

Supplementary Information to: Nutritional Value Score rates foods based on global health priorities

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Methods

Food composition data

All food composition data are publicly available in the Supplementary Data Excel File. The first tab, 'Master FCD_ID & BD', is the final food composition database used for the Nutritional Value Score (NVS) analysis. It includes all unprocessed, minimally processed, and processed sentinel foods listed in the country-adapted Diet Quality Questionnaires for Indonesia and Bangladesh (dietquality.org), with the exception of sago porridge, papaya leaves, mangosteen, green mango and green papaya in Indonesia, and of pa ruti, arum, khichuri, koromcha, and lassi in Bangladesh. We were unable to include these foods as they were not available in either USDA databases¹ or national food composition tables for Indonesia and Bangladesh². We also excluded sausages as these are often ultra-processed and our analysis did not include ultra-processed foods.

The second tab, 'FCD NS & HSR_ID', is a modified version of the final food composition database used for Nutri-Score (NS) and Health Star Rating (HSR) analyses. It only includes Indonesian foods, as we did not apply the NS and HSR algorithms to Bangladeshi foods. Compared to the final food composition database used for the NVS analysis, it includes six additional dietary/food components which were necessary to conduct the NS and HSR analyses: (i) total sugars (g); (ii) protein (g); (iii) fruit, vegetables, and legumes (fvl) content (% of energy); (iv) red meat content (g of protein); (v) concentrated fruit and vegetables content (% of energy); and (vi) fruit, vegetables, legumes, and nuts (fvln) content (% of energy). Data on components (i) and (ii) were obtained following the same process as for all other components already present in the final food composition database used for the NVS analysis. Components (iii) to (vi) were calculated considering the type of food, cooking methods used, and ingredients added (e.g., proportion of energy derived from added oils and fats).

The third and fourth tabs, 'Plant foods_granular data' and 'Animal foods_granular data', present nutrient values for all individual food items included under aggregate sentinel foods (for example, clams, mussels, oysters, and scallops for bivalve mollusks), and for different cooking methods and cuts (in the case of meat) for the same food (for example, omelet, scrambled, fried, and hard-boiled for eggs).

Similarly, the fifth and sixth tabs, 'Plant foods_granular_NS&HSR' and 'Animal foods_granular_NS&HSR', also present nutrient values for all individual food items included under aggregate sentinel foods, and for different cooking methods and cuts for the same food, but with the inclusion of the six additional dietary/food components needed for the NS and HSR analyses.

The seventh tab, 'ALA values_USDA&literature', includes values for ALA either from USDA databases (our preferred option when available) or from scientific literature. We aimed to obtain ALA values for *at least* one food per Diet Quality Questionnaire question, so that we could use them as a proxy for all other foods included under the same question. However, when this was not possible (for example, for question 9 on citrus fruits or question 15 on yogurt), we used the broader food group (or sub-group) average ALA value (in this example, the average ALA values for fruits and dairy, respectively).

Finally, the eighth tab, 'DIAAS values_literature', presents values for DIAAS obtained from scientific literature. For fruits and vegetables we used food group average values, assuming that DIAAS values do not show large variation across specific fruits and vegetables. For all

Dietary reference intakes

[illegible]

Iron (mg) ^a			Zinc (mg) ^b				Calcium (mg)	Potassium (mg)	Magnesium (mg)
20%	15%	10%	R	SR	SU	U			
8.17	12.25	16.33	8.45	10.5	12.5	14.5	960	3000	366.25
<p>Recommended intakes for iron, zinc, and calcium are from the European Food Safety Authority³. Recommended intakes for potassium, and magnesium are from the Institute of Medicine⁴. ^aThe percentages indicated represent different levels of bioavailability, which translate into different RNI's (the higher the bioavailability of iron in diets, the lower the amount needed to meet daily requirements).</p> <p>^bAssuming 300 mg phytate/day and 44% absorption for refined (R) diets, 600 mg phytate/day and 35% absorption for semi-refined (SR) diets, 900 mg phytate/day and 30% absorption for semi-unrefined (SU) diets, and 1,200 mg phytate/day and 26% absorption for unrefined (U) diets. Abbreviations: R, refined; SR, semi-refined; SU, semi-unrefined; U, unrefined.</p>									

Additional results figures for Indonesia

Nutritional Value Scores by food group

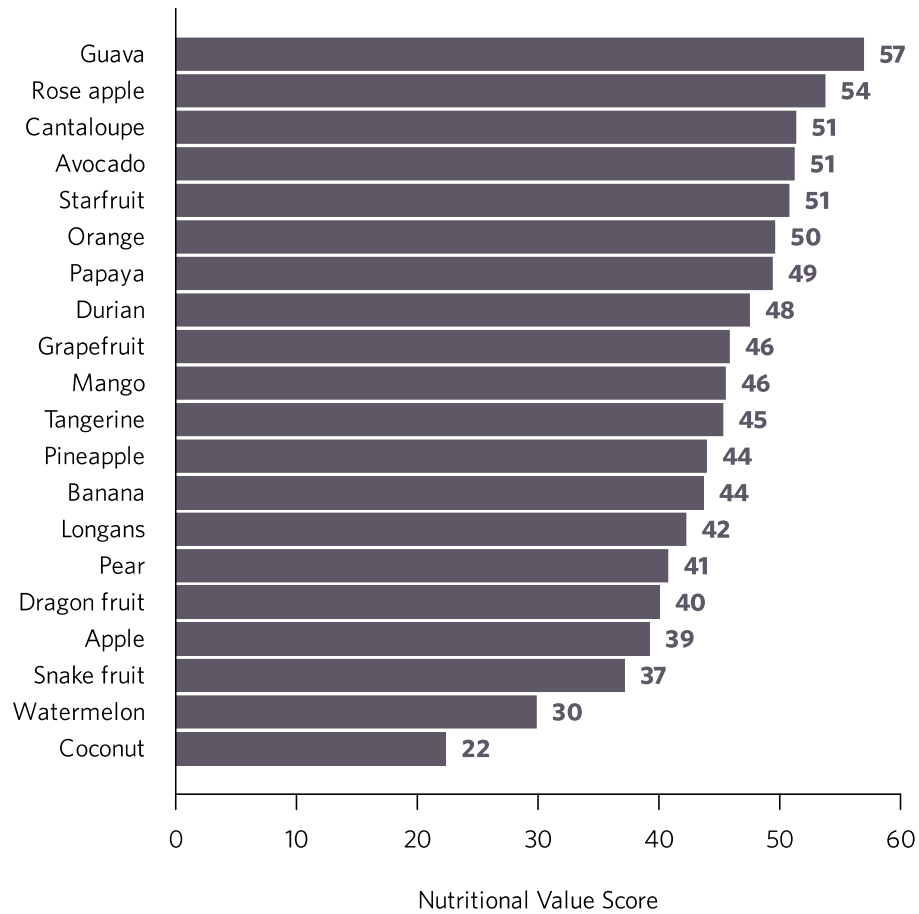


Figure 1 | Nutritional Value Scores for common Indonesian fruits.



Figure 2 | Nutritional Value Scores for common Indonesian legumes, nuts, and seeds.

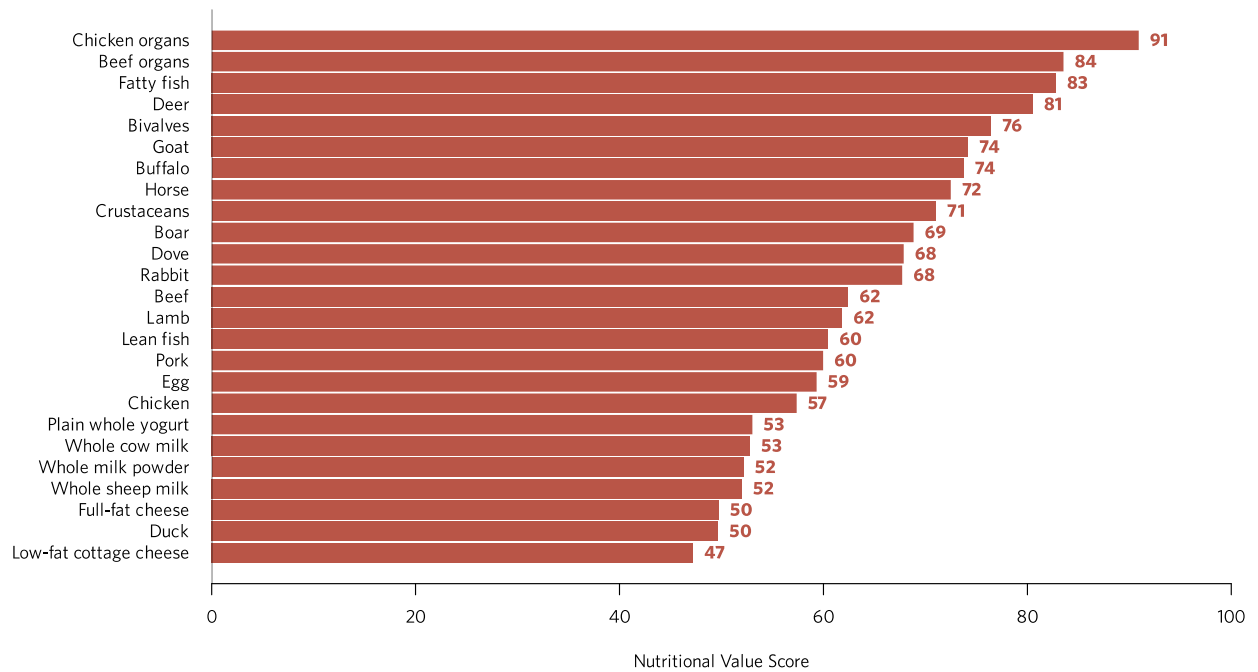


Figure 3 | Nutritional Value Scores for common Indonesian animal-source foods.

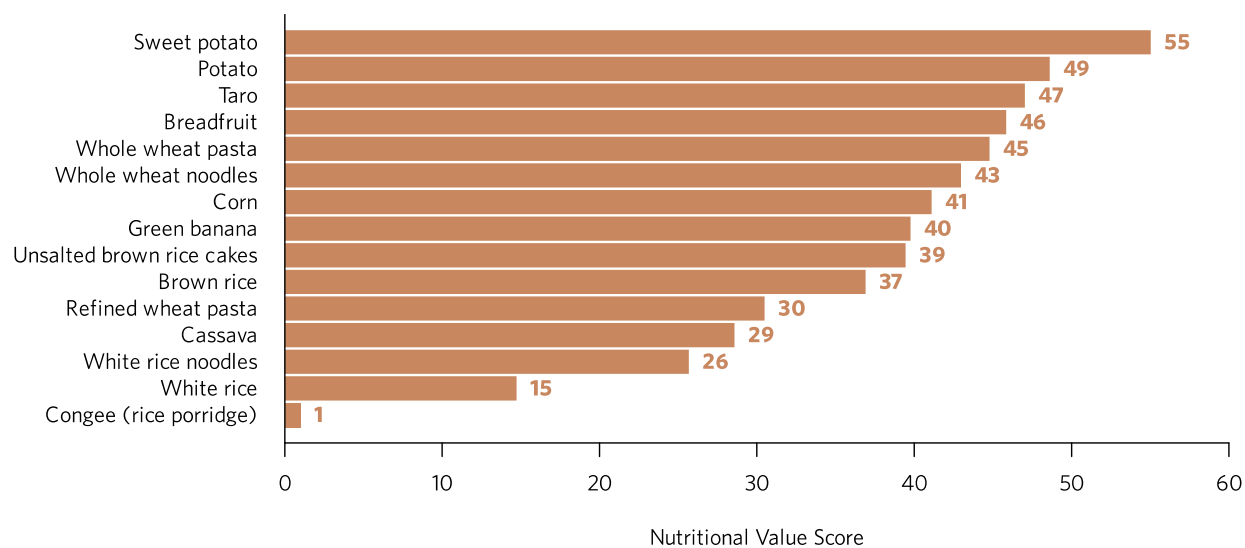


Figure 4 | Nutritional Value Scores for common Indonesian starchy staples.

Results for Bangladesh

Component nutritional scores

Table 3 | Component scores, Nutrient Density Scores, and Nutritional Value Scores for common Bangladeshi foods

Food	Vitamin score	Mineral score	n-3 fatty acid score	EAA score	Fiber score	Nutrient ratio score	Calorie score	Nutrient Density Score	Nutritional Value Score
Red amaranth leaves	65	100	11	38	97	100	0	89	100
Spinach	75	90	15	48	68	99	0	92	99
Amaranth leaves	65	91	15	43	92	100	0	87	98
Dried fish	46	91	86	86	1	100	-48	100	96
Malabar spinach	76	76	16	38	67	99	0	83	93
Chicken liver	100	59	1	82	1	99	-9	97	92
Fatty fish	47	27	100	69	1	100	-19	65	77
Goat	41	55	1	89	1	99	-3	68	74
Taro shoots	41	48	12	35	82	99	0	50	73
Bitter melon	38	48	9	32	69	99	0	47	69
Cabbage	44	42	9	35	61	99	0	48	69
Dove	40	48	8	74	1	99	-18	60	68
Paneer	48	51	3	80	1	94	-36	67	67
Radish	29	41	11	34	62	99	0	40	64
Calabash	26	48	11	34	51	98	0	42	63
Quail	40	36	6	73	1	99	-21	54	63
Kohlrabi	36	36	7	34	59	99	0	40	63
Beef	35	43	2	77	1	98	-29	55	62
Pointed gourd	28	39	7	31	63	99	0	37	62
Green beans	35	27	6	35	68	99	0	36	61
Tomatoes	40	35	9	33	33	98	0	42	61
Lean fish	38	17	21	76	2	99	-9	47	61
Pumpkin	45	39	1	32	24	96	0	45	60
Jackfruit seeds	50	35	2	55	14	86	-5	53	60
Long bean	33	38	5	38	35	97	0	41	60
Carrots	39	25	1	35	58	98	0	36	60
Egg	49	18	9	63	1	97	-7	47	59
Hog plum (amra)	30	44	11	27	27	97	0	41	59
Chickpeas	23	33	3	39	65	98	-7	33	58
Chicken	30	24	8	78	1	99	-17	44	57
Guava	33	22	3	27	73	97	0	30	57

Food	Vitamin score	Mineral score	n-3 fatty acid score	EAA score	Fiber score	Nutrient ratio score	Calorie score	Nutrient Density Score	Nutritional Value Score
Sweet potato	33	19	1	52	31	96	0	35	55
Dal	27	30	3	27	68	93	-3	31	55
Green papaya	23	34	6	31	37	98	0	32	55
Rose apple	29	16	19	29	53	98	0	27	54
Peanuts	39	47	1	30	54	99	-98	46	54
Plain whole yogurt	23	27	7	61	1	94	0	37	53
Whole cow milk	28	22	6	59	1	95	0	37	53
Unsalted popcorn	15	41	1	23	100	97	-54	29	53
Ash gourd	30	35	12	34	88	64	0	37	52
Whole sheep milk	26	21	5	64	1	94	0	36	52
Starfruit	21	13	16	28	65	99	0	21	52
Cantaloupe	37	22	9	26	20	94	0	32	51
Malta orange	34	13	7	25	40	97	0	26	51
Full-fat cheese	25	42	3	78	1	80	-50	50	50
Duck	27	22	1	63	1	99	-35	37	50
Orange	29	15	7	26	42	97	0	24	50
Papaya	30	18	7	24	32	96	0	26	49
Potato	19	20	2	53	20	93	0	29	49
Low-fat cottage cheese	13	6	4	94	1	90	-3	31	47
Okra	26	18	3	31	21	94	0	25	46
Grapefruit	27	12	9	25	26	95	0	22	46
Cauliflower	31	11	3	31	20	94	0	24	46
Mango	32	9	6	26	24	94	0	23	46
Banana	19	16	3	26	30	94	0	19	44
Pineapple	26	11	4	25	24	94	0	20	44
Custard apple	19	18	3	25	26	93	0	20	43
Chapati (roti)	23	23	1	11	68	91	-36	20	43
Jackfruit	22	19	3	27	17	90	0	23	43
Jujube	21	12	8	26	24	93	0	19	43
Lychee	22	9	9	26	19	92	0	18	41
Sweet corn	18	15	1	17	29	94	0	16	41
Eggplant	18	9	3	29	22	93	0	16	41
Java plum (jambolan)	12	9	10	26	28	95	0	13	40
Apple	7	5	4	24	39	97	0	8	38
Plaintain	16	15	3	25	23	89	-14	17	38

Food	Vitamin score	Mineral score	n-3 fatty acid score	EAA score	Fiber score	Nutrient ratio score	Calorie score	Nutrient Density Score	Nutritional Value Score
Brown rice	13	14	1	21	18	90	0	13	37
Paratha	9	14	1	7	66	89	-42	7	33
Watermelon	6	4	3	24	5	87	0	7	30
White rice	3	4	1	21	5	51	0	4	15

Nutritional Value Scores across all food groups and by food group

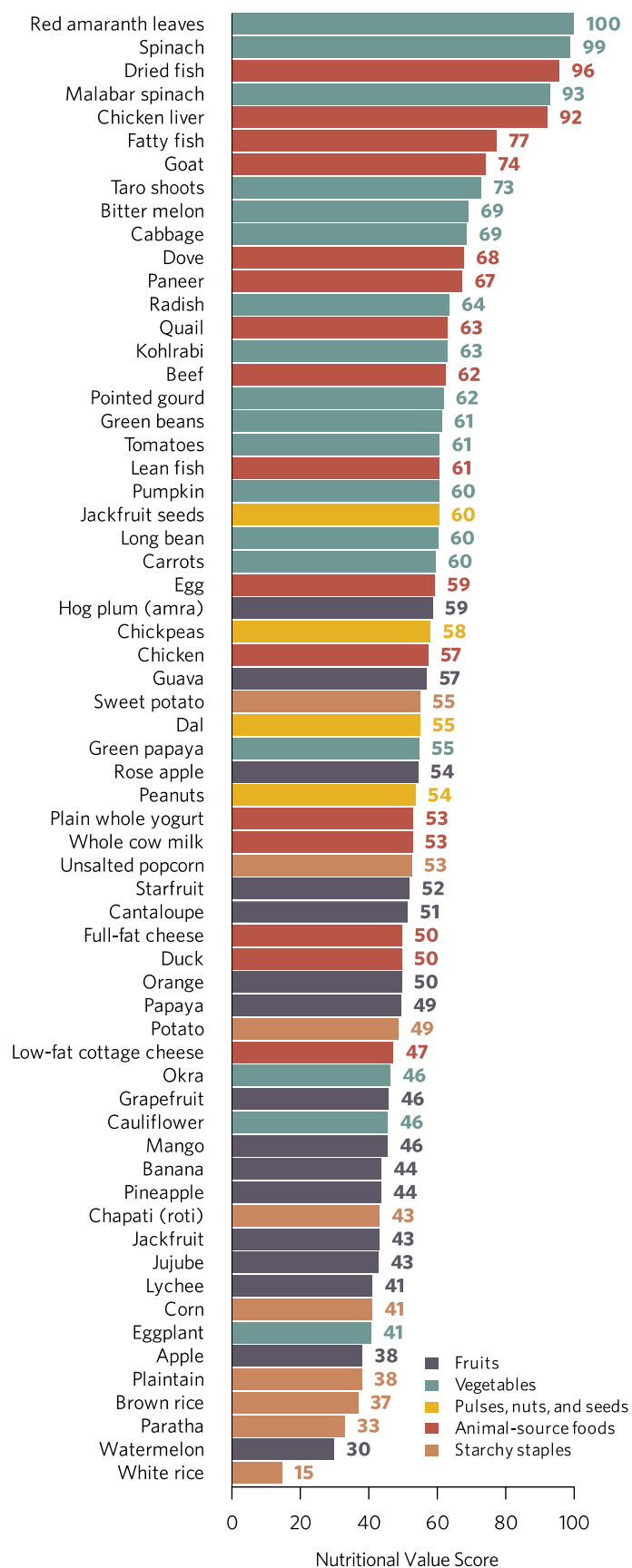


Figure 5 | Nutritional Value Scores for common Bangladeshi foods. This figure includes most, though not all, foods analyzed for Bangladesh.

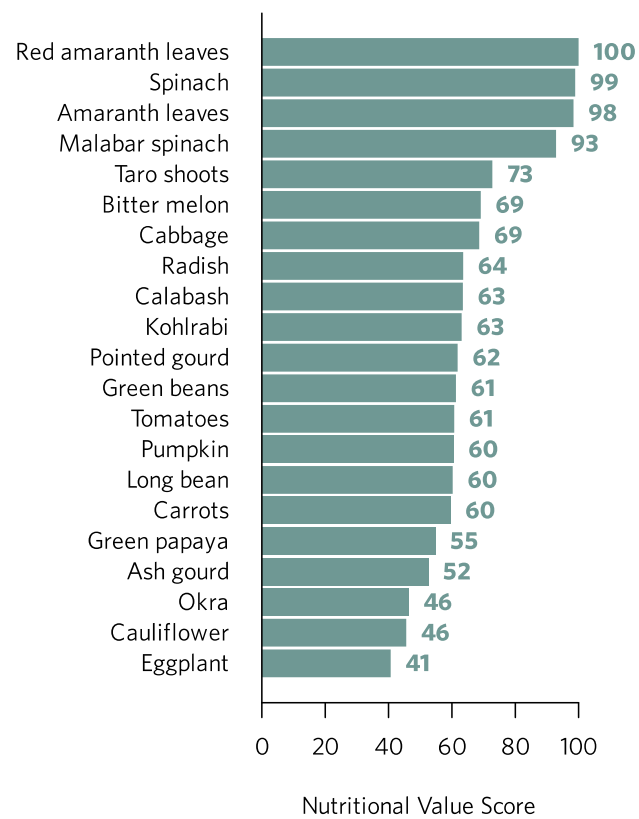


Figure 6 | Nutritional Value Scores for common Bangladeshi vegetables.

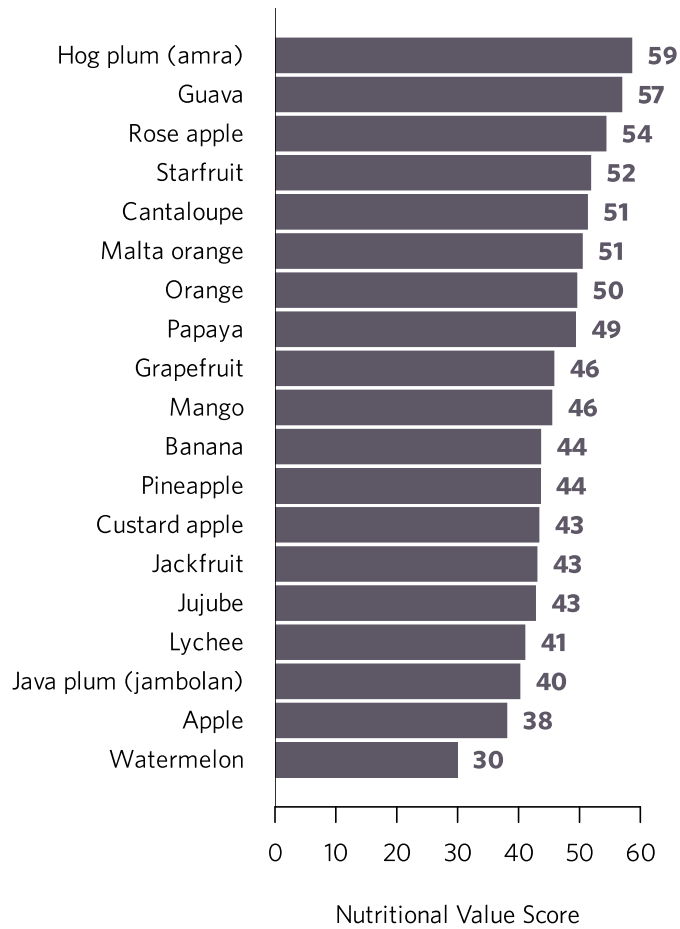


Figure 7 | Nutritional Value Scores for common Bangladeshi fruits.

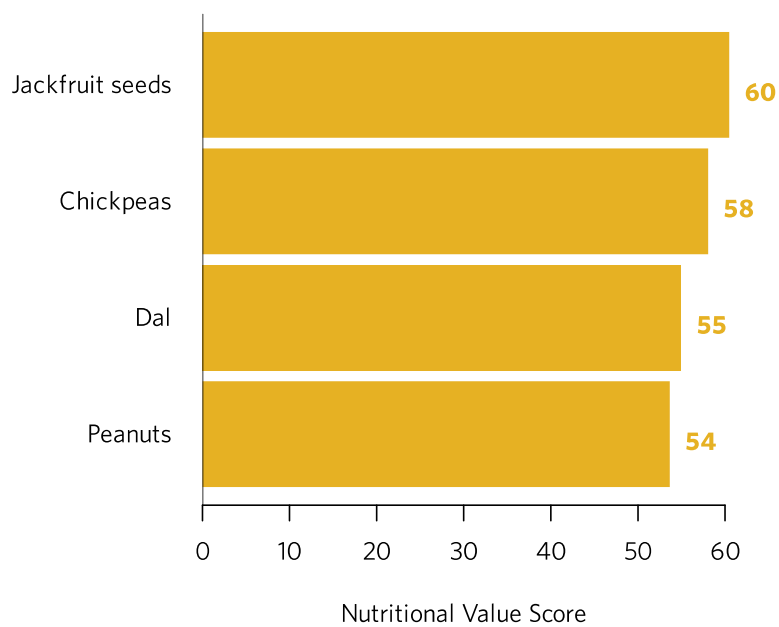


Figure 8 | Nutritional Value Scores for common Bangladeshi legumes, nuts, and seeds.

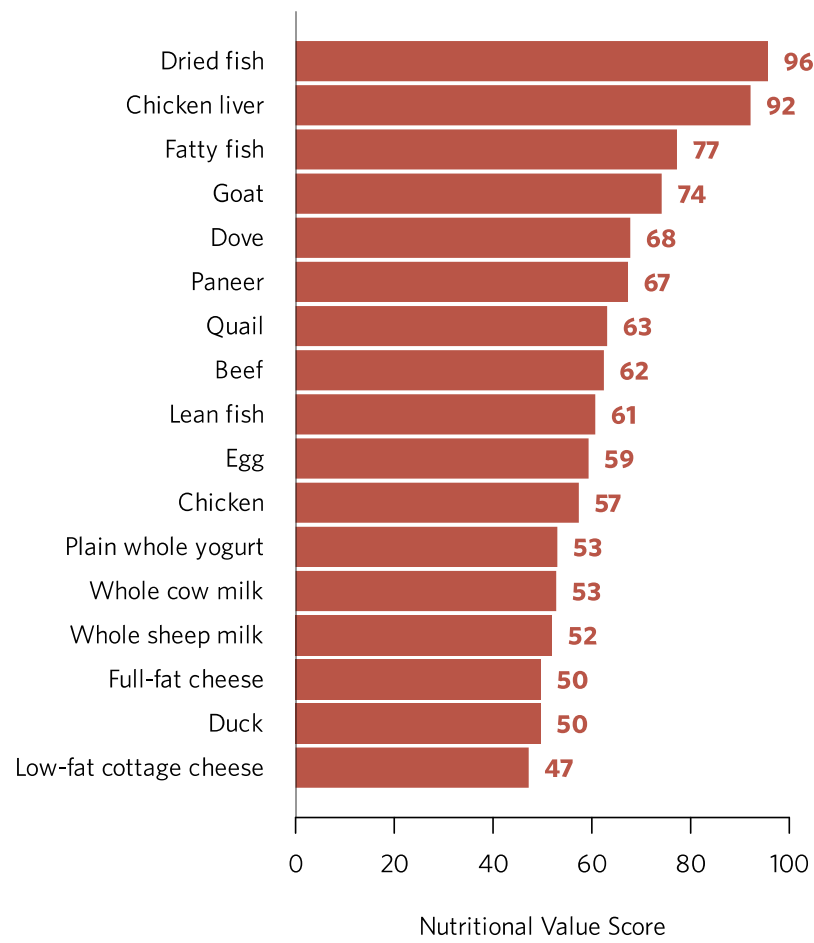


Figure 9 | Nutritional Value Scores for common Bangladeshi animal-source foods.

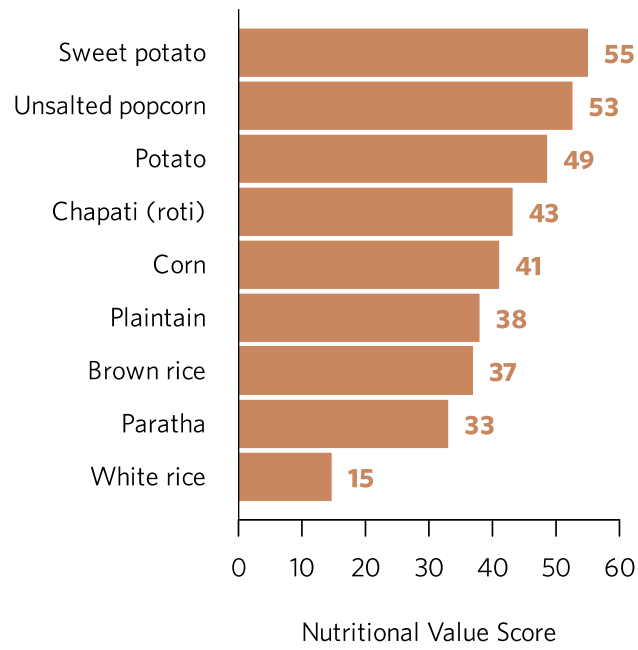


Figure 10 | Nutritional Value Scores for common Bangladeshi starchy staples.

Comparisons with other nutrient profiling systems

Table 4 | Nutritional Value Scores, Nutri-Score points, Nutri-Score rating, Health Star Rating scores, and Health Star Rating for commonly consumed foods in Indonesia

Food	Food group	DQQ food group	Nutritional Value Score	Nutri-Score points	Nutri-Score rating	Health Star Rating scores	Health Star Rating
Spinach	Vegetables	Dark green leafy vegetables	99	-5	A	-18	5
Chicken organs	Animal-source foods	Organ meat	91	4	C	-7	4.5
Pumpkin leaves	Vegetables	Dark green leafy vegetables	90	-5	A	-18	5
Water spinach	Vegetables	Dark green leafy vegetables	87	-4	A	-18	5
Chinese cabbage	Vegetables	Dark green leafy vegetables	84	-5	A	-18	5
Beef organs	Animal-source foods	Organ meat	84	5	C	-6	4
Fatty fish	Animal-source foods	Fish and seafood	83	6	C	-4	4
Chinese broccoli	Vegetables	Dark green leafy vegetables	82	-5	A	-18	5
Deer	Animal-source foods	Unprocessed red meat (ruminant)	81	2	B	-10	4.5
Sweet potato leaves	Vegetables	Dark green leafy vegetables	78	-5	A	-18	5
Bivalves	Animal-source foods	Fish and seafood	76	8	C	-2	4
Goat	Animal-source foods	Unprocessed red meat (ruminant)	74	2	B	-10	4.5
Buffalo	Animal-source foods	Unprocessed red meat (ruminant)	74	1	B	-10	4.5
Broccoli	Vegetables	Dark green leafy vegetables	73	-5	A	-18	5
Cassava leaves	Vegetables	Dark green leafy vegetables	73	-5	A	-18	5
Horse	Animal-source foods	Unprocessed red meat (non-ruminant)	72	3	C	-8	4.5
Crustaceans	Animal-source foods	Fish and seafood	71	7	C	-4	4
Bitter melon	Vegetables	Other vegetables	69	-5	A	-18	5
Zucchini	Vegetables	Other vegetables	69	-5	A	-18	5
Boar	Animal-source foods	Unprocessed red meat (non-ruminant)	69	2	B	-9	4.5
Cabbage	Vegetables	Other vegetables	69	-5	A	-18	5
Dove	Animal-source foods	Poultry	68	5	C	-5	4
Edamame	Pulses, nuts, and seeds	Legumes	68	-6	A	-18	5
Rabbit	Animal-source foods	Unprocessed red meat (non-ruminant)	68	3	C	-9	4.5
Red beans	Pulses, nuts, and seeds	Legumes	66	-8	A	-18	5
Sunflower seeds	Pulses, nuts, and seeds	Nuts and seeds	65	-10	A	-8	4.5
Beef	Animal-source foods	Unprocessed red meat (ruminant)	62	9	C	-2	4
Radish	Vegetables	Other vegetables	62	-5	A	-18	5

Mung beans	Pulses, nuts, and seeds	Legumes	62	-9	A	-18	5
Lamb	Animal-source foods	Unprocessed red meat (ruminant)	62	9	C	-2	4
Green beans	Vegetables	Other vegetables	61	-5	A	-18	5
Tree fern	Vegetables	Dark green leafy vegetables	61	-6	A	-18	5
Tomatoes	Vegetables	Other vegetables	61	-5	A	-18	5
Pumpkin	Vegetables	Vitamin A-rich orange vegetables	60	-5	A	-18	5
Lean fish	Animal-source foods	Fish and seafood	60	6	C	-5	4
Mung bean sprouts	Vegetables	Other vegetables	60	-5	A	-18	5
Pork	Animal-source foods	Unprocessed red meat (non-ruminant)	60	10	C	-1	3.5
Carrots	Vegetables	Vitamin A-rich orange vegetables	60	-4	A	-18	5
Egg	Animal-source foods	Eggs	59	6	C	-1	3.5
Long bean	Vegetables	Other vegetables	59	-5	A	-18	5
Tempeh	Pulses, nuts, and seeds	Legumes	59	-2	A	-18	5
Chicken	Animal-source foods	Poultry	57	5	C	-7	4.5
Guava	Fruits	Other fruits	57	-6	A	-18	5
Tofu	Pulses, nuts, and seeds	Legumes	55	-3	A	-11	5
Sweet potato	Starchy staples	White roots, tubers, and plantains	55	2	B	-2	4
Mushrooms	Vegetables	Other vegetables	54	-5	A	-18	5
Unsweetened soymilk	Pulses, nuts, and seeds	Legumes	54	-6	B	11	1
Rose apple	Fruits	Other fruits	54	-3	A	-18	5
Winged beans	Vegetables	Other vegetables	54	-4	A	-18	5
Peanuts	Pulses, nuts, and seeds	Nuts and seeds	54	-7	A	-13	5
Plain whole yogurt	Animal-source foods	Yogurt	53	3	C	0	4.5
Red pepper	Vegetables	Vitamin A-rich orange vegetables	53	-1	A	-18	5
Whole cow milk	Animal-source foods	Milk	53	3	C	1	3.5
Whole milk powder	Animal-source foods	Milk	52	3	C	0	4
Whole sheep milk	Animal-source foods	Milk	52	8	D	2	3
Cantaloupe	Fruits	Vitamin A-rich fruits	51	-3	A	-18	5
Avocado	Fruits	Other fruits	51	-6	A	-18	5
Starfruit	Fruits	Other fruits	51	-4	A	-18	5
Luffa gourd	Vegetables	Other vegetables	51	-4	A	-18	5
Full-fat cheese	Animal-source foods	Cheese	50	23	E	28	4
Duck	Animal-source foods	Poultry	50	12	D	1	3.5
Orange	Fruits	Citrus	50	-3	A	-18	5
Papaya	Fruits	Vitamin A-rich fruits	49	-3	A	-18	5

Potato	Starchy staples	White roots, tubers, and plantains	49	2	B	0	3.5
Green pepper	Vegetables	Other vegetables	48	-2	A	-18	5
Durian	Fruits	Other fruits	48	-2	A	-18	5
Peanut butter	Pulses, nuts, and seeds	Nuts and seeds	47	-5	B	-8	4.5
Low-fat cottage cheese	Animal-source foods	Cheese	47	5	C	3	3.5
Taro	Starchy staples	White roots, tubers, and plantains	47	-1	A	-4	4
Cashews	Pulses, nuts, and seeds	Nuts and seeds	46	-2	B	-3	4
Grapefruit	Fruits	Citrus	46	-3	A	-18	5
Breadfruit	Starchy staples	White roots, tubers, and plantains	46	-2	A	-5	4
Mango	Fruits	Vitamin A-rich fruits	46	-2	A	-18	5
Tangerine	Fruits	Citrus	45	-2	A	-18	5
Cauliflower	Vegetables	Other vegetables	45	1	B	-18	5
Whole wheat pasta	Starchy staples	Whole grains	45	0	A	-6	4
Oncom	Pulses, nuts, and seeds	Legumes	44	-3	A	-13	5
Pineapple	Fruits	Other fruits	44	-3	A	-18	5
Cucumber	Vegetables	Other vegetables	44	-2	A	-18	5
Banana	Fruits	Other fruits	44	-1	A	-18	5
Whole wheat noodles	Starchy staples	Whole grains	43	2	B	-4	4
Longans	Fruits	Other fruits	42	-3	A	-18	5
Sweet corn	Starchy staples	Whole grains	41	2	B	-10	4.5
Pear	Fruits	Other fruits	41	-4	A	-18	5
Eggplant	Vegetables	Other vegetables	41	0	A	-18	5
Dragon fruit	Fruits	Other fruits	40	-4	A	-18	5
Green banana	Starchy staples	White roots, tubers, and plantains	40	2	B	-1	3.5
Unsalted brown rice cakes	Starchy staples	Whole grains	39	2	B	-5	4
Apple	Fruits	Other fruits	39	-2	A	-18	5
Snake fruit	Fruits	Other fruits	37	-1	A	-18	5
Brown rice	Starchy staples	Whole grains	37	1	B	-1	3.5
Refined wheat pasta	Starchy staples	Refined grains	30	1	B	-3	4
Watermelon	Fruits	Other fruits	30	-3	A	-18	5
Cassava	Starchy staples	White roots, tubers, and plantains	29	3	C	2	3.5
White rice noodles	Starchy staples	Refined grains	26	1	B	-1	3.5
Coconut	Fruits	Other fruits	22	10	C	5	3
White rice	Starchy staples	Refined grains	15	1	B	0	3.5
Congee (rice porridge)	Starchy staples	Refined grains	1	3	C	2	3.5

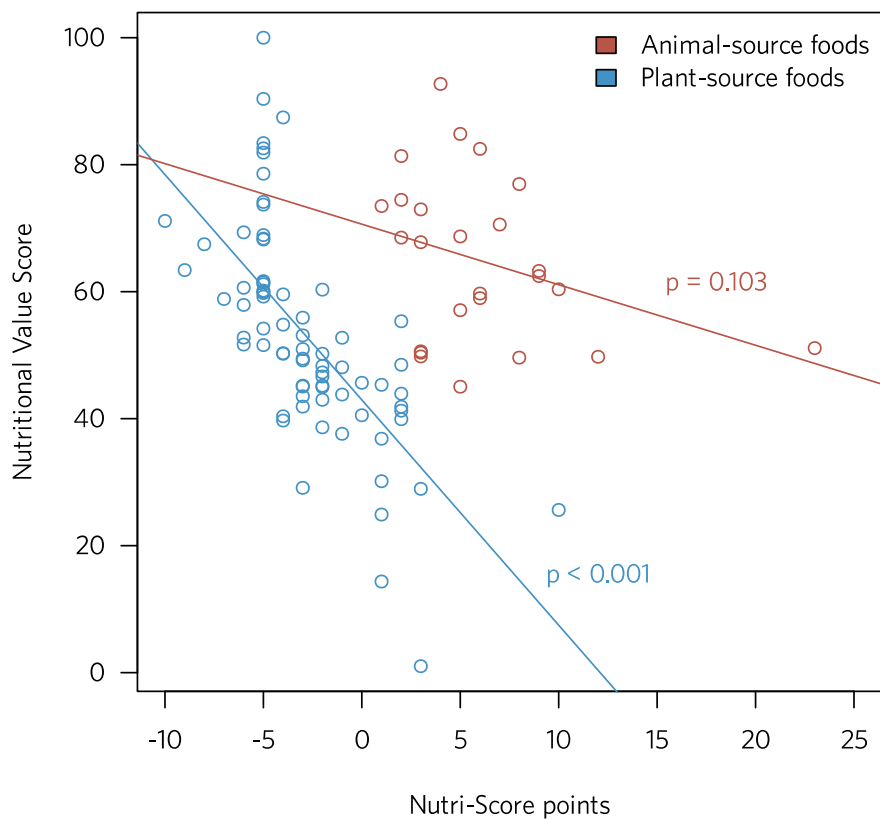


Figure 11 | Linear regression analysis of the relationship between Nutri-Score points and Nutritional Value Score for animal-source and plant-source foods. The p-values indicate the statistical significance of the linear relationship between Nutri-Score points and Nutritional Value Score for each food category.

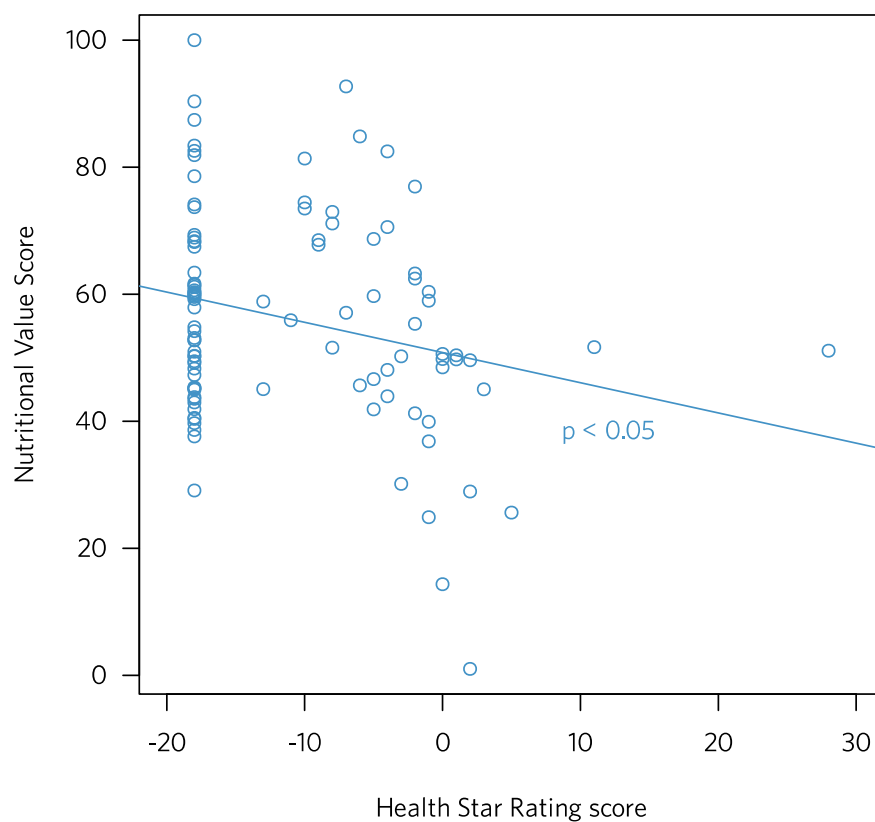


Figure 12 | Linear regression analysis of the relationship between Health Star Rating score and Nutritional Value Score. The p-values indicate the statistical significance of the linear relationship between Health Star Rating scores and Nutritional Value Score.

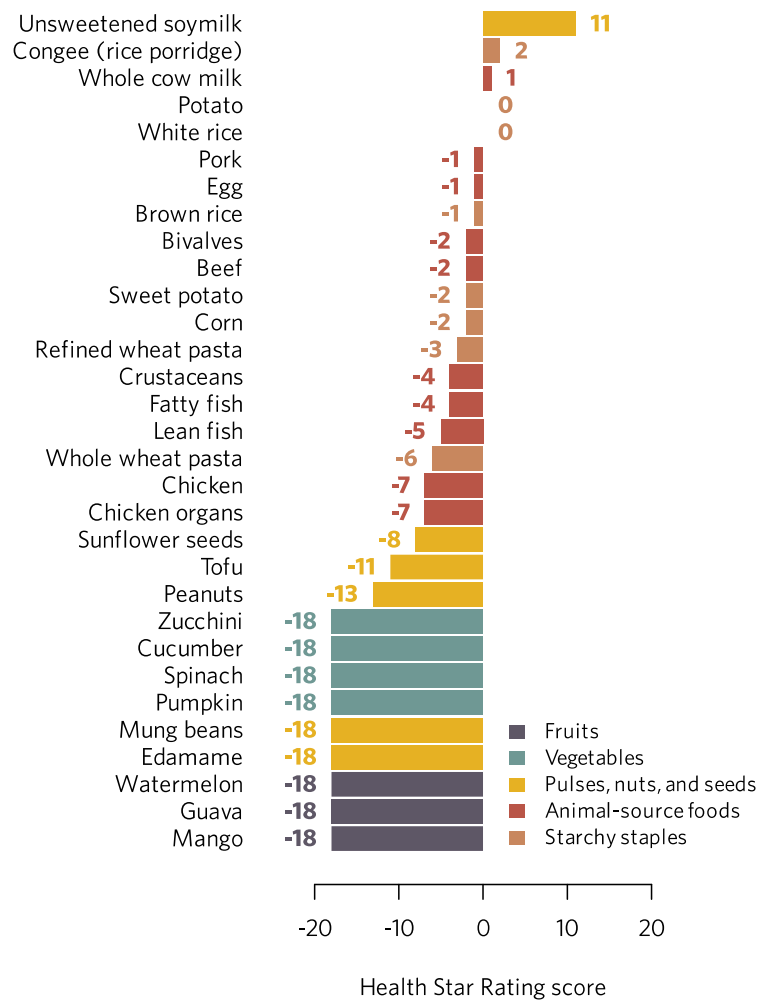


Figure 13 | Health Star Rating score for common Indonesia foods. Lower scores are considered healthier foods and higher scores are considered unhealthier foods. Fresh fruits and vegetables were assigned the minimum scores since they are automatically given 5 stars, and thus are not scored in the algorithm.

Implications for life cycle assessment

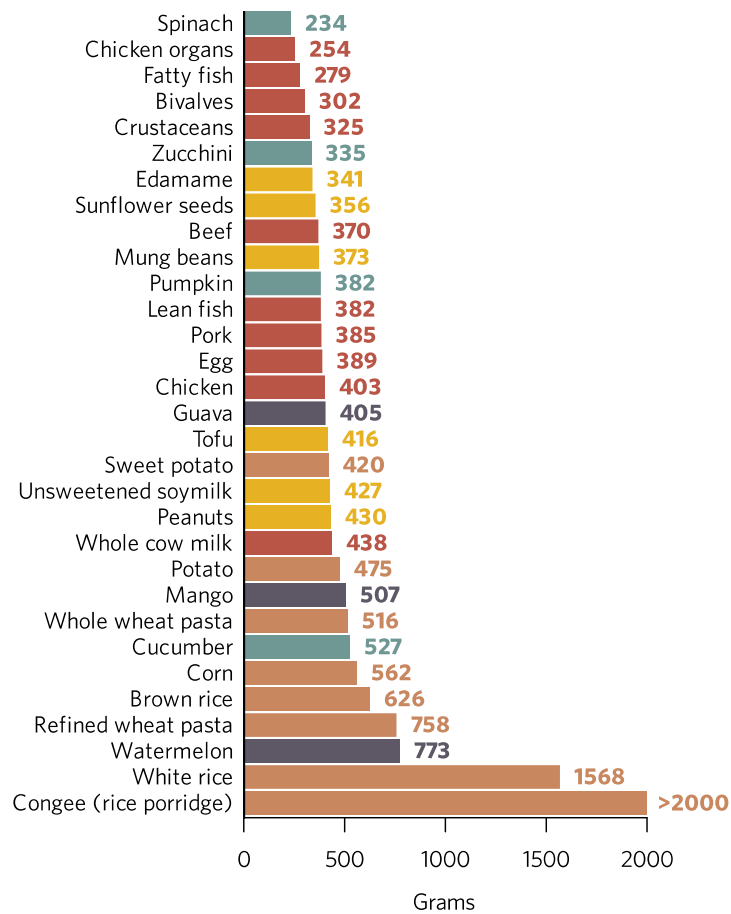


Figure 14 | Grams of Indonesian foods needed for a Nutritional Value Score of 100. The Nutritional Value Score rates foods by nutritional value. It is scaled from 1 (lowest) to 100 (highest).

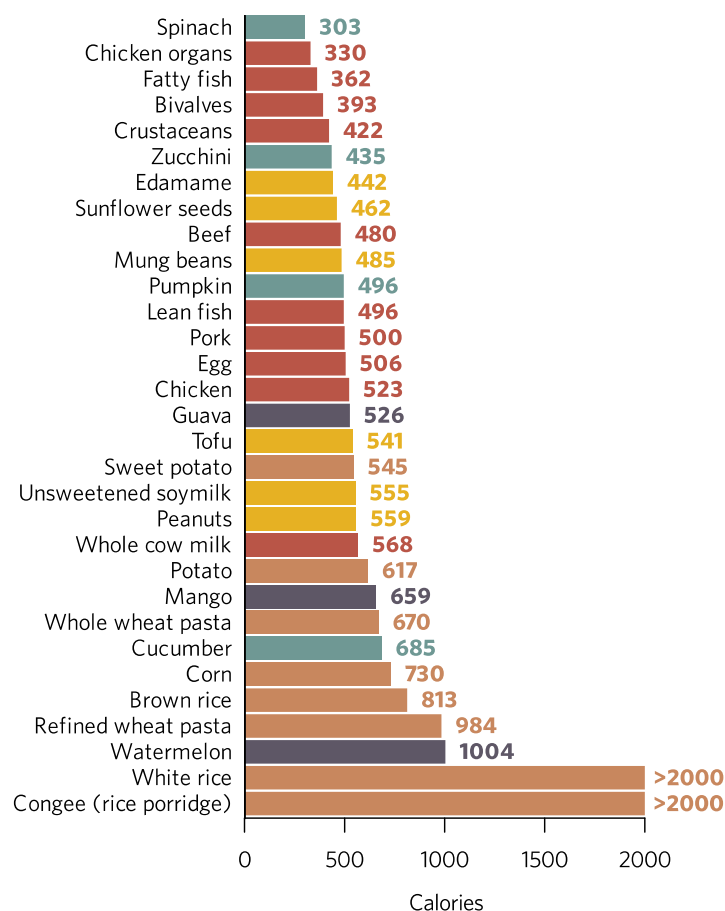


Figure 15 | Calories of Indonesian foods needed for a Nutritional Value Score of 100. The Nutritional Value Score rates foods by nutritional value. It is scaled from 1 (lowest) to 100 (highest).

Sensitivity analyses

The final analysis capped micronutrients at 100% of the RNI per 300 Calories and per 231 grams. Capping at 50% of the RNI made no change (6 foods) or increased the NVS of all foods except for chicken organs, beef organs, pear, dragon fruit, apple, refined wheat pasta, watermelon, white rice noodles, and white rice (Table 5). In general, capping at 50% of the RNI favors foods with a balance of many micronutrients (for example, dark green leafy vegetables, milk, and yogurt). In contrast, capping at 200% of the RNI made no change (9 foods) or decreased the NVS of all foods except for beef organs, bivalves, apple, refined wheat pasta, watermelon, white rice noodles, and white rice (Table 6). The NVS for foods with a balance of many micronutrients like dark green leafy vegetables, milk, and yogurt decreased when capping at 200% of the RNI.

In general, capping has differential effects on foods with a balance of micronutrients versus foods with a high quantity of one or two micronutrients. To demonstrate, the NVS for whole cow milk in the final analysis was 53, increased to 60 when capping at 50% of the RNI, and decreased to 48 when capping at 200% of the RNI. Conversely, the NVS for beef organs (very high in vitamin A) was 84 in the final analysis, decreased to 83 when capping at 50% of the RNI, and increased to 85 when capping at 200% of the RNI.

Table 5 | Vitamin and mineral scores, Nutrient Density Scores and Nutritional Value Scores for common Indonesian foods when capping micronutrients at 100% and 50% of RNIs

Food	Vitamin score (100%)	Vitamin score (50%)	Mineral score (100%)	Mineral score (50%)	Nutrient Density Score (100%)	Nutrient Density Score (50%)	Nutritional Value Score (100%)	Nutritional Value Score (50%)
Spinach	75	82	90	98	92	94	99	99
Chicken organs	92	93	63	59	95	89	91	86
Pumpkin leaves	64	70	67	78	75	80	90	92
Water spinach	65	74	68	73	75	78	87	87
Chinese cabbage	60	69	66	72	72	75	84	84
Beef organs	80	88	53	58	85	86	84	83
Fatty fish	61	75	26	42	73	83	83	88
Chinese broccoli	60	72	56	70	66	75	82	86
Drumstick leaves	72	79	60	84	75	85	81	87
Deer	61	69	58	66	80	83	81	81
Sweet potato leaves	53	75	51	66	61	75	78	85
Bivalves	39	58	56	66	68	78	76	81
Goat	41	51	55	61	68	71	74	75
Buffalo	51	58	40	60	67	76	74	78
Broccoli	58	74	41	62	55	70	73	81
Cassava leaves	49	60	59	84	61	74	73	80
Horse	40	54	50	65	66	76	72	77
Crustaceans	41	61	37	55	61	75	71	79
Bitter melon	38	52	48	56	47	56	69	72
Zucchini	47	59	49	60	53	61	69	72
Boar	40	63	33	50	60	75	69	77
Cabbage	44	59	42	56	48	59	69	74
Dove	40	59	48	61	60	72	68	74
Edamame	33	47	41	68	48	65	68	77
Rabbit	42	52	33	55	60	71	68	74
Red beans	32	48	33	55	40	56	66	74
Sunflower seeds	52	58	59	69	61	66	65	66
Beef	35	47	43	53	55	63	62	65
Radish	29	39	41	59	39	50	62	67
Mung beans	24	31	27	45	34	44	62	66
Lamb	37	48	38	51	54	62	62	65

Green beans	35	55	27	47	36	53	61	70
Tree fern	46	59	6	11	35	41	61	63
Tomatoes	40	58	35	49	42	55	61	67
Pumpkin	45	60	39	55	45	58	60	66
Lean fish	36	52	16	27	46	56	60	65
Mung bean sprouts	38	52	37	58	43	57	60	67
Pork	43	60	25	41	52	65	60	67
Carrots	39	56	25	37	36	48	60	65
Egg	49	67	18	30	47	58	59	65
Long bean	31	47	38	58	40	55	59	66
Tempeh	19	34	38	62	41	57	59	67
Chicken	30	44	24	39	44	56	57	63
Guava	33	46	22	34	30	40	57	61
Tofu	11	20	39	63	36	50	55	62
Sweet potato	33	48	19	31	35	46	55	60
Mushrooms	35	51	24	41	33	47	54	61
Unsweetened soymilk	19	36	19	38	33	48	54	61
Rose apple	29	44	16	28	26	37	54	58
Winged beans	14	23	46	72	37	52	54	61
Peanuts	39	49	47	62	46	55	54	58
Plain whole yogurt	23	38	27	49	37	53	53	61
Red pepper	47	61	12	21	32	41	53	56
Whole cow milk	28	43	22	40	37	51	53	60
Whole milk powder	25	39	23	44	36	51	52	59
Whole sheep milk	26	47	21	38	36	52	52	60
Cantaloupe	37	50	22	32	32	41	51	55
Avocado	25	44	18	30	24	36	51	57
Starfruit	21	28	13	22	20	27	51	52
Luffa gourd	20	33	25	36	26	36	51	55
Full-fat cheese	25	35	42	51	50	56	50	52
Duck	27	44	22	36	37	50	50	56
Orange	29	39	15	25	24	32	50	52
Papaya	30	39	18	31	26	35	49	53
Potato	19	33	20	33	29	40	49	54

Green pepper	31	41	11	18	24	31	48	49
Durian	29	46	16	26	24	36	48	53
Peanut butter	34	45	42	54	40	49	47	51
Low-fat cottage cheese	13	24	6	11	31	37	47	49
Taro	20	35	19	31	21	33	47	52
Cashews	18	30	64	71	43	49	46	48
Grapefruit	27	38	12	21	22	30	46	48
Breadfruit	17	28	17	28	19	29	46	49
Mango	32	47	9	15	23	31	46	48
Tangerine	24	37	13	23	21	30	45	48
Cauliflower	31	50	11	18	24	35	45	50
Whole wheat pasta	15	27	22	37	20	31	45	49
Oncom	6	10	46	54	35	39	44	44
Pineapple	26	35	11	18	20	27	44	45
Cucumber	14	24	23	39	22	33	44	49
Banana	19	30	16	27	19	28	44	47
Whole wheat noodles	15	26	22	37	20	31	43	47
Longans	28	39	11	18	21	28	42	44
Sweet corn	18	31	15	25	16	26	41	45
Pear	7	11	7	11	9	13	41	40
Eggplant	18	31	9	15	16	24	41	43
Dragon fruit	7	11	7	11	9	12	40	39
Green banana	17	30	18	30	20	30	40	44
Unsalted brown rice cakes	18	26	34	46	28	36	39	42
Apple	7	12	5	8	9	12	39	38
Snake fruit	26	35	30	40	30	37	37	39
Brown rice	13	22	14	22	13	21	37	39
Refined wheat pasta	3	5	6	10	6	8	30	29
Watermelon	6	11	4	6	7	9	30	28
Cassava	14	25	10	16	7	14	29	30
White rice noodles	1	1	1	1	1	1	26	22
Coconut	6	10	19	31	15	21	22	24

White rice	3	5	4	6	4	6	15	13
Congee (rice porridge)	11	16	6	9	11	15	1	1

Table 6 | Vitamin and mineral scores, Nutrient Density Scores and Nutritional Value Scores for common Indonesian foods when capping micronutrients at 100% and 200% of RNIs

Food	Vitamin score (100%)	Vitamin score (200%)	Mineral score (100%)	Mineral score (200%)	Nutrient Density Score (100%)	Nutrient Density Score (200%)	Nutritional Value Score (100%)	Nutritional Value Score (200%)
Spinach	75	69	90	93	92	92	99	99
Chicken organs	92	87	63	61	95	93	91	90
Pumpkin leaves	64	48	67	67	75	69	90	87
Water spinach	65	51	68	62	75	66	87	82
Chinese cabbage	60	53	66	63	72	68	84	82
Beef organs	80	74	53	59	85	86	84	85
Fatty fish	61	46	26	21	73	64	83	78
Chinese broccoli	60	47	56	42	66	53	82	75
Drumstick leaves	72	60	60	44	75	62	81	74
Deer	61	45	58	44	80	66	81	72
Sweet potato leaves	53	38	51	39	61	48	78	70
Bivalves	39	31	56	61	68	68	76	77
Goat	41	26	55	44	68	55	74	67
Buffalo	51	36	40	30	67	55	74	67
Broccoli	58	46	41	28	55	44	73	67
Cassava leaves	49	43	59	46	61	52	73	68
Horse	40	31	50	39	66	57	72	68
Crustaceans	41	33	37	29	61	53	71	67
Bitter melon	38	31	48	41	47	41	69	66
Zucchini	47	36	49	38	53	43	69	63
Boar	40	24	33	25	60	49	69	63
Cabbage	44	36	42	29	48	38	69	63
Dove	40	25	48	38	60	48	68	61
Edamame	33	27	41	32	48	41	68	65
Rabbit	42	33	33	26	60	52	68	64
Red beans	32	19	33	25	40	30	66	61
Sunflower seeds	52	40	59	53	61	53	65	61
Beef	35	26	43	34	55	47	62	58

Radish	29	22	41	33	39	32	62	59
Mung beans	24	17	27	21	34	27	62	59
Lamb	37	27	38	30	54	46	62	57
Green beans	35	22	27	19	36	26	61	56
Tree fern	46	36	6	5	35	30	61	59
Tomatoes	40	29	35	25	42	32	61	55
Pumpkin	45	32	39	28	45	34	60	54
Lean fish	36	29	16	13	46	41	60	59
Mung bean sprouts	38	25	37	26	43	31	60	54
Pork	43	25	25	20	52	41	60	54
Carrots	39	31	25	17	36	29	60	56
Egg	49	32	18	14	47	37	59	54
Long bean	31	20	38	28	40	29	59	53
Tempeh	19	12	38	31	41	34	59	55
Chicken	30	18	24	19	44	36	57	53
Guava	33	28	22	16	30	25	57	55
Tofu	11	7	39	31	36	30	55	53
Sweet potato	33	28	19	15	35	31	55	53
Mushrooms	35	22	24	18	33	24	54	49
Unsweetened soymilk	19	13	19	10	33	25	54	51
Rose apple	29	22	16	11	26	20	54	51
Winged beans	14	9	46	36	37	30	54	50
Peanuts	39	27	47	42	46	38	54	50
Plain whole yogurt	23	15	27	14	37	28	53	48
Red pepper	47	36	12	9	32	26	53	50
Whole cow milk	28	18	22	12	37	27	53	48
Whole milk powder	25	16	23	13	36	27	52	47
Whole sheep milk	26	17	21	11	36	27	52	47
Cantaloupe	37	30	22	16	32	26	51	49
Avocado	25	15	18	15	24	17	51	48
Starfruit	21	17	13	9	20	16	51	50
Luffa gourd	20	12	25	17	26	19	51	47
Full-fat cheese	25	17	42	47	50	49	50	50
Duck	27	16	22	18	37	30	50	46
Orange	29	22	15	11	24	19	50	48

Papaya	30	24	18	13	26	21	49	47
Potato	19	12	20	15	29	23	49	46
Green pepper	31	26	11	8	24	21	48	47
Durian	29	17	16	13	24	17	48	44
Peanut butter	34	24	42	36	40	33	47	44
Low-fat cottage cheese	13	9	6	4	31	28	47	46
Taro	20	12	19	15	21	15	47	45
Cashews	18	11	64	65	43	40	46	46
Grapefruit	27	20	12	9	22	17	46	44
Breadfruit	17	10	17	14	19	14	46	44
Mango	32	23	9	7	23	17	46	43
Tangerine	24	17	13	10	21	15	45	43
Cauliflower	31	19	11	9	24	17	45	42
Whole wheat pasta	15	9	22	18	20	15	45	43
Oncom	6	4	46	43	35	33	44	44
Pineapple	26	20	11	8	20	16	44	43
Cucumber	14	9	23	16	22	16	44	41
Banana	19	11	16	12	19	14	44	42
Whole wheat noodles	15	9	22	18	20	15	43	41
Longans	28	24	11	8	21	18	42	42
Sweet corn	18	11	15	12	16	11	41	39
Pear	7	4	7	5	9	7	41	41
Eggplant	18	11	9	7	16	12	41	39
Dragon fruit	7	4	7	5	9	7	40	40
Green banana	17	11	18	15	20	15	40	38
Unsalted brown rice cakes	18	12	34	29	28	22	39	37
Apple	7	5	5	4	9	7	39	40
Snake fruit	26	21	30	23	30	24	37	35
Brown rice	13	8	14	11	13	10	37	36
Refined wheat pasta	3	2	6	5	6	5	30	31
Watermelon	6	4	4	4	7	5	30	31
Cassava	14	9	10	9	7	3	29	28
White rice noodles	1	1	1	1	1	1	26	27
Coconut	6	4	19	17	15	12	22	22
White rice	3	2	4	3	4	3	15	16

Congee (rice porridge)	11	7	6	4	11	8	1	1
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When shifting weights of dietary attributes toward protection against NCDs, the NVS for most foods increased, especially for plant-source foods (Table 7). The NVS for some animal-source foods decreased, particularly organ meats, deer, and full-fat cheese. In contrast, when shifting weights of dietary attributes toward nutrient density, the NVS for most foods decreased, especially for nutrient-poor fruits and starchy staples; the NVS for chicken organs increased.

Table 7 | Nutritional Value Scores for common Indonesian foods when shifting the weights of dietary attributes toward protection against NCDs or nutrient density, as compared to the original algorithm

Food	Nutritional Value Score (original)	Nutritional Value Score (NCD-focused)	Nutritional Value Score (nutrient-density-focused)
Spinach	99	95	94
Chicken organs	91	76	95
Pumpkin leaves	90	94	79
Water spinach	87	88	77
Chinese cabbage	84	83	74
Beef organs	84	72	84
Fatty fish	83	83	75
Chinese broccoli	82	86	68
Drumstick leaves	81	76	75
Deer	81	71	80
Sweet potato leaves	78	83	64
Bivalves	76	74	69
Goat	74	69	69
Buffalo	74	70	68
Broccoli	73	79	57
Cassava leaves	73	72	62
Horse	72	68	68
Crustaceans	71	71	63
Bitter melon	69	78	50
Zucchini	69	72	54
Boar	69	67	62
Cabbage	69	76	50
Dove	68	63	61
Edamame	68	75	51
Rabbit	68	64	61

Red beans	66	79	43
Sunflower seeds	65	55	59
Beef	62	57	55
Radish	62	71	41
Mung beans	62	77	38
Lamb	62	57	54
Green beans	61	73	39
Tree fern	61	74	39
Tomatoes	61	66	43
Pumpkin	60	62	46
Lean fish	60	63	48
Mung bean sprouts	60	64	44
Pork	60	56	52
Carrots	60	69	38
Egg	59	59	47
Long bean	59	65	42
Tempeh	59	64	43
Chicken	57	58	45
Guava	57	70	33
Tofu	55	61	38
Sweet potato	55	62	37
Mushrooms	54	61	35
Unsweetened soymilk	54	62	35
Rose apple	54	67	29
Winged beans	54	58	38
Peanuts	54	47	43
Plain whole yogurt	53	56	38
Red pepper	53	59	33
Whole cow milk	53	56	38
Whole milk powder	52	56	37
Whole sheep milk	52	56	37
Cantaloupe	51	57	33
Avocado	51	64	26
Starfruit	51	67	23
Luffa gourd	51	61	28
Full-fat cheese	50	41	48

Duck	50	49	37
Orange	50	61	26
Papaya	49	58	27
Potato	49	56	30
Green pepper	48	57	25
Durian	48	57	25
Peanut butter	47	40	37
Low-fat cottage cheese	47	53	33
Taro	47	59	23
Cashews	46	35	39
Grapefruit	46	56	23
Breadfruit	46	59	21
Mango	46	54	24
Tangerine	45	56	22
Cauliflower	45	53	25
Whole wheat pasta	45	55	21
Oncom	44	45	34
Pineapple	44	53	21
Cucumber	44	52	23
Banana	44	54	20
Whole wheat noodles	43	53	20
Longans	42	50	22
Sweet corn	41	52	17
Pear	41	58	12
Eggplant	41	51	17
Dragon fruit	40	56	11
Green banana	40	47	20
Unsalted brown rice cakes	39	39	26
Apple	39	55	11
Snake fruit	37	38	28
Brown rice	37	47	14
Refined wheat pasta	30	42	6
Watermelon	30	40	7
Cassava	29	37	6
White rice noodles	26	38	1
Coconut	22	27	12

White rice	15	22	1
Congee (rice porridge)	1	1	4

Winsorising the NVS by truncating outliers at the 5th and 95th percentiles made no change (4 foods) or decreased the NVS for most foods, but increased it for all foods scoring ≥ 75 in the final analysis (i.e., those with highest nutritional value) (Table 8). In general, the rank of foods stayed similar, but a larger number of foods were assigned the minimum and maximum scores.

Table 8 | Nutritional Value Scores for common Indonesian foods when winsorizing the NVS by truncating outliers at the 5th and 95th percentiles, as compared to the original algorithm

Food	Nutritional Value Score (original)	Nutritional Value Score (winsorized)
Spinach	99	100
Chicken organs	91	100
Pumpkin leaves	90	100
Water spinach	87	97
Chinese cabbage	84	91
Beef organs	84	91
Fatty fish	83	89
Chinese broccoli	82	88
Drumstick leaves	81	87
Deer	81	85
Sweet potato leaves	78	81
Bivalves	76	78
Goat	74	74
Buffalo	74	74
Broccoli	73	73
Cassava leaves	73	72
Horse	72	71
Crustaceans	71	69
Bitter melon	69	66
Zucchini	69	65
Boar	69	65
Cabbage	69	65
Dove	68	64
Edamame	68	63
Rabbit	68	63

Red beans	66	60
Sunflower seeds	65	58
Beef	62	54
Radish	62	53
Mung beans	62	53
Lamb	62	53
Green beans	61	52
Tree fern	61	52
Tomatoes	61	51
Pumpkin	60	51
Lean fish	60	51
Mung bean sprouts	60	50
Pork	60	50
Carrots	60	49
Egg	59	49
Long bean	59	49
Tempeh	59	48
Chicken	57	45
Guava	57	45
Tofu	55	42
Sweet potato	55	41
Mushrooms	54	40
Unsweetened soymilk	54	40
Rose apple	54	39
Winged beans	54	39
Peanuts	54	39
Plain whole yogurt	53	38
Red pepper	53	38
Whole cow milk	53	38
Whole milk powder	52	36
Whole sheep milk	52	36
Cantaloupe	51	35
Avocado	51	35
Starfruit	51	34
Luffa gourd	51	34
Full-fat cheese	50	32

Duck	50	32
Orange	50	32
Papaya	49	32
Potato	49	30
Green pepper	48	29
Durian	48	28
Peanut butter	47	28
Low-fat cottage cheese	47	28
Taro	47	28
Cashews	46	26
Grapefruit	46	26
Breadfruit	46	26
Mango	46	25
Tangerine	45	25
Cauliflower	45	25
Whole wheat pasta	45	24
Oncom	44	23
Pineapple	44	22
Cucumber	44	22
Banana	44	22
Whole wheat noodles	43	21
Longans	42	19
Sweet corn	41	17
Pear	41	17
Eggplant	41	17
Dragon fruit	40	16
Green banana	40	15
Unsalted brown rice cakes	39	14
Apple	39	14
Snake fruit	37	11
Brown rice	37	10
Refined wheat pasta	30	1
Watermelon	30	1
Cassava	29	1
White rice noodles	26	1
Coconut	22	1

White rice	15	1
Congee (rice porridge)	1	1

The final analysis accounted for bioavailability of iron and zinc. Not adjusting for bioavailability of iron and zinc either made no change (57 foods) or made a small difference on NVS scores (final NVS scores ± 2) (Table 9). The effect was slightly larger when looking at Nutrient Density Scores, for which the absence of bioavailability adjustments either made no change (47 foods) or slightly increased NVS scores (final NVS scores +4); and became evident when looking at Mineral Scores (no change for 38 foods and up to a ± 7 difference in NVS scores for all other foods).

Table 9 | Mineral Scores, Nutrient Density Scores, and Nutritional Value Scores for common Indonesian foods when not adjusting for bioavailability of iron and zinc, as compared to the original algorithm

Food	Mineral score (original)	Mineral score (No bioavailability adjustment)	Nutrient Density Score (original)	Nutrient Density Score (No bioavailability adjustment)	Nutritional Value Score (original)	Nutritional Value Score (No bioavailability adjustment)
Spinach	90	89	92	92	99	99
Chicken organs	63	62	95	95	91	91
Pumpkin leaves	67	67	75	76	90	90
Water spinach	68	67	75	75	87	87
Chinese cabbage	66	65	72	72	84	83
Beef organs	53	53	85	85	84	84
Fatty fish	26	27	73	74	83	83
Chinese broccoli	56	56	66	66	82	82
Drumstick leaves	60	63	75	77	81	82
Deer	58	58	80	80	81	81
Sweet potato leaves	51	53	61	62	78	79
Bivalves	56	57	68	69	76	77
Goat	55	55	68	68	74	74
Buffalo	40	39	67	67	74	73
Broccoli	41	41	55	56	73	74
Cassava leaves	59	63	61	63	73	74
Horse	50	55	66	69	72	74
Crustaceans	37	38	61	62	71	71
Bitter melon	48	49	47	49	69	70
Zucchini	49	49	53	54	69	69
Boar	33	34	60	61	69	69
Cabbage	42	42	48	48	69	69
Dove	48	52	60	63	68	69

Edamame	41	45	48	51	68	69
Rabbit	33	36	60	61	68	69
Red beans	33	37	40	42	66	67
Sunflower seeds	59	65	61	65	65	67
Beef	43	42	55	55	62	62
Radish	41	42	39	39	62	62
Mung beans	27	30	34	36	62	63
Lamb	38	39	54	55	62	62
Green beans	27	29	36	37	61	62
Tree fern	6	6	35	35	61	61
Tomatoes	35	36	42	43	61	61
Pumpkin	39	40	45	46	60	61
Lean fish	16	16	46	46	60	60
Mung bean sprouts	37	40	43	45	60	61
Pork	25	27	52	53	60	61
Carrots	25	25	36	37	60	60
Egg	18	19	47	48	59	60
Long bean	38	41	40	42	59	60
Tempeh	38	42	41	43	59	60
Chicken	24	25	44	45	57	58
Guava	22	22	30	30	57	57
Tofu	39	44	36	39	55	57
Sweet potato	19	19	35	35	55	55
Mushrooms	24	25	33	34	54	54
Unsweetened soymilk	19	21	33	34	54	55
Rose apple	16	16	26	26	54	54
Winged beans	46	53	37	41	54	56
Peanuts	47	52	46	48	54	55
Plain whole yogurt	27	25	37	37	53	53
Red pepper	12	13	32	33	53	53
Whole cow milk	22	21	37	37	53	52
Whole milk powder	23	23	36	36	52	52
Whole sheep milk	21	20	36	36	52	52
Cantaloupe	22	22	32	32	51	51
Avocado	18	19	24	24	51	52
Starfruit	13	12	20	20	51	51

Luffa gourd	25	25	26	26	51	51
Full-fat cheese	42	44	50	51	50	50
Duck	22	25	37	38	50	51
Orange	15	14	24	24	50	49
Papaya	18	18	26	26	49	49
Potato	20	20	29	29	49	49
Green pepper	11	11	24	24	48	48
Durian	16	16	24	24	48	48
Peanut butter	42	45	40	42	47	49
Low-fat cottage cheese	6	6	31	31	47	47
Taro	19	20	21	21	47	47
Cashews	64	68	43	45	46	47
Grapefruit	12	12	22	22	46	46
Breadfruit	17	18	19	19	46	46
Mango	9	9	23	23	46	45
Tangerine	13	13	21	21	45	45
Cauliflower	11	12	24	24	45	46
Whole wheat pasta	22	26	20	22	45	46
Oncom	46	47	35	36	44	44
Pineapple	11	11	20	21	44	44
Cucumber	23	23	22	22	44	44
Banana	16	16	19	19	44	44
Whole wheat noodles	22	26	20	22	43	44
Longans	11	11	21	21	42	42
Sweet corn	15	17	16	16	41	42
Pear	7	7	9	9	41	41
Eggplant	9	10	16	17	41	41
Dragon fruit	7	7	9	9	40	40
Green banana	18	19	20	20	40	40
Unsalted brown rice cakes	34	38	28	30	39	41
Apple	5	5	9	9	39	39
Snake fruit	30	34	30	32	37	38
Brown rice	14	15	13	14	37	37
Refined wheat pasta	6	7	6	6	30	31
Watermelon	4	4	7	7	30	30
Cassava	10	10	7	7	29	29

White rice noodles	1	1	1	1	26	26
Coconut	19	22	15	16	22	23
White rice	4	4	4	4	15	15
Congee (rice porridge)	6	6	11	11	1	1

When using mass as the sole reference unit, the NVS for most foods decreased, especially for plant-source foods, including highly nutrient-dense ones such as dark green leafy vegetables (Table 10). However, the NVS for some animal-source foods (like pork and full-fat cheese) and nuts and seeds (such as sunflower seeds, peanuts, and cashews) increased. When using energy as the sole reference unit, the NVS for most foods also decreased, this time especially for animal-source foods and nuts and seeds, including highly nutrient-dense ones such as organ meats. However, the NVS for some vegetables like dark green leafy vegetables increased. These results, summarized in Figures 16 and 17 for select foods, highlight the complementarity of mass and energy reference units, and the potential to obtain more balanced scores when combining the two rather than using them in isolation.

Table 10 | Nutritional Value Scores for common Indonesian foods when using mass or energy as the sole reference unit, as compared to the original algorithm

Food	Nutritional Value Score (original)	Nutritional Value Score (mass only)	Nutritional Value Score (energy only)
Spinach	99	62	100
Chicken organs	91	84	70
Pumpkin leaves	90	50	98
Water spinach	87	52	93
Chinese cabbage	84	48	92
Beef organs	84	78	64
Fatty fish	83	78	65
Chinese broccoli	82	49	86
Drumstick leaves	81	64	73
Deer	81	72	64
Sweet potato leaves	78	52	78
Bivalves	76	70	60
Goat	74	66	60
Buffalo	74	65	62
Broccoli	73	50	73
Cassava leaves	73	58	64
Horse	72	68	56
Crustaceans	71	62	60
Bitter melon	69	43	71
Zucchini	69	40	76

Boar	69	64	55
Cabbage	69	43	72
Dove	68	67	49
Edamame	68	61	53
Rabbit	68	65	52
Red beans	66	55	54
Sunflower seeds	65	77	28
Beef	62	63	44
Radish	62	40	64
Mung beans	62	54	49
Lamb	62	62	44
Green beans	61	43	60
Tree fern	61	45	59
Tomatoes	61	39	65
Pumpkin	60	42	62
Lean fish	60	58	48
Mung bean sprouts	60	43	60
Pork	60	64	40
Carrots	60	45	56
Egg	59	58	47
Long bean	59	45	56
Tempeh	59	58	41
Chicken	57	57	43
Guava	57	47	48
Tofu	55	52	43
Sweet potato	55	52	44
Mushrooms	54	45	48
Unsweetened soymilk	54	54	46
Rose apple	54	38	53
Winged beans	54	52	40
Peanuts	54	65	21
Plain whole yogurt	53	53	45
Red pepper	53	46	47
Whole cow milk	53	53	45
Whole milk powder	52	52	45
Whole sheep milk	52	52	44

Cantaloupe	51	40	49
Avocado	51	50	37
Starfruit	51	39	47
Luffa gourd	51	39	47
Full-fat cheese	50	54	30
Duck	50	53	34
Orange	50	41	44
Papaya	49	41	45
Potato	49	46	39
Green pepper	48	42	64
Durian	48	47	36
Peanut butter	47	58	19
Low-fat cottage cheese	47	48	40
Taro	47	46	35
Cashews	46	56	18
Grapefruit	46	38	43
Breadfruit	46	44	35
Mango	46	40	40
Tangerine	45	39	40
Cauliflower	45	44	36
Whole wheat pasta	45	44	33
Oncom	44	45	30
Pineapple	44	39	39
Cucumber	44	35	42
Banana	44	40	36
Whole wheat noodles	43	42	31
Longans	42	38	36
Sweet corn	41	38	33
Pear	41	36	35
Eggplant	41	40	32
Dragon fruit	40	36	34
Green banana	40	40	30
Unsalted brown rice cakes	39	46	20
Apple	39	35	34
Snake fruit	37	35	30
Brown rice	37	37	28

Refined wheat pasta	30	32	23
Watermelon	30	32	23
Cassava	29	31	19
White rice noodles	26	27	20
Coconut	22	28	7
White rice	15	18	10
Congee (rice porridge)	1	1	1

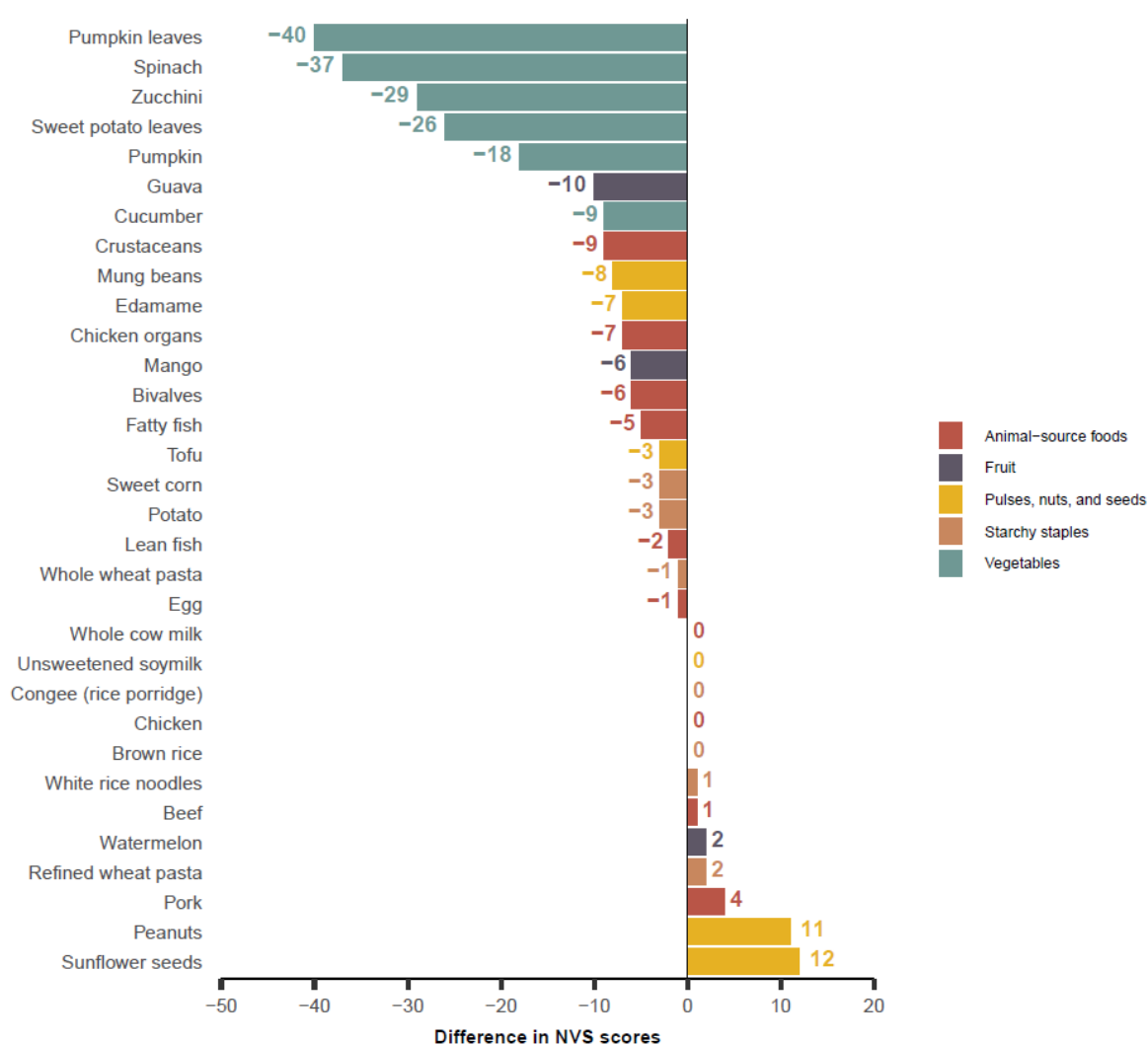


Figure 16 | Difference in NVS scores for a selection of foods commonly consumed in Indonesia when using mass as the sole reference unit versus the original NVS algorithm.

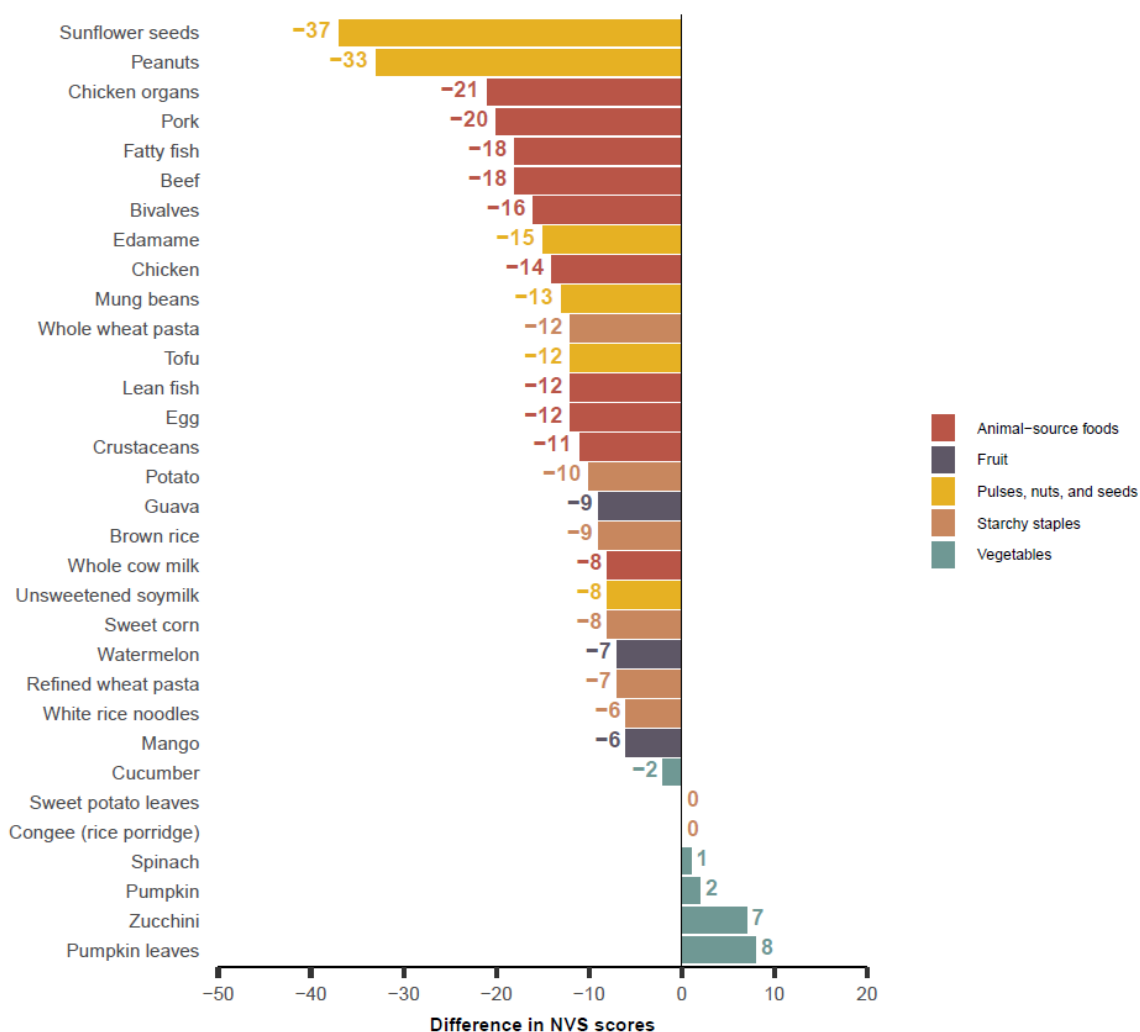


Figure 17| Difference in NVS scores for a selection of foods commonly consumed in Indonesia when using energy as the sole reference unit versus the original NVS algorithm

Each sensitivity analysis had different effects. Capping micronutrients at 50% of the RNI favored foods containing a balance of micronutrients, while capping at 200% favored foods with very high quantities of one or two vitamins or minerals. Shifting the weights of dietary attributes had a noticeable effect on the NVS. Plant-based foods tended to score much higher on the NCD-focused NVS while nutrient-dense plant-source foods and animal-source foods scored higher on the nutrient-density-focused NVS. Winsorizing did not impact the relative ranking but moved foods near the highest and lowest NVS closer to the corresponding extreme. Not adjusting for bioavailability of iron and zinc had a small impact on NVS scores per se, but significantly affected the mineral scores. Finally, using mass as the sole reference unit favored animal-source foods and nuts and seeds; using energy as the sole reference unit favored nutrient-dense vegetables. These sensitivity analyses reinforced our choice of capping, dietary attribute weights, winsorizing, bioavailability adjustments, and reference units. However, we suggest considering more NCD-focused dietary attribute weights in contexts where noncommunicable diseases are a larger problem than undernutrition, including most high-income countries.

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