

**Soil-type influences human selenium status and underlies widespread selenium  
deficiency risks in Malawi**

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**Supplementary Table 1.** Background data on participants, including socio-economic status (SES), collected using questionnaires administered by trained interviewers in the homes.

Variable	Mikalango			Zombwe		
	n	Mean	SD	n	Mean	SD
Age (years)	60	34.8	9.6	60	39.1	11
Height (cm)	55	152.8	5.9	53	156.5	5.5
Weight (kg)	56	52.8	8	53	55.4	11.6
BMI (wt ht <sup>-2</sup> )	55	22.5	3.3	53	22.5	4.1
SES Index <sup>1,2</sup>	60	5	4, 6	60	7	5, 8

<sup>1</sup>Median, 1<sup>st</sup> and 3<sup>rd</sup> quartile

<sup>2</sup>Variables included were house quality; sanitation; water source; household size; occupation; schooling.

Supplementary Table 2. Raw biomarker and dietary Se concentration data, including village identifier and volunteer code (n.d. = no data)

EPA	Village	Volunteer code	Composite diet Se concentration (mg d <sup>-1</sup> )	Blood plasma Se concentration (µg L <sup>-1</sup> )	Gpx3 activity (nmol min <sup>-1</sup> mL <sup>-1</sup> U/mL)	Urine Se concentration (µg L <sup>-1</sup> , creatinine corrected)
ZOMBWE	Bandawe Tembo	W-Ban-2086	0.0011	35.8	145.1	4.5
ZOMBWE	Bandawe Tembo	W-Ban-2087	0.0036	32.3	127.5	6.8
ZOMBWE	Bandawe Tembo	W-Ban-2088	0.0040	50.5	173.3	6.5
ZOMBWE	Bandawe Tembo	W-Ban-2089	0.0069	66.4	176.8	10.5
ZOMBWE	Bandawe Tembo	W-Ban-2090	0.0046	53.7	146.9	5.6
ZOMBWE	Bandawe Tembo	W-Ban-2091	0.0059	42.5	166.2	7.2
ZOMBWE	Bandawe Tembo	W-Ban-2092	n.d.	54.6	162.7	6.7
ZOMBWE	Bandawe Tembo	W-Ban-2093	n.d.	57.4	168.0	6.4
ZOMBWE	Bandawe Tembo	W-Ban-2094	0.0057	45.9	176.8	5.8
ZOMBWE	Bandawe Tembo	W-Ban-2095	0.0623	61.1	203.2	7.1
ZOMBWE	Bandawe Tembo	W-Ban-2096	0.0076	52.8	176.8	8.9
ZOMBWE	Kenani	W-Ken-2070	0.0057	56.5	144.2	7.6
ZOMBWE	Kenani	W-Ken-2071	0.0088	58.2	144.2	7.1
ZOMBWE	Kenani	W-Ken-2066	0.0017	41.9	123.1	6.5
ZOMBWE	Kenani	W-Ken-2067	0.0045	53.2	139.0	9.7
ZOMBWE	Kenani	W-Ken-2068	0.0039	45.6	126.7	6.1
ZOMBWE	Kenani	W-Ken-2069	n.d.	48.6	139.0	8.3
ZOMBWE	Msekeni	W-Mse-2097	0.0062	46.5	148.6	5.4
ZOMBWE	Msekeni	W-Mse-2098	0.0058	57.2	168.0	8.7
ZOMBWE	Msekeni	W-Mse-2099	0.0095	73.6	190.9	9.8
ZOMBWE	Msekeni	W-Mse-2100	0.0358	68.4	187.3	7.8
ZOMBWE	Msekeni	W-Mse-2101	0.0047	52.5	173.3	7.0
ZOMBWE	Msekeni	W-Mse-2102	0.0101	69.2	199.7	11.3
ZOMBWE	Msekeni	W-Mse-2103	0.0140	46.5	161.0	4.9
ZOMBWE	Msekeni	W-Mse-2104	0.0097	62.5	203.2	12.1
ZOMBWE	Msekeni	W-Mse-2105	0.0030	47.9	173.3	7.1
ZOMBWE	Msekeni	W-Mse-2106	0.0213	63.8	197.9	7.8
ZOMBWE	Msekeni	W-Mse-2107	0.0132	46.5	169.7	13.3
ZOMBWE	Msekeni	W-Mse-2108	0.0059	55.1	197.9	7.8
ZOMBWE	Msekeni	W-Mse-2109	0.0147	36.2	153.9	n.d.
ZOMBWE	Msekeni	W-Mse-2110	0.0039	44.5	194.4	5.2
ZOMBWE	Msekeni	W-Mse-2111	0.0098	48.9	166.2	9.2
ZOMBWE	Msekeni	W-Mse-2112	0.0079	54.2	194.4	7.2
ZOMBWE	Msekeni	W-Mse-2113	0.0198	43.1	164.5	5.4
ZOMBWE	Ngayiwona	W-Nga-2114	0.0130	64.0	197.9	7.2
ZOMBWE	Ngayiwona	W-Nga-2115	0.0096	44.8	180.3	7.8
ZOMBWE	Ngayiwona	W-Nga-2116	0.0182	57.3	156.6	7.3
ZOMBWE	Ngayiwona	W-Nga-2117	0.0043	58.7	177.7	8.4
ZOMBWE	Ngayiwona	W-Nga-2118	0.0024	67.2	206.7	7.7
ZOMBWE	Ngayiwona	W-Nga-2119	0.0148	56.6	151.3	7.1
ZOMBWE	Ngayiwona	W-Nga-2120	0.0078	53.7	181.2	6.4
ZOMBWE	Yesaya_Jere	W-Yes-2072	0.0029	66.5	133.7	7.0
ZOMBWE	Yesaya_Jere	W-Yes-2073	0.0036	57.9	142.5	7.7
ZOMBWE	Yesaya_Jere	W-Yes-2074	0.0118	50.4	130.2	6.7
ZOMBWE	Yesaya_Jere	W-Yes-2075	0.0086	58.5	123.1	12.3
ZOMBWE	Yesaya_Jere	W-Yes-2076	0.0071	51.3	151.3	8.1
ZOMBWE	Yesaya_Jere	W-Yes-2077	0.0055	56.3	168.9	5.3
ZOMBWE	Yesaya_Jere	W-Yes-2078	0.0058	41.1	116.1	4.1
ZOMBWE	Yesaya_Jere	W-Yes-2079	n.d.	39.1	130.2	4.7
ZOMBWE	Yesaya_Jere	W-Yes-2080	0.0078	71.1	163.6	9.9
ZOMBWE	Yesaya_Jere	W-Yes-2081	0.0069	51.1	144.2	9.7
ZOMBWE	Yesaya_Jere	W-Yes-2082	0.0167	58.2	130.2	9.7
ZOMBWE	Yesaya_Jere	W-Yes-2083	0.0031	56.0	140.7	8.2
ZOMBWE	Yesaya_Jere	W-Yes-2084	0.0034	44.3	133.7	5.3
ZOMBWE	Yesaya_Jere	W-Yes-2085	0.0050	78.4	138.1	10.2
ZOMBWE	Yolamu	W-Yoi-2061	0.0085	55.3	163.6	10.4
ZOMBWE	Yolamu	W-Yoi-2062	0.0067	53.1	158.3	9.5
ZOMBWE	Yolamu	W-Yoi-2063	0.0188	52.2	156.6	9.6
ZOMBWE	Yolamu	W-Yoi-2064	0.0036	43.5	149.5	8.6
ZOMBWE	Yolamu	W-Yoi-2065	0.0092	40.6	127.5	7.1
MIKALANGO	Billy	W-Bil-1001	0.0946	117.9	182.1	24.3
MIKALANGO	Billy	W-Bil-1002	0.1385	139.9	185.6	45.6
MIKALANGO	Billy	W-Bil-1003	0.1114	144.8	163.6	55.1
MIKALANGO	Billy	W-Bil-1004	0.0144	114.2	169.7	n.d.
MIKALANGO	Billy	W-Bil-1005	0.1057	180.8	169.7	40.4
MIKALANGO	Billy	W-Bil-1006	n.d.	107.9	162.7	49.4
MIKALANGO	Billy	W-Bil-1007	0.0284	129.8	161.0	32.2
MIKALANGO	Billy	W-Bil-1008	0.0648	148.8	182.1	29.0
MIKALANGO	Billy	W-Bil-1009	0.0547	144.3	162.7	58.9
MIKALANGO	Billy	W-Bil-1010	0.0981	203.8	173.3	33.9
MIKALANGO	Billy	W-Bil-1011	0.0533	119.1	164.5	51.0
MIKALANGO	Billy	W-Bil-1012	0.0490	117.2	169.7	n.d.
MIKALANGO	Billy	W-Bil-1013	0.0383	129.4	188.1	24.1
MIKALANGO	Billy	W-Bil-1014	0.0850	134.3	n.d.	49.7
MIKALANGO	Billy	W-Bil-1015	0.0153	116.4	197.1	25.1
MIKALANGO	Billy	W-Bil-1016	0.1918	115.4	n.d.	65.9
MIKALANGO	Chamwaka	W-Cha-1019	0.0558	116.5	n.d.	19.6
MIKALANGO	Chamwaka	W-Cha-1020	0.1075	148.9	143.4	30.3
MIKALANGO	Chamwaka	W-Cha-1021	0.1348	119.4	150.4	21.0
MIKALANGO	Chamwaka	W-Cha-1022	0.0277	102.3	141.6	18.1
MIKALANGO	Chamwaka	W-Cha-1023	n.d.	115.8	136.3	45.1
MIKALANGO	Chamwaka	W-Cha-1024	0.0286	126.0	113.5	15.9
MIKALANGO	Chifundo	W-Chif-1040	0.0519	104.1	n.d.	16.9
MIKALANGO	Chifundo	W-Chif-1041	0.0608	120.5	159.2	19.0
MIKALANGO	Chifundo	W-Chif-1042	0.0389	97.6	178.5	21.0
MIKALANGO	Chifundo	W-Chif-1043	0.0326	103.3	164.5	18.1
MIKALANGO	Chifundo	W-Chif-1044	0.1557	128.6	n.d.	37.4
MIKALANGO	Chifundo	W-Chif-1045	0.0731	121.1	180.3	16.1
MIKALANGO	Chifundo	W-Chif-1046	0.0667	84.5	146.9	13.4
MIKALANGO	Chifundo	W-Chif-1047	0.0898	117.1	155.7	36.4
MIKALANGO	Chifundo	W-Chif-1048	0.0798	113.4	113.5	n.d.
MIKALANGO	Chifundo	W-Chif-1037	0.0325	87.2	187.3	14.1
MIKALANGO	Chifundo	W-Chif-1038	0.0331	130.6	n.d.	25.8
MIKALANGO	Chifundo	W-Chif-1039	0.0194	111.6	216.7	21.4
MIKALANGO	Chimkango	W-Chi-1025	0.0138	107.9	159.2	20.4
MIKALANGO	Chimkango	W-Chi-1026	0.0300	130.7	153.9	55.4
MIKALANGO	Chimkango	W-Chi-1027	0.0314	91.8	148.6	26.6
MIKALANGO	Chimkango	W-Chi-1028	0.0978	110.1	171.5	19.5
MIKALANGO	Chimkango	W-Chi-1029	0.0617	105.6	171.5	19.7
MIKALANGO	Chimkango	W-Chi-1030	0.0537	119.7	166.2	22.1
MIKALANGO	Chimkango	W-Chi-1031	0.0416	175.8	187.3	68.2
MIKALANGO	Chimkango	W-Chi-1032	0.1224	127.8	n.d.	75.5
MIKALANGO	Moses	W-Mos-1049	0.0455	142.6	124.0	31.9
MIKALANGO	Moses	W-Mos-1050	0.0652	119.3	192.6	30.6
MIKALANGO	Moses	W-Mos-1051	0.1464	109.6	190.9	n.d.
MIKALANGO	Moses	W-Mos-1052	0.0193	84.1	196.1	12.4
MIKALANGO	Moses	W-Mos-1053	0.0670	92.9	203.2	14.6
MIKALANGO	Moses	W-Mos-1054	0.1675	133.9	176.8	105.8
MIKALANGO	Moses	W-Mos-1055	0.0460	103.5	183.8	25.1
MIKALANGO	Moses	W-Mos-1056	0.0515	98.0	212.0	27.6
MIKALANGO	Moses	W-Mos-1057	0.0768	102.6	215.5	19.6
MIKALANGO	Moses	W-Mos-1058	0.0271	82.6	199.7	12.5
MIKALANGO	Moses	W-Mos-1059	0.0058	98.9	229.6	14.0
MIKALANGO	Moses	W-Mos-1060	0.0764	124.1	204.9	15.6
MIKALANGO	Mozyenti	W-Moz-1013	0.0075	102.1	187.3	17.9
MIKALANGO	Mozyenti	W-Moz-1014	0.0144	114.1	176.8	21.5
MIKALANGO	Mozyenti	W-Moz-1015	0.1664	140.0	212.0	63.6
MIKALANGO	Mozyenti	W-Moz-1016	0.0723	105.3	201.4	25.6
MIKALANGO	Mozyenti	W-Moz-1017	0.0110	111.9	195.3	30.4
MIKALANGO	Mozyenti	W-Moz-1018	0.0403	118.5	205.8	39.3

**Supplementary Table 3.** Food Se composition data from literature sources, used in conjunction with food balance sheets to estimate dietary Se availability

Region	Item (FAO Food Balance Sheet category)	Fitted Item (item is as described in published source)	Source	Se concentration ( $\mu\text{g Se } 100 \text{ g}^{-2}$ fresh weight)	Source key
E	Apples	Apples, raw, with skin	e	0	
E	Aquatic Animals, Others	Matemba (fresh)	c	11.1	c (ref. 37)
E	Aquatic Plants	Seaweed, agar, raw	e	0.7	e (ref. 22)
E	Bananas	Banana	c	0.5	f (ref. 21)
E	Barley	Barley, pearled, raw	e	37.7	g (ref. 38)
E	Beans	Bengal beans	c	2.5	
E	Beer	Beer Europe (4.4% alcohol)	f	0	N.B. sources a,b and d not used in this table
E	Beverages, Alcoholic	Alcoholic beverage, distilled, all (gin, rum, vodka, whiskey) 80° proof	e	0	
E	Beverages, Fermented	Sorghum porridge	c	9.3	
E	Bovine Meat	Beef, meat, approx. 20% fat, raw	f	8	
E	Butter, Ghee	Ghee, butter	g	0	
E	Cassava	Cassava, raw	f	1	
E	Cephalopods	Molluscs, squid, mixed species, raw	e	44.8	
E	Cereals, Other	Wheat flour, white	f	2	
E	Citrus, Other	Orange, raw	f	1	
E	Cloves	Spices, cloves, ground	e	5.9	
E	Cocoa Beans	Cocoa, dry powder, unsweetened	e	14.3	
E	Coconut Oil	Coconut oil	f	0	
E	Coconuts - Incl Copra	Coconut, raw	f	810	
E	Coffee	Coffee, brewed from grounds, prepared with tap water	e	0	
E	Cottonseed Oil	Cottonseed oil	g	0	
E	Cream	Cream, fresh, double, including Jersey cream	g	3	
E	Crustaceans	Crustaceans, crab, blue, raw	e	37.4	
E	Dates	Dates, deglet noor	e	3	
E	Demersal Fish	Fish, herring, Pacific, raw	e	36.5	
E	Eggs	Egg, raw	f	11	
E	Fats, Animals, Raw	Lard	e	0.2	
E	Fish, Body Oil	Fish oil, sardine	e	0	
E	Fish, Liver Oil	Fish oil, cod liver	e	0	
E	Freshwater Fish	Matemba (fresh)	c	11.1	
E	Fruits, Other	Mango (raw)	f	0.6	
E	Grapefruit	Grapefruit, raw, pink and red and white, all areas	e	0.1	
E	Grapes	Grapes, red or green (European type varieties, such as Thompson seedless), raw	e	0.1	
E	Groundnut Oil	Groundnut oil	f	0	
E	Groundnuts (Shelled Eq)	Groundnut, dried, raw	f	3	
E	Honey	Honey	f	1	
E	Lemons, Limes	Lemon, fruit, raw	f	0	
E	Maize	White Ufa	c	2.6	
E	Maize Germ Oil	Wheatgerm oil	g	0	
E	Marine Fish, Other	Fish, herring, Pacific, raw	e	36.5	
E	Meat, Aquatic Mammals	Fish, herring, Pacific, raw	e	36.5	
E	Meat, Other	Lamb, meat not specified, raw	f	4	
E	Milk - Excluding Butter	Milk, cow, whole, raw	f	1	
E	Millet	Millet flour	c	8	
E	Molluscs, Other	Molluscs, snail, raw	e	27.4	
E	Mutton & Goat Meat	Lamb, meat not specified, raw	f	4	
E	Nuts	Cashew nut, raw	f	24	
E	Oats	Wheat flour, white	f	2	
E	Offals, Edible	Beef liver, raw	f	40	
E	Oilcrops Oil, Other	Palm oil	f	0	
E	Oilcrops, Other	Spices, poppy seed	e	1.6	
E	Olive Oil	Oil, olive, salad or cooking	e	0	
E	Olives	Olives, pickled, canned or bottled, green	e	0.9	
E	Onions	Onion, raw	f	2	
E	Oranges, Mandarines	Orange, raw	f	1	
E	Palm Oil	Palm oil	f	0	
E	Palmkernel Oil	Palm oil	f	0	
E	Peas	Peas, raw	f	0	
E	Pelagic Fish	Mackerel, spanish, raw	f	37	
E	Pepper	Spices, pepper, black	e	3.1	
E	Pigmeat	Pork, meat, approx. 40% fat, raw	f	6	
E	Pimento	Peppers, hot chili, red, raw	e	0.5	
E	Pineapples	Pineapple, pulp, raw	f	0	
E	Plantains	Plantain, ripe, raw	f	2	
E	Potatoes	Potato, raw	f	2	
E	Poultry Meat	Chicken, fresh only, raw	f	12	
E	Pulses, Other	Fresh Pigeon peas	c	6.4	
E	Rape and Mustard Oil	Vegetable oil, mustard	e	0	
E	Rice (Milled Equivalent)	Rice	c	2.4	
E	Ricebran Oil	Oil, vegetable, rice bran	e	0	
E	Roots, Other	Taro, tuber, raw	f	1	
E	Rye	Rye	e	35.3	
E	Sesameseed	Seeds, sesame seeds, whole, dried	e	5.7	
E	Sesameseed Oil	Oil, sesame, salad or cooking	e	0	
E	Sorghum	Sorghum	c	12.9	
E	Soyabean Oil	Oil, soyabean, salad or cooking	e	0	
E	Soyabean	Soyabean, dried, raw	f	14	
E	Spices, Other	Spices, turmeric, ground	e	4.5	
E	Sugar (Raw Equivalent)	Sugar, white	f	0	
E	Sugar Beet	Beets, raw	e	0.7	
E	Sugar Cane	Sugar, white	f	0	
E	Sugar, Non-Centrifugal	Sugar, white	f	0	
E	Sunflowerseed	Seeds, sunflower seed kernels, dried	e	59.5	
E	Sunflowerseed Oil	Oil, vegetable, sunflower, linoleic (approx. 65%)	e	0	
E	Sweet Potatoes	Sweet potato, raw	f	2	
E	Sweeteners, Other	Sweeteners, tabletop, saccharin	e	0	
E	Tea	Tea, infusion	f	0	
E	Tomatoes	Tomato, raw	f	1	
E	Vegetables, Other	Cabbage, raw	f	1	
E	Wheat	Wheat flour, white	f	2	
E	Wine	Alcoholic beverage, wine, table, all	e	0.2	
E	Yams	Yam tuber, raw	f	1	
S	Apples	Apples, raw, with skin	e	0	
S	Aquatic Animals, Others	Matemba (fresh)	c	11.1	
S	Aquatic Plants	Seaweed, agar, raw	e	0.7	
S	Bananas	Banana	c	0.5	
S	Barley	Barley, pearled, raw	e	37.7	
S	Beans	Bengal beans	c	2.5	
S	Beer	Beer Europe (4.4% alcohol)	f	0	
S	Beverages, Alcoholic	Alcoholic beverage, distilled, all (gin, rum, vodka, whiskey) 80° proof	e	0	
S	Beverages, Fermented	Sorghum porridge	c	9.3	
S	Bovine Meat	Beef, meat, approx. 20% fat, raw	f	8	
S	Butter, Ghee	Ghee, butter	g	0	
S	Cassava	Cassava, raw	f	1	
S	Cephalopods	Molluscs, squid, mixed species, raw	e	44.8	
S	Cereals, Other	Wheat flour, white	f	2	
S	Citrus, Other	Orange, raw	f	1	
S	Cloves	Spices, cloves, ground	e	5.9	
S	Cocoa Beans	Cocoa, dry powder, unsweetened	e	14.3	
S	Coconut Oil	Coconut oil	f	0	
S	Coconuts - Incl Copra	Coconut, raw	f	810	
S	Coffee	Coffee, brewed from grounds, prepared with tap water	e	0	
S	Cottonseed Oil	Cottonseed oil	g	0	
S	Cream	Cream, fresh, double, including Jersey cream	g	3	
S	Crustaceans	Crustaceans, crab, blue, raw	e	37.4	
S	Dates	Dates, deglet noor	e	3	
S	Demersal Fish	Fish, herring, Pacific, raw	e	36.5	
S	Eggs	Egg, raw	f	11	
S	Fats, Animals, Raw	Lard	e	0.2	
S	Fish, Body Oil	Fish oil, sardine	e	0	
S	Fish, Liver Oil	Fish oil, cod liver	e	0	
S	Freshwater Fish	Matemba (fresh)	c	11.1	
S	Fruits, Other	Mango (raw)	f	0.6	
S	Grapefruit	Grapefruit, raw, pink and red and white, all areas	e	0.1	
S	Grapes	Grapes, red or green (European type varieties, such as Thompson seedless), raw	e	0.1	
S	Groundnut Oil	Groundnut oil	f	0	
S	Groundnuts (Shelled Eq)	Groundnut, dried, raw	f	3	
S	Honey	Honey	f	1	
S	Lemons, Limes	Lemon, fruit, raw	f	0	
S	Maize	White Ufa	c	2.6	
S	Maize Germ Oil	Wheatgerm oil	g	0	
S	Marine Fish, Other	Fish, herring, Pacific, raw	e	36.5	
S	Meat, Aquatic Mammals	Fish, herring, Pacific, raw	e	36.5	
S	Meat, Other	Lamb, meat not specified, raw	f	4	
S	Milk - Excluding Butter	Milk, cow, whole, raw	f	1	
S	Millet	Millet flour	c	8	
S	Molluscs, Other	Molluscs, snail, raw	e	27.4	
S	Mutton & Goat Meat	Lamb, meat not specified, raw	f	4	
S	Nuts	Cashew nut, raw	f	24	
S	Oats	Wheat flour, white	f	2	
S	Offals, Edible	Beef liver, raw	f	40	
S	Oilcrops Oil, Other	Palm oil	f	0	
S	Oilcrops, Other	Spices, poppy seed	e	1.6	
S	Olive Oil	Oil, olive, salad or cooking	e	0	
S	Olives	Olives, pickled, canned or bottled, green	e	0.9	

S	Onions	Onion, raw	f	2
S	Oranges, Mandarines	Orange, raw	f	1
S	Palm Oil	Palm oil	f	0
S	Palmkernel Oil	Palm oil	f	0
S	Peas	Peas, raw	f	0
S	Pelagic Fish	Mackerel, spanish, raw	f	37
S	Pepper	Spices, pepper, black	e	3.1
S	Pigmeat	Pork, meat, approx. 40% fat, raw	f	6
S	Pimento	Peppers, hot chili, red, raw	e	0.5
S	Pineapples	Pineapple, pulp, raw	f	0
S	Plantains	Plantain, ripe, raw	f	2
S	Potatoes	Potato, raw	f	2
S	Poultry Meat	Chicken, flesh only, raw	f	12
S	Pulses, Other	Fresh Pigeon peas	c	6.4
S	Rape and Mustard Oil	Vegetable oil, mustard	e	0
S	Rice (Milled Equivalent)	Rice	c	2.4
S	Ricebran Oil	Oil, vegetable, rice bran	e	0
S	Roots, Other	Taro, tuber, raw	f	1
S	Rye	Rye	e	35.3
S	Sesameseed	Seeds, sesame seeds, whole, dried	e	5.7
S	Sesameseed Oil	Oil, sesame, salad or cooking	e	0
S	Sorghum	Sorghum	c	12.9
S	Soyabean Oil	Oil, soyabean, salad or cooking	e	0
S	Soyabeans	Soyabean, dried, raw	f	14
S	Spices, Other	Spices, turmeric, ground	e	4.5
S	Sugar (Raw Equivalent)	Sugar, white	f	0
S	Sugar Beet	Beets, raw	e	0.7
S	Sugar Cane	Sugar, white	f	0
S	Sugar, Non-Centrifugal	Sugar, white	f	0
S	Sunflowerseed	Seeds, sunflower seed kernels, dried	e	59.5
S	Sunflowerseed Oil	Oil, vegetable, sunflower, linoleic (approx. 65%)	e	0
S	Sweet Potatoes	Sweet potato, raw	f	2
S	Sweeteners, Other	Sweeteners, tabletop, saccharin	e	0
S	Tea	Tea, infusion	f	0
S	Tomatoes	Tomato, raw	f	1
S	Vegetables, Other	Cabbage, raw	f	1
S	Wheat	Wheat flour, white	f	2
S	Wine	Alcoholic beverage, wine, table, all	e	0.2
S	Yams	Yam tuber, raw	f	1
W	Apples	Apples, raw, with skin	e	0
W	Aquatic Animals, Others	Matemba (fresh)	c	11.1
W	Aquatic Plants	Seaweed, agar, raw	e	0.7
W	Bananas	Banana, fruit, raw	f	1
W	Barley	Barley, pearled, raw	e	37.7
W	Beans	Bengal beans	c	2.5
W	Beer	Beer Europe (4.4% alcohol)	f	0
W	Beverages, Alcoholic	Alcoholic beverage, distilled, all (gin, rum, vodka, whiskey) 80° proof	e	0
W	Beverages, Fermented	Sorghum porridge	c	9.3
W	Bovine Meat	Beef, meat, approx. 20% fat, raw	f	8
W	Butter, Ghee	Ghee, butter	g	0
W	Cassava	Cassava, raw	f	1
W	Cephalopods	Molluscs, squid, mixed species, raw	e	44.8
W	Cereals, Other	Wheat flour, white	f	2
W	Citrus, Other	Orange, raw	f	1
W	Cloves	Spices, cloves, ground	e	5.9
W	Cocoa Beans	Cocoa, dry powder, unsweetened	e	14.2
W	Coconut Oil	Coconut oil	f	0
W	Coconuts - Incl Copra	Coconut, raw	f	810
W	Coffee	Coffee, brewed from grounds, prepared with tap water	e	0
W	Cottonseed Oil	Cottonseed oil	g	0
W	Cream	Cream, fresh, double, including Jersey cream	g	3
W	Crustaceans	Crustaceans, crab, blue, raw	e	37.4
W	Dates	Dates, deglet noor	e	3
W	Demersal Fish	White grouper, raw	f	39
W	Eggs	Egg, raw	f	11
W	Fats, Animals, Raw	Lard	e	0.2
W	Fish, Body Oil	Fish oil, sardine	e	0
W	Fish, Liver Oil	Fish oil, cod liver	e	0
W	Freshwater Fish	Matemba (fresh)	c	11.1
W	Fruits, Other	Mango, ripe, fruit, raw	f	1
W	Grapefruit	Grapefruit, raw, pink and red and white, all areas	e	0.1
W	Grapes	Grapes, red or green (European type varieties, such as Thompson seedless), raw	e	0.1
W	Groundnut Oil	Groundnut oil	f	0
W	Groundnuts (Shelled Eq)	Groundnut, dried, raw	f	3
W	Honey	Honey	f	1
W	Lemons, Limes	Lemon, fruit, raw	f	0
W	Maize	Maize, white, whole, dried, raw	f	16
W	Maize Germ Oil	Wheatgerm oil	g	0
W	Marine Fish, Other	Sardines, raw	f	37
W	Meat, Aquatic Mammals	Fish, herring, Pacific, raw	e	36.5
W	Meat, Other	Rabbit, meat, raw	f	10
W	Milk - Excluding Butter	Milk, cow, whole, raw	f	1
W	Millet	Millet flour	c	8
W	Molluscs, Other	Molluscs, snail, raw	e	27.4
W	Mutton & Goat Meat	Lamb, meat not specified, raw	f	4
W	Nuts	Cashew nut, raw	f	24
W	Oats	Wheat flour, white	f	2
W	Offals, Edible	Beef liver, raw	f	40
W	Oilcrops Oil, Other	Palm oil	f	0
W	Oilcrops, Other	Spices, poppy seed	e	1.6
W	Olive Oil	Oil, olive, salad or cooking	e	0
W	Olives	Olives, pickled, canned or bottled, green	e	0.9
W	Onions	Onion, raw	f	2
W	Oranges, Mandarines	Orange, raw	f	1
W	Palm Oil	Palm oil	f	0
W	Palmkernel Oil	Palm oil	f	0
W	Peas	Peas, raw	f	0
W	Pelagic Fish	Mackerel, spanish, raw	f	37
W	Pepper	Spices, pepper, black	e	3.1
W	Pigmeat	Pork, meat, approx. 40% fat, raw	f	6
W	Pimento	Peppers, hot chili, red, raw	e	0.5
W	Pineapples	Pineapple, pulp, raw	f	0
W	Plantains	Plantain, ripe, raw	f	2
W	Potatoes	Potato, raw	f	2
W	Poultry Meat	Chicken, flesh only, raw	f	12
W	Pulses, Other	Cowpea, dried, raw	f	8
W	Rape and Mustard Oil	Vegetable oil, mustard	e	0
W	Rice (Milled Equivalent)	Rice	c	2.4
W	Ricebran Oil	Oil, vegetable, rice bran	e	0
W	Roots, Other	Taro, tuber, raw	f	1
W	Rye	Rye	e	35.3
W	Sesameseed	Seeds, sesame seeds, whole, dried	e	5.7
W	Sesameseed Oil	Oil, sesame, salad or cooking	e	0
W	Sorghum	Sorghum, whole grain, raw	f	13
W	Soyabean Oil	Oil, soyabean, salad or cooking	e	0
W	Soyabeans	Soyabean, dried, raw	f	14
W	Spices, Other	Spices, turmeric, ground	e	4.5
W	Sugar (Raw Equivalent)	Sugar, white	f	0
W	Sugar Beet	Beets, raw	e	0.7
W	Sugar Cane	Sugar, white	f	0
W	Sugar, Non-Centrifugal	Sugar, white	f	0
W	Sunflowerseed	Seeds, sunflower seed kernels, dried	e	59.5
W	Sunflowerseed Oil	Oil, vegetable, sunflower, linoleic (approx. 65%)	e	0
W	Sweet Potatoes	Sweet potato, raw	f	2
W	Sweeteners, Other	Sweeteners, tabletop, saccharin	e	0
W	Tea	Tea, infusion	f	0
W	Tomatoes	Tomato, raw	f	1
W	Vegetables, Other	Cabbage, raw	f	1
W	Wheat	Wheat flour, white	f	2
W	Wine	Alcoholic beverage, wine, table, all	e	0.2
W	Yams	Yam tuber, raw	f	1

#### Source key

c (ref. 37) Donovan, U.M., Gibson, R.S., Ferguson, E.L., Oumppu, S. & Heywood, P. The Selenium Content of Staple Foods from Malawi and Papua New Guinea. *J. Food Compos. Anal.* 4, 329-336 (1991).

e (ref. 22) U.S. Department of Agriculture, Agricultural Research Service (USDA-ARS). USDA National Nutrient Database for Standard Reference, Release 24. Nutrient Data Laboratory Home Page. Accessed online November 30, 2011: <http://www.ars.usda.gov/nutrientdata> (2011).

f (ref. 21) Stadlmayr, B. et al. *Composition of Selected Foods from West Africa*. (Food and Agriculture Organization, Rome, 2010).

g (ref. 38) Food Standards Agency. *McCance and Widdowson's The Composition of Foods, Sixth Summary Edition*. (Royal Society of Chemistry, Cambridge, 2002).

Supplementary Table 4. Dietary energy and Se availability and risk of dietary Se deficiency estimated from population demographics, food balance sheets and food Se composition tables; EAR=Estimated Average Requirement

Country (FAO)	Country (used for mapping)	Available energy supply (kcal capita <sup>-1</sup> d <sup>-1</sup> )	2010 population (UN)	0-9 yr (Se EAR=23 µg capita <sup>-1</sup> d <sup>-1</sup> )	10+ yr (Se EAR=45 µg capita <sup>-1</sup> d <sup>-1</sup> )	Pregnant (Se EAR=49 µg capita <sup>-1</sup> d <sup>-1</sup> )	Lactating (Se EAR=59 µg capita <sup>-1</sup> d <sup>-1</sup> )	Average Se EAR (µg capita <sup>-1</sup> d <sup>-1</sup> )	Se supply (µg capita <sup>-1</sup> d <sup>-1</sup> )	Standard Deviation	Proportion <EAR	% <EAR	Number <EAR
Algeria	Algeria	3600	35711170	6595440	27814966	557469	743292	41.3	58.1	14.5	0.124	12.4	4428077
Angola	Angola	2428	19131990	6391272	11283528	624511	832682	38.4	54.0	13.5	0.123	12.3	2362732
Benin	Benin	3093	8881757	2771193	5477386	271362	361816	38.8	66.5	16.6	0.048	4.8	426074
Botswana	Botswana	2499	2016250	437502	1493212	36658	48878	40.6	44.1	11.0	0.377	37.7	759659
Burkina Faso	Burkina Faso	3178	16496290	5380810	9849481	542571	723428	38.6	101.3	25.3	0.007	0.7	109069
Burundi	Burundi	1668	8413188	2202604	5705259	216568	288757	39.8	30.7	7.7	0.881	88.1	7415690
Cameroon	Cameroon	2780	19684950	5675955	12727124	549372	732497	39.3	69.7	17.4	0.041	4.1	799095
Central African Republic	Central African Republic	2486	4422757	1241526	2905794	119046	157393	39.4	44.3	11.1	0.329	32.9	1455846
Chad	Chad	2522	11258580	3684883	6669073	387695	516026	38.6	47.4	11.8	0.229	22.9	2582431
Congo	Congo	3106	4063173	1166232	2641054	109666	146221	39.3	69.6	17.4	0.041	4.1	166211
Cote d'Ivoire	Côte d'Ivoire	3061	19817760	5670796	12933927	519874	693166	39.3	84.9	21.2	0.016	1.6	313080
Democratic Republic of the Congo	Congo, The Democratic Republic of the	2066	66148410	21945640	39001214	2229235	2972313	38.5	29.5	7.4	0.886	88.6	58626301
Djibouti	Djibouti	2285	891572	217511	628173	19667	26222	40.1	26.7	6.7	0.978	97.8	871632
Egypt	Egypt	3408	81674540	17506663	60751883	1464016	1952021	40.7	61.0	15.2	0.092	9.2	7474962
Eritrea	Eritrea	1640	5267874	1588578	3333205	148325	197767	39.0	47.7	11.9	0.232	23.2	1221659
Ethiopia	Ethiopia	1833	83266300	23516040	54894875	2080887	2774517	39.4	41.8	10.5	0.407	40.7	33878196
Gabon	Gabon	3396	1517479	361162	1083519	31199	41599	40.2	84.2	21.0	0.018	1.8	27914
Gambia	Gambia	2614	1730749	539967	1071726	51024	68032	38.8	68.0	17.2	0.040	4.0	70029
Ghana	Ghana	3733	24512310	6648359	16464624	599712	799616	39.6	263.6	65.9	0.000	0.0	8283
Guinea	Guinea	2806	10020580	3063120	6257282	300076	400102	39.0	78.1	19.5	0.022	2.2	224955
Guinea-Bissau	Guinea - Bissau	2507	4520728	445167	970922	44845	59794	39.2	82.8	20.7	0.018	1.8	26824
Kenya	Kenya	2219	40668810	12379002	25584760	1159305	1545740	38.9	36.5	9.1	0.605	60.5	24611827
Lesotho	Lesotho	3071	2185317	541650	1534570	46750	62334	40.0	32.3	8.1	0.829	82.9	1812372
Liberia	Liberia	2493	4005019	1256542	2464299	121791	162388	38.8	62.3	15.6	0.065	6.5	262067
Libya	Libyan Arab Jamahiriya	3547	6393420	1371217	4753881	114995	153327	40.7	61.7	15.4	0.087	8.7	554611
Madagascar	Madagascar	1887	20805670	6264800	13224505	564156	752208	39.0	71.8	17.9	0.038	3.8	704444
Malawi	Malawi	2527	14951050	4914496	8889526	493127	657502	38.5	31.3	7.8	0.821	82.1	12268719
Mali	Mali	3000	15395070	5275847	8835710	550077	733437	38.3	66.3	16.6	0.046	4.6	701324
Mauritania	Mauritania	3097	3466238	970637	2284331	90544	120726	39.4	55.0	13.7	0.129	12.9	446338
Morocco	Morocco	3771	32206930	5935910	25133744	487404	649871	41.3	91.1	22.8	0.014	1.4	463529
Mozambique	Mozambique	2315	23482910	7394904	14470709	693127	924170	38.7	39.5	9.9	0.469	46.9	11003287
Namibia	Namibia	2677	2294913	563163	1621621	47198	62931	40.1	105.2	26.3	0.007	0.7	15205
Niger	Niger	3087	15533330	5558691	8629414	576523	768698	38.0	81.1	20.3	0.017	1.7	258763
Nigeria	Nigeria	3444	159021600	48883830	98892659	4819307	6425743	38.9	101.6	25.4	0.007	0.7	1082900
Rwanda	Rwanda	2414	10659890	3283597	6616537	325609	434145	38.9	48.8	12.2	0.209	20.9	2228065
Senegal	Senegal	2657	12449740	3872402	7736137	360513	480684	38.8	85.1	21.3	0.015	1.5	184136
Sierra Leone	Sierra Leone	2356	5871303	1802482	3651583	178816	238422	38.9	68.6	17.1	0.042	4.2	246099
South Africa	South Africa	3329	50419690	10141649	38343065	829278	1105704	40.9	58.2	14.5	0.118	11.8	5943759
Sudan	Sudan	2248	43718950	12232802	28900486	1108144	1477526	39.4	53.6	13.4	0.144	14.4	6312550
Swaziland	Swaziland	2519	1190839	306165	822011	26856	35807	39.9	44.4	11.1	0.342	34.2	407285
Togo	Togo	2635	6053456	1659088	4042821	150663	200884	39.5	70.9	17.7	0.038	3.8	231848
Tunisia	Tunisia	3842	10602540	8625897	138721	138721	184961	41.9	61.1	15.3	0.104	10.4	1101383
Uganda	Uganda	2566	33531980	11797379	19014974	1165555	1554073	38.0	67.0	16.8	0.042	4.2	1403923
United Republic of Tanzania	Tanzania, United Republic of	2303	45011760	14583788	27149146	1405211	1873615	38.6	114.6	28.7	0.004	0.4	179123
Zambia	Zambia	2156	13135080	4382042	7729293	438748	584997	38.4	28.1	7.0	0.929	92.9	12205087
Zimbabwe	Zimbabwe	2620	12651440	3286129	8713777	279230	372307	39.8	30.2	7.5	0.899	89.9	11370262
<b>TOTAL</b>			<b>1012155352</b>										<b>219247629</b>

Footnotes:

Demographic data from: UN (2010). Population Data. Accessed online May 1, 2012: <http://esa.un.org/unpd/wpp/Excel-Data/population.htm> (United Nations, 2010).

EAR data from: Institute of Medicine (2002). Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids: A Report of the Panel on Dietary Antioxidants and Related Compounds.

Subcommittees on Upper Reference Levels of Nutrients and of Interpretation and Use of Dietary Reference Intakes, and the Standing Committee on the Scientific Evaluation of Dietary Reference Intakes. (National Academies Press, Washington DC, 2002).