A comparison of a range of nutrient profiling models as applied to cooked meals

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A comparison of a range of nutrient profiling models as applied to cooked meals

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Aims and objectives

- A variety of different models for assessing the nutritive value of foods and ingredients exist, but all can be subject to criticism in not adequately assessing the full complement of nutrient components in a food or meal.
- This work was carried out in conjunction with an **expert review panel** comprised of technical experts from industry, academia, and policy, and aimed to compare some of the most prominent nutrient profiling methods when applied to a range of cooked meals.

Data and Methods

Cooked meals


Chicken Curry (Tesco)


Beef Stew (BBC)


Vegetarian Curry (Tesco)


Spaghetti Bolognese (Beef & Quorn) (Nutritics)


Spaghetti Carbonara (Tesco)

Steps

1. Convert the quantities in recipe to quantity in g.
2. Find the quantities (g) after cooking.
   →Use Bognár (2002) Tables [2]
3. Find the quantities of nutrients per portion.
   →Use nutrient databases (e.g., McCance and Widdowson's dataset)
4. Convert the quantities of nutrients per 100g.
5. Estimate the nutrient score.

Nutritics

Models

Ofcom NPM

- 'A' points (energy + saturated fat + sugars + sodium) - 'C' points (fruit, veg and nuts + fibre + protein).
- Foods scoring 4 or more points, are classified as 'less healthy'.

NRF9.3 [3]

- 9 nutrients to encourage (protein, fibre, vitamins A, C and E, calcium, iron, magnesium and potassium) and 3 to discourage (saturated fat, sodium and added sugar).

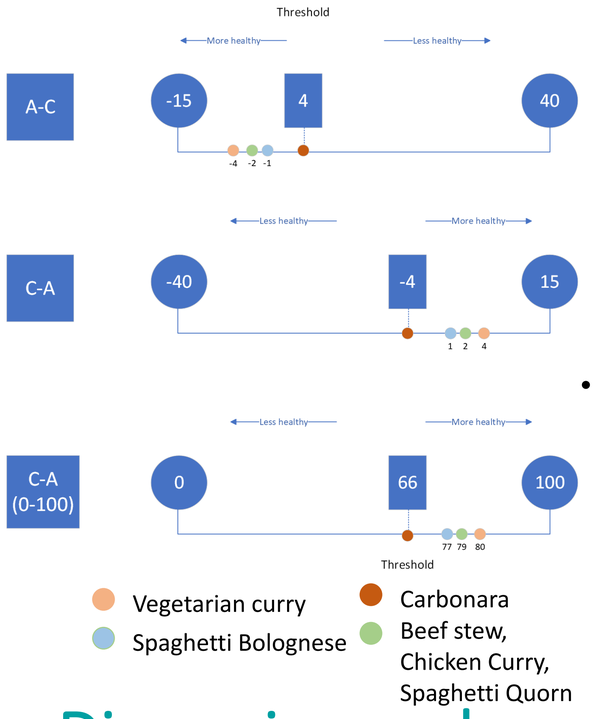
SAIN:LIM [1]

- The nutrients included to encourage are proteins, fiber, vitamin C, D (optional) calcium, and iron. Nutrients to discourage is the same as above.

Results

- Vegetarian Curry (1 aubergine, 1 courgette, 400g tin chopped tomatoes, 100g spinach, 150g peas, 300g basmati rice, 1onion, 2 garlic cloves, 1 red chilli, 1tsp cumin, coriander, turmeric, 5cm ginger) was the "healthiest" meal according to NPM and SAIL:LIM scores. NRF9.3 (in 100kcal) seems to agree with this result; foods with high water content and low energy density benefit when estimated in kcals rather than grams[4].
- Beef Stew (1kg braising steak, 900g potatoes, 4 carrots, 2 onions and 3 celery stalks) had the highest NRF9.3 score (for all cases), this is due in part to the fact that it is rich in vitamin A. The NPM score is not that high because much of its vegetable content (potatoes and other starchy vegetables such as yams) do not count as vegetables in the NPM.

Figure 1. NPM scores in a) (-15)-40 scale, b) (-40)-15 scale, and c) 0-100 scale



- Carbonara (80g spaghetti, 65g smoked pancetta, 1 onion, 1 garlic clove, 2 egg yolks and 30g parmesan) had the lowest (most unhealthy) NPM score (A-C=9-5=4), mainly due to it being high in saturated fats and sodium. NRF9.3 (100 kcal) and SAIN:LIM scores were similar. The difference between NRF9.3 (100kcal) and NRF9.3 (in 100g) is due to the low water content and high energy density having a pronounced impact when estimated in kcals as opposed to 100g [4].
- Spaghetti Bolognese and Quorn (520g pasta, 150g onions, 800g chopped tomatoes, 6g garlic, 120g cheddar, 400g beef or Quorn mince) received quite low NRF9.3 and SAIN:LIM scores. However, their NPM scores are not the lowest. This is because both dishes have quite high protein content which has more significant weight in NPM than NRF9.3 index.

Figure 2. NPM, NRF9.3 and SAIN:LIM scores for Chicken and Vegetarian Curry, Carbonara, Beef Stew, Spaghetti Bolognese and Quorn.

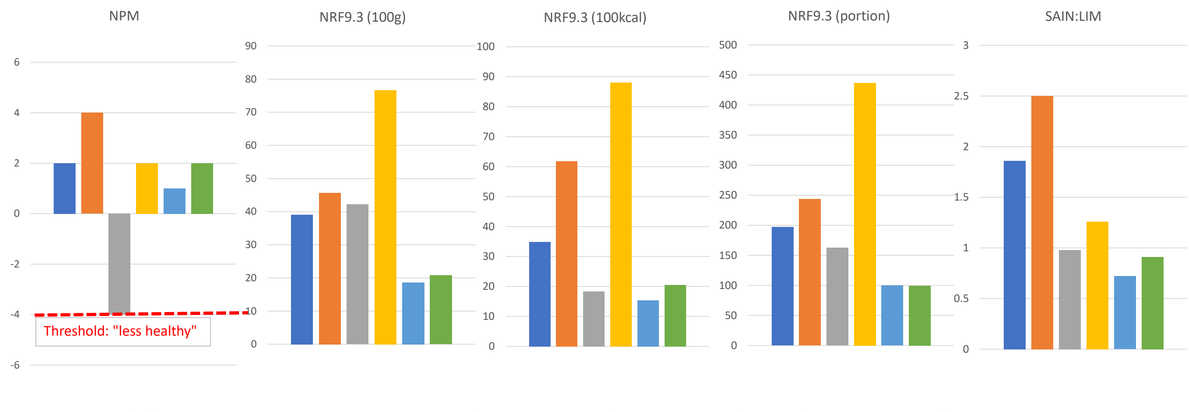


Figure 3. Pointing system decomposition for the NPM scores

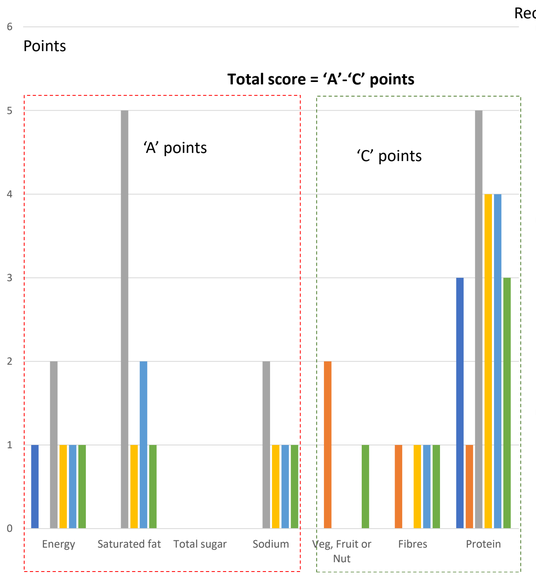
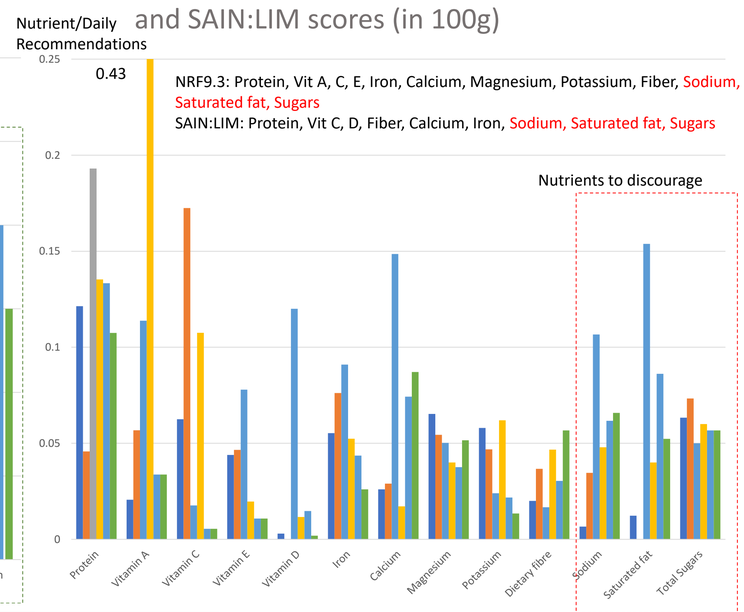


Figure 4. Nutrients decomposition of NRF9.3 and SAIN:LIM scores (in 100g)



Discussion and conclusions

Assessing the "healthiness" of meals using different Nutrient Profiling Models is dependent on the choice of model used. Scores should be considered under the lens of each model's characteristics:

- The type of nutrients, e.g., NPM does not consider micronutrients.
- The number of nutrients; this affects the weighing of each nutrient in the total score.
- Reference amounts; foods with high water content will get lower dietary quality score per 100g compared to per 100 kcal.
- The type of formula; e.g., NRF takes the difference between nutrients to encourage and discourage while SAIN:LIM takes the ratio.

	Benefits	Drawbacks
NPM	– Food groups included. – Validated. – UK's national measure. – It can change scale.	– Micronutrients not included. – Estimated only in 100 grams.
NRF9.3	– Micronutrients included. – Validated. – Estimated in 100 grams/kcals and per portion.	– Food groups not included. – Not sure if the scale can change.
SAIN:LIM	– Micronutrients included.	– Food groups not included. – Not validated. – Not sure if the scale can change. – SAIN part is estimated only in 100 kcals/ LIM part in 100 grams.

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