)	0.000	0.003±0.007(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.006(28)
Coffee, from instant													
8 fl oz	240	0.18	0.23± 0.14(28)	0.00	0.01±0.01(28)	0.000	0.002± 0.003(28)	0.067	0.094±0.061(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.003(28)
Decaffeinated coffee, from instant													
8 fl oz	240	0.17	0.18± 0.09(28)	0.00	0.01±0.01(28)	0.000	0.002± 0.003(28)	0.077	0.084±0.043(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.002(28)
Tea, made from tea bag - 8 fl oz	240	0.02	0.02± 0.03(28)	0.02	0.02±0.02(28)	0.014	0.014± 0.009(28)	0.611	0.625±0.313(28)	0.000	0.000±0.000(28)	0.000	0.006± 0.026(28)
Beer, canned													
12 fl oz	356	0.00	0.01± 0.03(28)	0.00	0.01±0.02(28)	0.018	0.015± 0.012(28)	0.036	0.036±0.014(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.006(28)
Table wine													
4 fl oz	118	0.39	0.41± 0.11(28)	0.07	0.08±0.02(28)	0.011	0.012± 0.010(28)	0.135	0.156±0.083(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.002(28)
Whisky, 80-proof													
1 1/2 fl oz	42	0.00	0.00± 0.00(28)	0.00	0.00±0.00(28)	0.007	0.007± 0.003(28)	0.001	0.001±0.001(28)	0.000	0.000±0.000(28)	0.000	0.000± 0.000(28)
Strained/junior vegetables													
Creamed spinach													
1 jar	213	1.54	1.75± 0.51(28)	1.09	1.09±0.21(28)	0.126	0.124± 0.029(27)	1.181	1.120±0.259(28)	0.000	0.000±0.000(28)	0.021	0.023± 0.011(28)
Peas													
1 jar	206	2.16	2.08± 0.40(28)	1.02	1.00±0.23(28)	0.167	0.177± 0.052(27)	0.499	0.511±0.125(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.003(28)
Green beans													
1 jar	206	1.44	1.53± 0.48(28)	0.45	0.47±0.12(28)	0.101	0.105± 0.027(27)	0.566	0.672±0.321(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.006(28)
Carrots													
1 jar	213	0.46	0.48± 0.16(28)	0.35	0.36±0.09(28)	0.085	0.083± 0.027(27)	0.264	0.322±0.185(28)	0.000	0.000±0.002(28)	0.000	0.002± 0.003(28)
Sweetpotato/yellow squash - 1 jar	220	0.65	0.70± 0.21(28)	0.35	0.36±0.07(28)	0.185	0.186± 0.047(27)	0.398	0.449±0.167(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.003(28)
Creamed corn													
1 jar	213	0.37	0.40± 0.13(28)	0.61	0.62±0.11(28)	0.043	0.049± 0.015(27)	0.246	0.222±0.065(28)	0.000	0.001±0.003(28)	0.006	0.007± 0.006(28)
Mixed/garden vegetables - 1 jar	213	0.78	0.81± 0.24(28)	0.46	0.45±0.14(28)	0.098	0.097± 0.025(27)	0.412	0.421±0.102(28)	0.000	0.000±0.000(28)	0.003	0.004± 0.006(28)
Strained/junior fruits and fruit juices													
Orange juice													
1 jar	130	0.13	0.15± 0.07(28)	0.05	0.05±0.02(28)	0.043	0.046± 0.012(27)	0.046	0.074±0.053(28)	0.000	0.000±0.000(28)	0.003	0.003± 0.002(28)
Applesauce													
1 jar	213	0.23	0.25± 0.08(28)	0.04	0.04±0.04(28)	0.049	0.061± 0.025(27)	0.093	0.113±0.053(28)	0.000	0.000±0.002(28)	0.000	0.003± 0.003(28)
Apple juice													
1 jar	130	0.23	0.27± 0.12(28)	0.03	0.03±0.02(28)	0.014	0.017± 0.012(27)	0.209	0.195±0.090(28)	0.000	0.000±0.000(28)	0.003	0.005± 0.008(28)
Dutch apple/apple betty - 1 jar	220	0.18	0.21± 0.12(28)	0.04	0.04±0.05(28)	0.040	0.037± 0.025(27)	0.058	0.060±0.027(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.003(28)
Banana and pineapple													
1 jar	220	0.31	0.31± 0.07(28)	0.11	0.10±0.07(28)	0.075	0.072± 0.020(27)	0.507	0.499±0.134(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.004(28)
Peaches													
1 jar	220	0.32	0.39± 0.17(28)	0.18	0.17±0.06(28)	0.108	0.117± 0.032(27)	0.107	0.117±0.039(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.004(28)
Pears													
1 jar	213	0.30	0.30± 0.09(28)	0.17	0.19±0.07(28)	0.166	0.167± 0.024(27)	0.170	0.180±0.093(28)	0.000	0.000±0.000(28)	0.000	0.003± 0.005(28)
Prunes/plums													
1 jar	220	0.51	0.54± 0.17(28)	0.20	0.20±0.06(28)	0.145	0.140± 0.047(27)	0.165	0.173±0.050(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.003(28)
Fruit dessert													
1 jar	220	0.31	0.36± 0.13(28)	0.09	0.09±0.06(28)	0.064	0.066± 0.030(27)	0.349	0.372±0.193(28)	0.000	0.000±0.000(28)	0.000	0.001± 0.003(28)
Strained/junior cereals													
Mixed cereal prepared w/ whole milk													
1 oz	28	3.32	3.36± 0.82(28)	0.18	0.16±0.06(28)	0.015	0.017± 0.004(27)	0.126	0.125±0.030(28)	0.001	0.001±0.001(28)	0.003	0.005± 0.010(28)
Oatmeal w/ applesauce and bananas - 1 jar	220	15.40	15.31± 1.77(28)	0.63	0.63±0.09(28)	0.110	0.124± 0.033(27)	0.921	0.928±0.114(28)	0.000	0.000±0.000(28)	0.000	0.002± 0.004(28)
Infant formulas													
Milk-based formula plus iron, canned, ready-to-serve													
1 fl oz	30	0.42	0.47± 0.12(28)	0.21	0.22±0.06(28)	0.023	0.024± 0.007(27)	0.004	0.005±0.006(28)	0.000	0.000±0.000(28)	0.003	0.003± 0.001(28)
Milk-based formula, canned, ready-to-serve - 1 fl oz	30	0.06	0.07± 0.03(28)	0.23	0.23±0.06(28)	0.024	0.026± 0.007(27)	0.003	0.004±0.007(28)	0.000	0.000±0.000(28)	0.003	0.003± 0.001(28)
Strained/junior meat/poultry													
Beef													
1 jar	99	1.69	1.68± 0.16(28)	3.57	3.53±0.33(28)	0.043	0.046± 0.009(27)	0.000	0.006±0.007(28)	0.000	0.003±0.004(28)	0.004	0.011± 0.018(28)

and rice. Iodine was highly variable in some of these sources. The average CV was 104% (range 28–231%). Iodine is naturally variable in soils and hence in plant and animal tissues. The variability of iodine in salt water affects the iodine content of fish.

TABLE 4—*Continued*

Food serving[b]	Weight of serving (g)	Iron		Zinc		Copper		Manganese		Selenium		Iodine	
		Median	Mean±sd(n)	Median	Mean±sd(n)	Median	Mean±sd(n)	Median	Mean±sd(n)	Median	Mean±sd(n)	Median	Mean±sd(n)
Pork													
1 jar	99	0.97	0.99± 0.15(28)	2.32	2.31±0.26(28)	0.058	0.057± 0.009(27)	0.005	0.005±0.006(28)	0.013	0.013±0.003(28)	0.005	0.009± 0.012(28)
Chicken/turkey													
1 jar	99	1.18	1.22± 0.18(28)	1.54	1.61±0.38(28)	0.049	0.049± 0.011(27)	0.018	0.017±0.010(28)	0.013	0.013±0.002(28)	0.017	0.031± 0.038(28)
Strained/junior dinners													
Beef and vegetables													
1 jar	128	1.05	1.06± 0.16(28)	1.95	1.90±0.37(28)	0.056	0.058± 0.014(27)	0.138	0.141±0.025(28)	0.000	0.002±0.003(28)	0.005	0.031± 0.078(28)
Ham and vegetables													
1 jar	128	0.79	0.79± 0.10(28)	1.33	1.34±0.22(28)	0.072	0.073± 0.017(27)	0.137	0.136±0.018(28)	0.009	0.008±0.004(28)	0.000	0.013± 0.051(28)
Chicken/turkey and vegetables - 1 jar	128	0.98	1.03± 0.24(28)	1.21	1.17±0.21(28)	0.051	0.054± 0.012(27)	0.136	0.140±0.029(28)	0.008	0.007±0.004(28)	0.026	0.047± 0.067(28)
Vegetables w/ beef													
1 jar	213	0.88	0.91± 0.17(28)	0.92	0.92±0.20(28)	0.092	0.097± 0.023(27)	0.306	0.297±0.097(28)	0.000	0.000±0.002(28)	0.000	0.003± 0.004(28)
Vegetables w/ bacon/ ham - 1 jar	213	0.71	0.73± 0.13(28)	0.58	0.59±0.16(28)	0.104	0.107± 0.025(27)	0.332	0.319±0.064(28)	0.000	0.000±0.000(28)	0.000	0.004± 0.006(28)
Vegetables w/ chicken/turkey													
1 jar	213	0.62	0.68± 0.29(28)	0.75	0.74±0.12(28)	0.070	0.076± 0.020(27)	0.295	0.292±0.053(28)	0.000	0.001±0.003(28)	0.013	0.012± 0.008(28)
Tomatoes, beef, and macaroni - 1 jar	213	0.98	1.01± 0.16(28)	0.83	0.81±0.15(28)	0.106	0.110± 0.022(27)	0.277	0.284±0.057(28)	0.000	0.002±0.005(28)	0.005	0.006± 0.007(28)
Chicken and noodles													
1 jar	213	0.82	0.83± 0.15(28)	0.68	0.72±0.21(28)	0.072	0.079± 0.023(27)	0.262	0.275±0.056(28)	0.000	0.003±0.005(28)	0.021	0.019± 0.009(28)
Turkey and rice													
1 jar	213	0.71	0.73± 0.14(28)	0.84	0.84±0.15(28)	0.070	0.073± 0.021(27)	0.250	0.261±0.049(28)	0.000	0.001±0.003(28)	0.009	0.016± 0.039(28)
Strained/junior dessert													
Pudding/custard													
1 jar	220	0.36	0.39± 0.12(28)	0.53	0.49±0.13(28)	0.024	0.034± 0.029(27)	0.023	0.061±0.071(28)	0.000	0.000±0.000(28)	0.018	0.019± 0.014(28)

[a] Values below the limits of quantitation are reported as "0." See Table 1 for the limits of quantitation for the individual analytes.
[b] Serving portions are those commonly recognized by dietitians and nutritionists for purposes of providing nutrition education, guidance, and counseling. Serving sizes for strained and junior foods reflect junior jar sizes in cases where strained and junior jar sizes were not the same.

Sources of iodine in milk include iodine feed supplements given to dairy cows and iodophor sanitizing solutions used to clean cattle and dairy equipment (Pennington, 1988). Variable quantities of iodine in milk may affect the iodine content of cheese, dairy desserts, and entrees or recipe items made with milk or cheese. The variability of iodine in the seven Total Diet Study dairy products was somewhat lower than in other foods (average CV = 41%; range 33–62%).

The iodine content of foods can be increased by the use of iodine-containing food additives such as iodate dough conditioners used in breads and FD&C Red No. 3 (erythrosine), which is 58% iodine on a weight basis. FD&C Red No. 3 has been used in ready-to-eat cereals and probably accounts for the variability of this element in the fruit-flavored cereal.

Another factor which can greatly increase the iodine content of foods is the use of iodized salt. We attempted to eliminate this variable in the present study by omitting discretionary salt and by using only noniodized salt in mixed dishes and recipe items. It is generally assumed that industry uses noniodized salt for economic reasons and because some people are sensitive to iodine (Pennington, 1990); however, food manufacturing companies may, if they choose, use iodized salt in food products. In these cases, the food label must indicate in the list of ingredients that iodized salt was added to the product.

DISCUSSION

As discussed in the preceding paper (Pennington and Young, 1990), nutrient variability is of more practical significance when it occurs in foods considered to be sources of particular nutrients. Source categories for iron, zinc, copper, and iodine are shown in Table 6. Source categories have been defined by FDA (Pennington *et al.*, 1990) for purposes of making nutritional claims on food labels. Excellent sources contain 40% or more of the USRDA (U.S. Recommended Daily Allowance), good sources contain 25% or more of the USRDA, and fair sources contain 10% or more of the USRDA per serving. The USRDAs for iron, zinc, copper, and iodine are, respectively, 18, 15, 2, and 0.150 mg/day. No USRDAs have been established for manganese or selenium.

TABLE 5

AVERAGE CONCENTRATIONS OF MICROELEMENTS IN FOODS BY FOOD GROUPS

Food group (n)	Iron	Zinc	Copper	Manganese	Selenium	Iodine
			(mg per serving)			
Vegetables						
Leafy (7)	1.39	0.26	0.038	0.321	0.000	0.002
Stem/flower (4)	0.40	0.22	0.045	0.135	0.000	0.000
Beans/peas (9)	1.72	0.94	0.184	0.430	0.001	0.018
Root/tuber (13)	0.61	0.29	0.087	0.225	0.000	0.016
Other (17)	0.54	0.30	0.072	0.124	0.000	0.003
Fruit, fruit juices (25)	0.42	0.11	0.071	0.234	0.000	0.004
Grain products						
Cooked grains (5)	1.82	0.44	0.051	0.375	0.005	0.027
Ready-to-eat cereals (7)	5.79	1.80	0.121	0.840	0.004	0.087
Bread, rolls, pasta, etc. (13)	0.99	0.32	0.042	0.193	0.007	0.020
Nuts (3)	0.62	1.14	0.227	0.800	0.001	0.002
Eggs (3)	1.02	0.76	0.031	0.015	0.013	0.027
Dairy products (11)	0.14	1.05	0.017	0.017	0.002	0.049
Animal flesh						
Fish (4)	0.84	0.70	0.077	0.079	0.037	0.057
Poultry (3)	0.78	1.45	0.049	0.019	0.022	0.015
Meat (11)	2.14	4.14	0.625	0.045	0.023	0.016
Breakfast/luncheon meat (5)	0.50	0.83	0.023	0.012	0.004	0.006
Mixed dishes (12)	2.71	2.52	0.185	0.382	0.022	0.064
Soups (4)	0.80	1.17	0.049	0.119	0.001	0.013
Desserts						
Dairy-based (5)	0.81	0.73	0.116	0.118	0.000	0.070
Grain-based (7)	1.13	0.34	0.078	0.177	0.004	0.024
Other (5)	0.45	0.28	0.051	0.131	0.000	0.027
Sweeteners (6)	0.17	0.07	0.034	0.042	0.000	0.005
Fats and sauces (9)	0.02	0.02	0.001	0.002	0.000	0.001
Beverages (13)	0.12	0.02	0.007	0.079	0.000	0.003
Strained/junior foods						
Vegetables (7)	1.11	0.62	0.117	0.531	0.000	0.006
Fruits, fruit juices (9)	0.31	0.10	0.080	0.198	0.000	0.003
Cereals (2)	9.34	0.40	0.071	0.527	0.001	0.004
Infant formula (2)	0.27	0.23	0.025	0.005	0.000	0.003
Meat/poultry (3)	1.30	2.48	0.051	0.009	0.010	0.017
Dinners (9)	0.86	1.00	0.081	0.238	0.003	0.017
Dessert (1)	0.39	0.49	0.034	0.061	0.000	0.019

TABLE 6

SOURCE CATEGORIES FOR IRON, ZINC, COPPER, AND IODINE IN TOTAL DIET STUDY FOODS

	Fe[a]		Zn[b]		Cu[c]		I	
	No. of foods	CV mean (range)	No. of foods	CV mean (range)	No. of foods	CV mean (range)	No. of foods	CV mean (range)
Excellent source	1	48	0	-	1	51	16	118 (28-231)
Good source	6	33 (11-77)	10	19 (9-38)	0	-	17	115 (33-230)
(Fair) source	26	24 (11-63)	18	22 (13-47)	29	24 (12-62)	44	146 (44-370)

[a] Iron: Excellent source = raisin bran cereal; good sources = oat ring cereal; fried liver; fruit-flavored cereal; farina; fresh/frozen, boiled spinach; and chili con carne w/ beans.

[b] Zinc: Good sources = raisin bran cereal; fruit-flavored cereal; ground beef; beef chuck; beef round; beef loin; lamb chop; fried liver; beef and vegetable stew; and fast food hamburger.

[c] Copper: Excellent source = fried liver.

The one excellent source of iron (raisin bran cereal) is variable (CV = 48%), probably because of fortification practices. The six good sources have an average CV of 33% (range 12–77%), and the 26 fair sources have an average CV of 24% (range 11–63%). There are no excellent sources of zinc; the 10 good sources have an average CV of 19% (range 13–47%).

The one excellent source of copper (fried liver) is somewhat variable (CV = 51%). There were no good sources of copper; the 29 fair sources had a CV of 24% (range 12–62%). The 16 excellent, 17 good, and 44 fair sources of iodine are all quite variable. Of these 77 foods, 50 had CVs greater than or equal to 100%; 12 of these were over 200% and one was over 300%. The most variable foods were yellow cake (CV = 233%), creamed corn (CV = 263%), corn flakes (CV = 370%), and granola (CV = 283%).

Compared to the macroelements (Pennington and Young, 1990), the microelements appear to be somewhat more variable in major sources. It is difficult to pinpoint the causes of variability of foods prepared for consumption because the inherent, environmental, processing, cooking, and analytical variables are compounded, especially for mixed dishes since they contain varying levels of ingredients each with its own causes of nutrient variability. The average variability of the 11 macro- and microelements in the top 20 food sources (in increasing order of variability) was 14% for phosphorus, 15% for potassium, 17% for magnesium, 20% for sodium and zinc, 21% for copper, 25% for manganese, 26% for copper, 28% for iron, 32% for selenium, and 104% for iodine. Sodium was highly variable for some foods, reflecting the different quantities of salt added to industry products by different manufacturers. Variability

of some elements (e.g., iron and zinc in breakfast cereals) probably reflects different fortification levels of the elements. Selenium was more variable than the other elements, except iodine. Iodine was highly variable, and data on the iodine content of foods should probably be used with caution.

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