

Original Article

Meal-based nutrient profiling models for the away-from-home food environment in Southeast Asia

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It is imperative to recognise that the main components of the food environment in SEA are not processed foods and the so-called ultra-processed foods. Instead, large segments of the population have their meals frequently away from home, as demonstrated by data from Malaysia and Indonesia in this supplement. A myriad of eating places have mushroomed in countries in the region, ranging from street foods, coffee shops, hawker centres and restaurants as well as through numerous food delivery services. Many of these meals are imbalanced, lacking in the healthful food groups, whilst containing high amounts of sugar, oil and salt. Frequent and excessive consumption of these meals and beverages could very well be the main contributors to the nutrition related health problems in the region. Recognising this, the supplement summarises research carried out on developing nutrient profiles based on meals or dishes as one of the strategies to improve the food environment. One article in this supplement summarises the principles and utilisation of nutrient profiles while another three articles summarise such meal-based profiles developed by researchers in Thailand and Japan. Meal-based nutritional profile systems, based on food cultures of countries in the region, could help both food vendors to reformulate and improve their menus as well as to consumers to select healthier away-from-home meals. It is hoped that information in this supplement may prove useful for researchers, policy makers, and health care professionals in their efforts to improve the food environment in SEA.

Key Words: nutrient profiling models, meals away from home, food environment, Southeast Asia

INTRODUCTION

The causes of obesity and associated non-communicable diseases (NCDs) are well recognised as complex, with unhealthy dietary patterns and lack of physical activity as major factors. Much has been said of the contributions of unhealthy food environment, including the so-called ultra-processed foods (UPFs) to the rise in overweight and obesity.^{1,2} However, it is also vital to recognise the overall food environment has changed markedly over the years and should include meals eaten out of homes.^{3,4} Identifying which dietary factors are main contributors within this specific food environment is essential to implement effective interventions.

It is recognised that Asia diets are diverse and complex, influenced by local ingredients and the food cultures in the region. The food environments in Asian countries, for example Southeast Asia differ from those of other regions, such as Europe. Eating out frequently or regularly is a characteristic of the food culture of many groups in these countries. Large population segments obtain their meals from a huge variety of traditional food outlets, such as hawker stalls, street foods, cafes, restaurants, workplace cafeterias, school canteens, and numerous food delivery services. Many of these meals away from home are unbalanced in such desirable food groups as whole grains, legumes, vegetables, and fruits. Many of these meals are also high in salt, oil, and sugar.⁴ Unlike pre-packaged foods, which are regulated, meals away from home have no regulatory oversight and lack dietary messages to inform consumers on making healthier choices. Given their major contribution to the overall food environment in

SEA, it is imperative that meals away from home be given closer attention, to assist both vendors and consumers to create and choose healthier alternatives.

Recognising the unique food environment in SEA, tackling obesity and associated NCD problems must necessarily be different as well. Obesogenic elements in the food environment in these countries include not only pre-packaged foods but also meals away from home, so the suggestion that UPFs are the main contributor to NCDs may not hold true for much of the population in this region. Advising the public only regarding consumption of pre-packaged foods may not lead to the positive outcomes we need. The entirety of the food environment needs to be seriously considered, including meals consumed away from home, widely available from a variety of outlets.

It is also important to focus not only on excessive intake of sugar, oil, and salt but also on increased consumption of healthful foods and ingredients, such as whole grains, legumes, vegetables, and fruits.

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Providing dietary guidance, including tools to facilitate consumers in understanding and choosing healthier meals and dishes would be helpful. This guidance should offer information for consumers on the nutritional profile of meal or dish they intend to consume. The profile would include a number of nutrients that consumers should seek out and those they should avoid.

In this regard, some efforts towards developing meal- or dish-based Nutrient Profiling Models (NPMs) have already been undertaken by some research organisations and institutions. These models, based on meals and dishes, are designed to better align with the needs and food culture of SEA. This supplement focuses on ways to provide guidance to vendors and to consumers of meals away from home to enable them to offer and make healthier choices.

OBJECTIVES OF THE SUPPLEMENT

To better address these issues of dietary choices in the unique food environment in SEA, this supplement, addressing meal-based nutrient profiling models for the away-from-home food environment, has three broad objectives. First, it aims to raise awareness among all stakeholders of the importance of focusing on meals taken away from home, whether eaten at various locations or purchased through delivery services. Second, recognising the heavy reliance on meals away from home in the region, this supplement summarises research carried out in developing meal-based nutrient profiling models. Third, the contributing authors discuss how the profiling models may help food vendors to improve their menus and the general public to choose healthier meals. Our goal is to provide useful information to researchers, policy makers, and health care professionals in their approaches to improve the food environment in SEA countries.

ARTICLES IN THIS SUPPLEMENT

To address the objectives of this supplement, the publication comprises the following articles. The first two articles, by Siok Hui Voon, and Chanchira Phosat and Rewadee Chongsuwat, detail the food environment in two SEA countries, Malaysia and Thailand, respectively, highlighting the widespread consumption of meals away from home and the proliferation of numbers and types of meal delivery platforms. Many of these meals are energy-dense, high in salt and sugar, and nutritionally imbalanced, lacking in essential nutrients. These articles discuss the potential negative impact of such dietary patterns on health outcomes, including increased risk to NCDs, as well as food safety concerns. Several public health measures are suggested, including raising nutritional awareness, improving nutritional profiles of meals and dishes, and promoting healthier choices of meals.

The third article, by Adam Drewnowski, introduces the concepts and principles to consider when modelling nutritional profiles using different types of NPMs, as well as approaches already adopted and their use in pre-packaged foods. Drewnowski then discusses the potential for developing NPMs for mixed dishes and complete meals, to more accurately capture the current SEA food environment, and highlights several areas that deserve particular attention in view of the complex nature of these meals.

The next three articles highlight current research on meal- or dish-based NPMs being developed in countries in the region, one in Thailand (Pakpadsorn Sarachantapong et al.) and another two in Japan (Hidemi Takimoto et al. and Chie Furuta). These articles outline the approaches adopted, the proposed models, and how they may be used to provide guidance both for meal reformulation and for consumer choice.

PROCESSED FOODS AND THE FOOD ENVIRONMENT

It has been well established that an unhealthy diet is a major cause of many non-communicable diseases (NCDs). Many health professionals attribute unhealthy diet to the availability of pre-packaged foods in the food environment. Various efforts have been made to make healthier pre-packaged foods available to the consumers mostly targeting 'negative nutrients', such as calories, sugar, oil, and salt. Regulations have been enacted by countries in the region to mandate nutrition labelling, as well as front-of-pack labelling schemes to guide consumers in making healthier choices. The introduction of the NOVA classification to categorise a range of foods from unprocessed to ultra-processed foods (UPFs), and the linking of consumption of these foods to the increased prevalence of NCDs have led to greater scrutiny of processed foods.^{1,2,5}

In the meantime, concerns have been raised regarding the NOVA classification and the use of the term UPFs. It was pointed out that the classification is ambiguous and is not grounded on rigorous scientific principles. The lack of clarity of the classification has led to confusion and frequent misclassification of foods. The UPF category is highly heterogeneous and includes a range of food groups with a wide range of nutritional composition and also include potentially beneficial products and life-saving products eg ready-to-use therapeutic foods and infant formulas. There is also concern on the purported association between the consumption of UPFs and diet-related chronic diseases.⁶⁻⁸

The concept of UPFs has led to widespread adoption by public health and food policy makers. Consequently, programmes policies began adopting reducing or minimising the consumption of UPFs as an approach to reduce chronic disease. In view of the short-comings mentioned above, Forde (2023) pointed out that the NOVA classification of foods is not appropriate for use to inform food policy or used for population-wide dietary guidelines.⁹

It has also been pointed out that it is unwise to demonise all processed foods as removing these UPFs from the diet would also result in the removal of many important nutrients.¹⁰ Processed foods, especially those fortified with micronutrients, do play crucial roles in helping the population in many developing countries meet nutritional needs, and in combating hidden hunger. This is particularly true for populations in remote, low-income, or disaster-prone areas, where fresh foods are unavailable or are too expensive. For these communities, processed foods are the most practical, affordable, and safe way to deliver essential nutrients.⁹

It is indeed important to continue to monitor the roles of processed foods in the diets of population. The popula-

tion should be provided guidance on appropriate use of processed foods and selecting healthier options. However, with their unique food environments, it is important to recognise that processed foods do not play a major role in the diets of communities in SEA countries. Data from Indonesia indicate that, from 1990 to 2025, the trend of daily protein and total calorie intake from processed foods for 35 years has been mostly below 25% of total daily intake.¹¹ Instead, in addition to consuming some pre-packaged foods, large segments of the region's population rely frequently on meals purchased away from home, or delivered to the home, often two to three times a day.⁴ We cannot ignore this important segment of the food environment in SEA countries. Given its large contribution to the region's diet, providing guidance to vendors to encourage healthier recipes and consumers to select healthier meals is the essential aim of this supplement.

AWAY-FROM-HOME MEALS: AN INTEGRAL PART OF FOOD ENVIRONMENT

The first two contributions to this supplement, by Siok Hui Voon and by Chanchira Phosat and Rewadee Chongsuwat, show that eating out of the home in Malaysia and Thailand, respectively, has risen markedly in recent decades, becoming an inherent part of their food cultures. Concomitant to this rise, a variety of eating places has mushroomed, ranging from simple stalls on the street and coffee shops to cosy cafes and hawker centres in shopping malls, as well as fancy restaurants. One should not overlook the many food delivery services that emerged during the COVID-19 pandemic in 2020; these have remained as a colourful part of the eating out-of-home culture of SEA. These two articles also note similar practices in other SEA countries, as well. A common scenario in the region is that, for several times a week, the individual would likely have breakfast in a stall near his house or office; have lunch at the office cafeteria or coffee shop nearby. For dinner he could be having dinner at a mamak shop nearby or order meals from a food delivery service.

Such practices are especially common in urban areas, among individuals with hectic lifestyles and tight schedules. Many low- and middle-income families rely on both parents working outside the home, to have enough income; they often leave their young children in the care of their grandparents. Cooking at home becomes a rare practice, and family members seek meals out of home or rely on delivery services. What they have in mind is just to ensure they have some food that suits their palate, without considerations for nutritional value. Such regular practices place their children at risk to imbalanced meals, deficient in essential nutrients. Such practices are now not just in urban areas, but also spread to semi-urban and rural communities.

The poor food environment in Malaysian primary schools is a matter of great concern. Canteens in many of these schools traditionally sell a variety of foods and drinks of low nutritional value. Children will spend their parent's hard-earned pocket money on these foods during the mid-morning recess. To improve the school food environment, Voon's contribution highlighted the implementation of the Malaysian School Nutrition Promotion

Programme in selected schools in the country where the sale of mid-morning meal is a nutritious meal monitored by nutritionists.

Voon, as well as Phosat and Chongsuwat, have summarised that the main drivers for the increase in consuming away-from-home meals in the past decades, including urbanisation, rising incomes, changes in family structures and way of life and growing preference for convenience. With both husband and wife working out of the home, preparing meals at home becomes challenging. Many families find meals away from home, including delivered to the home, affordable and convenient. The need for meals to be delivered to homes because of travel restrictions during the COVID-19 pandemic became a common practice even after the health threat was resolved. Digital food delivery platforms and the craze of viral or trendy foods via digital media are further factors that encourage the consumption of these frequently unhealthy meals away from home. Easy accessibility, affordability, and taste appeal are the primary drivers of choice among many population groups, not nutrition content.

Meals consumed away from home include a variety of local, traditional favourites as well as international cuisines, and include a large number of local desserts and beverages. As noted by Voon and by Phosat and Chongsuwat, such meals eaten away from home are nutritionally imbalanced, lacking such healthful ingredients as vegetables and whole grains. These are also usually high in sodium, oil, and sugar. In addition, portion size of many of these meals seem to have become larger over the years. Regular consumption of these meals can have far-reaching public health consequences, including nutritional inadequacies and increased risk of NCDs. Food vendors also use the "eat all you can" gimmick to drive people to overheat and overindulge, heading towards increased health risks.

MAKING AVAILABLE HEALTHIER CHOICES FOR AWAY-FROM-HOME MEALS

It is important to better understand the drivers of meals-away-from-home consumption. Policies and interventions must be based on accurate information. As a start, we need more comprehensive, nationally representative data on the practice. We need information on the main reasons for such practices, their choices of meals and perception, and reasons for these choices, as well as the contribution of these meals to their overall diet. Such data would be useful for understanding how the various components of the overall diet of the population are linked to nutritional status.

Recognising the widespread practice of eating out of home, tackling the food environment must include this sector. Interventions can target both supply side (vendors) and the demand side (consumers) of the food service sector.

Vendors can offer healthier alternatives for many of their dishes—greater availability of more nutritious choices will enable consumers to better follow nutritional advice. Healthier options should also be made available to school children, office workers, and families eating out or ordering meals online.

Incentives could be provided to vendors to encourage them to provide healthier meals to their customers. Schemes could be worked out to enable eating places to implement tagging of some nutrients such as calories, sodium and sugar, or implement schemes to provide logos to cafes and restaurants providing meals that meet certain nutritional profile. These can serve as nudges and guides to consumers seeking more nutritious choices. However, it is recognised that such approaches would be challenging to vendors outside the formal sector such as street vendors and hawkers.

PROMOTING CONSUMER AWARENESS AND EMPOWERMENT

Low food and nutrition literacy is a main contributor to the regular consumption of unhealthy meals, particularly when dining outside the home. Even those with some awareness often do not make healthier choices, possibly due to cultural preferences for specific flavours among some communities. And consumers seem to lack the sense of urgency and do not recognise the seriousness of health implications of regular, frequent unhealthy eating.

It is therefore important to pay attention to the demand side of the away-from-home meals culture. It is essential to implement public health interventions that raise awareness and promote consumers to opt for healthier choices when eating-out and ordering meals through food delivery services. Interventions should include all age groups including children in schools, teenagers in colleges, young adults at work places as well as families. In this regard, it can be noted that there is a lack of national dietary guidelines in SEA to include messages on making healthier food choice when dining out. Only Malaysian guidelines has a clear key message on making healthier options when eating out.¹² Tips to help consumers select delicious yet more nutritious meals and beverages should be disseminated widely via a broad range of community promotion programmes.

With the wide variety of meals available, tips that enable consumers to identify healthier meals would be helpful, such as a guide to understand nutritional profiles of meals or dishes. The core of this supplement focuses on this aspect. In the third article in this supplement, Adam Drewnowski summarises the concepts of nutritional profiling and its potential application for meals and dishes. The three articles that follow describe the development of nutrient profiles for meals and dishes namely Sarachantapong et al. for Thai dishes, and Takimoto et al. and Chie Furuta for Japanese meals.

PRINCIPLES AND USE OF NUTRIENT PROFILES

Nutrient profiling models have been designed to rate the nutritional quality of individual foods, according to their energy content and nutrient composition. The objective of such models would be to identify healthful nutrient-rich foods and rank them higher than foods of lower nutritional value. Nutrient profile models may establish algorithms that requires the input of a number of parameters (e.g. selected specific nutrients and other related components) to enable the generation of scores or classifications or degree of “healthiness”, of a food product. Some models are based on the content or threshold of a number of nu-

trients to limit, e.g. energy, saturated fats, trans fats, sugar and salt.¹³⁻¹⁵

Nutrient profiling has been used for various purposes including helping consumers in identifying more nutritious foods, regulating nutrition and health claims, restriction of marketing and advertising of foods to children and for defining food tax policies.^{13,15} A common use of nutrient profiling is for criteria-based front-of-pack nutrition labelling schemes to classify ‘healthier’ food products. Regulatory authorities implement such schemes to encourage food manufacturers to reformulate their products to make available healthier options to consumers.¹⁶ The food industry has indeed developed nutritional profiles to review their products and carry out reformulation to produce healthier alternatives.¹⁷ The focus by manufacturers in the past has been on improving nutritional profile of processed packaged foods by reducing or removing ‘negative’ ingredients such as total fat, saturated fat, sugar or salt, often linked to increased risk to non-communicable diseases.¹³

The WHO has been working on establishing nutrient profile models for over a decade, having developed region-specific models in all the six WHO regions as guides to governments for the implementation of restrictions on the marketing of foods to children. The focus in these guides was to restrict access to foods that may contribute to excessive intake of energy and ‘negative’ nutrients, namely total fat, total sugar, added sugar, non-sugar sweetener, energy, saturated fat and sodium. In the WHO guides, thresholds were placed on these nutrients.¹⁵

In the manual on developing nutrient profiling model for global use, Drewnowski, Amanquah and Gavin-Smith¹⁴ proposed that it is necessary to adjust models for use in low- and middle-income countries where hunger, undernutrition and micronutrient deficiencies remain serious problems, alongside high prevalences of overweight and obesity. Models for use in these countries would need to address inadequate intakes of several vitamins and minerals as well as high quality protein. It is indeed important to also focus on including ‘good’ or ‘positive’ nutrients that support health and well-being, e.g. protein, vitamins and minerals. The profiles can also include healthful food items like wholegrains, legumes and fruits as well as non-nutritional food components like dietary fibre and phytonutrients. Nutrient profiles for healthier choice labelling schemes in some countries already include nutrients to encourage. In Malaysia, in the prescribed set of nutritional criteria for breakfast cereals, a minimum amount of dietary fibre and whole grains must be present, in addition to meeting the threshold for fat, sodium and total sugars. For several categories of products, a minimum amount of selected vitamins or minerals must be present.¹⁶

In discussing nutrients in foods, it would be useful to distinguish between nutrient profile models and food composition databases. Both are actually interlinked and complementary rather than alternative approaches. As discussed in previous paragraphs, nutrient profile models comprise a set of nutritional criteria to enable classifying or ranking the ‘healthiness’ of foods and beverages. The criteria could comprise several ‘negative’ and ‘positive’ nutrients. The discussions above have been focused on

nutrient profiling models for individual foods. Recognising the widespread practice of consuming meals away from home in SEA, and the concern that many of such meals are imbalanced and high in salt, oil and sugar, there has been increasing interest on developing nutrient profiles for meals or dishes. This is the main focus of this supplement and they will be dealt with in detail in two articles. These models are designed to evaluate the overall nutritional balance of composite meals and dishes available in the many eating places. Such nutrient profiles can be used to as tools for food vendors to reformulate their recipes. These profiles can also be used at the eating places as guidance for consumers to opt for healthier meals. They are conceptually similar to the nutritional profiles for packaged foods discussed in previous paragraphs.

Food composition databases contain data on macro- and micronutrients in individual raw or packaged foods in a variety of food groups. Some databases also include data for meals and dishes. Foods and meals are obtained from retail shops and eateries and analysed in laboratories. The number of nutrients and the number of food items in these national databases vary greatly. Food composition data are used for various nutrition projects and activities, including use by nutritionists and dietitians in planning meals and for nutrition education to consumers. These are also used by researchers for calculating nutrient intake from food consumption studies.^{18,19} These databases merely tabulate nutrient content of these foods or meals and do not provide any ranking of 'healthiness'. Food composition data are often not used directly by consumers.

Food composition databases have been established in several countries across the globe. Several of these databases can be viewed in the International Network of Food Data Systems (INFOODS) website (<https://www.fao.org/infoods/infoods/tables-and-databases/asia/en/>). A few countries in the region have also established such databases, e.g. Malaysia (<https://myfcd.moh.gov.my/>), Thailand (<http://www.inmu.mahidol.ac.th/thaifcd/home.php>).

It is therefore clear that the two approaches serve distinct but interconnected roles within the nutrition data ecosystem.

NUTRIENT PROFILE MODELS FOR MEALS AND DISHES

Drewnowski's article provides an overview of how nutrient profile models are developed and used as quantitative tools to assess the nutritional quality of foods and beverages and, potentially, of dishes and meals. Several models have been developed by various organisations; most of these apply to packaged foods, to serve a variety of educational and regulatory purposes. These include criteria for front-of-pack nutritional labelling and for regulating marketing and advertising to children. Food manufacturers have also developed models for product reformulation. Models that were developed in high-income countries, where obesity and NCDs are the main health issues of concern, typically centre on reducing calories in packaged processed foods and reducing such nutrients to avoid like as saturated fat, total fat, added sugar, and sodium. Such approaches provide consumers with no in-

formation on beneficial nutrients the food may contain. More recent nutrient profile models have included dietary components to encourage, such as whole grains, fruits, vegetables, nuts, pulses, and dairy.

Drewnowski suggests that the negative nutrition approach toward profiling may not be appropriate for SEA countries, where nutrient shortfalls and nutrient deficiencies are still significant health problems. A more positive approach featuring nutrients to encourage might be more appropriate. Further, in view of the diversity of Asian food cultures, it is time to go beyond packaged foods and apply the nutrient profile models to mixed dishes and to complex composite meals. Models can be based on nutrients to limit (e.g., total and/or saturated fat, total or added sugar, and sodium) and nutrients to encourage (e.g., protein, fibre, and several vitamins and minerals), or both. Typically, the final score in a compensatory nutrient profile model is the combined value for positive nutrients to encourage minus the combined value of negative nutrients to limit. Such models can provide useful benchmarks for recipe reformulation and improvement.

Drewnowski also highlights the conceptual and technical challenges involved in applying nutrient profile models to complex mixed dishes and meals in the food cultures of Southeast Asian countries. To address many of these challenges, Sarachantapong and colleagues have developed a nutrient profiling scoring system for Thai meals, which typically consist of rice and a variety of side dishes shared among diners. This profiling system, tailored to the dietary pattern and cultural context of Thailand, is based on a scoring algorithm combining six nutritional components: nutrients to encourage (energy, protein, and vegetables) and nutrients to reduce (total fat, added sugar and sodium), chosen in line with public health priorities of the country. Their objective was to develop a system as a science-based practical tool for evaluating the nutritional quality of meals. This system can be useful to a wide range of stakeholders. It can be a practical framework for food vendors, such as restaurants, canteens, and other meal service operators, to offer healthier menus. Policymakers and programme managers can use the system to develop guidelines similar to nutrition labelling and certification of packaged foods. Consumers can use it as a guide to make better dietary choices when purchasing meals.

Another nutrient profiling system, this one developed for Japanese dishes, as described by Takimoto et al. in this supplement, is based on dish categories from the Japanese Food Guide Spinning Top and data from the National Health and Nutrition Survey. Dishes are categorised to align with traditional Japanese food culture of staple, side, main, mixed, and mixed with staple. The scoring system, based on nutrients per serving, subtracts positive nutrient points (fruits, vegetables, nuts/seeds, legumes, protein, dietary fibre) from points for nutrients to limit (energy, saturated fat, sugars, sodium). The system was useful for ranking the typical 105 dishes in the Japanese Food Guide Spinning Top and offers a culturally relevant framework to support public health initiatives, empowering consumers to make informed choices to improve their dietary habits. The system can also guide food

manufacturers to reformulate ready-to-eat meals to more nutritious options.

The development, validation, and application of another nutrient profile model for Japanese cuisines is summarised by Furuta in this supplement. The framework is sensitive to cultural eating patterns and public health priorities, including sodium reduction. The model takes into account four key components of public health relevance in Japan: protein and vegetables (components to encourage) and saturated fatty acids and sodium (components to limit). A scoring algorithm for the dishes and meals calculates scores based on these components. For validation of the model, nutrient composition data a large variety of dishes and meals were utilised. The developed model provides guidance in dietary balance and sodium reduction within the Japanese cultural context.

WAY FORWARD: USE OF MEAL-BASED NUTRITIONAL PROFILES IN DIETARY RECOMMENDATIONS

The food environment in SEA, and possibly many other Asian countries must include not only processed packaged foods but also meals consumed out of homes from a multitude of eateries, and foods and beverages purchased from a variety of delivery services. Efforts to improve the diets of the populations in this region must take cognizance of this unique aspect of the food culture, where large segments of these populations consume away-from-home meals. Strategies and programmes must necessarily be different from other parts of the world if we are to effectively reduce risk of the population to diet-related diseases. While current legislative focus and food industry efforts on nutrition labelling and claims for packaged processed foods must continue, greater focus should be given to meals eaten out of homes. It is imperative to engage with food vendors to encourage them to offer more nutritious meals and beverages to the public. Multiple strategies can be undertaken including training programmes for recipe and menu modification, understanding their business challenges, tagging of calorie and key nutrients, and promotional programmes such as logos for 'healthier restaurant/dining'. Concomitantly, all out efforts must be made to improve awareness of consumers to about how and why they should consume healthier meals when dining out. All of such efforts would benefit from a multitude of approaches, through multiple channels, including social media.

The development of nutritional profile models for dishes and meals in SEA would be a key tool to implement these strategies and approaches. Policymakers and programme managers can use such models to develop guidelines like those for labelling and certification of packaged foods. The models can be used by food vendors to understand the nutrient profiles of their current recipes and to reformulate them to provide healthier recipes and menus. Similarly, these nutritional profile models, when included in promotion programmes to consumers, can be used a guidance for them to select more nutritious options. Such messages on selection of healthier meals when dining out should be more prominently articulated in dietary recommendations in SEA, since such practices are common in these countries.

A more holistic approach toward improving the food environment, which captures all major contributors to the community's diet, is needed to be more effective in addressing the unhealthy diet of the population in the region. Nutrition profiling models that takes into consideration the unique food cultures in SEA offer a way forward to achieve this goal.

DISCLOSURE ON THE USE OF AI AND AI-ASSISTED TECHNOLOGIES

AI assisted technologies were not used in the preparation of this publication.

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

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