Commentary

Japan's nutrient profile model for dishes: A culturally sensitive approach to nutrient profiling

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Background and Objectives: Excessive sodium intake remains a major public health issue in Japan, contributing to the burden of non-communicable diseases, such as hypertension. To address this, these authors developed two nutrient profiling models, one for processed foods and another for dishes, to guide food reformulation and promote healthier eating. This article focuses on the dish model, which can be applied to other regions where ready-to-eat meals are highly available. **Methods and Study Design:** The Nutrient Profile Model for Dishes in Japan (NPM-DJ) was developed using data from the Japanese Food Guide Spinning Top and Japan's National Health and Nutrition Survey. Dishes were categorised to align with the traditional food culture and scored based on nutrient content per serving, including both nutrients to limit and nutrients to encourage. **Results:** The NPM-DJ evaluates dishes holistically per serving, accounting for seasonings and oils. A scoring system subtracts positive nutrient points (fruits, vegetables, nuts/seeds, legumes, mushrooms, seaweed, protein, dietary fibre) from baseline points (energy, saturated fat, sugars, sodium). Example calculations demonstrate its utility in ranking the typical 105 Japanese dishes as shown in the Japanese Food Guide Spinning Top. **Conclusions:** The NPM-DJ offers a culturally relevant framework for improving dietary habits and guiding food reformulation. It supports public health initiatives and empowers consumers to make informed choices.

Key Words: nutrient profiling for dishes, sodium intake, Japanese diet, food reformulation, public health

INTRODUCTION

Japan's traditional diet, while rich in vegetables and low in fat, is characterised by high sodium intake, primarily from seasonings such as soy sauce and miso.[1] Historical data show a decline in carbohydrate intake and a rise in fat and animal protein consumption (Figure 1). Seasonings remain the dominant source of sodium, contributing approximately 70% of total intake. This contributes to elevated risks of non-communicable disease, such as hypertension.[2] To address these challenges, the National Institutes of Biomedical Innovation, Health and Nutrition developed two nutrient profile models: the Nutrient Profile Model for Processed Foods in Japan[3] and the Nutrient Profile Model for Dishes in Japan (NPM-DJ).[4] These models aim to support food reformulation by food manufacturers and to promote healthier dietary choices for consumers.

This article describes in detail the NPM-DJ, which can also be applied to other regions where ready-to-eat meals are highly available.

MATERIALS AND METHODS

Development of the NPM-DJ

The dish categories in the NPM-DJ were designed using the Japanese Food Guide Spinning Top,[5] as well as dietary survey data from Japan's National Health and Nutrition Survey.[1] Because higher adherence to the Japanese Food Guide Spinning Top has been reported to relate to lower mortality among Japanese adults,[6] we decided to apply this guideline as a basis for dish categorisation. Dishes were classified into five categories: staple, side, main, mixed, and mixed with staple. Each dish was assessed per serving. For typical recipes in the Japanese diet, 105 dishes listed in the Food Guide Servings (SV) Quick Reference Table were used.[7] The flowchart for determining dish categories in NPM-DJ is shown in Figure 2.

Scoring system

The Health Star Rating system[8] was selected as the reference, because its specific nutrients and food components "to limit" or "to encourage" are included in the Japanese nutrient labelling system, and its scoring algorithm could be adapted to reflect local nutrition policies, such as the Dietary Reference Intakes for Japanese.[9] Baseline points were assigned for amounts of energy, saturated fat, sugars, and sodium per serving. Modification points were awarded for proportion of fruits, vegetables, nuts/seeds, and legumes, mushrooms, and seaweed (V points) and for protein (P points) and dietary fibre (F points) per serving.

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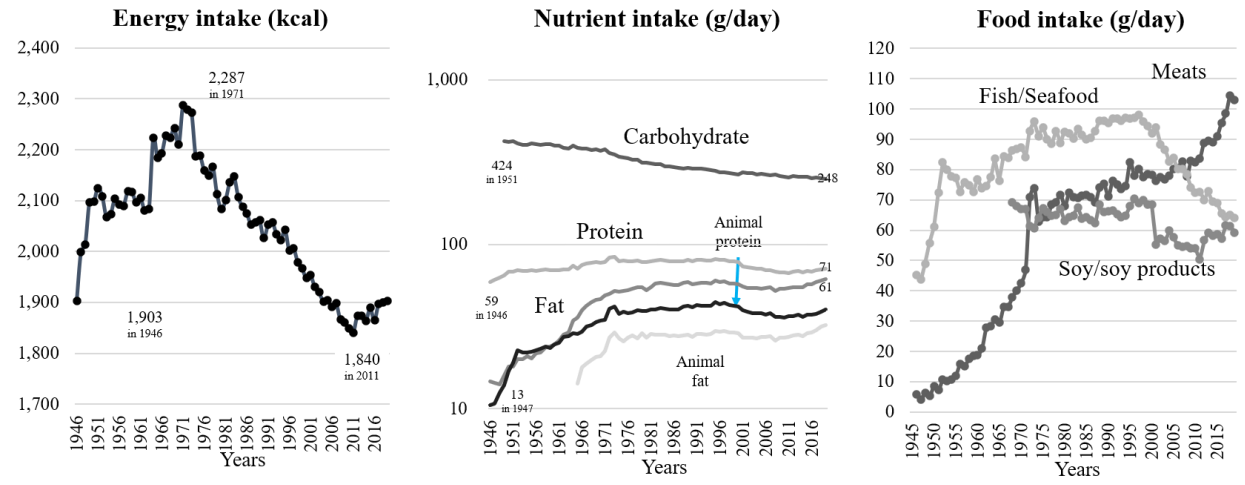

Figure 1. Annual average intakes in Japan [1] for (A) energy, (B) macronutrients, and (C) major food categories.

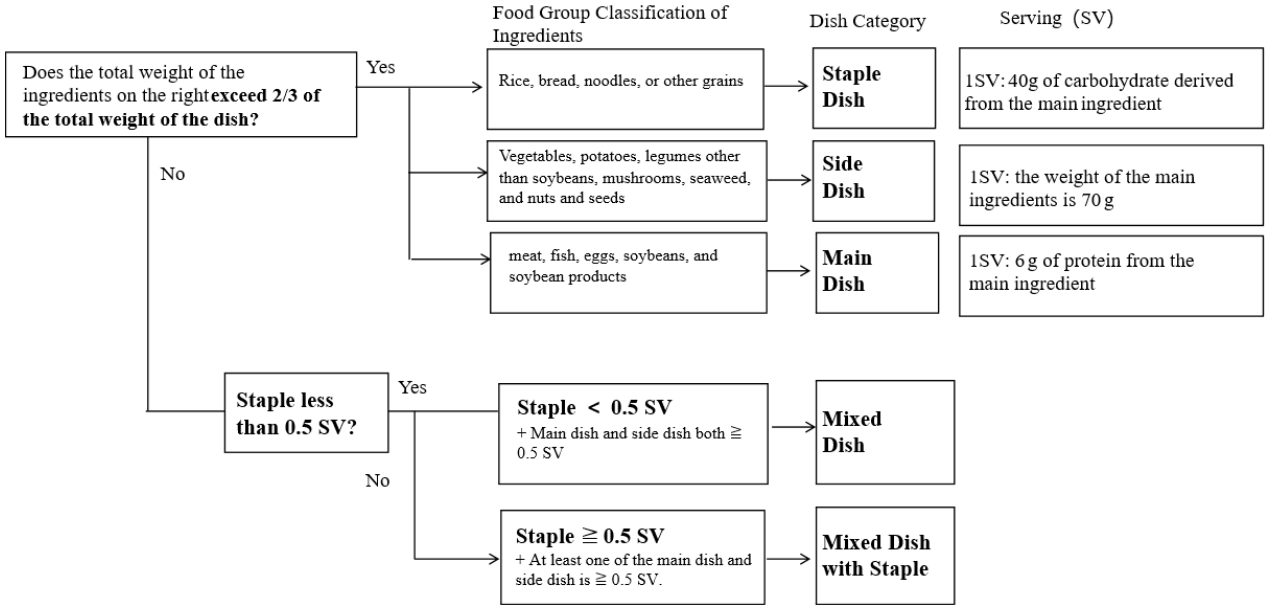

Figure 2. Flow chart for determining dish categories in the Nutrient Profile Model for Dishes in Japan. 1SV, one serving.

The scoretable for calculating points in a dish, for the amount of energy (kcal), saturated fat (g), total sugars (g), sodium (mg), fruits, vegetables, nuts/seeds, and legumes (g), mushrooms, seaweed, protein (g), and dietary fibre (g) is the same as that for processed foods,[3] except that the unit for dishes is one serving,[4] not 100g. The final score was calculated by subtracting the sum of modification points from the sum of baseline points, which lower scores correspond to "healthier" scores. To maintain consistency with the Health Star Rating system, the protein cap was also applied as well: products scoring ≥13 baseline points cannot score P points unless they score ≥5 V points (Figure 3).

RESULTS

The 105 dishes from the Japanese Food Guide Spinning Top were categorised as follows: staple dish = 20; side dish = 34; main dish = 21; mixed dish = 12; and mixed dish with staple = 18.[4] Side dishes, which consist mainly of plant-based foods, such as vegetables, potatoes, legumes other than soybeans, mushrooms, seaweed, and nuts and seeds, were the largest category, often eaten along with a staple dish such as boiled rice.

A scoring table was generated by deriving final scores for each of the 105 dishes, as described below, which were then ranked into 10th percentiles according to each of the five dish categories: staple dish, side dish, main dish, mixed dish, and mixed dish with staple.[4] Thus, ratings range from 0.5 to 5 stars: the lowest (least healthy) rating of 0.5 corresponds to the 90th percentile of the final scores in each category; the rating increases by 0.5 for every 10th percentile decrease; the highest (healthiest) rating of 5 corresponds to the lowest 10th percentile of the final scores in each category,[4] because dishes with lower scores have low content of nutrients "to limit", or have high content of nutrients/food components "to encourage".

As an example of nutrient profiling using NPM-DJ, we present a typical traditional Japanese side dish, simmered hijiki seaweed (Figure 4). The dish, which in its cooked form comprises 188.2 g, has boiled hijiki seaweed simmered with shredded carrot as the major food

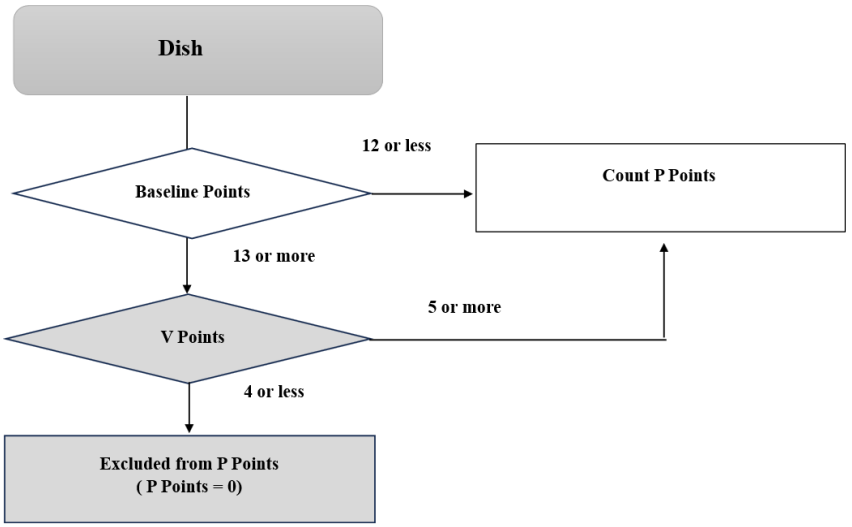

Figure 3. Protein cap: determining whether the dish qualifies for protein (P) points based on baseline points and vegetable (V) points.

Nutrients	Contents		Point	Remarks
Energy	54	kcal /dish	0	Points are read from the score table
Saturated fat	0.24	g/dish	0	
Total Sugars	3.8	g/dish	1	
Sodium	398	mg/dish	3	
Vegetables(V)	83	%	5	
Protein	2.7	g/dish	0	
Dietary fiber	4.2	g/dish	5	

Calculate Negative nutrients
Baseline point = 0 + 0 + 1 + 3 = 4

Calculate Positive nutrients
Modification point = 5 + 0 + 5 = **10**

Final Score= Baseline Points − Modification Points = 4 − 10 = **- 6**

Dish Category = Side dish (Reading from the score table)

Rank: 4.5
(The rank for a **Side Dish** with a final score of −6)

Figure 4. Using the Nutrient Profile Model for Dishes in Japan for simmered hijiki seaweed.

components. It is flavoured with a soup stock of *katsuo-bushi* (dried bonito flakes) and dried kombu (algae), soy sauce, sugar, and Japanese sake. As shown in Figure 4, baseline points (4) are the sum of negative nutrients, three of which are from sodium. Modification points (10) are the sum of positive nutrients, and the final score, calculated by subtracting modification points from the baseline points, it is –6. The details of the points allocated to the specific nutrients/foods in a dish are shown in the Supplementary Materials in the original paper by Tousen et al (Table S1. Score table of the Nutrient Profile Model for Dishes in Japan version 1.0).[4] As the simmered hijiki seaweed dish belongs to the side dish category, using the scoring table described above, the 80th percentile for side dishes is –6, so this dish is ranked 4.5. This example illustrates how traditional dishes can rank favourably due to high vegetable and fibre content, despite high sodium levels.

DISCUSSION

The NPM-DJ provides a culturally sensitive approach to nutrient profiling. Unlike Western models, it accounts for the role of seasonings and oils in Japanese cuisine. By evaluating dishes holistically, it enables realistic dietary assessments and supports both consumers and food manufacturers. Food manufacturers providing ready-to-eat meals can check the scores of their recipes and reformulate them to more healthier options. Consumers receive guidance in making healthier choices of foods and meals. For example, the simmered hijiki seaweed dish (Figure 4) could achieve rank 5.0 if the sodium content could be reduced (<309 mg/dish)[4] so that the final score is reduced to -7.

Another issue to be considered, is the application of the protein cap rule to dishes. The original protein cap rule in the Health Star Rating system[8] was intended to prevent foods scoring favourably because of high protein content, in spite of high energy/saturated fat/ sugar/ sodium content. For dishes, however, protein sources in Japan are

mainly whole foods such as meat, fish, or soy products. In our recent study, we examined the effect of not applying the protein cap rule to 40,108 dishes consumed by adult participants in the National Health and Nutrition Survey, Japan.[10] This resulted in reduction in final scores of mixed dishes, which may assure consumers of their nutritional quality. In order to improve the current model, collecting recipe data on frequently eaten dishes sold in supermarkets or convenience stores should be undertaken.

The dual-model strategy comprising the NPM-DJ for meals, described here, and the Nutrient Profile Model for Processed Foods in Japan for ingredients, described elsewhere,[3] thus offers a comprehensive framework that aligns with public health goals[11] and can be adapted for other cultures facing similar challenges.

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DISCLOSURE ON THE USE OF AI AND AI-ASSISTED TECHNOLOGIES

AI-assisted technologies were used solely for language proofreading. The authors reviewed and edited the content and takes full responsibility for the content of the publication.

CONFLICT OF INTEREST AND FUNDING DISCLOSURES

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