healthfreak

Food Scoring Methodology

A transparent, evidence-based framework for evaluating nutritional quality in the UK eat-out market

VERSION	DATE	DEVELOPMENT SAMPLE	STATUS
v0.3	March 2026	318 dishes · 4 restaurants	Public methodology document

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1. Introduction

Eating out has become a substantial part of the UK dietary pattern. The Food Standards Agency estimates that food eaten outside the home accounts for approximately 20–25% of total energy intake among adults. Calorie labelling has been mandatory for large food businesses since 2022, but calorie counts alone are an inadequate proxy for nutritional quality. A 600 kcal salmon dish and a 600 kcal croissant carry identical calorie labels but vastly different health implications.

Health Freak was created to close this gap. Our scoring system assigns a numerical score from 0–10 to individual dishes, enabling diners to compare meals based on evidence-based nutritional quality. This document describes our methodology in full — every variable, every coefficient, and every scientific reference.

> *All formula coefficients, calibration decisions, and dataset statistics are published here. We welcome scrutiny from nutrition researchers, registered dietitians, and the public.*

2. Data and Development Sample

2.1 Restaurant chains included

Chain	Format	Dishes scored
itsu	Pan-Asian fast casual, sushi and rice bowls	78
Pret a Manger	Grab-and-go sandwiches, wraps, salads, hot food	169
The Salad Project	Build-your-own salads and protein bowls	27
Farmer J	Fieldtray build-your-own hot food	44

2.2 Nutritional data sources

Each nutritional data point is assigned one of three provenance tiers:

Tier 1 — Sourced. Data published directly by the restaurant. For all four chains in the development sample, the eight core macronutrients — energy, protein, total fat, saturated fat, carbohydrate, free sugars, dietary fibre, and salt — are sourced at this tier.

Tier 2 — Derived. Values calculated mathematically from other sourced data points using Atwater factors (protein: 4 kcal/g; carbohydrate: 4 kcal/g; fat: 9 kcal/g).

Tier 3 — AI estimated. Values estimated by an AI model using the dish photograph, ingredient list, and description. Micronutrient values, NOVA processing classification, and plant diversity scores are estimated at this tier for all four chains in the development sample. AI-estimated values are disclosed transparently on the platform.

2.3 NOVA processing classification

Each dish was classified using the NOVA food processing system (Monteiro et al., 2019): L = minimally processed, M = processed, H = ultra-processed, D = directly harmful. Classification was produced by an AI model using dish photograph, ingredient list, and description, and cross-checked by human review. In our development sample: 7% L, 72% M, 21% H, 0% D.

3. Formula Overview

The Health Freak score is produced in four steps:

1. Calculate the **Macronutrient Quality Score (MQS)** — a per-100-kcal assessment of macronutrient balance, 0–10.
2. Calculate the **Micronutrient Richness Score (MRS)** — mean fractional coverage of 12 micronutrients against UK DRVs, 0–10.
3. Blend MQS and MRS with a plant diversity bonus.
4. Apply the food processing penalty.

```
Base Score = clamp( MQS × 0.75  +  MRS × 0.25  +  plant_bonus  −  processing_penalty,
0, 10 )
```

4. Positive Factors

4.1 Protein density

> **RCT / META-ANALYSIS**
> Leidy et al. (2015, Am J Clin Nutr) — systematic review of 38 RCTs: higher protein intake consistently associated with greater satiety, reduced energy intake, and improved body composition.

> **RCT / META-ANALYSIS**
> Morton et al. (2018, Br J Sports Med) — meta-analysis of 49 RCTs (n=1,863): protein supplementation significantly increased muscle mass and strength in adults.

Protein is assigned a coefficient of 1.2 per g per 100 kcal, capped at 5.0 component points. 24% of items in our development sample hit this cap — representing the legitimately highest-protein dishes.

```
prot_component = min( protein / (kcal/100) × 1.2,  cap 5.0 )
```

4.2 Dietary fibre

> **RCT / META-ANALYSIS**
> Reynolds et al. (2019, The Lancet) — systematic review of 185 prospective studies and 58 RCTs: higher fibre intake associated with 15–30% reductions in all-cause mortality, CVD, type 2 diabetes, and colorectal cancer. Dose-response relationship confirmed.

Fibre is assigned a coefficient of 0.8 per g per 100 kcal, capped at 2.0 component points.

```
fibre_component = min( fiber / (kcal/100) × 0.8,  cap 2.0 )
```

4.3 Plant diversity

> **RCT**
> Wastyk et al. (2021, Cell) — 10-week RCT (n=36): diversity of plant types was a significant independent predictor of microbiome richness.

> **COHORT**
> McDonald et al. (2018, mSystems — American Gut Project, n=10,000+): individuals eating 30+ plant types per week had significantly greater gut microbial diversity.

Plant diversity is scored 1–5 (number of distinct plant food groups present: wholegrains,

legumes, vegetables, fruits, nuts/seeds). Bonus up to +0.5 base score points.

```
plant_bonus = min( plant_diversity / 4 × 0.5,  0.5 )
```

5. Penalty Factors

5.1 Saturated fat

> **RCT / META-ANALYSIS**
> Hooper et al. (2020, Cochrane Review) — meta-analysis of 15 RCTs (n=56,675): reducing saturated fat and replacing with polyunsaturated fat reduced cardiovascular events by 21%.

> **UK GUIDANCE**
> SACN (2019, Saturated Fats and Health): sufficient evidence to recommend reducing saturated fat below 10% of total energy.

Coefficient: 0.6 per g per 100 kcal. Cap: 2.5 component points. Only 3% of dishes hit this cap, meaning the formula retains resolution across the full range of restaurant dishes.

```
satfat_penalty = min( saturated_fat / (kcal/100) × 0.6,  cap 2.5 )
```

5.2 Free sugars — blended formula

> **RCT / META-ANALYSIS**
> Te Morenga et al. (2012, BMJ) — systematic review of 30 RCTs: reducing free sugar intake associated with 0.8 kg decrease in body weight; increasing it associated with 0.75 kg increase.

A purely relative (per-100-kcal) approach caused 31% of items to hit the maximum penalty — indistinguishably penalising a 72-kcal spicy miso soup (4g natural sugar) and a regular soft drink. Our blended formula fixes this: cap-hitting fell from 31% to 6%.

```
sugar_penalty = 0.5 × min( sugars / (kcal/100) × 0.3,  1.5 )
              + 0.5 × min( sugars / 30g_daily_max  × 1.5,  1.5 )
```

5.3 Salt — blended formula

> **RCT / META-ANALYSIS**
> Aburto et al. (2013, BMJ) — meta-analysis of 34 RCTs: reducing sodium lowered systolic blood pressure by 3.39 mmHg in normotensive adults; larger effect in hypertensive individuals.

> **GLOBAL BURDEN**
> GBD 2019: high sodium diet was the third largest dietary risk factor for mortality globally, responsible for 3 million deaths annually.

The same blended approach as sugar: 50% relative (per-100-kcal) + 50% absolute referenced against 3g per meal (half the UK daily maximum). 17% of dishes in the development sample contain ≥3g salt — a meaningful "high" threshold for UK restaurant food.

```
salt_penalty = 0.5 × min( salt / (kcal/100) × 1.5,  1.5 )
             + 0.5 × min( salt / 3g_meal_ref   × 1.5,  1.5 )
```

5.4 Food processing penalty

> **RCT**
> Hall et al. (2019, Cell Metabolism) — the only RCT of ultra-processed versus unprocessed diets (n=20, crossover): participants consumed 508 more kcal/day on the ultra-processed diet and gained 0.9 kg. Effect was not explained by macronutrient content alone.

COHORT

Srour et al. (2019, BMJ — NutriNet-Santé, n=105,159): each 10 percentage-point increase in NOVA 4 share of diet associated with 12% higher all-cause mortality.

NOVA	Category	Penalty	Rationale
L	Minimally processed	0	Reference; no adverse signal
M	Processed	−0.3 pts	Modest processing; main concerns captured in MQS
H	Ultra-processed (NOVA 4)	−0.8 pts	14% higher all-cause mortality; L→H gap = 8% of scale
D	Directly harmful	−1.2 pts	Reserved for products where sugar delivery is the primary function

6. Micronutrient Richness Score (MRS)

Each of 12 nutrients is measured as a fraction of the UK DRV, capped at 1.0. The mean coverage is scaled to 0–10.

```
coverage_i = min( micronutrients[i] / DRV[i],  1.0 )
MRS = mean( coverage_i  for all 12 nutrients ) × 10
```

Nutrient	UK DRV	Key evidence
Vitamin A	700 µg	Immune function; Imdad et al. 2017 Cochrane Review
Vitamin C	80 mg	Antioxidant, immune support; EFSA 2013
Vitamin D	10 µg	VITAL trial (Manson 2019, NEJM, n=25,871 RCT): 25% reduction in cancer mortality
Vitamin B12	1.5 µg	Smith et al. 2010 (RCT): B12+folate slowed brain atrophy by 53%
Folate	200 µg	MRC Vitamin Study (1991, Lancet, RCT): 72% reduction in neural tube defects
Iron	8.7 mg	WHO 2023; oxygen transport and cognitive function
Calcium	700 mg	Tang et al. 2007 (BMJ, meta-analysis of 17 RCTs): increased bone density, reduced fracture risk
Magnesium	300 mg	Fang et al. 2016 (BMC Medicine, 40 studies): 19% lower T2DM risk per 100mg/day increase
Zinc	9.5 mg	Immune function; well-established in RCTs of immune response
Potassium	3500 mg	Aburto et al. 2013 (BMJ, 22 RCTs): reduced SBP by 3.49 mmHg; counteracts sodium
Selenium	75 µg	Blankenberg et al. 2003 (NEJM): low selenium = 50% higher CVD mortality
Omega-3	2.5 g	REDUCE-IT trial (Bhatt 2019, NEJM, n=8,179 RCT): 25% reduction in major CV events

MRS contributes 25% of the base score blend. This asymmetry reflects the current data: the development sample average MRS is 1.95/10. If MRS were weighted more heavily, the formula would uniformly penalise all restaurant food for failing micronutrient targets that are not realistic in an eat-out context. This weight will be revisited as more analytically verified micronutrient data becomes available.

7. Scoring Profiles

Five profiles re-weight the formula for specific nutritional goals. All use the same underlying formula structure; only multipliers and blend weights change.

Profile	MQS weight	MRS weight	Key change
Base	75%	25%	Balanced. Reference profile.
Protein Prime	75%	25%	Protein term ×1.3 in raw MQS sum
Fibre First	55%	30%	Fibre term ×2.5; plant bonus up to +1.5
Lean Cut	80%	15%	Protein ×1.3; total fat and carb penalties added
Bio Hacker	35%	45% (longevity-weighted)	Longevity MRS; sat fat ×1.5 in raw sum

7.1 Bio Hacker — longevity-weighted MRS

The Bio Hacker profile uses a variant of the MRS in which the 12 nutrients are re-weighted according to the strength of evidence for their roles in longevity:

```
longevity_MRS = clamp( Σ( coverage_i × weight_i ) / 19.3 × 10,  0, 10 )
```

Nutrient	Weight	Rationale
Omega-3	4.0×	REDUCE-IT RCT (Bhatt 2019): 25% CVD event reduction. Highest dataset variance.
Vitamin D	3.0×	VITAL trial (Manson 2019): 25% cancer mortality reduction. ~50% of UK adults deficient.
Selenium	2.5×	50% higher CVD mortality at low levels (Blankenberg 2003, NEJM). Good dataset variance.
Vitamin B12	2.0×	Brain atrophy slowed 53% with B12+folate (Smith 2010 RCT).
Vitamin C	1.5×	Immune function; antioxidant role in ageing.
Folate	1.5×	DNA repair; synergistic homocysteine lowering with B12.
Potassium	1.0×	Blood pressure regulation; counteracts sodium.
Magnesium	1.0×	Glycaemic regulation; Fang 2016 meta-analysis.
Vitamin A	0.8×	Primarily a deficiency concern in UK context.
Calcium	0.8×	Bone health; moderate evidence for longevity specifically.
Zinc	0.7×	Immune function; lower longevity-specific evidence.
Iron	0.5×	**Down-weighted:** excess iron is pro-oxidant; associated with increased colorectal cancer risk at population intakes (EPIC-Oxford, Fonseca-Nunes 2015).

8. Calibration

8.1 Per-100-kcal normalisation

All macronutrient inputs are normalised per 100 kcal. This rewards protein-dense foods regardless of portion size, avoids rewarding large portions, and matches the normalisation used in most nutritional research comparing dietary patterns.

8.2 Rescaling the raw MQS

The raw MQS sum ranges from −5.5 (all penalty terms maximised, no positive contribution) to +7.0 (protein and fibre caps both hit, no penalties). This 12.5-unit range is linearly rescaled to 0–10:

```
MQS = clamp( (raw_MQS + 5.5) / 12.5 × 10,  0, 10 )
```

8.3 Protein cap and multiplier

The protein cap was raised from 3.0 to 5.0 following analysis showing that the lower cap was hit by 61% of scoreable items, eliminating discrimination among high-protein dishes. At the revised cap of 5.0, 24% of items hit the cap — representing legitimately extreme protein density (raw fish, shellfish, poultry-dominant dishes).

Within the Protein Prime and Lean Cut profiles, the protein component receives an additional in-formula multiplier (×1.3). An initial multiplier of ×3.0 and ×2.5 caused 66–68% of items to saturate the MQS ceiling before penalties ran, negating all discrimination. At ×1.3, the theoretical maximum protein contribution to raw MQS is 6.5, rescaling to 9.6/10.

9. Development Sample Outcomes

Metric	Value
Mean score	5.11 / 10
Median	5.64
Items ≥ 7.0	19 (6%)
Items 5.0–7.0	182 (57%)
Items 3.0–5.0	66 (21%)
Items < 3.0	51 (16%)
Maximum	7.74 (itsu salmon sashimi)

Restaurant	Dishes	Avg score	Top dish
itsu	78	5.37	salmon sashimi (7.74)
Farmer J	44	5.29	Farmer's Catch (7.24)
Pret a Manger	169	4.97	Shawarma Chicken (7.59)
The Salad Project	27	4.94	Miso Salmon (7.57)

The cross-profile consistency of salmon-based dishes at the top of all five profiles is a useful validity check: oily fish performs strongly across protein density, micronutrient breadth (B12, vitamin D, selenium), minimal processing, and omega-3 content simultaneously.

10. Limitations

Micronutrient data quality. All 318 dishes in the development sample have AI-estimated micronutrient values. The estimation process uses dish photographs, ingredient lists, and descriptions — allowing reasonable approximations for nutrients predictable from ingredients (omega-3 from salmon, vitamin D from oily fish) but carrying more uncertainty for nutrients sensitive to preparation method and cooking temperature (vitamin C, folate). The MRS component should be interpreted as an approximation.

Saturated fat type. The formula does not distinguish between saturated fatty acid subtypes. Lauric acid (coconut), stearic acid (cocoa), and palmitic acid (animal fat) have different metabolic profiles. This is an area for future refinement as fatty acid profile data becomes more available.

Individual variation. Scores are population-level guides based on UK DRVs for healthy adults. They do not account for individual health conditions, medications, life stage, or food allergies.

Development sample size. 318 dishes across four premium fast-casual chains. Coefficients will be reviewed as the dataset expands to include broader restaurant categories and price points.

11. Key References

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