Commentary

The Ajinomoto group nutrient profiling system for Japanese dishes and meals

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Nutrient profiling systems (NPS) are used to rank foods by nutrient composition to support public health policy and consumer guidance. Most existing NPS are designed for packaged foods and evaluate nutrients per 100 g or 100 mL, which may not reflect dietary patterns in cultures where home-cooked meals predominate. In Japan, excessive sodium intake, primarily from seasonings and condiments, remains a major public health issue. The Ajinomoto Group Nutrient Profiling System (ANPS) was developed to evaluate Japanese dishes and meals "as consumed," using culturally relevant serving sizes and four criteria: protein, vegetables, saturated fatty acids, and sodium. ANPS was validated using nutrient composition data from 1,089 dishes and 1,816 meals, including recommended, randomly generated, restaurant, and bento-box meals. Validation analyses examined correlations with established nutrient profiling and diet-quality indices. The ANPS showed moderate positive correlations with the Nutrient Rich Food Index (NRF6.3 for dishes, NRF9.3 for meals) and with meal-quality indicators, including the metric Healthy Eating Index 2015 (mHEI-2015). The system has been implemented in the multi-industry *Tsujitsuma Shiawase* project, where ANPS-based marks help guide consumers toward healthier choices through recipes and public campaigns. The ANPS offers a culturally appropriate and scientifically robust framework for evaluating Japanese meals and supporting sodium reduction. Limitations include exclusion of desserts and beverages in dishes and the lack of direct assessment of excess energy or sugar intake. Ongoing refinement and broader validation are needed to strengthen its usefulness for dietary assessment and public health promotion.

Key Words: nutrient profiling system, Japanese dishes, Japanese meals, sodium reduction, dietary assessment

INTRODUCTION

Nutrient profiling systems (NPS) are science-based algorithms designed to rank foods according to their nutrient composition, with the aim of supporting public health policies, guiding product reformulation, and enabling informed consumer choice.[1] Globally, most existing nutrient profiling models (NPMs) have been developed to evaluate packaged foods, typically expressing nutrient content on a density basis, such as per 100 g or 100 mL.[2,3] This approach is well suited for diets dominated by processed products, where standardized serving sizes and nutrient labelling are common practice.

However, the WHO has emphasized that NPS should be culturally oriented and tailored to the specific dietary challenges of the populations they serve.[1] Many existing NPS were originally designed in Western countries, where obesity and related chronic diseases are priority public health concerns. Consequently, these models often prioritize energy and fat reduction as key evaluation criteria. In contrast, Japan has one of the lowest obesity prevalence rates globally, and its major nutritional challenge differs substantially from that of Western populations.[4]

In particular, Japan faces a significant public health issue with excessive sodium intake.[5,6] Average daily sodium consumption in Japan exceeds national recommendations by approximately 40%, and more than 60% of this sodium comes from seasonings and condiments, such as soy sauce, miso, and added table salt.[7] While seasonings can technically be assessed as packaged foods, evaluating them on a per 100 g/mL basis does not accurately reflect their real-world contribution to sodium intake, since they are typically consumed in small portions as part of a meal. This highlights a fundamental limitation of density-based NPMs, which may not accurately represent actual dietary patterns or public health risks in cultures where portion sizes and eating habits differ significantly. Therefore, there is a need for NPMs that fit the Japanese food culture—ones that evaluate dishes and meals as they are consumed, using culturally relevant serving sizes and criteria that address the unique dietary challenges faced by the Japanese population.[8-10]

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Manuscript received 01 April 2026. Initial review completed 05 May 2026. Revision accepted 05 June 2026.
doi: 10.6133/apjcn.202607_35(Suppl1).0007

In response to these needs, we developed the Ajinomoto Group Nutrient Profiling System (ANPS), a novel approach designed specifically for Japanese dishes and meals.[9,10] The ANPS aims to complement existing packaged-food NPMs by providing a framework that is sensitive to cultural eating patterns and public health priorities, including sodium reduction.[6] This article describes the development, validation, and application of ANPS dishes and meals and discusses its potential for improving dietary balance and supporting healthier eating habits in Japan.

OVERVIEW OF THE AJINOMOTO GROUP NUTRIENT PROFILING SYSTEM

The ANPS was developed to provide a culturally relevant framework for evaluating the nutritional quality of Japanese dishes and meals. Unlike conventional NPMs that focus on packaged foods and use density-based metrics (e.g., per 100 g or 100 mL), the ANPS is designed to assess both individual dishes and meals "as consumed," reflecting the diversity and structure of Japanese cuisine. This approach enables more accurate guidance for healthier recipe development, meal planning, and consumer education within the context of traditional and modern Japanese eating patterns.

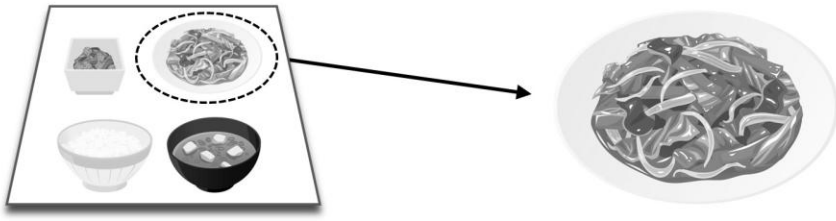
The ANPS employs four key components selected for their public health relevance in Japan: protein and vegetables (components to encourage) and saturated fatty acids and sodium (components to limit). These criteria address major dietary concerns, particularly the excessive sodium intake prevalent in Japan, much of which is derived from seasonings and condiments, yet the ANPS does not solely focus on sodium. The system also emphasizes the importance of adequate protein and vegetable intake, as well as limiting saturated fatty acids, to address a broad range of dietary challenges. For each dish category, nutrient targets are anchored at one-third of the daily reference values from the Dietary Reference Intakes for Japanese, WHO, and scientific literature.[6,11-17] The ANPS for dishes was further refined using median contributions observed across seven prototypical meal units, which represent common combinations of staple, main, soup, and side dishes. The ANPS scoring algorithm for dishes and for meals assigns points for each of the four components: protein and vegetables receive decreasing scores as their targets are missed, whereas sodium and saturated fatty acids receive decreasing scores as their contents exceed recommended levels. For both the dish and meal ANPS, the four subscores are summed and multiplied by 2.5 to yield a final score ranging from 0 to 100. Notably, sodium is evaluated in 0.5-point increments to provide more sensitive and nuanced assessment compared to the 1-point increments used for the other components. This feature enables the ANPS to more accurately reflect the real-world sodium content of Japanese dishes while still maintaining a balanced evaluation of other key components.

To validate the system, the ANPS for dishes was applied to a comprehensive dataset comprising 661 traditional Japanese dishes using recipes included in the nutrition calculation tool, Excel Eiyo-kun, version 8 (Kenpakusha, Tokyo, Japan), with nutrient compositions calculated by standard tables of food composition.[18] The dataset was further supplemented by 428 low-sodium recipes from Ajinomoto Co., Inc.'s consumer website to ensure a wide range of sodium variability. For meal validation, a total of 1,816 meals were analysed: 310 nutritionally recommended meals, 792 randomly generated meals, 474 restaurant meals, and 240 take-away bento-box meals. To generate the random-meal dataset while maintaining realistic Japanese meal structures, dishes from Excel Eiyo-kun, version 8 were combined under four predefined Japanese meal-pattern templates (based on the Japanese Food Guide Spinning Top and previous reports).[9,19] Two external registered dietitians then screened the generated meals to exclude implausible combinations (e.g., mismatched dish styles or duplicate dish categories); 208 meals were removed and 792 were retained for analysis. Nutrient values for recommended and randomly generated meals were calculated based on recipe ingredients and weights using the standard tables of food composition.[20] For restaurant and bento-box meals, nutrient information was obtained from manufacturer data or, if not available, estimated by registered dietitians (IMD Inc., Tokyo, Japan). This approach ensured that the validation dataset reflected a diverse range of real-world Japanese meal patterns and nutrient profiles. The scoring algorithm is summarized in Figure 1, which outlines the calculation steps and component scoring for both dishes and meals.

Validation studies demonstrated the scientific robustness of the ANPS. For convergent validity, we compared ANPS scores with established nutrient profiling and diet-quality indices, including the Nutrient Rich Food (NRF) Index and the metric Healthy Eating Index 2015 (mHEI-2015).[21,24] The NRF n.3 score reflects n qualifying nutrients and three nutrients to limit (NRF6.3/NRF9.3: n = 6 or 9). The convergent validity of the ANPS for dishes was confirmed by a moderate positive correlation with the Nutrient Rich Food Index (NRF6.3; Pearson's r = 0.45, $p < 0.0001$). [9,21-23] As a sensitivity analysis, Spearman's rank correlation was also examined (r = 0.51, $p < 0.001$). In applying ANPS-Dish to the validation dataset, the median score across all dishes was 70.0 (IQR, 55-78.8), whereas low-sodium dishes scored higher (median 80.0; IQR, 72.5-88.8), illustrating the algorithm's practical discriminability for sodium reduction.[9]

For meals, independent analyses showed moderate positive associations of the ANPS with established meal-quality indices, including the mHEI-2015 (Spearman's r = 0.59, $p < 0.001$) and NRF9.3 (Spearman's r = 0.40, $p < 0.001$).[10,24] These moderate correlations are plausible because ANPS, mHEI-2015, and NRF9.3 capture related but non-identical constructs. In particular, ANPS emphasizes sodium sensitivity in Japanese meals, which may be less strongly reflected in nutrient-density–based indices such as NRF9.3. These findings confirm the utility of the ANPS for evaluating dietary balance and guiding sodium reduction strategies within the Japanese cultural context.

STEP1. Obtain nutritional information of the per serving of the evaluating meal or dish



When evaluating meals

When evaluating dishes

Determine the dish category of the evaluating dish

For example: Categorized as **main dish subcategory 7**

Criteria for subcategory 7:
Total ingredients ≥120 g AND Protein ≥6 g AND Vegetables ≥50g

STEP2. Determine the component points according to nutritional target values of meal or the specific dish category

Scoring charts

	For meals				For dishes (main dish subcategory 7)			
Target Daily Values	1/3 Daily Value				20% Daily Value	25% Daily Value	10% Daily Value	15% Daily Value
Component Points	Protein (g)	Vegetable (g)	Sodium (mg)	SFAs (g)	Protein (g)	Vegetable (g)	Sodium (mg)	SFAs (g)
10	≥ 22.0	≥ 116.7	≤ 917	≤ 7.41	≥ 13.2	≥ 87.5	≤ 275.6	≤ 3.33
9.5	-	-	≤ 1009	-	-	-	≤ 303.1	-
9	≥19.8	≥ 105.0	≤ 1101	≤ 8.15	≥ 11.9	≥ 78.8	≤ 330.7	≤ 3.66
8.5	-	-	≤ 1193	-	-	-	≤ 358.3	-
8	≥ 17.6	≥ 93.4	≤ 1284	≤ 8.89	≥ 10.6	≥ 70.0	≤ 385.8	≤ 4.00
7.5	-	-	≤ 1376	-	-	-	≤ 413.4	-
7	≥ 15.4	≥ 81.7	≤ 1468	≤ 9.63	≥ 9.2	≥ 61.3	≤ 440.9	≤ 4.33
6.5	-	-	≤ 1559	-	-	-	≤ 468.5	-
6	≥ 13.2	≥ 70.0	≤ 1651	≤ 10.37	≥ 7.9	≥ 52.5	≤ 496.1	≤ 4.66
5.5	-	-	≤ 1743	-	-	-	≤ 523.6	-
5	≥ 11.0	≥ 58.4	≤ 1835	≤ 11.12	≥ 6.6	≥ 43.8	≤ 551.2	≤ 5.00
4.5	-	-	≤ 1926	-	-	-	≤ 578.7	-
4	≥ 8.8	≥ 46.7	≤ 2018	≤ 11.86	≥ 5.3	≥ 35.0	≤ 606.3	≤ 5.33
3.5	-	-	≤ 2110	-	-	-	≤ 633.9	-
3	≥ 6.6	≥ 35.0	≤ 2202	≤ 12.60	≥ 4.0	≥ 26.3	≤ 661.4	≤ 5.66
2.5	-	-	≤ 2293	-	-	-	≤ 689.0	-
2	≥ 4.4	≥ 23.3	≤ 2385	≤ 13.34	≥ 2.6	≥ 17.5	≤ 716.5	≤ 5.99
1.5	-	-	≤ 2477	-	-	-	≤ 744.1	-
1	≥ 2.2	≥ 11.7	≤ 2569	≤ 14.08	≥ 1.3	≥ 8.8	≤ 771.7	≤ 6.33
0.5	-	-	≤ 2660	-	-	-	≤ 799.2	-
0	< 2.2	< 11.7	> 2660	> 14.08	< 1.3	< 8.8	> 799.2	> 6.33

STEP3. Calculate the total ANPS score

ANPS total score = Sum of 4 component points × 2.5

Figure 1. Scoring algorithm of the Ajinomoto Group Nutrient Profiling System (ANPS). Step 1 involves obtaining the nutritional information per serving of the meal or dish to be evaluated. For dishes, it is also necessary to determine the dish category before proceeding. Step 2 assigns component points based on the nutritional target values for the meal or the specific dish category. Step 3 calculates the total ANPS score by summing the component points and multiplying the result by 2.5.

APPLICATIONS, CONSUMER EDUCATION, AND PUBLIC HEALTH IMPLICATIONS

The real-world application of ANPS has been implemented through the multi-industry *Tsujitsuma Shiawase* project, initiated by Ajinomoto Co., Inc., which aims to make balanced nutrition both enjoyable and achievable for Japanese consumers. Central to this initiative is the use of *Tsujitsuma Shiawase* marks: visual indicators awarded to dishes and meals that meet specific ANPS criteria for protein, vegetables, saturated fatty acids, and sodium (Figure 2). These marks are designed to guide consumers toward healthier choices in a flexible, guilt-free manner, encouraging the idea that nutritional balance can be achieved over time rather than through rigid daily restrictions.

To maximize its impact, the *Tsujitsuma Shiawase* marks have been integrated into a variety of consumer-facing platforms. Recipe websites now feature thousands of marked menus, allowing users to search for dishes that align with their nutritional needs or preferences, such as increasing vegetable intake or reducing sodium. Multiple food manufacturers, media companies, and related organizations have incorporated the marks into public relations campaigns, advertisements, and social media content. By leveraging culinary influencers and ambassadors, the project has enhanced public recognition and understanding of the marks, with recent surveys indicating a growing awareness and positive reception among consumers.

Type of Mark Name	Comprehensive Balance Type Nutrition Golden Balance
Mark	
Criteria for Awarding the Mark / Concept	Dish/meal with a high JANPS®* score (75 points or higher). Indicates a meal with good overall nutritional balance.

*JANPS® is the comprehensive system under which both ANPS for dishes and meals are subsumed

Figure 2. The Tsujitsuma Shiawase mark and concept.

Beyond individual guidance, the ANPS-based marking system supports broader public health objectives, particularly in the area of sodium reduction. By clearly identifying low-sodium options and rewarding recipes that achieve significant sodium cuts, the system encourages both consumers and food producers to prioritize sodium reduction strategies. The flexible approach of *Tsujitsuma Shiawase*, allowing for nutritional "balancing out" across multiple meals, helps reduce the psychological burden often associated with dietary management, making sustained behaviour change more attainable.

Overall, the integration of the ANPS and *Tsujitsuma Shiawase* marks into everyday food choices represents a promising model for consumer education and public health promotion. By combining scientific rigor with culturally sensitive communication and practical tools, this multi-industry initiative not only empowers individuals to make healthier choices but also fosters a supportive environment for long-term dietary improvement at the population level.

IMPACT AND FUTURE DIRECTIONS

A key strength of ANPS lies in its cultural specificity, which enables more accurate evaluation of Japanese dietary patterns compared to conventional NPMs. By focusing on dishes and meals as consumed, and selecting nutritional criteria that reflect Japan's public health priorities, particularly sodium reduction, ANPS provides a framework that is both scientifically rigorous and culturally relevant. This approach highlights the importance of regional adaptation in nutrient profiling, as dietary habits, food culture, and health challenges vary widely across populations.

Despite its comprehensive coverage of traditional and modern Japanese meals, the ANPS for dishes currently excludes desserts and beverages from its evaluation. This decision reflects both the relatively minor role these items play in the overall Japanese diet and the methodological challenges of accurately assessing their nutritional impact with the current algorithm. However, as dietary patterns evolve and the consumption of snacks and sweetened beverages increases, future iterations of the ANPS may need to incorporate these categories to ensure continued relevance and effectiveness. While the use of the ANPS for meals allows for the evaluation of entire meals that include desserts and beverages, the current ANPS evaluation criteria do not fully address such key issues as excess calorie and sugar intake, which are particularly relevant for these food categories. Looking ahead, further validation and predictive studies are planned to strengthen the scientific foundation of the ANPS. While initial analyses have demonstrated moderate positive correlations with established nutrient profiling indices and meal-quality scores, additional research is needed to assess the system's ability to predict health outcomes and support behaviour change at the population level. Collaboration with academic institutions and industry partners will be essential for expanding the scope of the ANPS, refining its algorithms, and adapting it for use in other cultural contexts.

Ultimately, the ongoing development and application of the ANPS represent a promising direction for nutrition science and public health. By combining cultural sensitivity with robust scientific methodology, the ANPS offers a model for future NPS that can be tailored to the unique needs of diverse populations, supporting healthier eating habits and contributing to the prevention of diet-related diseases.

CONCLUSION

In summary, the ANPS offers a culturally sensitive and scientifically robust approach to evaluating the nutritional quality of Japanese dishes and meals. By addressing the unique dietary challenges of Japan, particularly excessive sodium intake from seasonings, and integrating into

consumer education initiatives, the ANPS supports healthier eating patterns and public health objectives. Ongoing refinement, validation, and regional adaptation will further enhance its utility as a model for NPS in diverse populations.

ACKNOWLEDGEMENTS

I thank Prof. Adam Drewnowski, Ms. Hiroko Jinzu, Ms. Reiko Kanno, Ms. Yuki Okabe, Mr. Keishiro Arima, Mr. Hiroaki Kobayashi, Mr. Shunji Sakai, Ms. Sachi Nii, Mr. Yuki Nakayama, Ms. Mika Konishi, and Ms. Tomoe Tomoda for their expertise and insightful advice.

DISCLOSURE ON THE USE OF AI AND AI-ASSISTED TECHNOLOGIES

AI technologies were used for language proofreading.

The author reviewed and edited the content and takes full responsibility for the content of the publication.

CONFLICT OF INTEREST AND FUNDING DISCLOSURES

Chie Furuta is employed by Ajinomoto Co., Inc.

This study was supported by a research grant from Ajinomoto Co., Inc. The company had no control over the content of this publication, which was fully determined by the authors and the editor.

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