



## Taiwan's Experiences in Promoting Sustainable Healthy Diets Through School Lunch Programs and Social Dining at Elderly Activity Sites

Min Su Tzeng

Adjunct Associate Professor, MS Program in Transdisciplinary Long-Term Care,  
Fu Jen Catholic University, New Taipei City, Taiwan

\*Corresponding e-mail: mstzeng53@gmail.com

Received August 25, 2025; Accepted May 29, 2026

### ABSTRACT

*In recent years, food value chains have rapidly transformed, and the diet and health status of Taiwanese people have also changed significantly. Changes in the food value chain have undoubtedly contributed to shifts in dietary patterns. The World Health Organization (WHO) states that a healthy diet helps prevent various forms of malnutrition as well as non-communicable diseases (NCDs). This article focuses on strategies implemented to encourage Taiwanese students and the elderly to make healthier food choices in school lunches and elderly activity sites in Taiwan, aiming to influence demand for healthy, nutritious food through promoting healthy diets and driving changes in the food value chain. School lunches in Taiwan began in 1951, while most programs for elderly social dining started in the 2000s. To improve dietary intake and nutritional health among students and seniors, the development of nutrition-related laws and standards, along with the employment of dietitians, provides a legal framework and regulatory tools for promoting healthy eating. Cross-sector collaboration among organizations and professionals enables a more comprehensive approach to promoting healthy diets. The national nutrition survey monitors the dietary habits, nutrition, and health status of the population. The establishment of the Campus Food Ingredients Registration platform also helps ensure the quality and safety of school lunches on an ongoing basis. School nutrition education, integrated with food and agriculture curricula, is conducted across various courses in line with educational standards. Subsidies for catering expenses and kitchen facilities at remote schools help eliminate regional disparities. Initiatives aimed at modifying food textures enhance the palatability of meals served at elderly social dining sites. Menu planning aligns with local agricultural products, seasonal availability, and festivals, incorporating cultural and sustainable considerations. Training programs for catering staff help ensure meal quality. It is believed that advancing healthy diets can be linked to transforming the food value chain to achieve goals of improving people's health and supporting Earth's sustainability.*

Keywords: legal framework, nutrition survey, nutrition education, sustainability, food texture modification

### INTRODUCTION

An old Chinese proverb states, "Food is the primary necessity of the people." We also often say, "You are what you eat." It demonstrates that diet plays a crucial role in human health and survival. The food value chain (FVC) encompasses all activities food undergoes from conception to production, delivery to the final consumer, and disposal after use (Hawkes and Ruel, 2011). In recent decades, the food value chain in developing countries has experienced rapid changes. Food consumption patterns have shifted from small-scale, family-based local agricultural product consumption to large-scale purchases of food transported over long distances worldwide, involving various sectors within the food value chain. This shift is mainly driven by factors such as urbanization, economic growth, and the expansion of modern retailers, processors, and distributors (Gómez and Ricketts, 2013). The transformation of the food value chain also impacts consumers' dietary patterns.

The global dietary pattern has shifted from a diet mainly composed of limited staple foods to a more diverse diet rich in calories and macronutrients, primarily dominated by foods as meat, sugar, and processed foods (Vermeulen et al., 2020; Popkin, 2014; Popkin, 2017). This change in dietary habits has also led to a shift in disease patterns, from acute infectious diseases to chronic, non-communicable diseases. Unhealthy diets continue to be a significant contributor to the global disease burden. In 2014, the FAO/WHO Second International Conference on Nutrition (ICN2) recognized that: “current food systems are being increasingly challenged to provide adequate, safe, diversified and nutrient-rich food for all that contribute to healthy diets due to, inter alia, constraints posed by resource scarcity and environmental degradation, as well as by unsustainable production and consumption patterns, food losses and waste, and unbalanced distribution”. (FAO & WHO, 2015) Therefore, shaping food systems for sustainable healthy diets also requires considering environmental impacts.

The WHO has set the aims of sustainable healthy diets as: “to achieve optimal growth and development of all individuals and support functioning and physical, mental, and social well-being at all life stages for present and future generations; contribute to preventing all forms of malnutrition (i.e., undernutrition, micronutrient deficiency, overweight and obesity); reduce the risk of diet-related NCDs; and support the preservation of biodiversity and planetary health.” It has also established guiding principles and provided a reference for member states to create healthy and sustainable diets for their populations (FAO and WHO, 2019). Nine actions for the implementation of sustainable healthy diets were proposed, including: “create an enabling environment”, “ensure policy coherence”, “establish a representative baseline”, “identify food availability and accessibility”, “analyze existing food systems”, “quantify and balance the potential trade-offs”, “ensure affordable and desirable foods”, “develop national food-based dietary guidelines”, and “promote capacity development strategies for behavior change”. These nine actions provide excellent guidance for countries on planning healthy and sustainable eating strategies.

By the end of 2025, Taiwan's population aged 65 and over accounted for 20.06%, officially entering a super-aged society (Ministry of the Interior, 2025). The latest population projections for 2024-2070 show that the long-term phenomenon of low birth rate and aging population in Taiwan will become more pronounced in the future (National Development Council, 2024). How to maintain the health of the elderly population and avoid increasing the country's economic and social burden is an important issue for Taiwan. At the other end of life span, childhood is a crucial time for establishing good eating habits. Therefore, this article focuses on strategies that have been implemented or could be implemented in school lunches and social dining programs at elderly activity sites in Taiwan to encourage Taiwanese students and seniors to make healthier food choices. It is hoped that establishing healthy dietary patterns among consumers will alter the demand for nutritious food, thus promoting the development of sustainable agriculture and the food industry.

## **CHANGES IN TAIWAN'S DEMOGRAPHICS, FOOD AVAILABILITY, AND DIETARY PATTERNS**

After World War II, Taiwan's population growth trajectory mirrored that of many other countries. The arrival of the baby boom led to rapid population growth, but the subsequent aging of the population was even faster than in other countries. Advances in agriculture and technology led to economic and trade growth, significantly altering people's lifestyles and diets, leading to differences in health and disease patterns.

### **Changes in causes of death, chronic diseases, and obesity in Taiwan**

Due to shifts in socioeconomic structure, improved living standards, and better healthcare, the main causes of death in Taiwan have shifted from acute and infectious diseases to malignant tumors (cancer), chronic diseases such as cardiovascular diseases, and accidental injuries. The top ten causes of death accounted for 75% of total deaths in 2024, mainly due to chronic diseases. The three leading causes of death by mortality rate were (1) malignant tumors (cancer), (2) heart disease, and (3) pneumonia (Ministry of Health and Welfare, 2024). Six of the top ten causes of death are closely linked to diet.

The prevalence of chronic diseases such as cancer, hypertension, coronary heart disease, diabetes, and hyperlipidemia in Taiwan has been increasing each year. The rate of diabetes among adults aged 18 and older rose from 1993 to 2016 but then began to slow down (Pan, 2020). According to the 2017-2020 diabetes prevalence survey, the prevalence rates were 11.4% for males and 8.9% for females. The prevalence of metabolic syndrome among adults aged 19 and older in Taiwan has shown a general upward trend for both men and women. During the 2017-2020 survey period, the prevalence was 39.3% for men and 30.3% for women.

The prevalence of obesity and overweight among males aged 19 and over in Taiwan has shown an upward trend, while the prevalence of obesity among females has remained the same, but the prevalence of overweight has shown an upward trend; the proportion of men and women with body weight above the ideal body weight is as high as 50% (Pan, 2020). Using waist circumference to observe the central obesity problem, it was found that the rate of central obesity has increased significantly year by year, and the increase in men is greater than that in women. In the 2017-2020 survey period, the prevalence of central obesity among male and female adults aged 19 and above was 47.2% and 52.9%, respectively.

### Food availability, diet, and nutrient intake patterns in Taiwan

Due to changes in population structure and people's eating habits, the average annual net food supply per person in Taiwan in the past 20 years has changed, among which cereals, kernels and oilseeds, vegetables, fruits, aquatic products, and dairy products have decreased, and potatoes, meat and eggs have increased (Wu, 2024). As the proportion of eating out increases and dietary choices diversify, white rice (the traditional staple food) is gradually replaced by other foods, and the annual supply of white rice per person is declining. Although cereals have long been the main source of calories for the Taiwanese, the caloric supplies from meat and dairy products have increased significantly due to the westernization of the diet.

Taiwan's Daily Food Guide divides food into six categories: whole grains, protein foods (beans, fish, eggs, and meat), dairy products, vegetables, fruits, and oils (including nuts & seeds), and recommends the daily servings of each food category based on the nutritional needs of different age groups. The recommended daily food serving sizes from six food groups showed on Figure 1 are for elderly. The results of the National Nutrition and Health Survey in Taiwan from 2017 to 2020 showed that the intake of whole grains and cereals for men of all ages was close to the recommended intake for the "moderate" physical fitness level, while the intake of women was between the "slightly lower" and "moderate" physical fitness levels (Pan, 2020). The protein intakes of most men met or slightly exceeded the recommended level, while the intakes of women were roughly in line with the recommended intake. The intakes of dairy products for males and females over 1-year-old failed to reach the recommended intake of 1.5 servings per day. The intakes of vegetables and fruits for most age groups deviated from the recommended intakes. The daily intake of nuts and seeds for people under 44 was only 0.4 servings, which seriously deviated from the recommended intake. In summary, Taiwanese intakes of the six major food categories that deviated the most from the Daily Food Guide recommendations were vegetables, fruits, dairy products, and nuts and seeds.

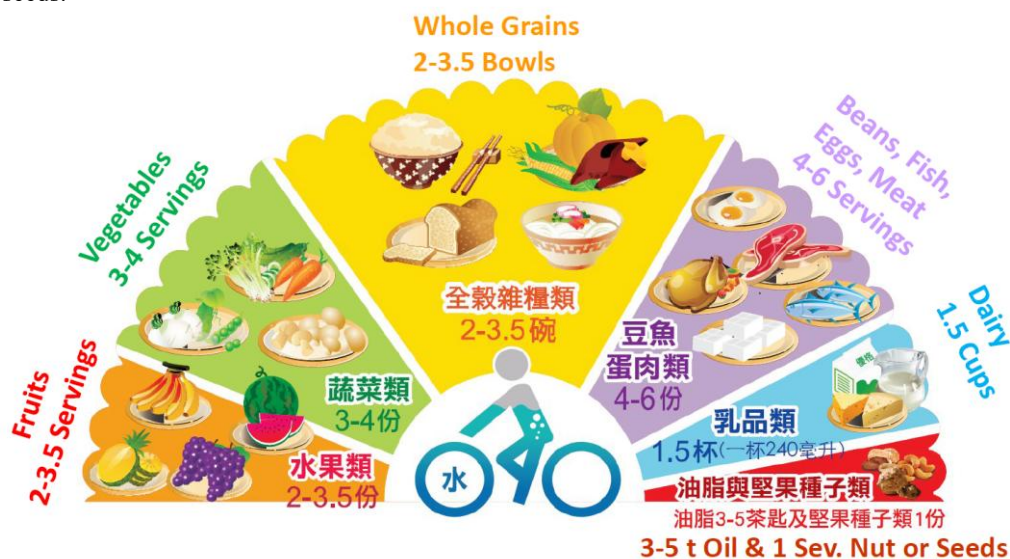


Figure 1. Taiwan's daily food guide for elderly

Note. Foods are divided into six categories: whole grains, protein foods (beans, fish, eggs, and meat), dairy products, vegetables, fruits, and oils (nuts & seeds). Daily servings of each food category in this figure are recommended based on the nutritional needs of adults. Adapted from *Choose your food wisely and enjoy an active new life - A Nutritional Resource Handbook for Elderly*, (p. 21), by Wu CJ *et al*, 2020, The Health Promotion Administration, Ministry of Health and Welfare, Taiwan.

The nutrients that Taiwanese people do not consume enough mainly include vitamin D, calcium, and dietary fiber (Pan, 2020). The vitamin D intake for people over 4 years old only reached 38%-57% of the recommended

amount. For a long time, calcium has been the mineral with the worst nutrient intake among Taiwanese people. The calcium intake of Taiwanese people over the age of 4 has not reached the recommended amount, especially for adolescents, who are in a period of rapid growth, with intake levels reaching only 36 - 59% of the recommended amount. In recent years, the daily dietary fiber intake of Taiwanese people has not reached the recommended amount. The proportion of people reaching the recommended calories for moderate activity ranges from 33% to 79%.

## HEALTHY DIET IMPROVEMENT STRATEGIES IN TAIWAN

To improve the nutritional health of the Taiwanese people, the Taiwanese government has been dedicated to establishing nutrition laws and standards for decades, creating a solid foundation for nutrition improvement. To evaluate the effectiveness of various nutrition improvement strategies, different diet and nutrition monitoring systems were set up early on. Additionally, since diet and nutrition involve multiple professional fields, government agencies have formed cross-agency, organizational, institutional, and professional links to promote sustainable healthy diets. The following provides a brief overview of the strategies implemented to change the Taiwanese's eating habits for health and sustainability.

### Nutrition legislation

Nutrition-related laws in Taiwan include the Dietitians Act, the School Health Act, the Food and Agriculture Education Act, and the Nutrition and Healthy Diet Promotion Act. As early as 1984, Taiwan enacted the Dietitians Act, which established a certified nutritional profession system. To implement school lunch programs and manage campus food services, the School Health Act was amended. Since 2007, schools with more than 40 classes or a total of over 40 classes have been required to hire dietitians. Currently, the total number of school dietitians nationwide exceeds 700.

In 2022, the Food and Agriculture Act was enacted to promote comprehensive food and agricultural education as well as strengthen connections between diet, environment, and agriculture. It aims to facilitate the sustainable development of rural areas, agriculture, and the environment, and establish a national food and agricultural education system along with the training of relevant personnel. Following the enactment of the Food and Agriculture Education Act, the Nutrition and Healthy Diet Promotion Act was enacted to create a supportive environment for healthy diets, increase public knowledge of nutrition and healthy eating, and improve people's health. The four diet and nutrition-related bills mentioned above have built the foundation for sustainable and healthy diets.

### Nutrition-related standards

The Taiwan government has developed various nutrition standards to educate the public on a healthy diet, how to choose food properly, and establish healthy eating habits. At the same time, to enable group meal providers to prepare meals that meet diners' needs, multiple institutional meal content standards are also established. The three key nutrition standards — "Diet Reference Intakes (DRIs)," "National Dietary Guidelines," and "Daily Food Guide" — serve as references for planning nutrition policies, nutrition education, meal planning, nutrition surveys, and assessing nutrition-related disease risks among Taiwan's population, promoting overall health and nutrition. These three standards were first established in the 1970s and 1980s and have been revised regularly, approximately every five years, based on the nutritional status of the population and new scientific evidence (Tzeng, 2008).

"My Plate" is designed based on the Daily Food Guide to help the public eat a healthy diet easily. The establishment of the "Nutrition Labeling" regulations provides an important reference for the public to understand and compare the nutritional content of food when buying packaged products. "School Lunch Content Standards" and "Campus Beverage and Snack Sales Scope" are key bases for regulating school lunch menu planning and the types of beverages and snacks permitted on campus.

### Nutrition monitoring systems

The current Taiwan "Food Composition Database" was established in the 1990s and contains more than 2,000 records, serving as a vital foundation for evaluating the nutritional intake of Taiwanese people. The "National Nutrition Survey", carried out since 1979, is an essential tool for long-term tracking of dietary habits and nutritional health among Taiwanese residents. The survey primarily includes body measurements for different age

groups, blood and urine biochemical tests, medical history questionnaires, and assessments of diet and nutrient intake. The “Campus Food Ingredients Registration Platform” allows schools to upload various ingredients used in lunch preparation, helping to address food safety issues when they occur. It also aims to promote balanced nutrition among students by analyzing the nutritional combinations of ingredients. Table 1 demonstrates how Taiwan's national nutritional strategies align closely with the nine actions proposed by the WHO/FAO (2019) for sustainable healthy diets.

Table 1. Comparison of Taiwan's national nutrition strategies with the nine actions for implementing sustainable healthy diets proposed by FAO/WHO (2019)

FAO/WHO Action*	Corresponding Taiwanese Strategy
<b>1. Create an enabling environment</b>	The <b>Nutrition and Healthy Diet Promotion Act</b> was enacted specifically to build a supportive environment for public health and nutrition.
<b>2. Ensure policy coherence</b>	Government agencies formed <b>cross-agency, organizational, and professional links</b> to integrate agriculture, education, and health policies.
<b>3. Establish a representative baseline</b>	The <b>National Nutrition Survey (since 1979)</b> tracks long-term dietary habits and health markers to serve as a scientific baseline.
<b>4. Identify food availability &amp; accessibility</b>	The <b>Food Composition Database</b> (over 2,000 records) evaluates the nutritional value of locally available ingredients.
<b>5. Analyze existing food systems</b>	The <b>Food and Agriculture Education Act</b> strengthens the connection between diet, the environment, and rural agricultural systems.
<b>6. Quantify &amp; balance trade-offs</b>	The <b>Campus Food Ingredients Registration Platform</b> balances food safety risks with nutritional goals by analyzing ingredient combinations.
<b>7. Ensure affordable/desirable foods</b>	<b>School Lunch Content Standards</b> and campus beverage regulations ensure students have access to healthy, regulated food in public institutions.
<b>8. Develop national food-based dietary guidelines</b>	Regular updates of the " <b>Daily Food Guide</b> ," " <b>National Dietary Guidelines</b> ," and the " <b>My Plate</b> " initiative.
<b>9. Promote capacity development &amp; behavior change</b>	Implementation of the <b>Dietitians Act</b> and the placement of <b>700+ school dietitians</b> to drive education and behavioral shifts.

Note. \*From FAO and WHO. 2019. Sustainable healthy diets – Guiding principles. Rome

## HEALTHY DIET PROMOTION THROUGH SCHOOL LUNCHESES IN TAIWAN

In Taiwan, school lunches have evolved over half a century, from initially providing powdered milk to now featuring comprehensive nutrition planned by dietitians. School lunches provide more than just food and nutrition;

they also serve as a platform for integrating school education into daily life. Education in subjects such as literature, mathematics, health, art, science, and social studies can be integrated into daily school lunches, with the development of sustainable and healthy eating habits being a key purpose of school lunches.

### **History of school lunches in Taiwan**

School lunch in Taiwan started with a donation of milk powder from the United Nations in 1951. In the 1960s, the government began actively planning and implementing a nutritious lunch program, securing funding from the United Nations World Food Program. However, due to Taiwan's withdrawal from the United Nations, the program ended early in 1972 (Wang, 2024). In February 1973, the Taiwanese government established the "School Lunch Self-Reliance Plan" and raised funds to manage school lunches. In the 1990s, dietitians were gradually employed to oversee meal planning and collaborated with teachers to promote student nutrition education.

### **School lunch quality monitoring**

In the 2010s, Taiwan experienced a series of major food safety incidents, which caused panic among consumers and severely damaged public trust in domestic food system. Parents became increasingly concerned about the safety of their children's school lunches. In response, the Campus Food Ingredient Registration Platform was established to create a food safety control system through the tracking of school lunch ingredients procurement records. When a food safety incident occurs, the platform can quickly identify relevant businesses within the supply chain, trace raw material suppliers, and facilitate rapid recalls to prevent further harm to students. To improve school lunch safety and implement preventive measures, the government introduced a subsidy strategy called "Three Labels and One Q." The three labels represent the Organic Agricultural Product Label, the Taiwan Excellent Agricultural Product Label, and the Traceable Agricultural Product Label, while the "Q" stands for the traceable agricultural product QR code. The initiative encourages schools to prioritize foods bearing these labels or QR codes.

The Campus Food Ingredient Registration Platform is linked to the Food Composition Database to yield menu examples for school lunches. It also assists dietitians in designing nutritional plans to address nutrient deficiencies in students' daily diets, such as insufficient calcium intakes. Furthermore, the Registration Platform provides various dietary nutrition education materials and organizes educational competitions and activities.

### **Healthy diet and agricultural education integrated into the curriculum**

Nutrition education is already part of the school's basic curriculum. However, due to the large amount of content, the portion dedicated to nutrition education is relatively small and mostly delivered taught as theoretical knowledge, making it less connected to daily life. Diet and nutrition are essential to life. Good dietary habits are not only fundamental for students' healthy growth but also enhance learning effectiveness. Recently, with the implementation of school lunches and the passage of the Food and Agriculture Education Act, Ministry of Agriculture has encouraged schools to incorporate healthy diet, food, and agriculture education into various courses such as language, social studies, mathematics, and natural sciences through the provision of financial subsidies. Combined with school lunch programs, this approach helps students learn about and consume healthy meals daily, fostering development of long-term healthy eating habits.

### **School vegetable garden**

Through planting school vegetable gardens, the school helps students learn how to plant, cook, eat, share, and appreciate healthy food (Figure 2). By growing various vegetables, students realize the connection between food and health. After learning how to cook these vegetables, they enjoy eating them and become less picky. During the planting process, the school teaches students how to turn kitchen waste into compost and use rainwater for irrigation. They not only learn about the environmental impact of food miles but also develop an appreciation for the efforts of farmers and food preparers, fostering gratitude. The establishment of the school vegetable garden contributes to the development of healthy eating habits among students.



Figure 2. School vegetable garden

Note. Through the planting of various vegetables, students understand the relationship between food and health and learn environmental protection concepts.

Source: Created by the author

### Sustainability elements in the school lunch program

To promote the sustainability of the earth, different county and city governments stipulate that school lunches must purchase a fixed number of organic vegetables per week. In addition, to reduce food waste, the quantity of leftovers is monitored on a monthly basis. Many schools serve a vegetarian meal each week to familiarize students with a vegetarian diet and learn different ways to promote environmental sustainability.

### The rural central kitchen project

The project aims to address the disparities in manpower and funding for school lunches in rural areas. The Ministry of Education and the Ministry of Agriculture collaborate with local governments to implement the "Promoting Rural School Central Kitchen Project." This involves subsidizing costs for rural school meals, helping schools build central kitchens, planning joint food procurement, coordinating manpower and transportation, and subsidizing wages for rural school lunch staff. Simultaneously, the project promotes improvements in lunch menu planning, offering diverse and nutritious meals to enhance the quality of school lunches in remote and indigenous areas.

Behavior Change is a major highlight in Taiwan's strategy, using 'school lunch integrations' or 'experiential learning' (gardening) rather than just classroom lectures to change eating habits. Data and access are addressed through digital transparency, using the registration platform to ensure safety and track ingredient sources. Equity and affordability are specifically targeted through the "Central Kitchen" model, ensuring students in remote areas receive the same quality of nutrition as those in cities. A comparison of Taiwan's school lunch nutrition strategies with the nine actions proposed by the WHO/FAO (2019) for sustainable healthy diets is summarized in Table 2.

Table 2. Comparison of Taiwan's school lunch nutrition strategies with the nine actions for implementing sustainable healthy diets proposed by FAO/WHO (2019)

FAO/WHO Action*	Corresponding Taiwan Strategy
1. Create an enabling environment	Passage of the <b>Food and Agriculture Education Act</b> and providing financial subsidies to integrate healthy diets into the core curriculum.
2. Ensure policy coherence	<b>Cross-departmental collaboration</b> between the Ministry of Education and Ministry of Agriculture to align school lunch goals with local agricultural development.

<b>3. Establish a representative baseline</b>	Utilization of the <b>Campus Food Ingredient Registration Platform</b> to track procurement records and identify nutritional gaps (e.g., low calcium intake).
<b>1. Identify available and accessible foods</b>	Implementation of the <b>"Three Labels and One Q"</b> strategy to prioritize the use of local, organic, and traceable agricultural products.
<b>2. Analyze existing food systems</b>	The <b>Rural Central Kitchen Project</b> identifies and fixes systemic disparities in manpower, funding, and logistics within remote and indigenous areas.
<b>3. Quantify and balance potential trade-offs</b>	Addressing the trade-off between <b>cost and food safety</b> by providing government subsidies to offset the price of certified, safe ingredients.
<b>4. Ensure affordable and desirable foods</b>	Subsidizing meals and staff wages in remote areas and employing <b>dietitians</b> to design diverse, appealing, and balanced menus.
<b>5. Develop national food-based dietary guidelines</b>	Linking the registration platform to the <b>Food Composition Database</b> to create standardized, nutrient-dense menu examples for schools.
<b>6. Promote behavior change strategies</b>	<b>School Vegetable Gardens:</b> Moving from theoretical knowledge to hands-on planting and cooking to reduce pickiness and foster gratitude/sustainability.

Note. \*From FAO and WHO. 2019. Sustainable healthy diets – Guiding principles. Rome

## HEALTHY DIET IMPROVEMENT STRATEGIES FOR ELDERLY SOCIAL DINING SITES

Taiwan is poised to enter a super-aged society by 2025, and the government is actively developing various programs to delay the onset of disability. Among these initiatives are the establishment of Community Nutrition Promotion Centers in counties and cities, along with the hiring of full-time community dietitians to promote nutrition education. The goal is to improve the nutritional health of the elderly through proper nutrition and delay the onset of disability. The following introduces the various initiatives implemented by the community nutrition promotion centers to promote sustainable and healthy dietary practices.

### Prevention and Delayed Disability Care Program

By the end of 2018, the proportion of elderly people aged 65 and above in Taiwan exceeded 14% of the total population, marking the country as an aging society. Taiwan is expected to surpass 20% in 2025 as the country enters a super-aged society, bringing greater challenges to social system, public finance, economic development, and healthcare services. The Ministry of Health and Welfare has been implementing the "Prevention and Delayed Disability Care Program" since 2017 to provide services needed by the elderly. The program established "Community Nutrition Promotion Centers" in three counties and cities for the first time in 2017, mainly targeting the elderly. Dietitians visit communities to promote healthy diets. Since 2018, Community Nutrition Promotion Centers have been fully established to offer nutrition education, malnutrition risk screenings, consultations, and other services. Dietitians conduct healthy diet education by encouraging the intake of whole grains and promoting the concept of texture-modified diets. They also provide guidance on social dining at elderly activity sites and community catering operators to improve healthy eating habits among the elderly.

### Texture-Modified Diet

The oral physiological functions of the elderly change with age, which affects swallowing, nutritional intake, and quality of life. To help people with chewing or swallowing disorders eat, providing texture-modified foods and consistency-adjusted liquids can effectively improve food safety. Countries have established standards for grading texture-modified foods. Currently, common grading standards include the International Dysphagia Diet Standardization Initiative, the Japanese Universal Design Foods of the Care Food Association, and the new care food standards of Japan's Ministry of Agriculture, Forestry and Fisheries. In 2018, Taiwan introduced the Taiwan Silver-Friendly Food Texture Classification Specification (Eatender), which categorizes textures as easy to chew, gum-chewable, tongue-crushing, and no-need-to-chew. The Eatender logo can be used for labeling the texture of packaged food ingredients (Wang, 2020).

To help the elderly with chewing or swallowing difficulties, the government, along with the Ministry of Health and Social Welfare, the Ministry of Agriculture, non-governmental organizations (such as the Hsinchu Food Industry and Research Institute), and food companies, has promoted texture-modified diets through various strategies. These include establishing food texture levels, creating a manual for texture-modified diets for the elderly (Figure 3), training students, catering operators, cooks in tourist hotels, and chefs at catering outlets on how to make these diets. They also coach catering outlets on preparing texture-modified foods and conduct texture-modified diet competitions to arouse public awareness. This allows the elderly to purchase texture-modified diets and packaged foods graded by Eatender at hotels, restaurants, and supermarkets when dining out.





Texture-Modified Diet Easy Test		
level	Size suggestions	Fork test
<p><b>7</b></p> <p>Easy to Chew</p>	<p>No size restrictions</p> <p>Smaller pieces (less than 3 cm) are easier to eat.</p>	 <p>Food can be cut with a fork</p>  <p>Food will not squeeze out between the fork opening, and it will not return to its original shape after the fork is removed.</p>
<p><b>6</b></p> <p>Gum Chewing</p>	<p>less than 1.5 cm cube size</p>	 <p>Food can be cut into pieces less than 1.5 cm by a fork.</p>  <p>Food can be pierced and squeezed out through the fork's opening, and won't return to its original shape after the fork has opened.</p>

Figure 3. Household tests for sixth and seventh levels of texture-modified diet

Adapted from: *Eating for Health: A New Era of Nutrition for Seniors – Texture Modified Diet Education Manual* (p. 11) by CJ Wu et al, 2024, The Health Promotion Administration, Ministry of Health and Welfare, Taiwan

### Nutrition counseling and training at elderly activity sites

The food sources at elderly dining facilities can be broadly categorized as self-cooking or meal ordering. Community dietitians' nutrition counseling focuses on "food and nutrition" supplemented by guidance on "texture-modified diet." The content of "food and nutrition" counseling covers: whether the meals align with "healthy diet principles", "use fresh, local, and diverse ingredients", "provide sufficient protein, vegetables, etc.", and "use

whole grains and unrefined grains". The guidance given to catering operators additionally includes: "reducing the supply of fried foods and processed foods," "using iodized salt and decreasing salt intake," and "not serving sugary drinks or offering reduced-sugar, low/no-sugar foods."

### Meal planning

To ensure that the elderly at social dining sites eat enough and properly, the meal planning should focus on nutritional needs and promote healthy eating environments. Before the community dietitian began counseling at the elderly dining sites, menu choices were mostly determined by the person in charge or the cook, based on diners' preferences. After the counseling, the elders can still select their favorite menus, however, dietitians adapt meals to meet their nutritional needs, considering local and seasonal foods, and compile popular recipes into a booklet for reference.

### Cook training

Most of the people who prepare meals at the site are local volunteers, and there is still room for improvement in food safety, hygiene, and nutrition knowledge. Therefore, in the catering counseling at the site, community dietitians not only train volunteers in food nutrition knowledge and food preparation skills but also observe food storage and preparation operations on-site and offer appropriate suggestions for improvement (Figure 4). In addition, community dietitians use social media (Line) to enable cooks at various elderly social dining to learn from each other and increase opportunities for capacity building and catering improvement.

## On-site counseling



Figure 4. Nutritional counseling at an elderly social dining

Adapted from courtesy of Ms. Wang Peizhu, Taipei Community Nutrition Extension Center, Department of Health, Taipei City Government.

### Whole grain promotion

Most of the nutrients needed daily by the elderly do not decrease with age; however, the appetite and food intake among the elderly tend to diminish. Therefore, it is even more important for older adults to increase their consumption of nutrient-dense foods. Whole grains contain more nutrients than refined grains, and many of these nutrients and dietary fibers help prevent chronic diseases such as cancer, diabetes, and cardiovascular disease. Increasing whole grains and unrefined multigrain in meal planning is a key project to improve nutritional status among the elderly in Taiwan in recent years. Community dietitians also use texture-modifying techniques during preparation to make whole-grain diets more appealing. The Taiwan Grain Industry Association has established certification labels for whole-grain foods and collaborated with the Ministry of Agriculture to host a grain award competition, encouraging more people to learn about whole-grain foods and increase their intake.

### Approaches to increasing the availability and accessibility of healthy diets

It is relatively challenging for older adults in remote areas to obtain food due to inconvenient transportation. Their daily food needs are supplied by mobile food trucks or local fruit shops. Industry cooperation and vegetable cart owners work together to transform mobile food trucks, allowing the elderly to buy nutritious and diverse foods and eliminating disparities in health resources in rural communities. Through the transformation of food trucks and fruit shops, the concept of a healthy diet is promoted not only by community dietitians for nutrition and health education but also by store or stall owners to encourage healthy eating, change the elderly's habits, and provide diverse, safe food to people in remote areas. The transformation of food trucks involves updating the vehicle's exterior, customizing internal shelves, purchasing coolers, adding dairy products and whole grains for sale, and using food nutrition labels (Figure 5). During sales, the six tips of My Plate are displayed in six aboriginal languages, improving food storage and promoting balanced nutrition. This ensures that the concept of a healthy diet is heard, bought, and consumed within the community. Nutritional knowledge is no longer out of reach but has become a part of the daily life of the elderly in remote areas.



Figure 5. Mobile food truck renovation

Note. Industry cooperation and vegetable cart owners collaborate to transform rural vegetable carts, helping the elderly to access nutritious and diverse foods and reducing health resource inequality in rural areas.

Retrieved and adapted from: <https://healthydiet-ncap.hpa.gov.tw/eatwell/nutritional-cart/> (accessed Jun. 4, 2025)

Many counties and cities have a high number of elderly dining sites that rely on outsourced catering services. Commercial catering often fails to provide healthy, tasty meals for the elderly because: 1) they can't prepare soft foods suitable for those with poor teeth; 2) they tend to purchase from the same catering store over time, leading to monotonous and unchanging taste; 3) they are often reluctant to deliver meals over long distances. Therefore, community dietitians not only guide catering staff on how to modify the texture of meals but also adjust meal plans to meet the nutritional needs of the elderly and coordinate meal delivery through various platforms (Figure 6). Elderly residents can order meal boxes from different catering stores online a week in advance, allowing them to enjoy nutritious meals tailored to their nutritional needs.

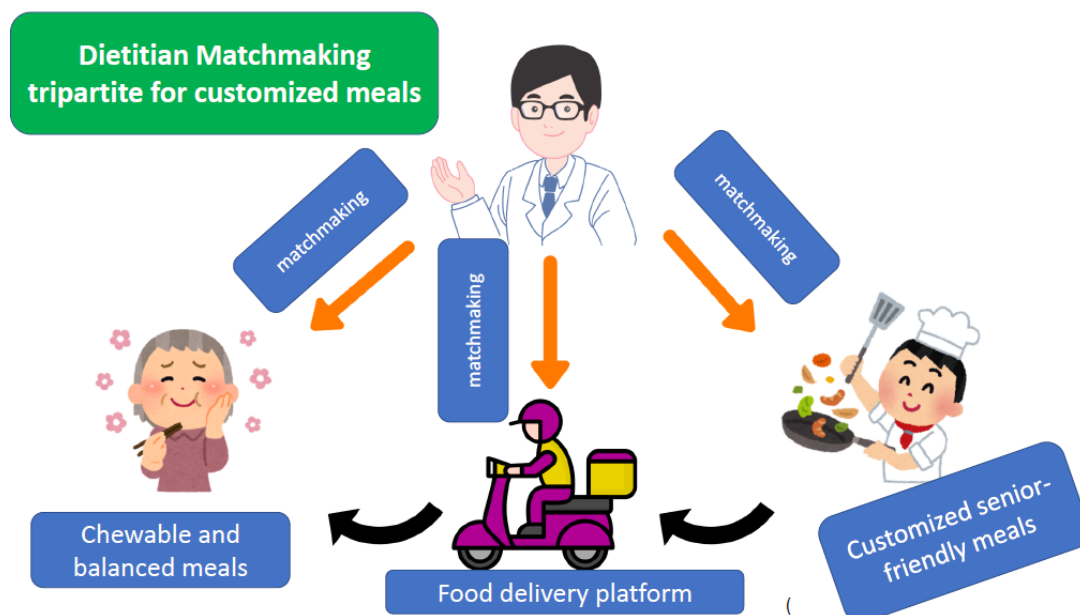


Figure 6. Food delivery platform for the elderly social dining

Note. After catering was trained in texture-modified meal skills, the community dietitian matched the catering with the food delivery platform and social dining sites to provide nutritious and customized senior-friendly meals.

Adapted from courtesy of Mr. Hou Xinji, Chiayi Community Nutrition Extension Center, Public Health Bureau, Chiayi City

### Health map and health food label

Offer community elders the opportunity to purchase healthy or texture-modified meals at regular restaurants. Community dietitians offer various healthy diet counseling to community catering operators, including training on texture-modified diets, promoting low-sugar or sugar-free beverages, increasing protein options — especially plant-based proteins — and guidance on purchasing less oil, salt, and processed foods. Standards are also established for various healthy food combinations. When a catering operator sells food that meets these standards, a healthy diet label is prominently displayed in the store to encourage customers to choose it. Additionally, the stores are marked on the official website of the health map maintained by each county and city health bureau, where residents and visitors can inquire about and purchase (Figure 7).

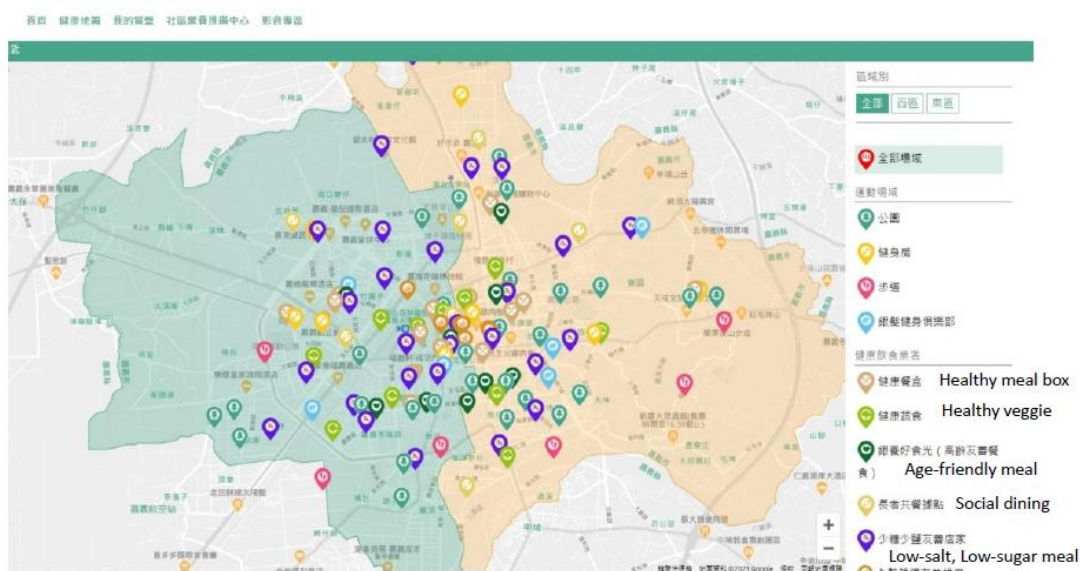


Figure 7. Healthy Food Map

Note. Catering operators who sell food must meet certain nutrition standards and be certified. Foods such as low-sugar or sugar-free beverages, those with less fat, or those with less salt will be marked on the official website of the Healthy Food Map, which is maintained by each county and city health bureau, for residents and tourists to inquire about or purchase.

Retrieved and adapted from: <https://healthmap.cichb.gov.tw/index.php?inter=map> (accessed Jun. 4, 2025)

The Taiwan's healthy diet improvement strategies for elderly social dining sites move beyond simple education. It focuses on structural interventions - such as modifying the supply chain (mobile trucks), setting industrial standards (texture grading), and localized communication (aboriginal languages) - to ensure that sustainable healthy diets are physically and physiologically accessible to the aging population. A comparison of elderly nutrition strategies with the nine action proposed by FAO/WHO (2019) for sustainable healthy diet is summarized in Table 3.

Table 3. Comparison of Taiwan's community elderly nutrition strategies with the nine actions for implementing sustainable healthy diets proposed by FAO/WHO (2019)

FAO/WHO Action*	Corresponding Taiwan Strategy
1. Create an enabling environment	Established " <b>Eatender</b> " <b>texture labels</b> and whole-grain certification to help elderly consumers identify suitable foods in markets and restaurants.
2. Ensure policy coherence	Coordinated collaboration between the <b>Ministry of Health, Ministry of Agriculture</b> , NGOs, and food industries to align health goals with food production.
3. Establish a representative baseline	Deployed <b>Community Nutrition Promotion Centers</b> to conduct malnutrition risk screenings and assess the nutritional status of the elderly.
4. Identify available and accessible foods	Mapped food sources in remote areas, identifying that mobile food trucks and local fruit shops are the primary providers for rural seniors.
5. Analyze existing food systems	Analyzed why commercial caterers fail seniors (e.g., lack of soft food techniques, long delivery distances) and provided targeted solutions.
6. Quantify and balance trade-offs	Dietitians adapt popular local menus to meet nutritional needs, balancing <b>elderly taste preferences</b> with <b>health requirements</b> .
7. Ensure affordable and desirable foods are available	Transformed <b>mobile food trucks</b> with coolers and customized shelves; used <b>aboriginal languages</b> and the "My Plate" tips to make healthy food more appealing.
8. Develop food-based dietary guidelines	Developed the <b>Taiwan Silver-Friendly Food Texture Specification</b> (grading food into 4 levels) and published regional recipe booklets.
9. Promote capacity development for behavior change	Trained volunteers, hotel chefs, and students in food preparation; used <b>Line (social media)</b> groups for cooks to share knowledge and improve skills.

Note. \*From FAO and WHO. 2019. Sustainable healthy diets – Guiding principles. Rome

## CONCLUSION

Taiwan's promotion of sustainable healthy diets aligns with the nine actions recommended by FAO/WHO under the *SUSTAINABLE HEALTHY DIETS GUIDING PRINCIPLES* for implementing such diets. Generally, the enactment of various nutrition-related bills (such as the Nutrition and Healthy Diet Promotion Act and the Food and Agriculture Education Act) and the establishment of nutrition standards (such as DRIs and Dietary Guidelines) provide the foundation for implementing sustainable healthy diets. Monitoring programs, such as the National Nutrition Survey, help evaluate improvements in healthy eating. Both schools and elderly dining centers conduct extensive healthy diet education aimed at changing behavior, and the activities carried out have made healthy diets more available, accessible, desirable, affordable, safe, and appealing. Through cooperation among central ministries and commissions such as the Ministry of Health and Welfare, the Ministry of Education, and the Ministry of Agriculture, along with local governments and the collaboration of public and private organizations, the demand for sustainable healthy diets is linked to the supply within the food value chain to achieve One Health and planetary sustainability.

## FUTURE RECOMMENDATIONS

Drawing on Taiwan's experience promoting sustainable healthy diets at school lunches and senior dining sites, we offer the following suggestions for the formulation and implementation of national agricultural policies:

### 1. **The importance of interdepartmental and interdisciplinary collaboration**

Sustainable healthy diets are inherently interdisciplinary, encompassing agriculture, health, science and technology, culture, education, and social welfare. For example, promoting sustainable healthy diets at Taiwan's senior dining sites, the funding for the meals at the base mainly comes from the social welfare department. The health department is primarily responsible for promoting healthy diets and ensuring food safety and hygiene. The production of agricultural products comes from the planning of the agricultural sectors. Ensuring that agricultural production and food manufacturing align with global sustainability requires the efforts of both agricultural and scientific research institutions. Furthermore, diet is a crucial cultural element of a nation or ethnic group, and dietary habits are significantly influenced by culture. Therefore, a sound agricultural policy that promotes sustainable healthy diets must be interdepartmental and interdisciplinary.

### 2. **Integrating demand and supply sides**

If sustainable healthy diets represent the demand side of the food value chain, then agricultural products represent the supply side. These two dimensions must be integrated to achieve the desired outcome. To prevent chronic diseases such as cancer and metabolic syndrome, Taiwan's educational authorities are promoting the use of brown rice in school lunches. In parallel, agricultural authorities have also included brown rice in government subsidies to reduce the cost of school lunch. In recent years, Taiwan's agricultural sector has been actively promoting the cultivation of multigrain, with unrefined multigrain also being a target for promoting sustainable healthy diet from health departments. This integration of supply and demand not only increases domestic food self-sufficiency, ensures food security, and promotes sustainable agricultural development, but also achieves the goal of promoting a healthy diet.

### 3. **Integrating food and agriculture education with healthy diet education**

In the past three years, Taiwan has passed two bills closely related to sustainable healthy diets: the Food and Agriculture Education Act and the Nutrition and Healthy Diet Promotion Act. These two bills, along with education and training on sustainable healthy diets, play a crucial role. How to avoid duplication and achieve optimal results is a question that must be considered when formulating agricultural policies.

## REFERENCES

- FAO & WHO. 2015. Second International Conference on Nutrition (ICN2). Report of the Joint FAO/WHO Secretariat on the Conference. <http://www.fao.org/3/i4436e/I4436E.pdf> (accessed June 6, 2025)
- FAO and WHO. 2019. Sustainable healthy diets – Guiding principles. Rome <https://www.who.int/publications/i/item/9789241516648> (accessed June 6, 2025)
- Gómez MI, Ricketts KD. 2013. Food value chain transformations in developing countries: selected hypotheses on nutritional implications. *Food Policy*. 42:139-50.
- Hawkes C, Ruel MT. 2011. Value chains for nutrition (2020 conference paper 4). Washington, DC: International Food Policy Research Institute;

- Ministry of Health and Welfare. 2024. Taiwan Health and Welfare Report. <https://www.mohw.gov.tw/cp-3196-79806-1.html> (accessed 06-06-2025)
- Ministry of the Interior. (2025, December) National Population Database Map. <https://gis.ris.gov.tw/dashboard.html?key=B02> (accessed 02-13-2026)
- National Development Council. (2024, October). The National Development Council released the "Population Projection of the Republic of China (2024-2070)". [https://www.ndc.gov.tw/nc\\_27\\_38548#](https://www.ndc.gov.tw/nc_27_38548#) (accessed 08-06-2025)
- Pan WH. 2020. National Health and Nutrition Survey Report (2017-2020). National Health Bureau. Taiwan (in Chinese)
- Popkin BM. 2014. Nutrition, agriculture and the global food system in low and middle-income countries. *Food Policy*. 47:91-96.
- Popkin BM. 2017. Relationship between shifts in food system dynamics and acceleration of the global nutrition transition. *Nutr. Rev.* 75:73–82.
- Tzeng MS. 2008. From Dietary Guidelines to Daily Food Guide: Taiwan's Experience. *Asia Pac J Clin Nutr.* 17 (S1):59-62
- Vermeulen SJ., Park T, Khoury CK., and Béné C. 2020. Changing diets and the transformation of the global food system. *N.Y. Acad. Sci.* 1478:3–17.
- Wang WY. 2024. Analysis of the origin and formation process of Taiwan's school lunch (1951-1972). *Taiwan Studies.* 23:125-158 (in Chinese)
- Wu KJ. 2024. Food supply statistics in 2023. *Agriculture Information.* 390:73-76 (in Chinese)

## ACKNOWLEDGEMENTS

The author would like to express my sincere gratitude to the following personnel and institutions for their resources and support. Ms. Xiao Qingyue, Ms. Wei Ziqin, Ms. Wang Peizhu, Ms. Chen Guanzhen, Mr. Hou Xinji, Taipei City Health Bureau, Kaohsiung City Health Bureau, Yilan County Health Bureau, Chiayi City Health Bureau, Penghu County Health Bureau, and Taipei City Qingjiang Elementary School.

## AUTHORS' CONTRIBUTIONS

Min Su Tzeng developed the main conceptual ideas, conducted literature research, personally involved and observed the process of Taiwan's nutrition strategies, benchmarks, and the promotion of healthy eating education, and wrote the manuscript.

## COMPETING INTERESTS

The author declares no conflict of interest.