Supplementary Material

Supplementary Table S1. Search strategy for each of the nutrients and bioactives with each identified health priority.

Component Of Search	Search Strategy
Nutrients	((((((((((((((((((((((((((((((((((((((("omega 3"[Title/Abstract]) OR ("omega 6"[Title/Abstract])) OR ("dietary fibre"[Title/Abstract])) OR ("dietary fiber"[Title/Abstract])) OR (Docosapentaenoic[Title/Abstract])) OR (Eicosapentaenoic[Title/Abstract])) OR (Docosahexaenoic[Title/Abstract])) OR (DPA[Title/Abstract])) OR (EPA[Title/Abstract])) OR (DHA[Title/Abstract])) OR (linolenic[Title/Abstract])) OR (linoleic[Title/Abstract])) OR (protein[Title/Abstract])) OR (tocopherol[Title/Abstract])) OR (retinol[Title/Abstract])) OR (pyridoxine[Title/Abstract])) OR (cobalamin[Title/Abstract])) OR (niacin[Title/Abstract])) OR (riboflavin[Title/Abstract])) OR (thiamin[Title/Abstract])) OR (biotin[Title/Abstract])) OR (pantothenic[Title/Abstract])) OR ("folic acid"[Title/Abstract])) OR (folate[Title/Abstract])) OR (vitamin[Title/Abstract])) OR (zinc[Title/Abstract])) OR (sodium[Title/Abstract])) OR (potassium[Title/Abstract])) OR (phosphorus[Title/Abstract])) (magnesium[Title/Abstract])) OR (iodine[Title/Abstract])) OR (copper[Title/Abstract])) OR (Calcium[Title/Abstract])) OR ("dietary fiber"[MeSH Terms])) OR (fatty acids, unsaturated[MeSH Terms])) OR (fatty acids, omega 6[MeSH Terms])) OR (fatty acids, omega 3[MeSH Terms])) OR ("fatty acids, essential"[MeSH Terms])) OR ("diet therapy"[MeSH Terms])) OR ("phosphorus"[MeSH Terms])) OR ("trace elements"[MeSH Terms])) OR ("micronutrients"[MeSH Terms])) OR ("avitaminosis"[MeSH Terms])) OR ("avitaminosis"[MeSH Terms])) OR ("nutrients"[MeSH Terms]))
AND Study Types	((("meta analysis"[Publication Type]) OR ("guideline"[Publication Type])) OR ("systematic review"[Publication Type]))
AND Growth and development	((((((((((((((((((((((((((("bone density"[MeSH Terms]) OR ("bone and bones"[MeSH Terms])) OR (bone diseases, metabolic[MeSH Terms])) OR ("bone density"[Title/Abstract])) OR ("fractures, bone"[MeSH Terms])) OR (fracture*[Title/Abstract])) OR (osteoporo*[Title/Abstract])) OR (osteopeni*[Title/Abstract])) OR ("cognition"[MeSH Terms])) OR ("intelligence"[MeSH Terms])) OR ("executive function"[MeSH Terms])) OR (brain[Title/Abstract])) OR (cognitive[Title/Abstract])) OR (cognition[Title/Abstract])) OR (IQ[Title/Abstract])) OR (intelligence[Title/Abstract])) OR ("musculoskeletal development"[MeSH Terms])) OR (skeletal[Title/Abstract])) OR (muscle[Title/Abstract])) OR ("puberty"[MeSH Terms])) OR ("genitalia"[MeSH Terms])) OR (puberty[Title/Abstract])) OR (skeletal[Title/Abstract])) OR (muscle[Title/Abstract])) OR ("sex organ"[Title/Abstract])) OR ("sexual organ"[Title/Abstract]) ("neurodevelopmental disorders"[MeSH Terms]) OR ("autistic disorder"[MeSH Terms])) OR ("autism spectrum disorder"[MeSH Terms])) OR ("attention deficit and disruptive behavior disorders"[MeSH Terms])) OR (ADHD[Title/Abstract])) OR (ASD[Title/Abstract]) OR (attention deficit

	[Title/Abstract])) OR (autism[Title/Abstract])) OR (neurodevelopment*[Title/Abstract])) OR (behaviour[Title/Abstract])) OR (behavior[Title/Abstract])) **AND** (((((((("child"[MeSH Terms]) OR (child*[Title/Abstract])) OR (pediatric*[Title/Abstract])) OR (paediatric*[Title/Abstract])) OR ("adolescent"[MeSH Terms]) OR (adolescen*[Title/Abstract])))) OR (adolescen*[Title/Abstract])) OR (teen*[Title/Abstract])
OR Mood and mental health	(((((((("mental health"[MeSH Terms]) OR ("anxiety disorders"[MeSH Terms])) OR ("disruptive, impulse control, and conduct disorders"[MeSH Terms])) OR (mood disorders[MeSH Terms])) OR (Depression[Title/Abstract])) OR (Anxiety[Title/Abstract])) OR (anxious[Title/Abstract])) OR (depressive[Title/Abstract])) OR ("mental health"[Title/Abstract]) **AND** (((((((("child"[MeSH Terms]) OR ("adolescent"[MeSH Terms])) OR (child*[Title/Abstract])) OR (teen*[Title/Abstract])) OR (adolescen*[Title/Abstract])) OR (pediatric*[Title/Abstract])) OR (paediatric*[Title/Abstract])) OR (adult*[Title/Abstract])) OR (menopaus*[Title/Abstract]))
OR Respiratory health	((((((("respiratory hypersensitivity"[MeSH Terms]) OR ("asthma"[MeSH Terms])) OR ("rhinitis, allergic"[MeSH Terms])) OR (“respiratory allergies” [Title/Abstract])) OR (rhinitis[Title/Abstract])) OR (asthma*[Title/Abstract]) **AND** (((((((("child"[MeSH Terms]) OR ("adolescent"[MeSH Terms])) OR (child*[Title/Abstract])) OR (teen*[Title/Abstract])) OR (adolescen*[Title/Abstract])) OR (pediatric*[Title/Abstract])) OR (paediatric*[Title/Abstract]))
OR Cancer	(((((((("neoplasms"[MeSH Terms]) OR (cancer[Title/Abstract])) OR (tumour[Title/Abstract])) OR (tumor[Title/Abstract])) OR (lymphoma[Title/Abstract])) OR (myeloma[Title/Abstract])) OR (leukemia[Title/Abstract])) OR (oncolog*[Title/Abstract])
OR Cardiovascular health	((((((((((("heart disease risk factors"[MeSH Terms]) OR ("heart diseases"[MeSH Terms])) OR ("cardiovascular diseases"[MeSH Terms])) OR (CVD[Title/Abstract])) OR (CHD[Title/Abstract])) OR (IHD[Title/Abstract])) OR (cardiovascular[Title/Abstract])) OR (coronary[Title/Abstract])) OR ("heart disease"[Title/Abstract])) OR (stroke[Title/Abstract]) OR (ischem*[Title/Abstract]))
OR Metabolic health	((((((((((("obesity"[MeSH Terms]) OR ("metabolic syndrome"[MeSH Terms])) OR ("insulin resistance"[MeSH Terms])) OR ("diabetes mellitus, type 2"[MeSH Terms])) OR ("metabolic diseases"[MeSH Terms])) OR (T2DM[Title/Abstract])) OR (T2D[Title/Abstract])) OR (“type 2 diabetes”[Title/Abstract])) OR (“metabolic syndrome”[Title/Abstract])) OR (“insulin resistance”[Title/Abstract])) OR (“blood glucose”[Title/Abstract])) OR ("hyperglycemia"[Title/Abstract])) OR (hyperglycaemia[Title/Abstract]) OR (insulin[Title/Abstract])) OR (hyperinsulinemia*[Title/Abstract])) OR (hyperinsulinaemia*[Title/Abstract])) OR (bodyweight[Title/Abstract])) OR (“waist circumference”Title/Abstract]))
OR Fertility	((("fertility"[MeSH Terms]) OR ("pregnancy rate"[MeSH Terms])) OR (Fertility[Title/Abstract])) OR ("pre pregnancy"[Title/Abstract])

OR Fetal development	**((((("fetal blood"[MeSH Terms]) OR ("pregnancy complications"[MeSH Terms])) OR ("pregnancy outcome"[MeSH Terms])) OR ("gestational weight gain"[MeSH Terms])) OR ("fetal weight"[MeSH Terms])**
OR Bone health and bone density	(((((((("bone density"[MeSH Terms]) OR ("bone and bones"[MeSH Terms])) OR (bone diseases, metabolic[MeSH Terms])) OR ("bone density"[Title/Abstract])) OR ("fractures, bone"[MeSH Terms])) OR (fracture*[Title/Abstract])) OR (osteoporo*[Title/Abstract])) OR (osteopeni*[Title/Abstract])) **AND** ((((((("menopause"[MeSH Terms]) OR ("menopause"[MeSH Terms])) OR (postmenopausal[Title/Abstract])) OR (menopaus*[Title/Abstract])) OR (postmenopaus*[Title/Abstract])) OR (post-menopaus*[Title/Abstract]))
OR Infectious immunity	(((((("immunity"[MeSH Terms]) OR ("infections"[MeSH Terms]) OR (immunity[Title/Abstract])) OR (immune[Title/Abstract])) OR (infection*[Title/Abstract])) AND ((((((((("aged"[MeSH Terms])) OR ("aged, 80 and over"[MeSH Terms])) OR (elderly[Title/Abstract])) OR (old[Title/Abstract])) OR (older[Title/Abstract])) OR (geriatric[Title/Abstract])) OR (pregnancy*[Title/Abstract])) OR (pregnant*[Title/Abstract])) OR (lactation*[Title/Abstract])) OR (lactating*[Title/Abstract]))
OR Independence	((((((((((((((((((((((((((((((((("frailty"[MeSH Terms]) OR ("malnutrition"[MeSH Terms])) OR ("sarcopenia"[MeSH Terms])) OR (frailty[Title/Abstract])) OR (malnutrition[Title/Abstract])) OR (sarcopenic[Title/Abstract])) OR (sarcopenia[Title/Abstract])) OR ("muscle wasting"[Title/Abstract])) OR ("muscle maintenance"[Title/Abstract])) OR (ADLs[Title/Abstract])) OR (ADL[Title/Abstract])) OR ("physical function"[Title/Abstract])) OR (independence[Title/Abstract])) OR (falls[Title/Abstract])) OR (independent living[MeSH Terms])) OR ("functional status"[MeSH Terms])) OR ("accidental falls"[MeSH Terms])) OR OR ("fractures, bone"[MeSH Terms])) OR (fracture*[Title/Abstract])) OR (osteoporo*[Title/Abstract])) OR (osteopeni*[Title/Abstract])) OR ("activities of daily living"[MeSH Terms])) OR ("institutionalization"[MeSH Terms])) OR ("physical and rehabilitation medicine"[MeSH Terms]) OR ("osteoarthritis"[MeSH Terms]) OR ("arthritis, degenerative"[MeSH Terms])) OR ("degenerative arthritis"[MeSH Terms])) OR (arthritis[Title/Abstract])) OR (osteoarthritis*[Title/Abstract])) OR ("dementia"[MeSH Terms]) OR ("cognition"[MeSH Terms])) OR (dementia[Title/Abstract])) OR (alzheimer*[Title/Abstract])) OR (cognition[Title/Abstract])) OR (cognitive[Title/Abstract]) OR (Parkinson*[Title/Abstract]) OR (neurodegenerati*[Title/Abstract]) **AND** (((((("aged"[MeSH Terms]) OR ("aged, 80 and over"[MeSH Terms])) OR (elderly[Title/Abstract])) OR (old[Title/Abstract])) OR (older[Title/Abstract])) OR (geriatric[Title/Abstract])

Supplementary Table S2. Dietary intake data [1] detailing inadequately consumed nutrients per each demographic group.

Demographic Group	Inadequate Nutrient [1,2]	EAR[3]	AI [3]	% < EAR or AI [1]	Mean Intake [1,2]
Children 4-8 years	Dietary fiber		25 g/day	>97%	13.2-13.8 g/day
	Vitamin D	10 µg/day		>96%	4.7-5.5 µg/day
	Vitamin E	6 mg/day		33%-51%	6.2-7.2 mg/day
	Vitamin K		55 µg/day	53%-55%	56.5- 57.5 µg/day
	Choline		250 mg/day	60%-70%	221- 241 mg/day
	Calcium	800 mg/day		22%-37%	911-1040 mg/day
	Iodine	65 µg/day		>20%	Median intake 79-86 µg/day
	Potassium		2300 mg/day	69%-80%	1920-2082 mg/day
Adolescent males 9-18 years	Dietary fiber		31-38 g/day	>97%	15 - 15.3 g/day
	Vitamin A	445-630 µg/day		28-65%	571 - 622 µg/day
	Vitamin C	39-63 mg/day		20-62%	60.7 - 71.4 mg/day
	Vitamin D	10 µg/day		92-95%	4.7-5.4 µg/day
	Vitamin E	9-12 mg/day		61-83%	8.6 - 9 mg/day
	Choline		375-550 mg/day	92->97%	258 - 308 mg/day
	Calcium	1100 mg/day		56-62%	1036 - 1081 mg/day
	Iodine	73-95 ug/day		>40%	117 µg/day (median intake)
	Magnesium	200-340 mg/day		27-81%	247 - 276 mg/day
	Phosphorus	1055 mg/day		13-25%	1331 - 1505 mg/day
	Potassium		2500-3000 mg/day	75-84%	2147-2389 mg/day
Adolescent females 9-18 years	Protein	0.71-0.76 g/kgbw/day		3-23%	1.61-2.02 g/kgbw/day
	Dietary fiber		26 g/day	>97%	13.2-15.4 mg/day
	Vitamin A	420-485 µg/day		26-59%	474-605 µg/day
	Vitamin C	39-56 mg/day		16-59%	55.9-78.4 mg/day
	Vitamin D	10 µg/day		95 - >97%	3.2-4.8 µg/day
	Vitamin E	9-12 mg/day		60-94%	7.3-8.7 mg/day
	Vitamin K		60-75 µg/day	28-56%	75.9-82.1 µg/day

	Vitamin B6	0.8-1 mg/day		3-21%	1.46-1.77 mg/day
	Folate	250-330 μg/day		5-34%	415-517 μg/day
	Vitamin B12	1.5-2 ug/day		3-20%	3.34-4.33 μg/day
	Choline		375-400 mg/day	93->97%	214-252 mg/day
	Calcium	1100 mg/day		68-86%	811-987 mg/day
	Copper	540-685 μg/day		4-23%	900-1000 μg/day
	Iodine	73-95 μg/day		>40%	Median intake 108 μg/day
	Iron	5.7-7.9 mg/day		3-23%	11.6-14.5 mg/day
	Magnesium	200-300 mg/day		28-89%	218-246 mg/day
	Phosphorus	1055 mg/day		28-53%	1064-1291 mg/day
	Zinc	7-7.3 mg/day		20-49%	7.7-9.6 mg/day
	Potassium		2300 mg/day	64-83%	1818-2139 mg/day
Adult males 19-70 years	Dietary fiber		30-38 g/day	>97%	16.1-18.8 g/day
	Vitamin A	625 μg/day		51-65%	566-666 μg/day
	Vitamin C	75 mg/day		50-65%	68.7-87.5 mg/day
	Vitamin D	10 μg/day		93-97%	4.2-5.2 μg/day
	Vitamin E	12 mg/day		67-79%	9.3-10.8 mg/day
	Vitamin K		120 μg/day	50-73%	98.8-133.1 μg/day
	Choline		550 mg/day	88-92%	361-400 mg/day
	Calcium	800 mg/day		23-29%	1035-1097 mg/day
	Iodine	95 μg/day		>20%	Median intake 167 μg/day
	Magnesium	330-350 mg/day		53-64%	306-353 mg/day
	Zinc	9.4 mg/day		17-25%	12-13.2 mg/day
	Potassium		3400 mg/day	68-86%	2530-3028 mg/day
Adult females 19-50 years	Dietary fiber		25 g/day	94-95%	14.3-15.2 mg/day
	Vitamin A	500 μg/day		42-47%	557-587 μg/day
	Vitamin C	60 mg/day		48-52%	66.8-71.5 mg/day
	Vitamin D	10 μg/day		>97%	3.5-3.8 μg/day

	Vitamin E	12 mg/day		84%	8.7 mg/day
	Folate	320 μg/day		23-24%	431-432 μg/day
	Choline		425 mg/day	93-94%	282-286 mg/day
	Calcium	800 mg/day		42-46%	852-879 mg/day
	Iodine	95 μg/day		>20%	Median intake 161 μg/day
	Iron	8.1 mg/day		20-22%	11.9-12.1 mg/day
	Magnesium	255-265 mg/day		49-54%	256-276 mg/day
	Potassium		2600 mg/day	71-77%	2160-2287 mg/day
Pregnancy and lactation 19-50 years	Dietary fiber		28-29 g/day	mean intake < AI	17.3 g/day
	LA		13 g/day	mean intake < AI	11.94 g/day
	ALA		1.3-1.4 g/day	mean intake < AI	1.21 g/day
	Vitamin A	550-900 μg/day		28%	646-696 μg/day
	Vitamin C	70-100 mg/day		25%	80-122 mg/day
	Vitamin D	10 μg/day		92%	3.6-5.5 μg/day
	Vitamin E	12-16 mg/day		92%	6.3-7.8 mg/day
	Vitamin B6	1.6-1.7 mg/day		25%	1.8-2.1 mg/day
	Folate	450-520 μg/day		36%	492-630 μg/day
	Choline		450-550 mg/day	mean intake < AI	253-321 mg/day
	Calcium	800 mg/day		21%	888-1093 mg/day
	Iodine	160-209 μg/day		10-40%	181-216 μg/day
	Iron	6.5-22 mg/day		84%	14.7-17.2 mg/day
	Magnesium	265-300 mg/day		53%	254-294 mg/day
	Zinc	9.5-10.4 mg/day		22%	10.2-12.4 mg/day
	Potassium		2800 - 2900 mg/day	mean intake < AI	2346-2778 mg/day
Menopause and post-menopause 51-70 years	Dietary fiber		21 g/day	83%	15.5 g/day
	Vitamin A	500 μg/day		41%	592 μg/day
	Vitamin C	60 mg/day		45%	73.8 mg/day
	Vitamin D	10 μg/day		>97%	3.8 μg/day

	Vitamin E	12 mg/day		86%	8.4 mg/day
	Vitamin B6	1.3 mg/day		28%	1.67 mg/day
	Folate	320 μg/day		31%	400 μg/day
	Choline		425 mg/day	93%	292 mg/day
	Calcium	1000 mg/day		76%	832 mg/day
	Iodine	95 μg/day		>20%	Median intake 164 μg/day
	Magnesium	265 mg/day		54%	276 mg/day
	Potassium		2600 mg/day	65%	2397 mg/day
Older adults >70 years	Dietary fiber		21-30 g/day	84-92%	15.3-19.1 g/day
	Vitamin A	500-625 μg/day		27-37%	701-782 μg/day
	Vitamin C	60-75 mg/day		39-43%	80.6-96.3 mg/day
	Vitamin D	10 μg/day		89 - >97%	4.3-5.9 μg/day
	Vitamin E	12 mg/day		72-87%	8.2-10.2 mg/day
	Vitamin K		90-120 μg/day	35-55%	125.8-127.9 μg/day
	Vitamin B6	1.3-1.4 mg/day		19-28%	1.68-2.32 mg/day
	Folate	320 μg/day		13-29%	408-517 μg/day
	Choline		425-550 mg/day	90-94%	281-383 mg/day
	Calcium	1000 mg/day		58-82%	785-968 mg/day
	Iodine	95 μg/day		>20%	Median intake 158-163 μg/day
	Magnesium	265-350 mg/day		59-61%	256-330 mg/day
	Zinc	6.8-9.4 mg/day		26-29%	8.5-11.7 mg/day
	Potassium		2600-3400 mg/day	69%	2324-3026 mg/day

[1] Intake data were sourced from NHANES 2017 to prepandemic reports [1] for all demographic groups except pregnancy, where data were sourced from older NHANES intake reports [2,3] as well as supporting information from the scientific literature [4–8]. Table shows nutrients consumed at inadequate levels only; no excess nutrients were identified.

[2] Vitamin D values have been reported in μg/day to reflect survey method of reporting. 1 μg/day is equivalent to 40 IU/day.

[3] EAR and AI values as per the most recent DRI report (as applicable) [9–11].

AI, Adequate Intake; EAR, Estimated Average Requirement; DRI, Dietary Reference Intake; NHANES, National Health and Nutrition Examination Survey.

Supplementary Table S3. Summary of evidence[1] identified for nutrients where an increased need over the DRI has been identified per each demographic group.

Demographic Group	Nutrient	Mechanism	Suggested Revised Requirement
Children 4-8 years	Protein [12,13]	Updated IAAO data suggest current maintenance requirements, determined via nitrogen balance, are too low.	Up to 1.55 g/kgbw/day
	Magnesium [14]	Increased intake suggested to be necessary to retain a minimum level of magnesium for growth and adequate bone mineral content.	133 mg/day
Adolescent males 9-18 years	Zinc [15]	Suggested that data used to establish required zinc intakes may overestimate zinc absorption due to not accounting for the presence of phytates in the diet, leading to an underestimation of zinc requirements.	10% increase in requirements.
	Protein [12,13,16,17]	Updated IAAO data suggest current maintenance requirements, determined via nitrogen balance, are too low.	1.2 to 1.55 g/kgbw/day
	Magnesium [18]	Suggested update to magnesium requirement needed to account for factors that can affect the need for magnesium, such as calcium intake, obesity, deficiency in antioxidant nutrients, and a low protein diet.	Not provided.
Adolescent females 9-18 years	Protein [12,13,16,17]	Updated IAAO data suggest current maintenance requirements, determined via nitrogen balance, are too low.	1.2 to 1.55 g/kgbw/day
	Magnesium [18]	Suggested update to magnesium requirement needed to account for factors that can affect the need for magnesium, such as calcium intake, obesity, deficiency in antioxidant nutrients, and a low protein diet.	Not provided.
	Zinc [15]	Suggested that data used to establish required zinc intakes may overestimate zinc absorption due to not accounting for the presence of phytates in the diet, leading to an underestimation of zinc requirements.	10% increase in requirements.
Adult males 19-70 years	Vitamin C [19,20]	An increased dose was found to be necessary to achieve maximum bioavailability, and plasma and tissue concentrations. The daily vitamin C intake needed to prevent collagen-related pathologies is > 75 to 110 mg/day.	>75-200 mg/day
	Protein [13,16,17]	Updated IAAO data suggest current maintenance requirements, determined via nitrogen balance, are too low.	0.99-1.2 g/kgbw/day

	Magnesium [18]	Suggested update to magnesium requirement needed to account for factors that can affect the need for magnesium, such as calcium intake, obesity, deficiency in antioxidant nutrients, and a low protein diet.	Not provided.
	Zinc [15]	Suggested that data used to establish required zinc intakes may overestimate zinc absorption due to not accounting for the presence of phytates in the diet, leading to an underestimation of zinc requirements.	13% increase in requirements.
Adult females 19-50 years	Protein [13,16,17]	Updated IAAO data suggest current maintenance requirements, determined via nitrogen balance, are too low.	0.99-1.2 g/kgbw/day
	Vitamin C [19,20]	An increased dose was found to be necessary to achieve maximum bioavailability, and plasma and tissue concentrations. The daily vitamin C intake needed to prevent collagen-related pathologies is > 75 to 110 mg/day.	>75-200 mg/day
	Magnesium [18]	Suggested update to magnesium requirement needed to account for factors that can affect the need for magnesium, such as calcium intake, obesity, deficiency in antioxidant nutrients, and a low protein diet.	Not provided.
	Zinc [15]	Suggested that data used to establish required zinc intakes may overestimate zinc absorption due to not accounting for the presence of phytates in the diet, leading to an underestimation of zinc requirements.	15% increase in requirements.
Pregnancy and lactation 19-50 years	Protein [13,16,17]	Updated IAAO data suggest current maintenance requirements, determined via nitrogen balance, are too low. It is likely that further increases will be needed for pregnancy and lactation.	At least 0.99-1.2 g/kgbw/day
	Zinc [15]	Suggested that data used to establish required zinc intakes may overestimate zinc absorption due to not accounting for the presence of phytates in the diet, leading to an underestimation of zinc requirements.	15% increase in requirements.
	Magnesium [18]	Suggested update to magnesium requirement needed to account for factors that can affect the need for magnesium, such as calcium intake, obesity, deficiency in antioxidant nutrients, and a low protein diet.	Not provided.
Menopause and post-menopause 51-70 years	Vitamin C [19,20]	An increased dose was found to be necessary to achieve maximum bioavailability, and plasma and tissue concentrations.	200 mg/day
	Vitamin D [21]	Decreased absorption during and post-menopause.	Not provided.

	Protein [13,16,17]	Updated IAAO data suggest current maintenance requirements, determined via nitrogen balance, are too low. It is likely that further increases will be needed for pregnancy and lactation.	At least 0.99-1.2 g/kgbw/day
	Magnesium [18]	Suggested update to magnesium requirement needed to account for factors that can affect the need for magnesium, such as calcium intake, obesity, deficiency in antioxidant nutrients, and a low protein diet.	Not provided.
	Zinc [15]	Suggested that data used to establish required zinc intakes may overestimate zinc absorption due to not accounting for the presence of phytates in the diet, leading to an underestimation of zinc requirements.	15% increase in requirements.
Older adults >70 years	Protein [13,22]	Older adults have higher requirements to achieve homeostasis due to anabolic resistance. Experts in the field of protein and aging have recommended that the optimal protein intake for elderly adults.	1.2-2 g/kgbw/day
	Vitamin B12 [23]	Recalculation of the RDA for vitamin B12 in older women.	17% increase in RDA.
	Vitamin C [19,20]	An increased dose was found to be necessary to achieve maximum bioavailability, and plasma and tissue concentrations. Recalculation of the RDA for vitamin C in older women.	200 mg/day
	Vitamin D [21,23]	There is higher variability in the vitamin D need in this group due to physiological changes among individuals, including reduced efficiency of vitamin D synthesis in skin and reduced endogenous production of active vitamin D; this is reflected in the RDA for vitamin D for adults over 70 years, but not the EAR. Increased dietary intake is required to maintain homeostasis in older adults and to maintain bone health. Decreased absorption is known to occur during ageing.	Not provided.
	Magnesium [18]	Suggested update to magnesium requirement needed to account for factors that can affect the need for magnesium, such as calcium intake, obesity, deficiency in antioxidant nutrients, and a low protein diet.	Not provided.
	Zinc [24]	Increased risk of zinc malabsorption due to highly prevalent malabsorptive factors during older age, including muscle wasting and polypharmacy.	Not provided.

	Zinc [15]	Suggested that data used to establish required zinc intakes may overestimate zinc absorption due to not accounting for the presence of phytates in the diet, leading to an underestimation of zinc requirements.	13-15% increase in requirements.

[1] Where consensus was identified in the scientific literature. No evidence for decreased needs, relative to the DRI, was found.

EAR, Estimated Average Requirement; DRI, Dietary Reference Intake; IAAO, indicator amino acid oxidation; RDA, Recommended Dietary Allowance.

Supplementary Table S4. Summary of evidence[1] identified for nutrients showing an association with one or more health priorities per each demographic group.

Demographic Group	Nutrient	Priority Health Outcome	Effect	Direction of effect	Dose range associated with effect[2]
Children 4-8 years	Calcium	Growth and development	↑ BMD, BMC [25,26]	Beneficial	460-850 mg/day
	Iron	Growth and development	↑ cognitive performance [27]	Beneficial	1.66-60 mg/day
	Zinc	Growth and development	↑ cognitive performance, weight, height [27,28]	Beneficial	1.66-5.6 mg/day
	Vitamin B12	Growth and development	↑ cognitive performance [27]; ↓ B12 status in ASD and ADHD subjects [29]	Beneficial	1.04-1.17 μg/day
	Vitamin D	Growth and development	↑ BMD, BMC [30–32], cognitive function [33]; ↓ hyperactivity scores in ASD subjects [34]	Beneficial	132-2000 IU/day
		Respiratory health	↓ allergic rhinitis symptoms [35], respiratory tract infections [36]	Beneficial	800-1000 IU/day
		Metabolic health	↓ HOMA-IR, BMI [37,38]	Beneficial	600->4000 IU/day
		Mood and mental health	↑ mood, wellbeing [39]	Beneficial	1000 IU/day – 50000 IU/week
	Omega 3	Growth and development	↑ learning, memory, decision making [40,41]	Beneficial	≥0.45 g/day long chain omega 3
		Mood and mental health	↓ depression as adjunct therapy [42]	Beneficial	Not provided
	Folate	Growth and development	↑ folate status in ADHD subjects [29]	Adverse	H vs L blood levels
Adolescent males 9-18 years	Calcium	Growth and development	↑ BMD, BMC [25,26]	Beneficial	460 to 850 mg /day
	Vitamin D	Growth and development	↑ BMD, BMC [30–32], cognitive function [33]	Beneficial	132-2000 IU/day
		Respiratory health	↓ allergic rhinitis symptoms [35], respiratory tract infections [36], asthma attacks [43,44]	Beneficial	500-4000 IU/day
		Mood and mental health	↑ mood, wellbeing [39]	Beneficial	1000 IU/day-50000 IU/week
		Metabolic health	↓ HOMA-IR, BMI [37,38]	Beneficial	600->4000 IU/day

		Cancer	↓ risk renal cell carcinoma, risk liver cancer, risk breast cancer, melanoma thickness [45–48]	Beneficial	H vs L blood status
	Iron	Growth and development	↑ cognitive performance [27]	Beneficial	1.66-60 mg/day
	Zinc	Growth and development	↑ cognitive performance, weight, height [27,28]	Beneficial	1.66-5.6 mg/day
	Vitamin B12	Growth and development	↑ cognitive performance [27]; ↓ B12 status in ASD and ADHD subjects [29]	Beneficial	1.04-1.17 μg/day
	Omega 3	Growth and development	↑ learning, memory, decision making [41]	Beneficial	≥0.45 g/day long chain omega 3s
		Mood and mental health	↓ depression as adjunct therapy [42]	Beneficial	Not provided
	Folate	Growth and development	↑ folate status in ADHD subjects [29]	Adverse	H vs L blood levels
Adolescent females 9-18 years	Calcium	Growth and development	↑ BMD, BMC [25,26]	Beneficial	460 to 850 mg/day
	Vitamin D	Growth and development	↑ BMD, BMC [30–32], cognitive function [33]	Beneficial	132-2000 IU/day
		Respiratory health	↓ allergic rhinitis symptoms [35], respiratory tract infections [36], asthma attacks [43,44]	Beneficial	500-4000 IU/day
		Mood and mental health	↑ mood, wellbeing [39]	Beneficial	1000 IU/day - 50000 IU/week
		Metabolic health	↓ HOMA-IR, BMI [37,38]	Beneficial	600->4000 IU/day
		Cancer	↓ risk renal cell carcinoma, risk liver cancer, risk breast cancer, melanoma thickness [45–48]	Beneficial	H vs L blood status
	Iron	Growth and development	↑ cognitive performance [27]	Beneficial	1.66-60 mg/day
	Zinc	Growth and development	↑ cognitive performance, weight, height [27,28]	Beneficial	1.66-5.6 mg/day
	Vitamin B12	Growth and development	↑ cognitive performance [27]; ↓ B12 status in ASD and ADHD subjects [29]	Beneficial	1.04-1.17 μg/day
	Protein	Growth and development	↑ risk for early menarche onset [49]	Adverse	H vs L intake
	Dietary fiber	Growth and development	↓ risk for early menarche onset [49]	Beneficial	H vs L intake
	Omega 3	Growth and development	↑ learning, memory, decision making [41]	Beneficial	≥0.45 g/day long chain omega 3s
		Mood and mental health	↓ depression as adjunct therapy [42]	Beneficial	Not provided
	Folate	Growth and development	↑ folate status in ADHD subjects [29]	Adverse	H vs L blood levels
Adult males 19-70 years	Vitamin D	Mood and mental health	↑ mental health, quality of life [39,50]; ↓ depression, anxiety [39,51–54]	Beneficial	≥2000-14000 IU/day (equivalent)
		Metabolic health	↓ WHR, FBG, FBI, HOMA-IR, BMI, WC, risk of T2DM [36,55–57]; ↑ QUICKI [57]	Beneficial	1000-7142 IU/day (equivalent); H vs L blood levels

		Cancer	↓ risk renal cell carcinoma, risk liver cancer, risk breast cancer, risk lung cancer, risk colorectal cancer, risk ovarian cancer, risk cancer mortality, melanoma thickness [45–48,58–60]; ↑ survival after diagnosis [61]	Beneficial	1200-8000 IU/day, H vs L blood levels, H vs L intake
		Cardiovascular health	↓ risk CVD events, risk CVD mortality, risk stroke BP, CRP [57,62–71]	Beneficial	S vs I/D blood status, H vs L blood status, 1000-7100 IU/day equivalent
	Omega 3	Mood and mental health	↓ depression symptoms or severity, psychological distress, anxiety [72–76]	Beneficial	1-6.6 g/day total omega-3s
		Metabolic health	↓ risk for T2DM [77]	Beneficial	H vs L blood levels
		Cancer	↓ risk for colorectal cancer [77,78]; ↑ cancer survival [79]	Beneficial	H vs L blood levels; H vs L intake
		Cardiovascular health	↓ risk CVD, risk CHD, risk stroke, risk MI, risk CVD-related mortality, TG, TC, plasma Hcy, non-HDL-C, CRP, SBP [63,77,80–90]; ↑ FMD [91,92]	Beneficial	H vs L blood levels; 0.34-4 g/day
		Cardiovascular health	↑ risk AF [89]	Adverse	0.28-5.4 g/day
	Vitamin C	Mood and mental health	↑ mood [93]	Beneficial	100-3000 mg/day
		Cardiovascular health	↑ endothelial function [94]; ↓ risk CVD mortality [95]	Beneficial	500-2000 mg/day; H vs L intake; H vs L serum levels
	Vitamin E	Cardiovascular health	↓ fatal MI, risk CVD mortality, SBP [96,97]; ↑ endothelial function [97]	Beneficial	54-1200 mg/day; H vs L serum levels
		Cancer	↓ risk bladder cancer, risk esophagal cancer, risk lung cancer, risk kidney cancer, risk pancreatic cancer [97]	Beneficial	10 mg/day; H vs L intake; H vs L serum levels
	Folate	Mood and mental health	↓ depression symptoms as adjunct therapy [98,99]	Beneficial	0.5 to 10 mg/day folic acid; 7.5 to 15 mg/day 5-MTHF
		Metabolic health	↓ FBG, FBI, HOMA-IR [100]	Beneficial	0.8-5 mg/day folic acid; 15 mg/day 5-MTHF
		Cancer	↓ risk for colorectal cancer, pathological changes associated with gastric precancerous conditions [101,102]	Beneficial	H vs L intake, 20-30 mg/day folic acid

		Cardiovascular health	↓ risk stroke, risk CVD, carotid intimid-media thickness [63,103]	Beneficial	H vs L folate; folic acid intake
	Zinc	Mood and mental health	↓ depression symptoms, risk of depression [104,105]	Beneficial	7-25 mg/day; H vs L blood levels
	Dietary fiber	Metabolic health	↓ risk for T2DM, fasting plasma glucose, fasting plasma insulin, HOMA-IR, HbA1c, BW, BMI [106–108]	Beneficial	3-30 g/day; H vs L intake
		Cancer	↓ risk colon cancer, risk pancreatic cancer, risk gastric cancer, risk liver cancer, risk cancer-related mortality [109–113]	Beneficial	10 g/day, H vs L intake
		Cardiovascular health	↓ risk CVD, risk CHD, risk CVD mortality, risk CAD, risk stroke, TC, LDL-C, SBP, DBP [106,108,110–112,114,115]	Beneficial	H vs L intake; DR per each 10-15 g/day; 3-35 g/day
	Calcium	Metabolic health	↓ BMI [116]	Beneficial	≥ 1000 mg/day
	Omega 6	Cancer	↓ risk prostate cancer in males [117]	Beneficial	H vs L tissue levels
		Cardiovascular health	↓ risk CVD, risk CVD mortality, risk stroke, risk fatal CHD [87,118,119]	Beneficial	H vs L intake (LA); H vs L blood levels (LA)
	Protein	Cardiovascular health	↓ risk CVD [120]	Beneficial	H vs L intake
	Vitamin B12	Cardiovascular health	↓ risk CVD, Hcy [103,121]	Beneficial	H vs L intake; >500 μg/day
	Copper	Cardiovascular health	↑ risk stroke, risk CAD mortality, risk CVD mortality [122]	Adverse	H vs L blood levels
	Vitamin B6	Cardiovascular health	↓ risk CVD [103]	Beneficial	H vs L intake
Adult females 19-50 years	Vitamin D	Mood and mental health	↑ mental health, quality of life [39,50]; ↓ depression, anxiety [39,51–54]	Beneficial	≥2000-14000 IU/day (equivalent)
		Metabolic health	↓ WHR, FBG, FBI, HOMA-IR, BMI, WC [36,56,57]; ↑ QUICKI [57]	Beneficial	1000-7142 IU/day (equivalent)
		Cancer	↓ risk renal cell carcinoma, risk liver cancer, risk breast cancer, risk lung cancer, risk colorectal cancer, risk ovarian cancer, risk cancer mortality, melanoma thickness [45–48,58–60]	Beneficial	>2000 IU/day, H vs L blood levels, H vs L intake
		Cardiovascular health	↓ risk CVD events, risk CVD mortality, risk stroke BP, CRP [57,62,64,65,67–71]	Beneficial	S vs I/D blood status, H vs L blood status; 1000-7100 IU/day equivalent

		Fertility	↑ AMH, IVF outcomes, clinical pregnancy rate [123–125]	Beneficial	S vs I/D blood status; 1000-7100 IU/day equivalent
	Omega 3	Mood and mental health	↓ depression symptoms or severity, psychological distress, anxiety [72–76]	Beneficial	1000-6600 mg/day
		Metabolic health	↓ risk for T2DM [77]	Beneficial	H vs L blood levels
		Cancer	↓ risk for colorectal cancer [77,78]; ↑ cancer survival [79]	Beneficial	H vs L blood levels; H vs L intake
		Cardiovascular health	↓ risk CVD, risk CHD, risk stroke, risk CVD-related mortality, TG, TC, plasma Hcy, non-HDL-C, CRP, SBP [63,77,80,81,83,84,86,88–90]; ↑ FMD [91,92]	Beneficial	H vs L blood levels; 0.4-3.8 g/day
		Cardiovascular health	↑ risk AF [89]	Adverse	0.28-5.4 g/day
		Fertility	↑ IVF rate [126]	Beneficial	1-2 g/day; H vs L intake
	Vitamin C	Mood and mental health	↑ mood [93]	Beneficial	100-3000 mg/day
		Cardiovascular health	↑ endothelial function [94]; ↓ risk CVD mortality [95]	Beneficial	500-2000 mg/day; H vs L intake; H vs L serum levels
	Vitamin E	Cardiovascular health	↓ fatal MI, risk CVD mortality, SBP [96,97]; ↑ endothelial function [97]	Beneficial	54-1200 mg/day; H vs L serum levels
		Cancer	↓ risk bladder cancer, risk esophagal cancer, risk lung cancer, risk kidney cancer, risk pancreatic cancer [97]	Beneficial	10 mg/day; H vs L intake; H vs L serum levels
	Folate	Mood and mental health	↓ depression symptoms as adjunct therapy [98,99]	Beneficial	0.5 to 10 mg/day folic acid; 7.5 to 15 mg/day L-Methylfolate
		Metabolic health	↓ FBG, FBI, HOMA-IR [100]	Beneficial	0.8-5 mg/day folic acid; 15 mg/day 5-MTHF
		Cancer	↓ risk for colorectal cancer, risk for breast cancer, pathological changes associated with gastric precancerous conditions [101,102,127]	Beneficial	H vs L intake, 20-30 mg/day folic acid
		Cardiovascular health	↓ risk CVD, carotid intimid-media thickness [103]	Beneficial	H vs L folate intake
	Zinc	Mood and mental health	↓ depression symptoms, risk of depression [104,105]	Beneficial	7-25 mg/day; H vs L blood levels

	Dietary fiber	Metabolic health	↓ risk for T2DM, fasting plasma glucose, fasting plasma insulin, HOMA-IR, HbA1c, BW, BMI [106–108]	Beneficial	3-30 g/day; H vs L intake
		Cancer	↓ risk colon cancer, risk pancreatic cancer, risk gastric cancer, risk liver cancer, risk breast cancer, risk cancer-related mortality [109–113,128]	Beneficial	10 g/day, H vs L intake
		Cardiovascular health	↓ risk CVD, risk CHD, risk CVD mortality, risk CAD, risk stroke, TC, LDL-C, SBP, DBP [106,108,110–112,114,115]	Beneficial	H vs L intake; DR per each 10-15 g/day; 3-35 g/day
	Calcium	Metabolic health	↓ BMI [116]	Beneficial	≥ 1000 mg/day
		Cancer	↓ risk breast cancer [129]	Beneficial	350 mg/day
	Omega 6	Cardiovascular health	↓ risk fatal CHD [119]	Beneficial	H vs L blood levels (LA)
	Protein	Cardiovascular health	↓ risk CVD [120]	Beneficial	H vs L intake
	Vitamin B12	Cardiovascular health	↓ risk CVD, Hcy [103,121]	Beneficial	H vs L intake; >500 μg/day
	Copper	Cardiovascular health	↑ risk stroke, risk CAD mortality, risk CVD mortality [122]	Adverse	H vs L blood levels
	Vitamin B6	Cardiovascular health	↓ risk CVD [103]	Beneficial	H vs L intake
Pregnancy and lactation 19-50 years	Vitamin D	Mood and mental health	↓ risk depression [130,131]	Beneficial	S vs D blood status
		Metabolic health	↓ risk GDM, HOMA-IR, FBG, FBI [132–137]; ↑ glucose tolerance [132]	Beneficial	400-3570 IU/day; S vs D blood status
		Cardiovascular health	↓ risk preeclampsia, LDL-C [132,133,135,138–140]	Beneficial	> 400 IU/day
		Fetal development	↓ risk premature birth, risk VDD, risk asthma, risk wheeze, risk dental caries in childhood, risk SGA, risk congenital abnormality, hyperbilirubinemia, neonatal hospitalization, wheezing [36,133,136,140–144]; ↑ BMD, birth length, bone growth, live birth rate [123,135,145–148]	Beneficial	S vs D blood status; H vs L blood status; >400-7100 IU/day equivalent
	Vitamin E	Fetal development	↓ risk asthmatic disease, risk wheeze in children [149]	Beneficial	7.9-400 mg/day
	Omega 3	Mood and mental health	↓ depression symptoms [150]	Beneficial	0.3-1 g/day
		Metabolic health	↓ fasting glucose, postprandial glucose, FBI, HOMA-IR in pregnant women with GDM [151]	Beneficial	1-2 g/day

		Cardiovascular health	↓ risk preeclampsia, TG, LDL-C, CRP [152–154]; ↑ HDL-C [153]	Beneficial	0.2-3 g/day
		Fetal development	↓ low birth weight, premature birth [154,155]	Beneficial	0.3-3 g/day
	Dietary fiber	Metabolic health	↓ fasting glucose, postprandial glucose, and HbA1c in pregnant women with GDM [151]	Beneficial	12 g/day
		Cardiovascular health	↓ TC, LDL-C in pregnant women with GDM [151]	Beneficial	12 g/day
		Fetal development	↓ premature birth, caesarean delivery, fetal distress for pregnant women with GDM [151]	Beneficial	12 g/day
	Folate	Metabolic health	↑ GDM risk [156]	Adverse	H vs L blood levels; prolonged supplementation
		Fetal development	↓ risk birth defects, risk neurodevelopmental issues, risk respiratory allergic diseases [157–159]	Beneficial	0.4-0.8 mg/day
	Magnesium	Metabolic health	↓ FBG, FBI, HOMA-IR in women with GDM [160]; ↑ QUICKI [160]	Beneficial	250 mg/day MgO; 150 mg Mq equivalent
		Cardiovascular health	↓ TC, LDL-C [160]	Beneficial	250 mg/day MgO; 150 mg Mq equivalent
	Zinc	Metabolic health	↓ FBG, FBI, HOMA-IR in women with GDM [161]	Beneficial	8 to 30 mg/day
		Infectious immunity	↓ CRP during infection [162]	Beneficial	12-30 mg/day
	Calcium	Cardiovascular health	↓ risk preeclampsia, risk HT [139,163–166]	Beneficial	120-2000 mg/day
	Iodine	Fetal development	↓ risk SGA [167]; ↑ psychomotor development [168]	Beneficial	H vs L iodine status; up to 300 μg/day
Menopause and post-menopause 51-70 years	Vitamin D	Mood and mental health	↑ mental health, quality of life [39,50]; ↓ depression, anxiety [39,51–54]	Beneficial	≥2000-14000 IU/day (equivalent)
		Metabolic health	↓ WHR, FBG, FBI, HOMA-IR, BMI, WC, risk of T2DM [36,55–57]; ↑ QUICKI [57]	Beneficial	1000-7142 IU/day (equivalent); H vs L blood levels
		Cancer	↓ risk renal cell carcinoma, risk liver cancer, risk breast cancer, risk lung cancer, risk colorectal cancer, risk ovarian cancer, risk cancer mortality, melanoma thickness [45–48,58–60]; ↑ survival after diagnosis [61]	Beneficial	1200-8000 IU/day, H vs L blood levels, H vs L intake

		Cardiovascular health	↓ risk CVD events, risk CVD mortality, risk stroke BP, CRP [57,62–71]	Beneficial	S vs I/D blood status, H vs L blood status; 1000-7100 IU/day equivalent
		Bone health and density	↓ risk osteoporosis, risk fracture [169,170]; ↑ BMD, bone remodelling markers [171,172]	Beneficial	H vs L blood levels; 400-1000 IU/day
	Omega 3	Mood and mental health	↓ depression symptoms or severity, psychological distress, anxiety [72–76,173,174]	Beneficial	0.5-6.6 g/day; H vs L intake
		Metabolic health	↓ risk for T2DM [77]	Beneficial	H vs L blood levels
		Cancer	↓ risk for colorectal cancer [77,78]; ↑ cancer survival [79]	Beneficial	H vs L blood levels; H vs L intake
		Cardiovascular health	↓ risk CVD, risk CHD, risk stroke, risk MI, risk CVD-related mortality, TG, TC, plasma HC, non-HDL-C, CRP, SBP [63,77,80–90]; ↑ FMD [91,92]	Beneficial	H vs L blood levels; 0.34-4 g/day
		Cardiovascular health	↑ risk AF [89]	Adverse	0.28-5.4 g/day
	Vitamin C	Mood and mental health	↑ mood [93]	Beneficial	100-3000 mg/day
		Cardiovascular health	↑ endothelial function [94]; ↓ risk CVD mortality [95]	Beneficial	500-2000 mg/day; H vs L intake; H vs L blood levels
	Vitamin E	Cardiovascular health	↓ fatal MI, risk CVD mortality, SBP [96,97]; ↑ endothelial function [97]	Beneficial	54-1200 mg/day; H vs L blood levels
		Cancer	↓ risk bladder cancer, risk esophagal cancer, risk lung cancer, risk kidney cancer, risk pancreatic cancer [97]	Beneficial	10 mg/day; H vs L intake; H vs L blood levels
	Folate	Mood and mental health	↓ depression symptoms as adjunct therapy [98,99]	Beneficial	0.5 to 10 mg/day folic acid; 7.5 to 15 mg/day L-Methylfolate
		Metabolic health	↓ FBG, FBI, HOMA-IR [100]	Beneficial	0.8-5 mg/day folic acid; 15 mg/day 5-MTHF
		Cancer	↓ risk for colorectal cancer, pathological changes associated with gastric precancerous conditions [101,102]	Beneficial	H vs L intake, 20-30 mg/day folic acid
		Cardiovascular health	↓ risk stroke, risk CVD, carotid intimid-media thickness [63,103]	Beneficial	H vs L folate; folic acid intake
	Zinc	Mood and mental health	↓ depression symptoms, risk of depression [104,105]	Beneficial	7-25 mg/day; H vs L blood levels

	Dietary fiber	Metabolic health	↓ risk for T2DM, fasting plasma glucose, fasting plasma insulin, HOMA-IR, HbA1c, BW, BMI [106–108]	Beneficial	3-30 g/day; H vs L intake
		Cancer	↓ risk colon cancer, risk pancreatic cancer, risk gastric cancer, risk liver cancer, risk breast cancer, risk cancer-related mortality [109–113,128]	Beneficial	10 g/day, H vs L intake
		Cardiovascular health	↓ risk CVD, risk CHD, risk CVD mortality, risk CAD, risk stroke, TC, LDL-C, SBP, DBP [106,108,110–112,114,115]	Beneficial	H vs L intake; DR per each 10-15 g/day; 3-35 g/day
	Calcium	Metabolic health	↓ BMI [116]	Beneficial	≥ 1000 mg/day
		Cancer	↓ risk breast cancer [129]	Beneficial	350 mg/day
		Bone health and density	↑ BMD [175,176]	Beneficial	1200 mg/day
	Omega 6	Cardiovascular health	↓ risk CVD, risk CVD mortality, risk stroke, risk fatal CHD [87,118,119]	Beneficial	H vs L intake (LA); H vs L blood levels (LA)
	Protein	Cardiovascular health	↓ risk CVD [120]	Beneficial	H vs L intake
		Bone health and density	↑ lumbar spine BMD [177]	Beneficial	10-90 g/day
	Vitamin B12	Cardiovascular health	↓ risk CVD, Hcy [103,121]	Beneficial	H vs L intake; >500 μg/day
	Copper	Cardiovascular health	↑ risk stroke, risk CAD mortality, risk CVD mortality [122]	Adverse	H vs L blood levels
	Vitamin B6	Cardiovascular health	↓ risk CVD [103]	Beneficial	H vs L intake
Older adults >70 years	Dietary fiber	Metabolic health	↓ risk for T2DM, fasting plasma glucose, fasting plasma insulin, HOMA-IR, HbA1c, BW, BMI [106–108]	Beneficial	3-30 g/day; H vs L intake
		Cancer	↓ risk colon cancer, risk pancreatic cancer, risk gastric cancer, risk liver cancer, risk breast cancer, risk cancer-related mortality [109–113,128]	Beneficial	10 g/day, H vs L intake
		Cardiovascular health	↓ risk CVD, risk CHD, risk CVD mortality, risk CAD, risk stroke [106,110–112,114,115]	Beneficial	H vs L intake; DR per each 10 g/day; 3-30 g/day
	Omega 3	Metabolic health	↓ risk for T2DM [77]	Beneficial	H vs L blood levels
		Cancer	↓ risk for colorectal cancer [77,78]; ↑ cancer survival [79]	Beneficial	H vs L blood levels; H vs L intake

		Cardiovascular health	↓ risk CVD, risk CHD, risk stroke, risk MI, risk CVD-related mortality, TG, TC, plasma HC, non-HDL-C, CRP, SBP [63,77,80–90]; ↑ FMD [91,92]	Beneficial	H vs L blood levels; 0.34-4 g/day
		Cardiovascular health	↑ risk AF [89]	Adverse	0.28-5.4 g/day
		Independence	↑ lower body strength, sit to stand performance, up and go performance, physical function, memory, attention [178–187]; ↓ pain, risk cognitive decline [180,188]	Beneficial	H vs L intake; 0.23-5 g/day EPA+DHA; 1.35-14 g/day ALA
	Vitamin D	Metabolic health	↓ WHR, FBG, FBI, HOMA-IR, risk of T2DM [36,55,57]; ↑ QUICKI [57]	Beneficial	1000-7142 IU/day (equivalent); H vs L blood levels
		Cancer	↓ risk renal cell carcinoma, risk liver cancer, risk breast cancer, risk lung cancer, risk colorectal cancer, risk ovarian cancer, risk cancer mortality, melanoma thickness [45–48,58–60]; ↑ survival after diagnosis [61]	Beneficial	1200-8000 IU/day, H vs L blood levels, H vs L intake
		Cardiovascular health	↓ risk CVD events, risk CVD mortality, risk stroke BP, CRP [57,62–71]	Beneficial	S vs I/D blood status, H vs L blood status; 1000-7100 IU/day equivalent
		Infectious immunity	↓ risk severe COVID-19, risk COVID-19 mortality [189]	Beneficial	≥ 1000 IU/day
		Independence	↑ quadriceps strength, bone remodelling markers, cognitive function [172,190,191]; ↓ risk of falls, risk mortality after hip fracture, risk knee osteoarthritis, risk post-surgery cognitive dysfunction [191–196]	Beneficial	H vs L blood status; S vs D blood status; 400- <1000 IU/day; 0.25-1 ug/day prescription forms of vitamin D (active)
		Independence	↑ risk falls, hip fracture [195,197]; ↓ physical performance [198]	Adverse	Doses >1000 IU/day, large intermittent doses
	Vitamin E	Cardiovascular health	↓ fatal MI, risk CVD mortality [97]; ↑ endothelial function [97]	Beneficial	134-1200 mg/day; H vs L serum levels
		Cancer	↓ risk bladder cancer, risk esophagal cancer, risk lung cancer, risk kidney cancer, risk pancreatic cancer [97]	Beneficial	10 mg/day; H vs L intake; H vs L serum levels
	Vitamin C	Cardiovascular health	↑ endothelial function [94]; ↓ risk CVD mortality [95]	Beneficial	500-2000 mg/day; H vs L intake; H vs L serum levels

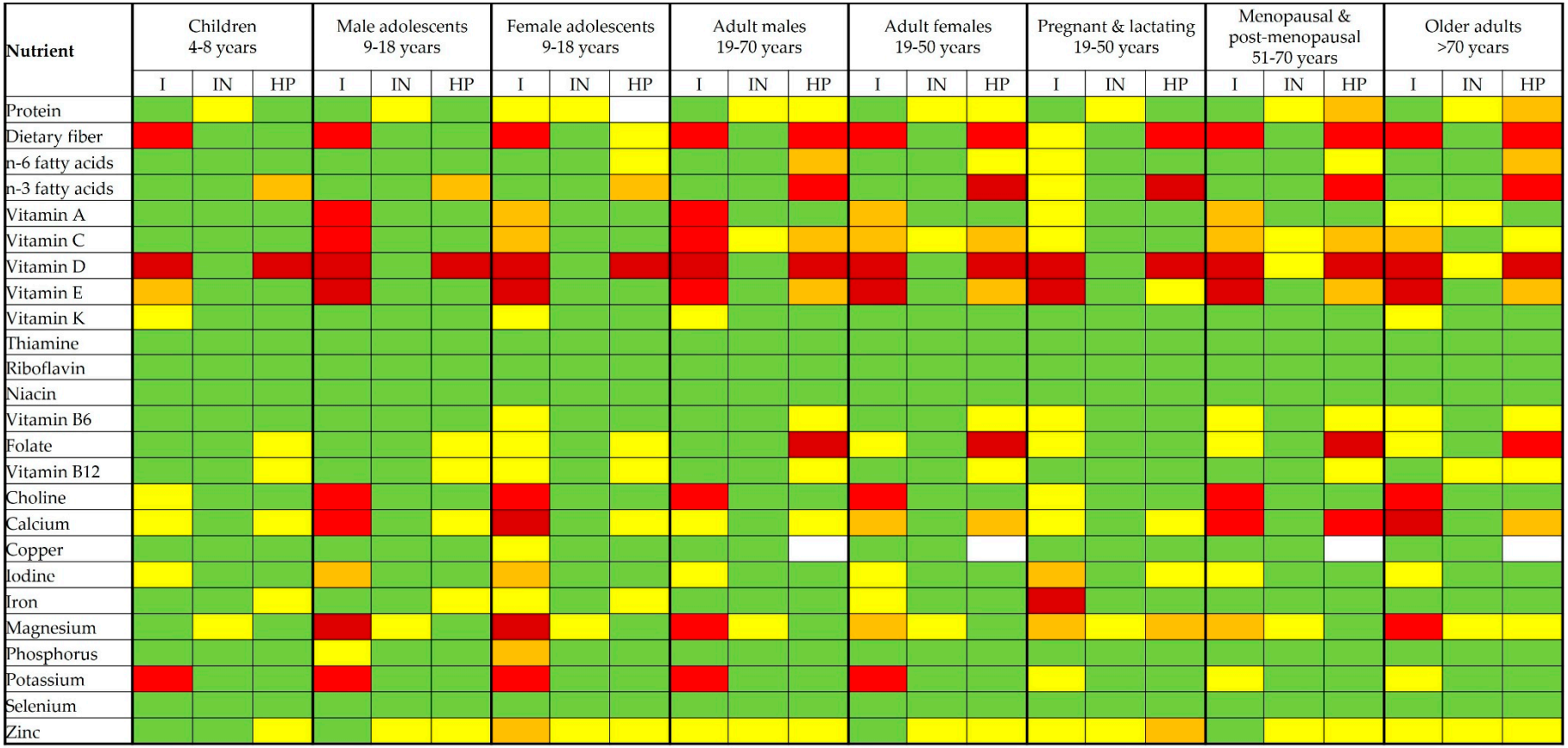
	Calcium	Metabolic health	↓ BMI [116]	Beneficial	≥ 1000 mg/day
		Cancer	↓ risk breast cancer [129]	Beneficial	350 mg/day
	Omega 6	Cancer	↓ risk prostate cancer in males [117]	Beneficial	H vs L tissue levels
		Cardiovascular health	↓ risk CVD, risk CVD mortality, risk stroke, risk fatal CHD [87,118,119]	Beneficial	H vs L intake (LA); H vs L blood levels (LA)
	Folate	Cancer	↓ risk for colorectal cancer [102]	Beneficial	H vs L intake
		Cardiovascular health	↓ risk stroke, risk CVD, carotid intimid-media thickness [63,103]	Beneficial	H vs L folate; folic acid intake
		Independence	↑ global cognitive function, memory, attention [178,199,200]; ↓ risk cognitive decline, risk AD [201,202]	Beneficial	H vs L blood status; H vs L intake; 0.4-5 mg folic acid
	Protein	Cardiovascular health	↓ risk CVD [120]	Beneficial	H vs L intake
		Independence [87,118,119]	↑ muscle protein synthesis, muscle mass, muscle performance, aerobic capacity, leg strength, increased lean body mass, muscle strength, hand-grip strength, walking capability, gait speed, sarcopenia outcomes [203–219]; ↓ risk sarcopenia, risk frailty, risk for falls, body fat, pain associated with osteoarthritis [204–207,209,210,214,220,221]	Beneficial	4-100 g/day; 1.1-1.8 g/kgbw/day; 6-15 g/day EAAs; 2.5-20 g/day BCAAs; 0.9-7.5 g/day leucine (often with resistance training)
	Vitamin B12	Cardiovascular health	↓ risk CVD, Hcy [103,121]	Beneficial	H vs L intake; >500 μg/day
	Copper	Cardiovascular health	↑ risk stroke, risk CAD mortality, risk CVD mortality [122]	Adverse	H vs L blood levels
	Vitamin B6	Cardiovascular health	↓ risk CVD [103]	Beneficial	H vs L intake
	Zinc	Infectious immunity	↓ CRP during infection [162]	Beneficial	15-100 mg/day
	Magnesium	Independence	↓ risk dementia, risk cognitive impairment (U-shaped association) [222]	Beneficial	H vs L blood levels

[1] Based on consistent evidence from SLRs of RCTs and/or prospective cohort studies.

[2] Dose represents amount added to normal diet, unless otherwise stated. For vitamin D, 1 μg is equivalent to 40 IU. For protein, intake is reported as g/day or g/kgbw/day, depending on how data have been presented within the source literature.

SLR, systematic literature review; RCT, randomized controlled trial; H, high; L, low; S, sufficient; I, insufficient; D, deficient; IU, international units; ADHD, Attention Deficit Hyperactivity Disorder; ASD, Autism Spectrum Disorder; AMH, anti-müllerian hormone; AD, Alzheimer's disease; BMI, body mass index; BMC, bone mineral content; BMD, bone mineral density; COVID-19, Coronavirus disease 2019; CVD, cardiovascular disease; CAD, coronary artery disease; CHD, coronary heart disease; Hcy, homocysteine;

EAA, essential amino acid; BCAA, branched chain amino acid; 5-MTHF, 5 methyltetrahydrofolate; IVF, *in vitro* fertilization; SGA, small for gestational age; VDD, vitamin D deficiency; HOMA-IR, Homeostatic Model of Insulin Resistance; WHR, waist to hip ratio; FBG, fasting blood glucose; FBI, fasting blood insulin; WC, waist circumference; T2DM, type 2 diabetes mellitus; GDM, gestational diabetes mellitus; BW, body weight;HbA1c, glycated hemoglobin; QUICKI, quantitative insulin sensitivity check index; DBP, diastolic blood pressure; SBP, systolic blood pressure; TC, total cholesterol; LDL-C, low density lipoprotein cholesterol; HDL-C, high density lipoprotein cholesterol; BP, blood pressure, HT, hypertension; CRP, C-reactive protein; TG, triglycerides; MI, myocardial infarction; AF, atrial fibrillation; FMD, flow mediated dilation.



COLOUR KEY							
Intake	% < EAR	Excess	0 to <20	≥20 to <40	≥40 to <60	≥60 to <80	≥80
	% < AI	Excess	0 to <50	≥50 to <75	≥75		
Increased needs		Decrease	0	present			
Health priorities		Adverse	0	1	2	3	≥4

Supplementary Figure S1. Heatmap showing the level of inadequate intake (I), suggested increased need (IN), and number of associations with health priorities (HP) for each included nutrient within each demographic group. Nutrient scoring and therefore the degree of need for prioritization increases from green to dark red.

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