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Nutrition Impact of Agriculture and Food Systems

Thailand

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Country Policy Analysis

Nutrition Impact of Agriculture and Food Systems

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Foreward

The agriculture and food systems are best placed to influence food production and the consumption patterns of nutritious foods necessary for a healthy and active live. The present agricultural and food systems have evolved to become more complex and global with longer supply chains from farm to fork. Nutrition-sensitive agriculture aims to maximize the impact of the food and agricultural sector on nutrition outcomes while minimizing any unintended negative nutritional consequences of agricultural policies and interventions on the consumer. It is placing a nutrition lens on the food and agricultural sector, without detracting from the sector's own goals which include production, productivity and income.

There is increasing attention to addressing the multiple forms of malnutrition (undernutrition, micronutrient deficiencies, and overweight and obesity) through agriculture and the food system. At the same time there is a need to better understand how agricultural and food systems impact nutrition outcomes. There is need to identify whether and how these systems can be modified to better meet nutrition goals in a sustainable way and reduce the risk of the multiple burden of malnutrition, including diet-related non communicable diseases (NCDs). There is an urgent need to provide practical answers and guidance for countries on the “what to do?” and “how to do it?” questions.

A number of countries are linking their national agriculture or food and nutrition security policies to nutrition related outcomes and the multiple burden of malnutrition. These countries refer to the multiple underlying causes of malnutrition in broad areas such as agriculture, food security, food supply as well as varies stages along the value chain. Some country strategies take account of the multisectoral nature of nutrition. Thailand is one of the eight countries selected as for in-depth review of specific ways how food and agricultural policies are having or are intended to have an impact on nutrition in the country.

UNSCN Secretariat

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Preface and Acknowledgements

The UNSCN had initiated country case study on nutrition-sensitive agriculture and food systems with the aim of maximizing the impact of agriculture and food systems on nutrition outcomes and of minimizing any unintended negative nutritional consequences of agriculture and food policies and interventions on the consumer. Thailand was selected and pleased to participate in this study as it is currently facing with some remnants of undernutrition and rising trend of overnutrition and non-communicable diseases (NCDs).

Under the complexity of globalization coupled with urbanization, there have been major changes in agriculture and food systems along with lifestyle changes including eating habits and less physical activities. As a consequence, nutrition transition has occurred. However, undernutrition is still highly prevalent in many developing countries whereas the trends of overnutrition and NCDs have been rising in both developed and developing countries. This coexistence of under- and overnutrition is known as the double burden of malnutrition that becomes major development issues worldwide.

This Thailand country case study was conducted with the general objective to determine how agriculture and food systems impact on nutrition and health. Additionally, the specific objectives aim to document and analyze nutrition-sensitive policies, strategies and interventions in the past and present situations and to share experience of success, current challenges, and lessons learned in institutional mechanism, research and community-based approaches which link agriculture, food, nutrition and health using nutrition indicators to measure outcomes and impacts. Methods used in this study were documentary and qualitative research.

The report emphasizes Thailand success in reducing malnutrition during the 1980s with drastically decline of anaemia in pregnant women and virtually elimination of severe and moderate underweight of underfives. The National Rural Development Committee was the forum for multisectoral agencies, academia and planners to develop and implement the Poverty Alleviation Plan at that time. National commitment with sound nutrition implementation strategies and goals led to community-based actions to reach all people and to alleviate malnutrition using nutrition indicators. Agriculture and food systems contributed significantly for malnutrition reduction through ensuring not only food for family but also local nutritious snacks as supplementary foods for pregnant women, complementary food for infants and young children, and milk from local dairy farm to school children from kindergartens to grade 6.

The report also highlights the current circumstances concerning food and nutrition security. The National Food Committee (NFC) established by law in 2008 is the highest legitimate forum for multi-stakeholder participation to deal with all dimensions of food management at all levels. Subsequently, a Strategic Framework for Food Management (SFFM) was developed and approved by the Cabinet in 2010. Furthermore, the NFC appointed three thematic committees on food security, food quality and safety and on linking of food, nutrition and health to facilitate and to coordinate implementation of the SFFM. It is expected that this management model will ensure food security, nutrition and sustainable agriculture with ultimate elimination of both under- and overnutrition, and alleviation of NCDs.

The country case study would not be possible without assistances and support from many persons and organizations in the review process by providing data, information and response to questionnaires as well as those in Annex 3 who gave their time and valuable opinions and views for direct interview. We wish to deeply thank all of them.

We would like to express our gratitude with thanks to Dr Marzella Wüstefeld, a member of the UNSCN Secretariat for her continued effort to assist in initiation, coordination and facilitation of this study as well as her helpful advice and comment to finalize the report.

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We, as a research team, had learned a lot from this work and expected that this report would be useful to all readers who may wish to apply Thailand's lessons learned to alleviate malnutrition in their countries and to enhance the potential of agriculture and food systems to impact on nutrition.

Kraisid Tontisirin
Thailand Study Team Leader

I. Executive Summary

Thailand is a developing country in Southeast Asia and has had experience in successfully alleviating undernutrition since the 1980s, particularly maternal and child malnutrition. During approximately the last 20 years, several prominent demographic transitions have occurred, most notably, a growing elderly population, urbanization and lifestyle changes. Agriculture has been geared for both local and international trade, changing significantly from traditional agriculture to modern large-scale food production and industrialization. Food distribution has also changed gradually towards a modern marketing system. Supermarkets and chain stores managed by a few big companies are replacing traditional markets. Consumption of sugary and fatty foods has been rising, while intakes of fruit and vegetables have been below 300 g per person per day. In addition, physical activity and exercise have been inadequate. Consequently, the current nutritional challenge is double-burden malnutrition (DBM), wherein increasing trends in overweight, obesity and non-communicable diseases (NCDs) coexist alongside remnants of undernutrition.

Thailand's experience in alleviating undernutrition is quite unique and could serve as a model for adaptation and adoption by other countries that are facing hunger and malnutrition. In the past, and like other developing countries, Thailand was faced with major nutrition problems, such as protein-energy malnutrition (PEM), iron deficiency anaemia (IDA) and other micronutrient deficiencies. Vulnerable groups were pregnant and lactating women, infants and preschool children in remote and poor areas.

During Thailand's first three National Development Plans (1961-1976), food production rested mainly on expanding agricultural areas to increase food productivity. On its part, the health sector focused largely on curing major nutrition challenges, with limited attention being given to preventive measures. Subsequently, health experts realized that controlling and preventing nutritional deficiencies required a multisectoral approach. Hence, the first Food and Nutrition Plan (FNP) was included in the country's fourth five-year National Economic and Social Development Plan (NESDP). It aimed at tackling major nutrition challenges and at improving the population's nutrition status. However, by the end of the Plan, malnutrition remained a serious problem.

The fifth NESDP was the turning point for Thailand's development, especially for rural areas where poverty and malnutrition coexisted at a high prevalence. At that time, malnutrition was considered a symptom of poverty. Consequently, the nation's Poverty Alleviation Plan (PAP) within the fifth Plan was designed to alleviate poverty and malnutrition. The PAP fostered multisectoral planning to cover the FNP and primary health care (PHC), which the health sector considered to be the major policy to increase health coverage and quality of care. Under the PAP, institutional mechanisms evolved to streamline multisectoral efforts from the central government to the community level, with the local level implementation of action plans focusing on improving nutrition and the basic minimum needs (BMN) of rural people, targeting especially vulnerable groups in poverty-stricken areas. This community-based approach stressed that basic services must be available in all rural communities. People's participation and the training

of village health volunteers (one per 10 households) were major strategies aimed at communicating health and nutrition messages as well as at reaching previously unreached groups.

The fifth NESDP also contained nutrition indicators. The prevalence of low birthweight, underweight of underfives, and underweight (and stunting) of school children, as well as adequate antenatal care (ANC) coverage were a part of BMN indicators. These indicators served as tools for assessing the nutrition situation and for monitoring and evaluating outcomes of remedial actions. Data collection, analysis and utilization were carried out at the community level. Supportive services in food and nutrition, especially for mothers and children, were integrated in multisectoral basic services, such as ANC that provided daily multivitamins and iron tablets together with promoting supplementary foods from local nutritious snacks for pregnant women; production and dissemination of community-based complementary foods for infants and young children, coupled with implementing growth monitoring and promotion (GMP) along with immunization, nutrition and health education; and the hygienic care and feeding of infants and young children. As a result, since 1982 the prevalence of IDA and underweight among underfives has reduced remarkably and steadily from over 50% in both cases to current levels of around 10% and 7%, respectively. Once this system was in place, malnutrition reduced rapidly within a few years.

In 1992, Thailand initiated school lunch and school milk programmes (SLP and SMP) starting from kindergarten and gradually expanding to cover Grade 6. The SLP provided a budget for each child per day during the academic year, with meals prepared from local food supplies based on weekly or monthly menus. As part of their SLP, some schools adopted agricultural programmes, including the cultivation of vegetables and fruits, the raising of fish and the production of chicken eggs. For the SMP, at first school milk was prepared from imported milk powder. However, with the promotion of local dairy farming and industry, the supply of fresh milk from local farms to the SMP increased from 12% in 1992 to 37% in 2009. This strategy is a win-win situation as the SMP generates income for farmers. In the meantime, school children gained nutrition and health benefits from milk for their growth and development. The alleviation of maternal and young child malnutrition, coupled with the SLP and SMP from kindergarten to Grade 6, led to a significant decline in stunting among children, and most remarkably among underfives.

During the last 20 years, Thailand has become a middle-income developing country with an ageing population and a growing urban sector. Simultaneously, new nutrition challenges are emerging, caused by lifestyle changes, a reduction in physical activity, and consumption of more processed foods. Under globalization, the rapid growth of agro-industry and changes in food systems have allowed the Thai people to access a greater variety of foods, including foods containing high levels of sugar, fat and salt, while the consumption of fruit and vegetables has been comparatively low. These situations have led to rising trends in overweight, obesity and NCDs, which are the major concerns of not only the health sector, but all other development sectors as well. Several agencies, academic institutions and non-governmental organizations (NGOs) have conducted many initiatives, projects, and public education and communication campaigns to prevent and control overnutrition and NCDs, such as the “Thai people have no big belly” and “Sweet enough” campaigns to reduce sugary food intake, along with campaigns

aimed at “Eating more fruit and vegetables” and “Increasing daily physical activity”. These efforts have raised public awareness and concern. However, they have had few outcomes and little impact on reducing overnutrition and NCDs, since they have been implemented in isolation.

In 2008, the National Food Committee (NFC) Act was enacted to frame food management policies and strategies in all dimensions and at all levels, including facilitating coordination among related agencies charged with strengthening food management efficiency and effectiveness. The NFC is the highest legitimate forum that allows multisectoral cooperation and total stakeholder participation. Consequently, a Strategic Framework for Food Management (SFFM) was developed and subsequently approved by the Cabinet in 2010. The SFFM covers four main strategic themes: food security, food quality and safety, food education, and food management. Furthermore, the NFC appointed three thematic committees to facilitate and to coordinate implementation of the SFFM. Their missions are as follows.

- 1) Committee on Food Security Throughout the Food-chain aims to ensure the adequate and sustainable production of nutritious and safe food supplies, as well as the conservation and maximization of food production resources and the ecosystem.
- 2) Committee on Food Quality and Safety aims: (i) to ensure harmonized food quality and safety standards for producing primary agricultural products, village processed and industrial food products; (ii) to strengthen food quality and safety assurance systems for domestic and export foods, as well as for imported foods for consumer protection and to facilitate domestic and international trade; and (iii) to harmonize efforts to promote high quality and safe food services for consumer confidence and health.
- 3) Committee on Linking of Food, Nutrition and Health aims: (i) to standardize and harmonize nutrition indicators; (ii) to strengthen food and nutrition information, education and communication, including promotion of food-based dietary guidelines (FBDGs) and dietetic education for different age groups; (iii) to promote greater consumption of fruit and vegetables and to reduce the intake of fatty, sugary and salty foods; (iv) to facilitate implementation of food and nutrition programmes among communities, schools and workplaces using a life course approach aimed at eliminating the remnants of undernutrition and at preventing and controlling overweight, obesity and NCDs; and (v) to promote nutritional well being as part of health promotion in communities and workplaces.

All tasks of these three thematic committees have been harmonized to create momentum from agriculture to food, nutrition and health. The ultimate goal is to achieve food security through sustainable food production and the supply of high quality, safe foods for the nutrition and health of consumers, as well as for food trade. The NFC has served as a forum for coordination, facilitation and problem solving at a national level, while all implementation actions are carried out at the local level and within workplaces based on similar approaches to those used to alleviate undernutrition under the PAP. It is expected that within a few years, Thailand will be able to scale-up these tasks nationwide to prevent overnutrition and NCDs.

Obviously, much more work needs to be done as part of this integrated programme, most notably, capacity development throughout the food-chain from food production to consumer education and communication; research to provide innovative support for the SFFM; and

strengthening of the roles of Local Administrative Organizations (LAOs), community leaders and volunteers to be in charge of community-based programmes. Development and promotion of healthy diets for each population group during normal, healthy times, and when conditions of ill health arise, are also required.

Thailand's experience clearly shows that agriculture and food systems have played critical roles in impacting on nutrition at a national macro-level and at a local micro-level among communities, households and individuals. Agriculture and food sectors have contributed their best to ensure adequate supplies of high quality and safe foods for consumers and for trade. National and local initiatives have worked to increase food accessibility, consumption and utilization, particularly among vulnerable groups in rural poor areas that have been prone to malnutrition. The multisectoral efforts of agriculture and health sectors, LAOs and community participation under the PAP have been successful and have effectively alleviated maternal and child malnutrition.

With the increasing prevalence of overweight, obesity and NCDs, agriculture and food systems will play an even greater role in ensuring adequate supplies and services of healthy and safe foods for consumers at local, national and international levels. It is expected that the NFC will continue to act as the national forum to facilitate achieving its mandate through the implementation of the SFFM, as well as the alleviation and ultimate elimination of DBM to achieve a food and nutrition secure society.

II. Purpose of Study and Research

Thailand successfully reduced childhood malnutrition during the 1980s with virtually elimination of severe and moderate underweight among underfives. Food and nutrition plans and the PHC approach were integrated and implemented under the PAP at community levels and targeting mothers, infants and children. National commitment with sound nutrition implementation strategies and goals led to community-based actions that included: (i) basic services in health, agriculture and education, (ii) mass mobilization of health volunteers, and (iii) mutual efforts/actions to reach all people and to prevent and control malnutrition using nutrition indicators, such as birthweight and weight for age of underfives.

Currently, Thailand is facing remnants of undernutrition along with rising trends in overweight and obesity. Chronic related NCDs are also increasing, such as high blood pressure, cardiovascular disease and diabetes mellitus. To address the nation's DBM situation, during the last five years, and under the National Food Committee (NFC) Act, a Strategic Framework for Food Management (SFFM) was developed and subsequently approved by the Cabinet in 2010. Implementation efforts focus on three main areas: (i) food security throughout the food-chain, (ii) food quality and safety, and (iii) linking of food, nutrition and health. It is highly expected that implementation of the SFFM will lead to the sustainable and efficient production of high quality and safe foods for trade and economic improvement and, most importantly, for improved food, nutrition and health security. Under this situation, this study's purpose is to share Thailand's experiences and lessons learned in alleviating undernutrition and its current efforts to deal with DBM, so that these experiences can serve as a model for adaptation and adoption by other countries facing similar nutritional challenges.

General objectives

- a) To determine how agriculture and food systems impact on nutrition and health.
- b) To review, document and synthesize relevant agriculture and food policies and strategies, as well as how the SFFM can support or potentially enhance nutrition and health outcomes with regard to issues and working processes.

Specific objectives

- a) To review information on Thailand's past and current situation focusing on health, nutrition, dietary transitions, agriculture and food systems, as well as food security.
- b) To review national and local level agriculture and food policies, key strategies, and mechanisms and processes that can lead to nutrition-sensitive agriculture and food systems and to strengthening food security at household and national levels.
- c) To analyze the nutrition sensitivity of existing relevant policies, strategies and programmes, as well as to make recommendations for increasing sensitivity at national to community levels.
- d) To share Thailand's experiences with regard to its success and persistent challenges, and its lessons learned in institutional mechanisms, research and community-based approaches to link agriculture, food, nutrition and health using nutrition indicators to measure outcomes and impacts.

III. Introduction

3.1 Background

Thailand is a Southeast Asian country with a population of 64.6 million people. The country covers 51,311,500 hectares and contains high biodiversity and abundant resources to produce sufficient food for the Thai people and for export to other countries. The nation's agricultural area is approximately 24 million hectares and produces food and non-food commodities. The main foods exported include rice, processed chicken, processed pineapples, fishery products and quick frozen foods. During the past 30 years, Thailand's agriculture and agro-industry have rapidly developed from traditional to modern systemic farming, including the mass production of animal foods (such as chicken, pork, shrimp, seafood) and vegetable oils (such as palm oil, rice bran oil and coconut milk). Certain tropical fruit and vegetables are also produced for local consumption and for export in fresh or preserved forms. Recently, a land use competition has emerged in terms of land used to produce food for humans, for animal feed, for fuels, and for non-food cash crop commodities, such as rubber and eucalyptus.

During Thailand's first three five-year National Development Plans (1961-1976), food production mainly centred on expanding agricultural areas to increase productivity. Nutrition was not recognized as a major development issue until the late 1970s. At this time, undernutrition and allied deficiency disorders and diseases were highly prevalent and became major medical and public health concerns and a challenge for national (economic) development. To stress the social importance of nutrition for economic development, subsequent national economic development plans incorporated the term "Social" and became National Economic and Social Development Plans (NESDPs). During this period, the health sector focused mainly on curing major nutrition challenges, with limited attention being given to preventive measures. Subsequently, health experts realized that controlling and preventing nutritional deficiencies required multisectoral approaches. Hence, in 1977 the first Food and Nutrition Plan (FNP) was included in the country's fourth NESDP. It aimed at tackling major nutrition challenges and at improving the population's nutrition status. It promoted a multisectoral approach along with research activities to prevent and control malnutrition, mainly undernutrition.

The fifth NESDP was really the turning point in Thailand's development. At that time, malnutrition was considered a symptom of poverty. Consequently, the nation's Poverty Alleviation Plan (PAP) was designed to alleviate poverty and malnutrition by encouraging multisectoral planning to cover the FNP and PHC, which was the major policy to increase health coverage and quality of care. Under the PAP, institutional mechanisms streamlined multisectoral efforts from the central government to the community level, with actions being implemented at the community level and focusing on improving nutrition and basic minimum needs. This community-based approach stressed that basic services must be available in all rural areas. People's participation and the training of village health volunteers (one per 10 households) were major strategies aimed at communicating health and nutrition messages as well as at reaching previously unreached groups.

Nutrition indicators—such as prevalence of low birthweight, underweight of underfives, and underweight (stunting) of school children, as well as adequate ANC coverage—became a part of basic minimum needs indicators. These indicators served as tools for assessing the nutrition

situation and for monitoring and evaluating outcomes of remedial actions. Such actions were identified and carried out successfully after problems had been identified at the community level. Multisectoral approaches were managed under the PAP, while the health sector provided ANC services for mothers and GMP for infants and young children. Nutrition-sensitive agriculture also played an important part in alleviating malnutrition. Special efforts were given to promoting and supporting the production of plant and animal foods, to developing and promoting supplementary foods from local nutritious snacks for pregnant women, and to producing and disseminating community-based complementary foods for infants and young children through active community participation. Resulting from these actions, severe and moderate PEM in underfives (as indicated by weight for age) were eliminated within a short period of five years with continued reduction in mild malnutrition.

During the last 20 years, Thailand has become a middle-income developing country with an ageing population and a growing urban sector. Expansion and modernization of food production and the continuation of food exportation also continue. The Thai people are seeing rising incomes, but they are also experiencing significant lifestyle changes that have led to declines in exercise and physical activity, along with the over-consumption of diets high in sugar, fat and salt. Consequently, overweight, obesity and diet related NCDs have been increasing gradually and continuously.

In 1992, the National School Lunch Programme (SLP) and School Milk Programme (SMP) were begun, initially covering kindergarten students but later on expanding to Grade 6. Both programmes have contributed significantly to reducing malnutrition among school children. The SLP and the SMP provide high quality diets not only in terms of energy but also protein, calcium and other micronutrients needed for growth. The current low prevalence of stunting in Thai children is a consequence of food and nutrition activities/programmes since 1982 under the PAP for mothers, infants and young children, and also the SLP and SMP since 1992 for kindergarten and primary school children. The SMP is also beneficial to local farmers who provide milk for the SLP, while at the same time having a positive impact on child nutrition.

During this transition period, the government policy on decentralization was gradually implemented, with budgets being increasingly allocated to local administrative authorities at sub-district and municipal levels. In addition to budget management, the decentralization process also increased local level knowledge and skills in programme management, together with the guiding principles of HM the King's Sufficiency Economy Philosophy for household food security (Annex 1). Food and nutrition issues eventually will be managed at the community level as well. Several tools for nutrition information, education and communication have been developed and promoted for desirable eating practices, such as nutrition labelling and Food-Based Dietary Guidelines (FBDGs) to provide practical knowledge to the general population and school children.

Data from the most recent national nutrition survey in 2004 indicated that Thailand is faced with DBM. There are still some remnants of undernutrition, such as stunting and iron and iodine deficiencies in remote areas. At the same time, prevalence of overweight and obesity increased among all age groups. Even younger age groups exhibited NCDs. In 2008, it was reported that the incidence of death from diet-related NCDs in Thailand was the highest among the ASEAN countries (WHO 2011).

Most recently, under the National Food Committee (NFC), the SFFM was developed and subsequently approved by the Cabinet in 2010. A multisectoral team from agriculture, health, local government, academia, the private sector and NGOs are in the process of implementing this Framework. It is hoped that promotion and support for linking food, nutrition and health will be further enhanced so as to control and prevent DBM, to promote the well being of all Thai people, as well as to strengthen the impact of agriculture and the food systems on nutrition.

3.2 Situation analysis

3.2.1 National nutrition situation

In 1960, a team of Thai and United States experts conducted the first national survey, which revealed that PEM was the most severe nutritional problem, especially among pregnant and lactating women, infants and preschool children of poor economic status. Deficiencies in vitamin A, thiamin, riboflavin and iodine were also found in the northern and north-eastern regions. Prevalence of anaemia and urinary bladder stone disease were high, though their etiologies were not clear.

The period of 1977-1981 was a turning point for nutrition problem solving in Thailand. For the first time, seven nutrition issues were included in the fourth NESDP, namely, PEM, IDA, iodine deficiency, urinary bladder stone, and deficiencies in vitamins A, B1 and B2. In the fifth NESDP begun in 1982, “nutrition” was an indicator in implementing the PAP as part of multisectoral efforts at the community level, particularly in areas of high prevalence. After two decades, Thailand’s community-based approach was proven to be effective in alleviating malnutrition. PEM in underfives was reduced from over 50% to less than 10%. During the same period, Thailand’s successful family planning programme resulted in a low fertility rate; now being only 1.6, which highlights Thailand’s potential in decreasing the country’s total population (World Bank 2011). But as the population below 15 years of age has declined significantly, the country is seeing an increasing number of elderly. Consequently, Thailand is now moving at a fast rate towards an ageing society and will become a complete ageing society in 2030 (Figure 1). Simultaneously, continued economic development and urbanization (Figure 2) have turned the country’s nutrition problem towards overnutrition. Diet-related NCDs have become a growing burden for Thai society. Meanwhile, micronutrient deficiencies, especially iodine and iron, still remain to be solved.

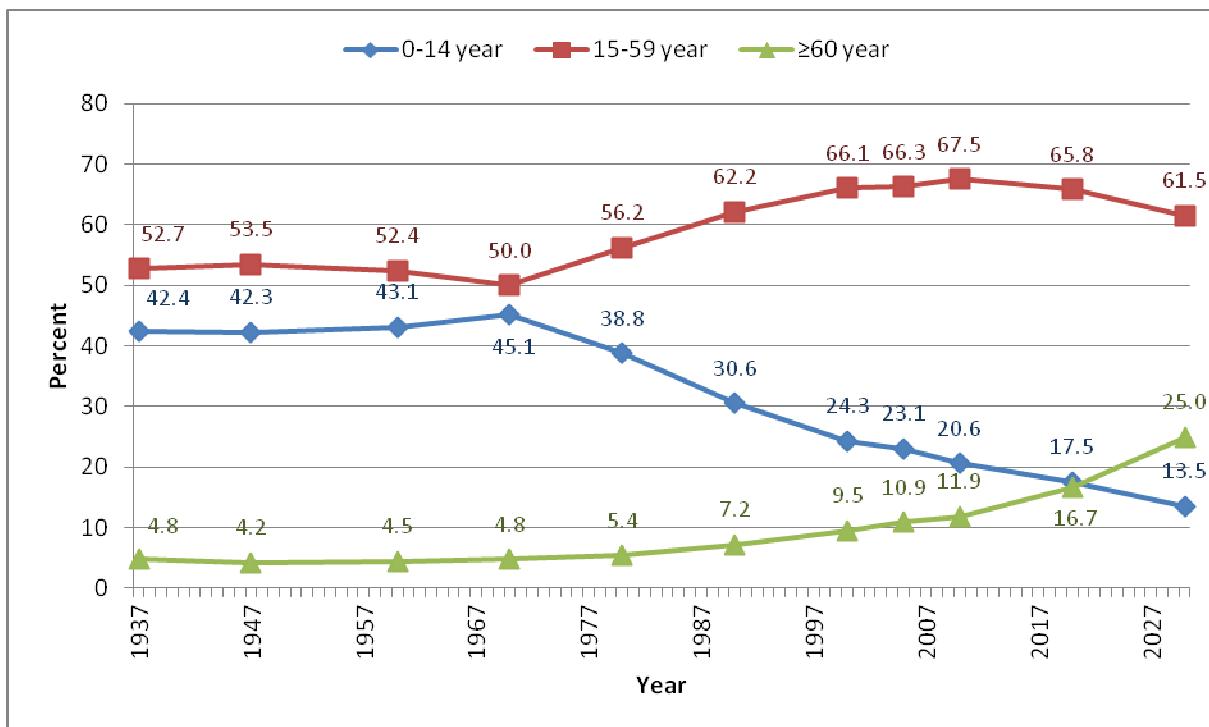


Figure 1 Population profile of Thailand, 1937-2030

Source: Bureau of Policy and Strategy (2011)

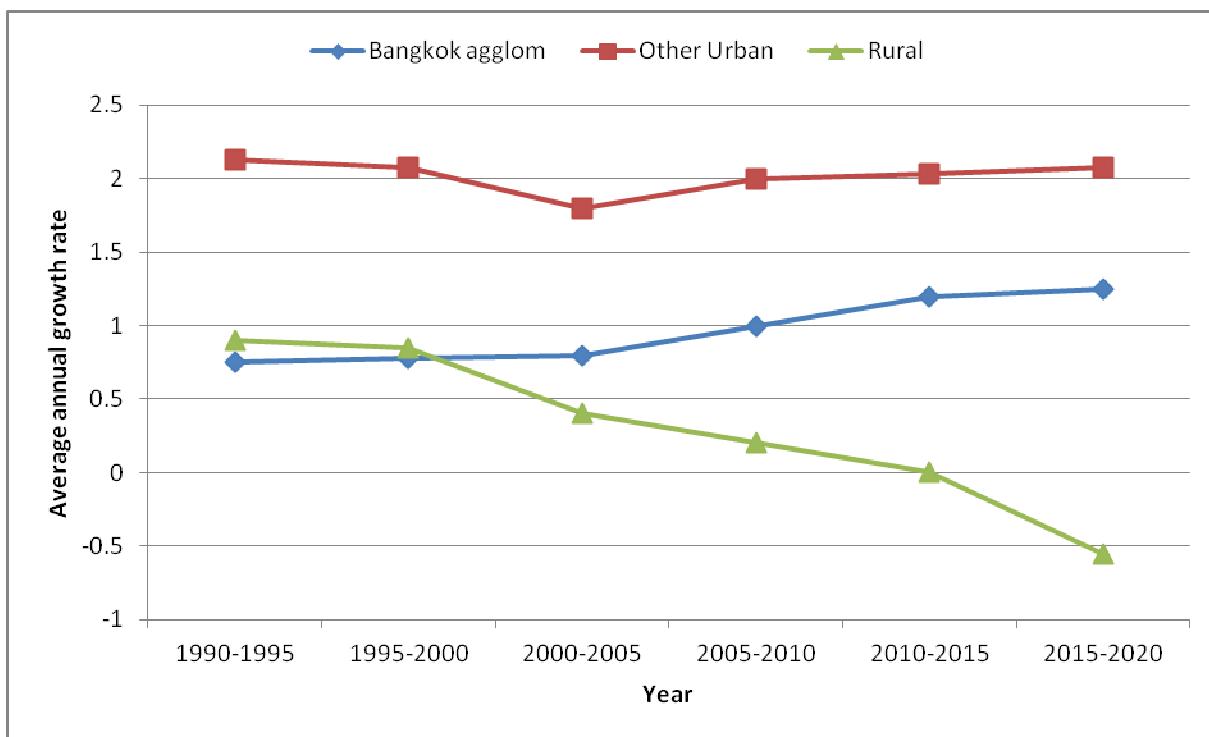


Figure 2 Average annual population growth rate of Thailand by urban status, 1960-2010

Source: UNFPA (2011)

Undernutrition

In 1981, over 50% of preschool children were underweight and over 15% exhibited moderate and severe malnutrition. Under the PAP, a multisectoral approach entailing public health, agriculture, education and local administration was implemented in every area of the country with active people's participation by community leaders and village health volunteers (one per 10 households). Centrally developed policy and knowledge were passed on to and practiced by communities led by village health volunteers under the supervision of service provider teams and community leaders. PHC was implemented through these volunteers in order to increase public health service coverage and reach all of the unreacheds in remote areas of the country. ANC coverage through community health centres has increased steadily from 35% in 1981 to a current level of around 95% (National Statistical Office 2006). This strategy is a good example of the effective decentralization of PHC activities, which have been very valuable in improving many nutrition and health indicators (Figure 3). In addition, Thailand's community-based approach to development was successful in facilitating service providers and community members to address prevalent nutrition issues using locally available foods and other resources. Major ministries—such as Public Health, Agriculture and Cooperatives, Education and Interior—jointly worked on the same indicator “nutrition”. Communities widely undertook major nutrition and health activities, such as complementary food production for infants and young children using appropriate technologies and locally available raw materials, strengthening community health centres, and nutrition education. Thailand's model was found to be effective as the number of underweight preschool children dropped steadily and continuously from over 50% in 1981 to 7% in 2012 (Figure 3).

Micronutrient Deficiencies

Iodine and iron were the first two micronutrients found to be deficient in the Thai population. During the past 40 years, salt fortified with potassium iodate has been promoted for production in many parts of the country. In 1994, under the Iodine Deficiency Disorder (IDD) Control Programme, the Thai Food and Drug Administration (Thai FDA) issued a notification that mandated the fortification of “Table salt” with iodine at a level of not less than 30 ppm. Other strategies, such as the iodization of drinking water, were also implemented for high-risk populations, especially school children. The goitre rate in school children was used as an indicator for IDD during 1989-2003. Using this indicator, IDD prevalence decreased to less than 2% and was no longer considered a public health problem. However, urinary iodine concentration (UIC) in pregnant women was later used as an indicator of IDD. The country's IDD situation during 2007-2008 thus became serious using the WHO UIC standard (>150 mcg/l). Over 50% of pregnant women had a UIC lower than the WHO cut-off point (Figure 3). Consequently, in 2011, the universal salt iodization (USI) strategy was implemented.

Iron deficiency anaemia has been a long term problem in Thailand with a prevalence of about 23%. IDA has been found more among women and older age groups, especially the elderly (Figure 4). With regard to pregnant women, the prevalence has been reduced remarkably and steadily since 1982 under the PAP, which integrated PHC services with food and nutrition activities at the community level. All pregnant mothers received at least four ANC visits, which provided check-ups for high risk conditions, multivitamin supplementation along with iron supplementation,

NUTRITION SITUATION	THAILAND'S DEVELOPMENT PLANS	POLICIES AND STRATEGIES
1960 ¹ - Anaemia in preg: 57%; - B1 deficiency: 23%; - B2 deficiency: 47%; - Low serum retinal: 38%; - Goitre in school children: 29%	1962	1 st NEDP : Economic Infrastructure, Sectoral Plans
	1967	2 nd NEDP : Improvement of Agriculture, Infrastructure
	1972	3 rd NEDP
	1977	4 th NESDP : + Social Plan + Food and Nutrition Plan (FNP) + Primary Health Care (PHC)
1981 ² - PEM (Wt/Age of U 5): > 50%	1982	5 th NESDP : + Poverty Alleviation Plan (PAP) + integrated and implemented PHC + FNP and Basic Minimum Need (BMN) Indicators in rural/urban communities
1986 ³ - PEM (Wt/Age of U 5): 30% 1989 ⁴ - Goitre in school children: 19%	1987	6 th NESDP
1991 ⁵ - Anaemia in preg: 18% 1995 ⁶ - B1 deficiency: < 1%; - B2 deficiency: < 1%	1992	7 th NESDP : 1992 + School Lunch Program (SLP) + School Milk Program (SMP)
1996 - PEM ³ (Wt/Age of U 5): 15%; - Anaemia in preg ⁵ : 13%; - Goitre in school children ⁴ : 4%	1997	8 th NESDP
2003 ⁴ - Goitre in school children: 1% 2005 ⁴ - Anaemia in preg: 10%	2002	9 th NESDP
2006 ⁷ - PEM (Wt/Age of U 5): 9% 2007 ⁸ - UIC in preg < 150 µg/L: 61%; - Low serum retinal ⁹ : 16%	2007	10 th NESDP : 2008 + National Food Committee Act : Voluntary fortification : 2010 + Strategic Framework for Food Management (SFFM) approved by Cabinet
2008 ⁸ - UIC in preg < 150 µg/L: 56% 2010 ⁸ - UIC in preg < 150 µg/L: 43%	2012	11 th NESDP : Integration of the SFFM and the 11 th NESDP : Promote cooperation and integration of all relevant sectors, academia, business and NGOs to strengthen national food and nutrition security : 2011 + Universal salt iodization (USI) : 2012 + Triferridine tablet (iron+folate+iodine)
2012 ¹⁰ - PEM (Wt/Age of U 5): 7%	2017	

Figure 3 Nutrition situation, policies and strategies of Thailand during 1st - 11th National Economic and Social Development Plans

Modified from: ¹Department of Health (1960); ²INCS (1981); ³ACC/SCN (2000); ⁴Mahidol University; ⁵Bureau of policy and strategy (2011); ⁶Department of Health (1995); ⁷UNICEF (2006); ⁸Bureau of Nutrition (2011); ⁹UNSCN (2010); ¹⁰FAO (2012); Tontisirin (2009)

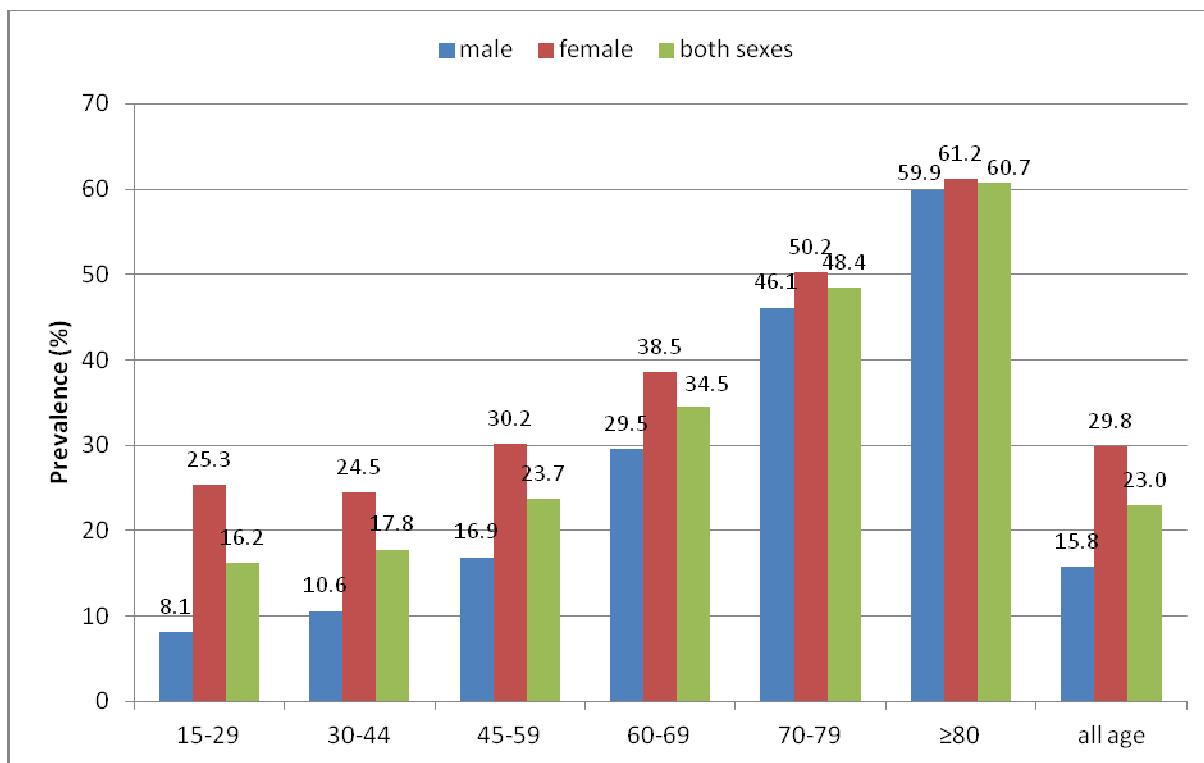


Figure 4 Prevalence of anaemia in the Thai population aged ≥ 15 years old by gender
Source: Bureau of Policy and Strategy (2011)

and nutrition education to promote consuming more foods as snacks using local, nutritious food products (Tontisirin *et al.* 1986). In 2005, IDA prevalence in pregnant women was around 10%, declining from almost 60% from 1960s (Figure 3 and 5). Since 2012, at ANC visits all pregnant women receive nutrition education and multivitamin supplementation daily, along with a tablet of “Triferidine” that contains iron, folate and iodine in order to prevent both IDA and IDD during pregnancy. Moreover, the situation of IDA in school children has also improved as they are benefiting from the SLP and SMP (Figure 6). However, some persistent cases of anaemia could be due to thalassemia and abnormal haemoglobin, which are commonly found in Thailand.

In addition to these programmes to prevent and control micronutrient deficiencies, food industries have implemented a few voluntary, commercial fortification programmes, such as the triple fortification of iron, iodine and vitamin A in a seasoning pack of instant noodles (Chavasit and Tontisirin 1998) and double fortification of iron and iodine in fish sauce. Although these programmes are not directly aimed at correcting micronutrient deficiencies, they help stabilize or increase the nutritional values of foods and thus are considered an indirect prevention mechanism; for example, the addition of fibres or some micronutrients in various types of food. However, food fortification should be carefully considered and limit the maximum level of micronutrients added in order to prevent adverse effects on human health.

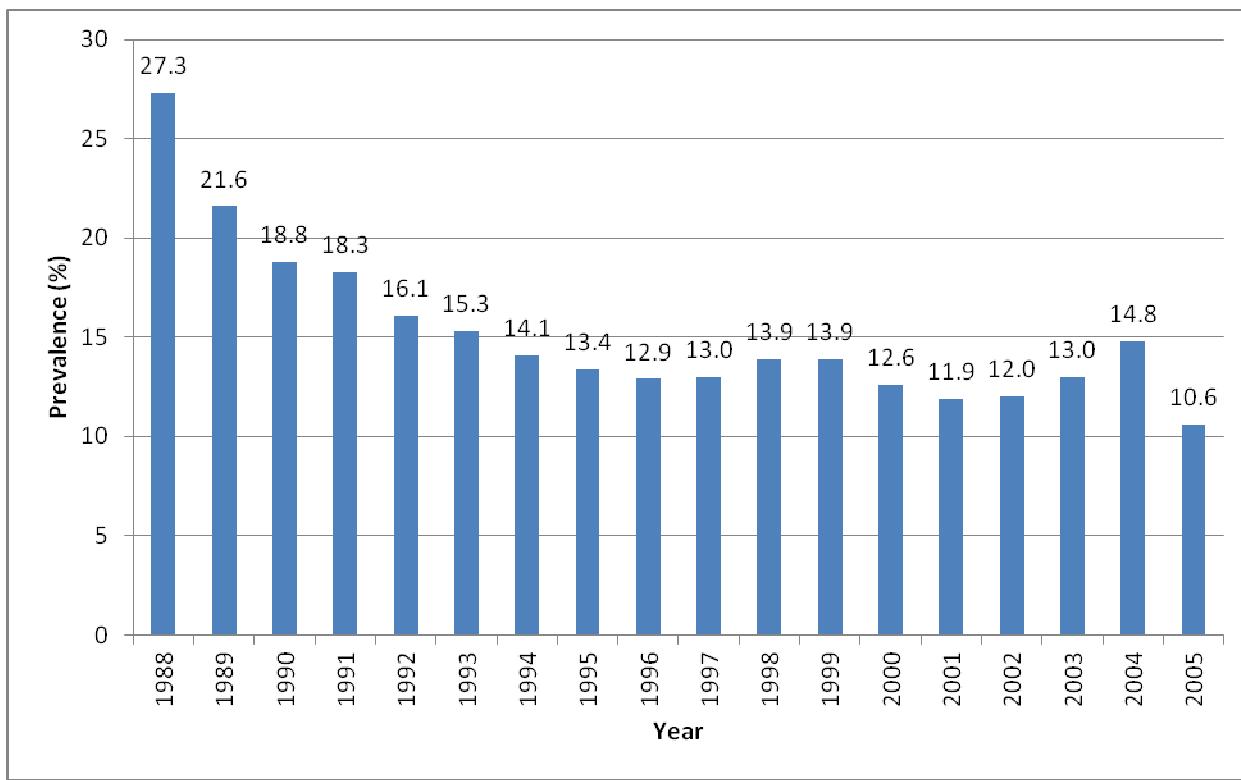


Figure 5 Prevalence of anaemia (Hct < 33%) in pregnant women in Thailand during 1988-2005
 Source: Bureau of Policy and Strategy (2011)

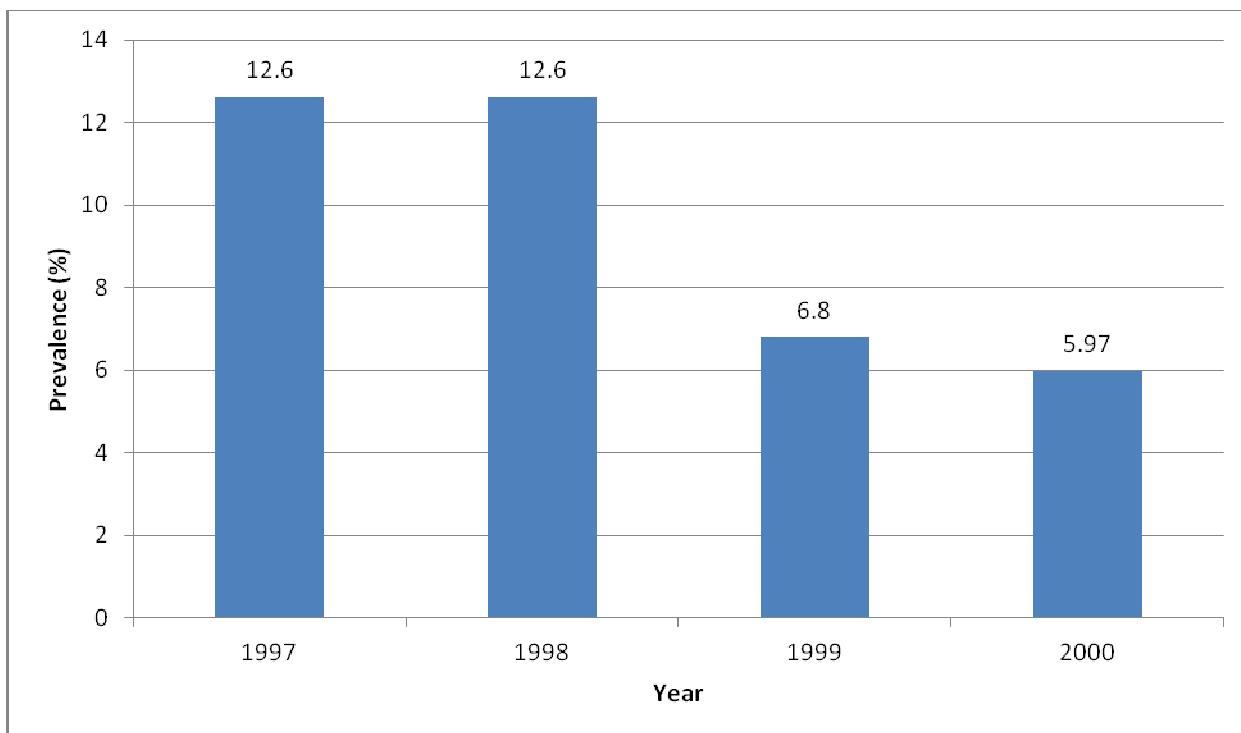


Figure 6 Prevalence of anaemia in school children
 Source: Bureau of Nutrition (2011b)

Non-communicable Diseases (NCDs)

NCDs have become a significant public health problem for Thailand during the last decade. Increasing numbers of the elderly and those who are overweight or obesity are closely associated with NCDs (Figure 7 and 8). The most up-to-date data in 2009 shows that the percentages of males and females with excessive waist circumferences (WCs) were 18.6% and 45.0%, respectively (Aekplakorn *et al.* 2011a). Hypertension, cardiovascular diseases and diabetes mellitus were among the top three leading NCDs. In 2011 cardiovascular diseases and stroke were the leading causes of death at a rate of approximately 30 per 100,000 populations. The prevalence of cardiovascular diseases, stroke, diabetes mellitus and hypertension were 936, 278, 849 and 1,178 per 100,000 populations, respectively (Bureau of Policy and Strategy 2013). Another indirect indicator related to NCDs is the amount of fruit and vegetables consumed daily. Even though the country produces a great quantity and variety of fruit and vegetables, on average Thai males consume daily only 268 g and females 283 g (Aekplakorn *et al.* 2011b). These levels are much lower than 400 g per day recommended by FAO and WHO (FAO and WHO 2004). Medical expenses for treating and managing NCDs were estimated at 140 billion Baht (4.7 billion USD) in 2009 and those for overweight and obesity were estimated at 12 billion Baht (400 million USD). It is realized that food and nutrition strategies can be effective in preventing diet-related NCDs. Hence, several organizations and agencies are conducting projects or programmes focusing especially on nutrition education and public campaigns, though they vary in outcomes and sustainability.

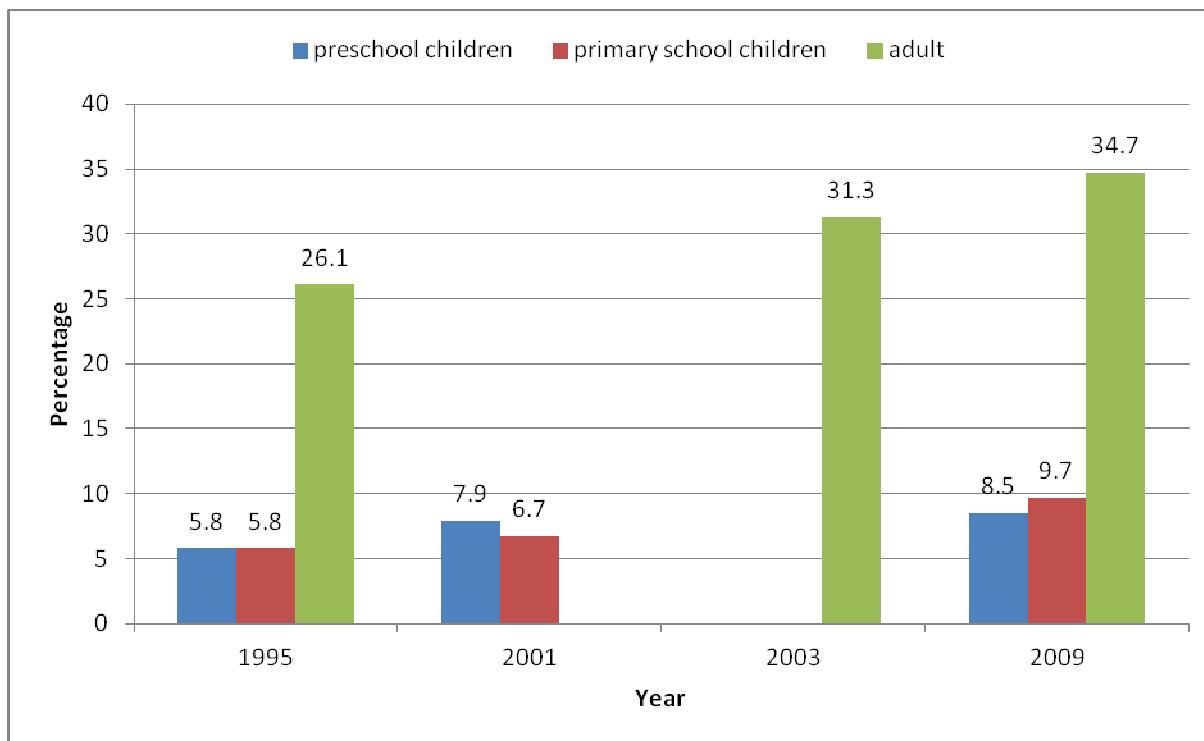


Figure 7 Prevalence of overweight and obesity in the Thai population

Source: Bureau of Policy and Strategy (1996); Bureau of Policy and Strategy (2006); Aekplakorn *et al* (2011b)

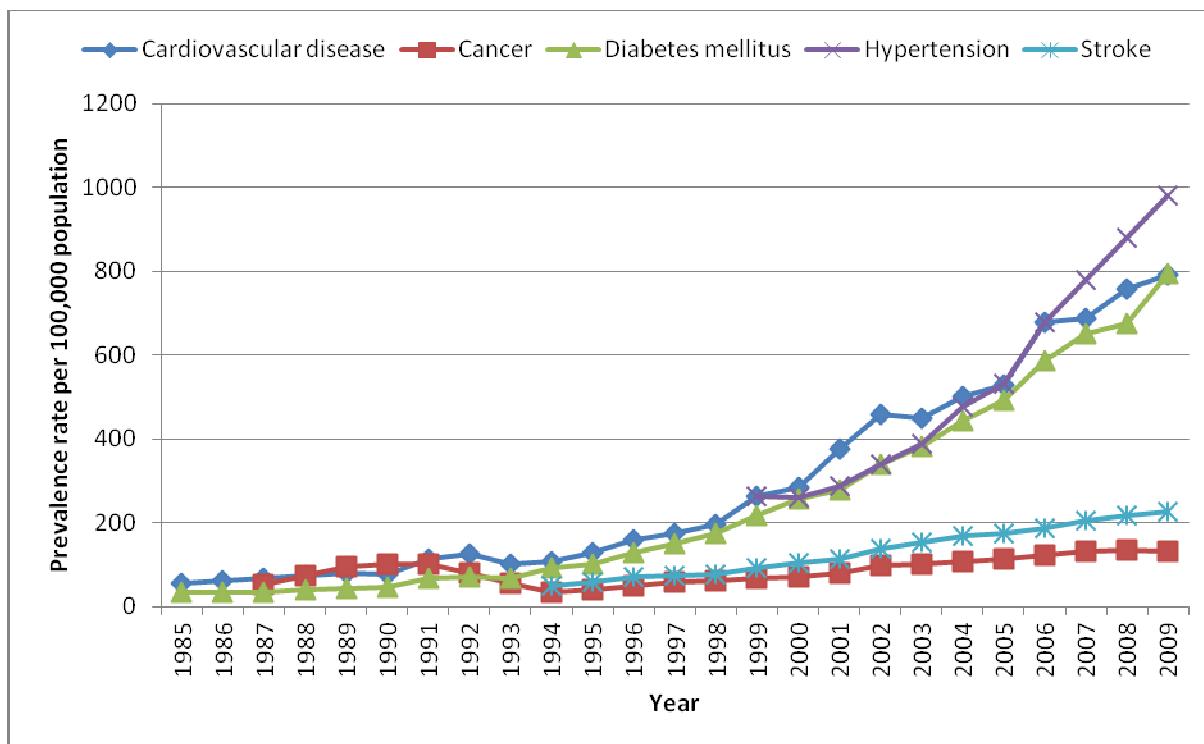


Figure 8 Increase in prevalence of non-communicable diseases in Thailand

Source: Bureau of Policy and Strategy (2011)

3.2.2 Dietary transition

Many factors can lead to changes in dietary patterns that affect a population's nutrition status, including changes in socioeconomic status, urbanization, food advertising, and food system changes. Rapid growth in the agro-industry and food systems during the last 30 years has allowed the Thai people to access a greater variety of foods, including more animal protein as well as more sugary and fatty foods (Table 1). Overall, energy consumption among the Thai people has been decreasing gradually, but the intake of protein and fat has been increasing. In terms of carbohydrates, while a reduction in the intake of complex carbohydrates from rice, tubers, dried nuts and pulses exists, the Thai people are increasing their consumption of sugar. The current energy contributions from macronutrients are 55%, 16% and 28% from carbohydrates, protein and fat, respectively (Table 1). Daily consumption of fruit and vegetables is relatively low and is a matter of concern, since low consumption of dietary fibres may limit a body's ability to protect itself against NCDs and cancers. Sodium intake is over two times the limit for healthy consumption, while the amount of potassium consumed is less than half of what is recommended. The low consumption of potassium is partly due to low fruit and vegetable intake. In addition, recent data indicate that milk consumption has decreased slightly, which will certainly affect calcium intake (Table 1).

One factor that can partially explain changing dietary behaviours is the change associated with urbanised eating and food shopping lifestyles. The rise in supermarkets and modern food trade chains, as well as the influx of fast foods from foreign franchises, appear to be a global phenomenon (Kennedy *et al.* 2004). Over the past two decades, Thai consumers have shifted

from buying foods at retail fresh food markets to purchasing foods at air-conditioned convenience stores, supermarkets or modern trade malls. Increases are also evident in the availability of fast food, frozen food, processed food, and imported food products at these modern outlets. Changes in marketing and dietary choices have led urban people to spend less time in cooking at home, preferring to increasingly rely on fast, ready-to-eat and conveniently processed foods. Moreover, it has become a fashion or a social trend, especially among the youth, to eat fast food from famous foreign franchises in shopping malls. While such foods are convenient to access and have a certain level of quality and safety, they are changing Thailand's food culture. This changing trend has diminished the roles of the local, traditional food system and its providers, because local foods are becoming less popular among consumers compared to modern, fast foods. As a result, diets are becoming less diverse and generally do not contain local, highly nutritious ingredients. Currently, many people also consume a limited variety of food and unnecessary food (e.g. soft drinks, unhealthy snacks) while consumption of traditional Thai foods containing a variety of useful ingredients and nutritional values has been slowly diminishing in popularity among consumers. Commercial media advertisements promoting fast foods and modern food services have accelerated this trend. Without doubt, changes in eating habits and lifestyle have contributed to rising trends of overnutrition and NCDs.

Table 1 Nutrients that the Thai people received from food consumption (1960-2009)

Nutrients received (per person per day)	Year					
	1960	1975	1986	1995	2003	2009
Energy (kcal)	1821	1749	1766	1751	1436	1443
Carbohydrate (g)	359.0	310.6	293.7	276.9	222.9	197.9
Protein (g)	49.1	50.2	50.8	58.1	53.5	56.4
Fat (g)	18.0	25.5	42.6	45.6	38.1	45.2
% energy from Carbohydrate	78.9	71.0	66.7	64.3	62.1	54.9
% energy from Protein	10.8	11.5	11.5	13.2	14.9	15.6
% energy from Fat	8.9	13.1	21.8	22.2	23.9	28.2
Animal protein (g)	15.2	19.6	22.9	29.7	29.2	37.5
Calcium (mg)	278	359	301	344	220	313
Iron (mg)	10.0	12.9	11.8	18.1	8.5	10.3
Vitamin A (μg)	231.5	367.9	608.3	676.7	171.5	428.4
Thiamin (mg)	0.48	0.63	0.89	0.89	0.79	0.72
Riboflavin (mg)	0.40	0.52	0.73	1.1	0.79	0.93
Niacin (mg)	15.0	12.8	13.3	14.7	13.7	13.3
Vitamin C (mg)	34.0	30.0	95.9	94.8	34.7	75.1
Sodium (mg)	-	-	-	-	-	4030.7
Potassium (mg)	-	-	-	-	-	1277.4
Cholesterol (mg)	-	-	-	-	-	262.6
Dietary fiber (g)	-	-	-	-	-	8.77

Modified from: Department of Health (1995 and 2003); Aekplakorn *et al.* (2011a)

3.2.3 Food, agriculture and food security situations

Agriculture and Food Systems

The agriculture and food systems in Thailand have been evolved notably and continuously during the last 30 years from traditional to modern systems. They are currently in the so-called "transition period". Under the previous traditional food systems, food was produced in a relatively small scale at household level. Multiple cropping at home garden and small animals raised at backyard as well as gathering and hunting foods from nature had been widely practiced all over the country. Rural people lived on subsistence economy with additional income from labour during the non farming season in towns or major cities. Surplus foods were sold to the local or nearby markets. Only simple food preservation techniques such as brining, fermentation, drying and salting were available by using mainly traditional methods. From the 1980s onward, Thailand had brought in modern technologies to improve agriculture productivities and agro-industry making the country subsequently a world leading food exporters. Thai food industries have adopted the international food quality and safety standards of Codex Alimentarius and produce food for exportation as well as for local market. Most food industries in Thailand are now being mandated with GMP principles which are gradually adjusted to meet the international requirements. Furthermore, Hazard Analysis and Critical Control Point (HACCP) or International Standards of food safety management system (ISO 22000) have been voluntary applied.

Under this modern agriculture and food systems, foods have been produced in large quantities to meet international safety and quality standards to compete with the world food market. Under such condition, large-scale mono-cropping systems have been increasingly practiced to serve the increasing needs of food industries. During this transition, misuses of herbicides, pesticides in plant cropping and chemical substances in producing animal food had been observed and a major concern. As a consequence, some agriculture products could not meet the safety requirements which pressured government and private sectors to jointly implement good agricultural practices, good animal husbandry practices and adoption of the integrated pest management programme and prudent use of antimicrobials in animal farming. Nowadays, most farms have been improved and well-controlled to supply high quality and safe food for consumers and industries. Quality controlling systems are established both at central and local agriculture markets by using test kits and laboratory facilities. Pesticide and animal drug registrations are now required which need further enforcement and compliance promotion. Due to rising awareness of safe and nutritious food by consumers including demand for fruits, vegetables and organic agriculture products, there is a very positive trend for farmers to respond to consumer concerns by producing and ensuring safe and nutritious food supply as they will get higher price for high quality and safe food products. With the rising trends of overnutrition and NCDs, there are also rising demands by consumers, academia and food regulators for healthy diets which include both fresh and processed food from small, medium and large industries. These challenges have been currently managed by multistakeholder approach under the National Food Committee that will be described later.

With the increasing numbers of tourists to Thailand, Thai food has been one of the most attractive enjoyment for tourists. These demands have stimulated food service systems to

produce safe, delicious and healthy diets at all levels in both urban and rural areas including restaurants and street vendors. Standards, guidelines and quality assurance have been developed and promoted in a practical way for food services of different types and at various levels. Such changes directly help in improving food service systems for both tourists and local people.

Modern agriculture and food systems also have impact on environmental which directly affected by land expansion for mono-cropping as well as improper uses of herbicide and insecticides. Deforestation, destruction of mangroves and degradation of top soil quality have been major challenges for future development. The current strategic framework for food management will deal directly with these issues and has been elaborated in the subsequent sections.

Food security

Thailand is one of very few countries in the world that can produce surplus agricultural food and non-food products for export (Table 2).

Table 2 Amounts of domestic agricultural supply and food utilisation of the Thai population (2009)

Products	DOMESTIC SUPPLY (1000 MT)					DOMESTIC UTILISATION (1000 MT)					
	Prod.	Imports	Stock	Exports	Total	Feed	Seed	Prices	Waste	Other Utilization	Food
Cereals	26344	2028	359	10118	18613	1680	461	821	1999	3100	10556
Starchy roots	30541	1067	0	18700	12908	2201	9	0	1513	7752	1432
Sugar crops	66816	0	0	0	66816	0	0	6305 0	3341	0	426
Sugar & Sweeteners	7292	121	217	5489	2141	0	0	3	152	0	1987
Pulses	208	29	0	72	166	0	13	0	7	0	146
Tree nuts	100	29	0	67	62	0	0	0	0	0	63
Oil crops	2178	1611	3	67	3725	26	6	1977	159	487	1065
Vegetable oils	1807	139	1	343	1603	0	0	0	0	1112	517
Vegetables	3820	314	0	543	3591	5	0	0	399	0	3244
Fruits	10145	458	160	3571	7192	0	0	95	786	0	7337
Stimulants	121	84	61	147	118	0	0	0	0	0	125
Spices	346	52	0	56	341	0	0	0	11	0	330
Alcoholic beverages	3531	72	0	149	3455	0	0	0	0	602	2853
Meat	2261	6	0	467	1799	0	0	16	23	0	1772
Offal	43	20	0	1	62	0	0	0	0	0	63
Animal fats	19	33	0	4	48	0	0	0	0	10	37
Milk (excluding butter)	841	860	-2	172	1527	0	0	0	25	7	1495
Eggs	970	2	0	65	907	0	146	0	48	0	712
Fish & sea food	3164	1640	0	2540	2264	573	0	0	0	0	1691

Source: FAOSTAT (2013)

Availabilities of most food commodities listed in Table 3 increase every year. The lower availability of food commodities for human consumption might be due to a commercial economic preference for the production of animal feed, fuel or food for export. One major food security concern for the country is a reduction in food production areas as agricultural land is being converted to the production of non-food products, such as rubber and ornamental plants. Moreover, areas used for producing cassava, sugar cane, palm oil and rubber increased by 3.9% during 2006-2010 (Ministry of Agriculture and Cooperatives 2012).

Table 3 Availabilities of different food commodities in Thailand (excluding foods for export and non-food uses) during 2005-2010

Products	2005	2006	2007	2008	2009	2010	% change 2005 - 2010
	1000 Tons						
Cereals	9543	9591	9375	9558	10556	13294	39.3
Starchy roots	1480	1493	1466	1580	1432	1501	1.4
Sugar crops	307	375	347	337	426	438	42.7
Sugar & Sweeteners	2123	2436	2178	2240	1987	2317	9.1
Pulses	165	146	155	143	146	192	16.4
Tree nuts	49	34	62	68	63	36	-26.5
Oil crops	1602	1436	1386	1166	1065	982	-38.7
Vegetable oils	523	430	505	521	517	500	-4.4
Vegetables	3254	3109	3395	3268	3244	2772	-14.8
Fruits	7550	8169	9005	7526	7337	8765	16.1
Stimulants	91	93	97	127	125	137	50.5
Spices	312	290	331	320	330	346	10.9
Alcoholic beverages	2377	2945	3140	3051	2853	2369	-0.3
Meat	1830	1914	2027	1860	1772	1841	0.6
Offals	47	54	56	59	63	74	57.4
Animal fats	26	24	36	36	37	23	-11.5
Milk(excluding butter)	1909	1637	1452	1571	1495	1817	-4.8
Eggs	599	634	631	651	712	753	25.7
Fish & sea food	2197	2057	1915	1565	1691	2080	-5.3

Modified from: FAOSTAT (2013); National Statistical Office and Office of Agricultural Economics (2012)

Nutrition security

In terms of macronutrients from locally available food commodities, carbohydrates and protein increased annually, while fat slightly decreased (Table 4). FAO data indicate that the Dietary Energy Supply was at a surplus with continued reduction in the number and prevalence of undernourished people in Thailand (FAO 2010; FAO 2012). In addition, it is clearly evident that Thailand has achieved the target 1.C of Millennium Development Goals (MDGs) set out by the United Nations, namely, “halve, between 1990 and 2015, the proportion of people who suffer from hunger, by reducing from 44% to 7% during the period of 1990-2012” (NESDB 2011; FAO 2012).

Table 4 Estimation of nutrient adequacies (per person per day) for the available local food supplies in Thailand during 2005-2010

Dietary energy and macronutrients (per person per day)	2005	2006	2007	2008	2009	2010	% change 2005 - 2010
Dietary energy (kcal)	2857	2887	2877	2820	2862	3116	9.0
Carbohydrate (gram) ¹	518	535	523	519	529	589	13.7
Protein (gram)	64	63	63	60	63	69	7.8
Fats (gram)	59	55	59	56	55	54	-8.5

¹Estimated by subtracting calories available from the reported amounts of protein and fat

Modified from: FAOSTAT; National Statistical Office and Office of Agricultural Economics (2012)

Results from the national nutrition survey shown in Table 5 indicate that the Thai people did not consume energy at the recommended level. However, protein consumption was slightly higher, which might be indicative of better economic development and higher consumer purchasing power. Table 5 also indicates that nutrient intake patterns in all parts of the country were quite similar, which might imply that changes in eating patterns have moved in the same direction. Improved logistics and marketing for a great variety of processed foods may facilitate the access and consumption of foods in a similar pattern. In considering food and non-food production and supply, Thailand has food security in terms of access to energy. The expenditure for food of a Thai person in 2011 was 61 Baht per day, which was 7.8% of total income (National Statistical Office and Office of Agricultural Economics 2012; National Statistical Office 2011). With the minimum daily labour wage of 300 Baht per day, the expenditure for food would be about 20%, which is still reasonable.

Table 5 Energy and nutrient adequacies of the Thai population in different parts of the country (in 2009) as referred to the Thai RDI (from national nutrition survey on nutrient consumption)

Energy and nutrients	Percentage of Thai's RDI							
	Municipal area	Non-municipal area	North	Central	North and northeast	South	Bangkok	Total
Energy	75.5	75.8	79.5	70.5	75.6	77.2	75.5	75.6
Protein	111.3	115.0	131.2	107.3	118.6	109.3	96.3	112.8
Calcium	40.4	38.6	48.0	38.9	33.4	42.7	36.2	39.7
Phosphorus	84.9	84.7	97.0	82.4	80.9	87.3	76.9	84.9
Iron	83.7	81.4	90.6	81.8	79.3	86.3	75.8	82.8
Vitamin A	79.1	67.7	76.6	69.7	78.3	83.1	64.4	74.6
Thiamine	112.3	104.6	120.2	105.4	103.8	116.8	100.3	109.2
Riboflavin	100.0	91.9	109.1	93.9	94.2	101.3	89.3	97.5
Niacin	84.0	87.8	94.8	80.8	89.2	87.5	74.5	85.5
Vitamin C	93.6	84.7	85.4	95.8	75.9	98.7	96.2	90.1

Source: Aekplakorn *et al.* (2011a)

3.3 Priorities in current national nutrition policy and action plans

NCDs are the priority public health problem for Thailand. The National Economic and Social Development Board (NESDB) along with all related ministries and organizations, such as the Ministry of Agriculture and Commodities (MOAC), Ministry of Public Health (MOPH) and Ministry of Commerce (MOC), developed the “Thailand Healthy Lifestyle Strategic Plan 2011-2020”. This Plan recognized that of the current major public health challenges, NCDs were mainly due to lifestyle changes. This strategic plan also included HM the King’s Sufficiency Economy Philosophy, which emphasizes local food production for household food and nutrition security, with only surpluses being sold.

The National Health Commission under the National Health Act (2007) is another national mechanism focusing on public policy regarding major health problems. The Commission brought the issue of overweight and obesity to the National Health Assembly in 2010. The aims were to raise public awareness of the issue’s importance, to promote appropriate behaviours and to strengthen the health monitoring and surveillance system. Action plans centred on six key issues: (i) promote breast-feeding and healthy diets, (ii) control the marketing of food for children, (iii) raise public awareness about the risks of obesity and overweight through public communication, (iv) promote physical activities, (v) strengthen health services and programmes to mitigate problems associated with overweight and obesity, and (vi) strengthen an overall system to address and monitor obesity and overweight, as well as a system to evaluate related programmes. The action plans requested for urgent implementation included traffic light Guideline Daily Amounts (GDAs), applying tax and price policies to unhealthy foods, and controlling the marketing of energy-dense and unhealthy foods targeted at children. The proposed action plans created social awareness, but they have yet to be fully implemented.

The Bureau of Nutrition, MOPH (2010-2013), has developed the most recent national nutrition policy. This policy clearly mentions three nutritional challenges, namely, (i) obesity prevention, (ii) IDD prevention and monitoring, and (iii) optimum development of Thai children. The activities corresponding to such policies are public campaigns and promotions, guidelines for actions and development, monitoring and surveillance, nutrient supplementation and food fortification (Table 6). Concepts for campaigns and promotions are designed to fit with new lifestyles, while also promoting the benefits of traditional Thai dishes.

Since most public health budgets in Thailand have been decentralized to local authorities to fund specific activities, the MOPH’s budget for public campaigns and promotion activities also requires additional funding support. On its part, the National Health Promotion Foundation is an example of a large funding agency that obtains 2% of excise tobacco and alcohol taxes. Currently, this agency supports the national campaign and other health promotion activities for overweight and obesity reduction. Many countries and international agencies recognize this mechanism as a best practice.

For food production, the MOAC has had a food security policy and strategy emphasizing adequate and sustainable food supplies for domestic consumption. Foods must be accessible to and affordable by all population groups at all times. Nonetheless, the MOAC cannot drive this policy by itself. It requires close collaboration with other ministries, such as the MOC. Food production and stocks must be sufficient enough to result in food supply stability and sustainability. In addition, post harvesting food processes must be further developed for greater efficiency and effectiveness in order to reduce food loss and waste, which could be up to 35% (Gustavsson *et al.* 2011). Agriculture zoning is also a new high priority policy for managing agricultural areas for food and non-food production.

Many organizations are involved in implementing food and nutrition activities in the country under the NFC. Within this context, the SFFM is being implemented by three committees namely, (i) food security, (ii) food quality and safety, and (iii) linking food, nutrition and health. The NFC and these three implementing committees, along with related task forces and working groups, have involved all related stakeholders from different disciplines and professionals to work together harmoniously on the SFFM. Table 7 shows examples of activities performed under the committee on linking food, nutrition and health under the NFC.

Table 6 List of activities included in the National Nutrition Plan developed by the Bureau of Nutrition, Ministry of Public Health (2010-2013)

Obesity Prevention
<ul style="list-style-type: none"> ○ Healthy Thai Province: No Big Belly ○ Healthy Thai menu for Thais ○ 2:1:1 Thai dishes (vegetables : rice : meat) ○ Diet and Physical Activity Strategy (DPAS)
Iodine Deficiency Disorder
<ul style="list-style-type: none"> ○ Cyclical monitoring of urinary iodine in pregnant women ○ Appropriate IDD surveillance system ○ Increase household coverage of iodised Salt, ○ Nutrition promotion in poverty zone ○ Campaign on International Iodine Day ○ Fortified fish sauce
Optimal Growth Development of Thai Children
<ul style="list-style-type: none"> ○ Breastfeeding policy and promotion ○ Essential nutrient supplementation for pregnant women ○ Dietary diversification campaign on problem nutrients (greater consumption of fruit and vegetables and iron rich diets, use of iodised salt and seasoning sauces, etc.) ○ Healthier food choices for kids

Source: Ministry of Public Health (2013)

Table 7 Examples of activities performed by the committee on linking food, nutrition and health under the National Food Committee

<ul style="list-style-type: none"> ○ Standards and indicators for nutrition and NCDs
<ul style="list-style-type: none"> ○ Food-based dietary guidelines for different age groups
<ul style="list-style-type: none"> ○ Food, nutrition and dietetic education for different age groups
<ul style="list-style-type: none"> ○ Increase fruit and vegetable consumption
<ul style="list-style-type: none"> ○ Reduction of sugar, sodium, and fat in diets
<ul style="list-style-type: none"> ○ School-based food and nutrition
<ul style="list-style-type: none"> ○ Community-based food and nutrition programme to promote healthy nutrition and healthy people while controlling and preventing obesity and related NCDs
<ul style="list-style-type: none"> ○ Annual national survey for nutrition status and NCDs
<ul style="list-style-type: none"> ○ Food and nutrition management during crisis

Source: The minutes of the first meeting of the committee on linking food, nutrition and health under the National Food Committee (2012)

IV. Methods

This study employed documentary and qualitative research methods. Documentary research involved compiling and synthesizing secondary data from agriculture, food systems, health and nutrition sectors. Special attention was made to issues related to national agriculture and food system policies and strategies that can impact on nutrition. The qualitative research used in-depth interviews as well as a questionnaire survey to obtain information from key informants who are stakeholders from government, NGOs, research institutes and funding agencies. After data collection and analysis, a public forum was held to share and discuss the study's findings. Finally, outputs and consensus from forum participants were documented as lessons learned on nutrition-sensitive agriculture and food systems in Thailand.

4.1 Documentary research

Data sources: Thailand's situation was analyzed historically and focused on issues relevant to the policies and strategies of agriculture, food systems, health, nutrition, dietary transition, food security, etc. Research data were derived from annual government reports, chronological statistical reports, research reports, fact sheets and proceedings. In addition, relevant documents or data used in this study came from FAOSTAT, the National Health Examination Survey Office, the Thai Food and Drug Administration, the Bureau of Nutrition, the National Statistical Office, the Office of Agricultural Economics, the National Bureau of Agricultural Commodity and Food Standards, and the Institute of Nutrition at Mahidol University.

Data management: Data were collected, analyzed and synthesized based on the study's objectives and the report structure suggested by the UNSCN. Matrices containing data sources, year of events (or publication) and identified aspects were generated. Data from each source were entered into each matrix chronologically.

In addition several relevant headings/issues were added to the report, such as the community-based programme and research to support national food policies, with the aim of sharing Thailand's experiences with readers. The research team convened regular meetings on an almost every other day basis to discuss all aspects of data management. Attention was given especially to lessons learned and recommendations. Since the team leader has had extensive and active involvement in Thailand's food, nutrition and health development since 1974, as a teacher, researcher and planner (of the FNP, the PAP and the SFFM), his experience and insight were integrated into this report.

4.2 Qualitative research: In-depth study and questionnaire survey

The qualitative approach was undertaken using in-depth interviews and a questionnaire survey. The main aim was to gain insights into the perceptions and actions of policy-makers and planners from relevant sectors and organizations in performing their roles and responsibilities. Those sectors and organizations included agriculture, nutrition and health, commerce, education, food industries, research institutes and NGOs.

Key informants: In Thailand, the stakeholders who are involved in nutrition-sensitive agriculture and food systems are known individuals. In this instance, the research team purposively

identified the key informants amongst this group. These stakeholders came from 13 agencies as noted in Annex 3.

Tool: A questionnaire and an interview guide were generated according to this study's scope and objectives. It contained issues on personal information of the key informants, their sectors' goals, visions, policies and strategies, policy implementation, budgets, inputs and outputs, outcomes, threats and opportunities. The questionnaire and interview questions are shown in Annex 4.

Interviewer: The interviewer was a media writer with extensive experience (15 years) in conducting qualitative interviews on agriculture, food and health issues. Interview data were collected using digital recorders.

Data management: The recorded data were transcribed verbatim. Content analysis was used to analyze and interpret data. The findings are noted below, and they were used to support, expand upon and confirm evidence found from documentary research.

4.3 Public hearing on the research findings

A draft report was presented in a workshop to key stakeholders and national focal points from the Ministry of Agriculture and Cooperatives, the Ministry of Public Health and the Ministry of Commerce, as well as experts working in specific areas from academic institutes, food industries and NGOs. All comments were discussed, recorded and analyzed to derive ways to promote nutrition-sensitive agriculture and food systems. A policy implementation strategy was emphasized in order to strengthen agriculture and food systems that are conducive to nutrition and the well being of the Thai people.

4.4 Summary and reporting

The final report was revised after the public hearing. It focused especially on incorporating relevant views and recommendations that can strengthen agriculture and food system strategies and actions that, in turn, can impact on nutrition and well being.

V. Findings

This chapter discusses relevant frameworks, strategies, legislation, policy processes and implementation processes in agriculture and food systems that can impact upon diet and nutrition. It highlights key policy frameworks and interventions that have led to significant changes in Thailand's nutrition situation. Discussion centres on operational mechanisms, stakeholder participation, models of collaboration among various agencies, as well as on how policies, actions, mechanisms, and monitoring and evaluation can affect the nutrition and health situation of different population groups. It also discusses terminology, especially in terms of the food and nutrition security concept and how it can contribute towards understanding and integrating nutrition and nutritional considerations in pertinent policies and strategies.

5.1 Policy development and strategic framework

This section provides a brief background on policy development in Thailand, its current framework and strategies, mechanisms and programmes related to agriculture, food systems and nutrition. Relevant policy structural approaches, from national to ministerial levels, are presented, as well as terminology and concepts applied in integrating national efforts on food and nutrition security.

5.1.1 Terminology

The terminology used in official Thai documents on food security clearly stresses food security for all ages of population. As noted in the 2008 National Food Committee Act, '*food security*' is defined as "*each citizen has access to an adequate supply of food that is safe and nutritionally suitable for all ages. Food security also means that food supplies have suitable, balanced production cycles that are appropriate for the ecosystem and the natural resources needed for national food production under normal circumstances, as well as during natural disasters or terrorist attacks related to food*" (Thai National Food Committee 2012).

'Food security' as used in Thailand is concerned with the nutritional well being of all age groups, while also taking into account ecological and natural resources. This terminology is also similar to '*sustainable diets*' as defined by FAO (2012), that is, "*Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources.*"

The term "food security" has led to significant changes in food management and nutrition in Thailand, since it can facilitate integrating and guiding the efforts of all relevant agencies in a clear direction. The principle that "*each citizen has access to an adequate supply of food that is safe and nutritionally suitable for all ages*" has been seriously considered and incorporated into the SFFM and into practice. Major areas of concern are ensuring an adequate supply of nutritious and safe food; determining ways to produce and promote high quality and safe foods for consumers and for trade; and linking food, nutrition and health for nutritional well being. All working partners in various sectors accept this concept and apply it in their action plans. Moreover, the NFC's document on the SFFM also states clearly that the main vision is

“Thailand can produce safe and high quality food and have sustainable food security for the people of Thailand and the world.” This vision is far-sighted, since it supports producing food not only for the Thai people but also for people of the world, especially considering that Thailand is a world exporter of agricultural products, particularly rice, fruit and vegetables, as well as animal foods. Hence, Thailand has the vision and determination to be the kitchen of the world by providing nutritious and safe food globally. With this vision, food management initiatives have a long term purpose aimed at sustainability and abidance with internationally accepted standards.

The NFC Act also defined *“Food quality”* to mean that food has appropriate physical properties, compositional and nutritional value; *“Food safety”* means the management process required to make food and agricultural products safe for consumption without contamination according to food laws and other relevant laws; and *“Food education”* means researching, developing and promoting appropriate knowledge, awareness and behaviours associated with food production chain and food consumption. These definitions encompass the entire food-chain from the ecosystem and productive resources to consumption and nutritional well being. The SFFM covers all of these aspects. In addition, the term *“Nutrition security”* was introduced and used extensively in promoting and implementing the SFFM. Nutrition security conveys the meaning of nutritional well being for all and centres on sustainability by ensuring adequate consumption of energy, protein and micronutrients with adequate utilization of these nutrients in the human body. To communicate with the general public as well as all stakeholders, the term *“Nutrition”* is operationally defined as the link between food and health in fulfilling the energy, protein, vitamin and mineral requirements from food in human life cycle for well being and good health. In the Thai context, these terms and their definitions are compatible with the term *“Food and nutrition security”* as defined by the Committee on World Food Security (CFS) (2012) as;

“Food and nutrition security exists when all people at all times have physical, social and economic access to food, which is safe and consumed in sufficient quantity and quality to meet their dietary needs and food preferences, and is supported by an environment of adequate sanitation, health services and care, allowing for a healthy and active life.”

5.1.2 Agriculture and food policies and strategies

Nutrition-relevant agriculture and food policies and strategies can be categorised into two levels, namely, national and ministerial. The current agriculture and food policy and strategies which are referred to and analysed in this report are tabulated in Table 8.

Table 8 Selected policies and strategic frameworks for Thailand

Policy and Strategies	Timeframe
Agriculture and Food Policy and Strategies	
National level	
a) National Economic and Social Development Plan (NESDP)	2012-2016
b) Strategic Framework for Food Management in Thailand (SFFM)	2012-2016
Ministerial level	
a) Ministry of Agriculture and Cooperatives (MOAC)	
i) The Eleventh Agricultural Development Plan	2012-2016
ii) Strategic Framework for Food Security	2013-2016
iii) Agricultural Commodity and Food Safety Standards Strategy	2010-2013
b) Ministry of Public Health (MOPH)	
i) The Eleventh Health Development Plan	2012-2016
ii) Thailand Healthy Lifestyle Strategic Plan	2011-2020
iii) National Nutrition Plan	2010-2013
iv) Food Safety Strategy	2012-2016
c) Ministry of Industry's master plan	2010-2014
d) Ministry of Commerce	2013-2016
e) Ministry of Social Development and Human Security	2012-2016
f) Ministry of Education	
i) School Lunch Programme (SLP)	Annual plan
ii) School Milk Programme (SMP)	Annual plan
Secondary Policies	
a) Village and Urban Community Fund Act (2004)	-
b) Women's Development Fund (2011)	-
c) Research and development supporting the implementation of the SFFM	-

5.1.2.1 National level

The principal institutional policy and strategic framework that guide planning and define areas for national development for all related sectors are the National Economic and Social Development Plan and the Strategic Framework for Food Management.

National Economic and Social Development Plan (NESDP)

Thailand formally integrated nutrition in the country's fourth NESDP (1977-1981). However, significant improvement in nutrition began in the fifth NESDP (1982-1986) under the umbrella of the National Committee on Rural Development, which streamlined multisectoral efforts from the central government on down to provincial, sub-district and community levels. Emphasis was placed on local level implementation of action plans that focused on improving nutrition and BMN. In particular, the PAP considered malnutrition as a symptom of poverty and nutrition indicators were used for goal setting and for monitoring progress. The PAP included programmes on rural job creation, village development, provision of basic services and agricultural production. These programmes were targeted at high poverty-stricken areas. This initiative also employed community surveys containing BMN indicators to assess and analyze the nutrition situation, followed by the development of remedial actions that were implemented nationwide. PHC for all, particularly for mothers and children, began by training a cadre of village health volunteers and by providing basic public services, including improving basic sanitation and health facilities. These integrated implementation strategies led to significant, positive changes in rural development and people's quality of life. In addition, the FNP was implemented under the PAP and targeted vulnerable populations. Agricultural food production for improving nutrition under a subsistence economy, supplementary food for pregnant mothers and community-based complementary food for infants and young children were emphasized, resulting in a marked reduction in the prevalence of underweight among underfives in rural communities (Tontisirin, Kachondham and Winichagoon 1992).

An ACC/SCN report (Gillespie *et al.* 1996) based on data from National Nutrition Surveillance noted that Thailand rapidly improved its nutrition situation in the 1980s, and especially during the first half of the decade (1982-1986) when the overall rate for mild, moderate and severe malnutrition dropped rapidly from 50.8% to 26.0%. This report also mentioned that this information was in agreement with that obtained from other sources, which concluded that the rate of nutrition improvement in Thailand during 1982-1990 was remarkable. It was one of the fastest improvement rates observed in the world. This improvement appears to be the result of the government's emphasis on rural development since the fifth NESDP and its willingness to allocate resources to it. For example, the share of PHC in the MOPH budget increased from 49% in 1981 to 55% in 1988 (Gillespie *et al.* 1996).

According to FAO's estimates of undernourishment from 1990, Thailand has made significant and continuous progress in reducing the number of people affected by hunger as shown in Table 9. This positive trend is also supported by a shift in the policy direction since the eighth to the current eleventh NESDP (2012-2016), which took a more human-centred development approach under the guiding principle of HM the King' Sufficiency Economy Philosophy. This developmental direction promotes household food security and holistic development. Health and

nutrition, basic public services, together with socioeconomic development, have been emphasized in national policy frameworks.

Table 9 Number of hunger and malnutrition during the period from 1990 to 2012

Period	Number of hunger and malnutrition around the world (millions) (%)	Number of hunger and malnutrition in Thailand (millions) (%)
1990-1992	1000 (19%)	25 (44%)
1999-2001	919 (15%)	12 (20%)
2004-2006	898 (14%)	7 (11%)
2007-2009	867 (13%)	6 (10%)
2010-2012	868 (12%)	5 (7%)

Source: <http://www.fao.org/hunger/en/>

The highlight of the eleventh NESDP with regard to agriculture and food systems is the integration of the SFFM into the plan. The eleventh NESDP with its 'food security' strategy advocates for a balance between food, animal feed and energy plant production, as well as the efficient utilisation of production resources through various initiatives, such as the expansion of irrigation and water facility construction. People's participation and stakeholder involvement at all levels are promoted. Natural resource management for sustainable agricultural production is also a focus, in addition to information systems and research.

Strategic Framework for Food Management in Thailand (SFFM)

A significant step in food management occurred in 2008 when the National Food Committee (NFC) Act was enacted to address national food management in all dimensions and all levels. It was the first time that the country had an authorized agency to integrate the works of over 10 agencies and over 30 Acts relevant to the food-chain. The NFC is a high-level legitimate forum that allows multisectoral cooperation and stakeholder participation. The Prime Minister or a designated deputy Prime Minister chairs the NFC. Committee members are experts from relevant organizations, including 11 ministries and four executive administrators. The NFC is responsible for proposing national policy frameworks and strategies as part of a master plan for food management. The Cabinet approved the SFFM in 2010 and it was integrated into the eleventh NESDP thereafter.

The principles underlying the establishment of the SFFM centred on: (i) serving as a guideline for relevant agencies to generate their work plans; (ii) encouraging inter-sectoral participation; (iii) increasing capacity to integrate operations; (iv) undertaking a risk assessment based on scientifically sound evidence; and (v) promoting sustainable benefits for the country.

Process development entailed reviewing relevant national and international food strategies and related research, as well as conducting a SWOT analysis to formulate the SFFM, which covers the entire food-chain at all levels, from household to national, on the basis of linking agriculture and food systems with nutrition and health as shown in Figure 9 and 10. The linkage of agriculture with a safe and nutritious food supply is shown in the "food-chain approach" in Figure 10. The concept encompasses nutrition considerations, starting from basic issues to outcomes, from agricultural production requiring proper land use, to water management, the genetic resources of plants and animals, as well as the prevention and control of plant and

animal diseases. Good agricultural practices (GAPs) as well as good hygienic practices (GHPs) and good manufacturing practices (GMPs) are also essential in ensuring a safe and nutritious food supply.

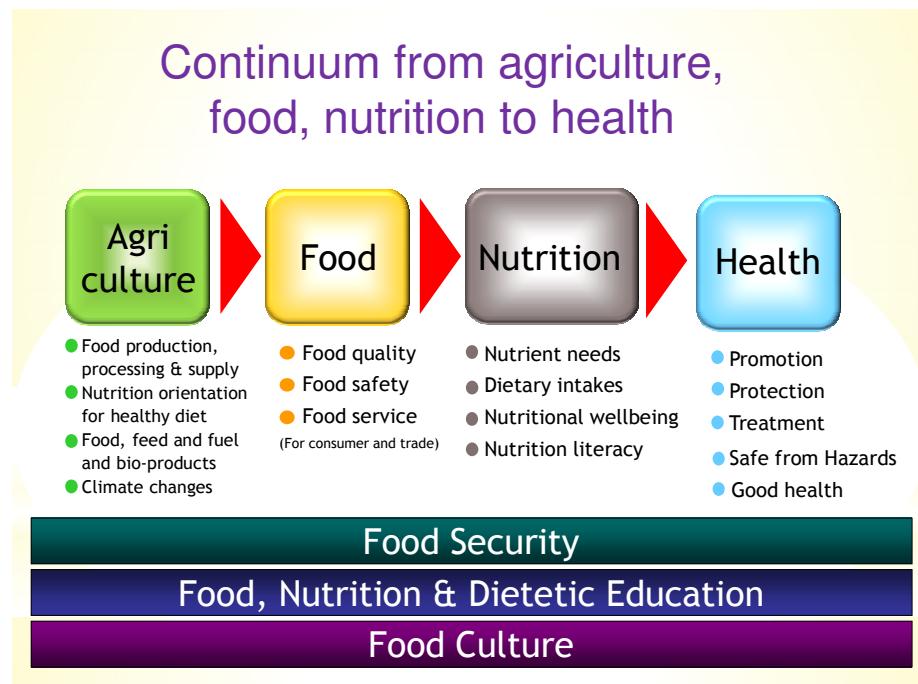


Figure 9 Continuum from agriculture, food, nutrition to health
Source: Thai National Food Committee (2011)

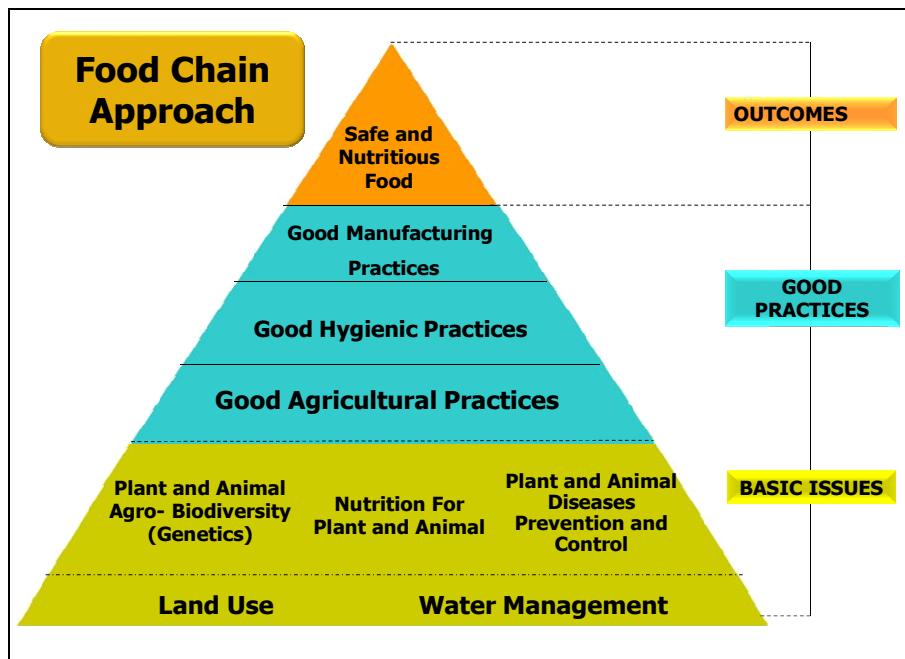


Figure 10 Food-chain approach
Source: Thai National Food Committee (2011)

The SFFM comprises four themes: (1) food security, (2) food quality and safety, (3) food education, and (4) food management.

- ***Theme 1: Food security***

This first strategic theme aims to ensure food security at national, community and household levels, which will then be the basis for nutrition security. This theme also stresses managing the agricultural production resources that are required for efficient food production, with participation from all sectors. The 10 major strategies under this theme are as follows.

1. Accelerate land reformation and agricultural area protection (4 measures)
2. Manage water and land resources for agricultural and community forests (3 measures)
3. Balance food crop and energy crop production (3 measures)
4. Improve food production efficiency (3 measures)
5. Create motivation for agriculture as an occupation and increase the number of young agriculturalists (7 measures)
6. Promote food access at household and community levels (5 measures)
7. Develop and improve logistical systems for agriculture and food production (4 measures)
8. Create collaboration between governmental agencies, the private sector and the Thai people regarding food security protection (4 measures)
9. Research and develop technologies and innovations at every step of the food production process (5 measures)
10. Create an emergency plan for food security during crisis situations (3 measures)

The process of promoting food security from natural resources to production and access is shown in Figure 11. Zoning for food and energy crops, improving production efficiency for safe and high quality food, promoting food access by communities and households, as well as conducting research and improving logistics for food distribution systems are areas of importance.

The promotion of household food accessibility can be achieved by encouraging local people to grow local crops of high nutritional value and to raise local fish and animals in order to create a local “food bank,” which can also be used in emergency situations. This agricultural practice follows HM the King’s Sufficiency Economy Philosophy. Emphasis is placed on local land use to attain household self-reliance on food. The government and local authorities provide support to strengthen household food security and to respond to the nutritional needs of Thais of all ages. Surplus food production after consumption is supplied to the market to generate income.

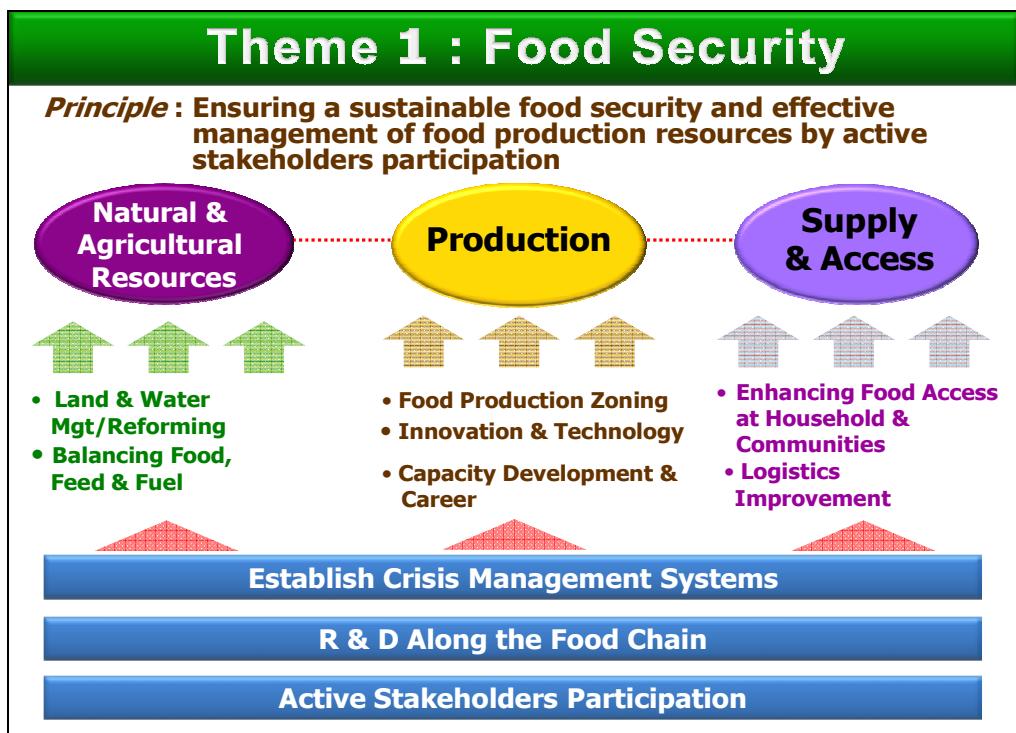


Figure 11 Strategic Theme 1: Food Security

Source: Thai National Food Committee (2011)

- **Theme 2: Food quality and safety**

This second strategic theme entails ensuring food production standards at community to food industry levels (Figure 12). It aims for the production of high quality, safe foods to protect consumers' health and facilitate domestic and international trade. Thematic strategies include the following.

1. Standardize food safety and promote implementation (3 measures)
2. Improve the production of primary food products to meet quality and safety standards and increase their nutritional value (5 measures)
3. Support and oversee food production at the community level to prevent losses and increase product value (6 measures)
4. Support and oversee food production at all industrial levels (4 measures)
5. Promote the trade and marketing of standard products from community and industrial levels (7 measures)
6. Strengthen control and monitoring mechanisms for national food quality and food safety (8 measures)

Initiatives under this theme include: (i) promoting research on breeding and disease control for plants, animals and other resources to increase their quality and nutritional value and (ii) promoting GAPs and increasing the number of farms using GAPs through knowledge transfer, as well as through support for healthy agricultural practices, such as bio-agriculture or organic agriculture as well as the Integrated Pest Management system.

To prevent food and nutritional losses and increase value, food preservation and processing practices are promoted through research and best practices, such as GAPs, GHPs, GMPs and Hazard Analysis Critical Control Points (HACCP). Moreover, there is a need to strengthen food control and monitoring systems for food quality and safety, from primary food production, to small and medium community enterprises, and on to large-scale industry. Food quality and safety assurance systems are required for both domestic and export foods to ensure consumer protection and facilitate food trade.

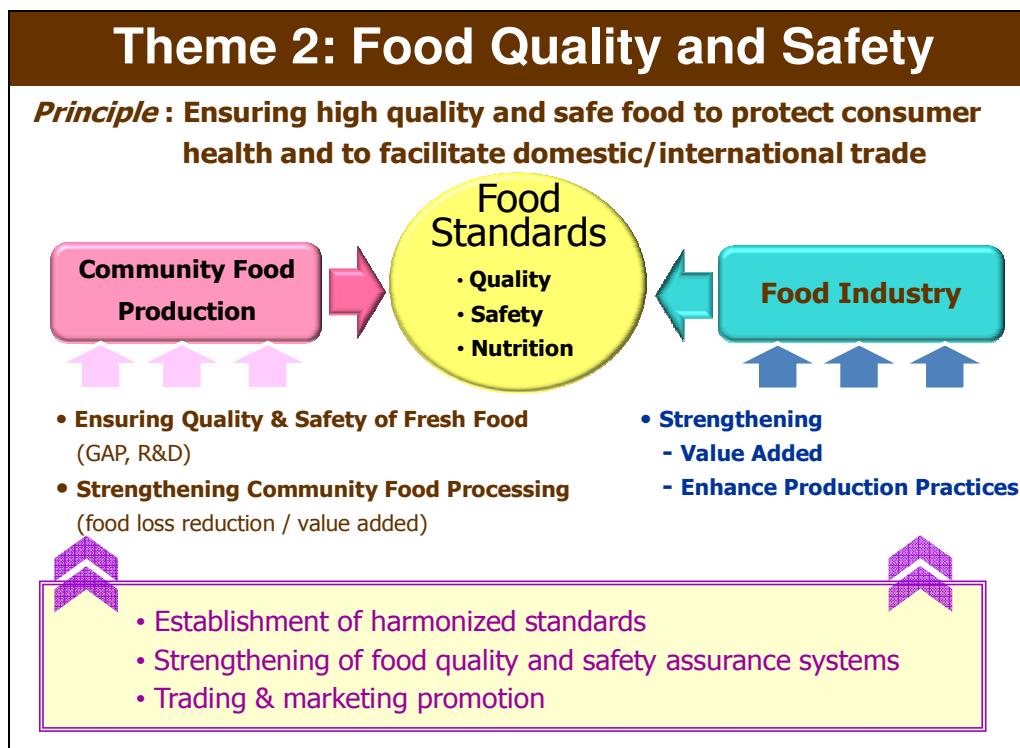


Figure 12 Strategic Theme 2: Food Quality and Safety

Source: Thai National Food Committee (2011)

- **Theme 3: Food education**

This third strategic theme focuses on knowledge and research promotion, the utilization of research for awareness raising, as well as resource management for food production and desirable consumer behaviours. Its principle of knowledge management from production to output is shown in Figure 13. The theme's major strategies include the following.

1. Promote collaboration and integration of all agencies involved in food education (3 measures)
2. Support applied food research (3 measures)
3. Create knowledge management in food education and promote continual knowledge dissemination (3 measures)
4. Promote appropriate food education among agriculturalists and communities (3 measures)
5. Promote appropriate individual and community consumer behaviours (5 measures)

One of the key strategies under this theme, and implemented by the MOAC, is to promote “Food educators or Smart farmers.” This group is defined as those persons who are proficient at their jobs, who have adequate knowledge and information for decision-making on food production and marketing, who are responsible for consumer safety and are cognizant of social and environmental concerns, and who feel proud to be good farmers. Moreover, developing suitable consumer behaviour indicators with regard to nutrition and health are also emphasized.

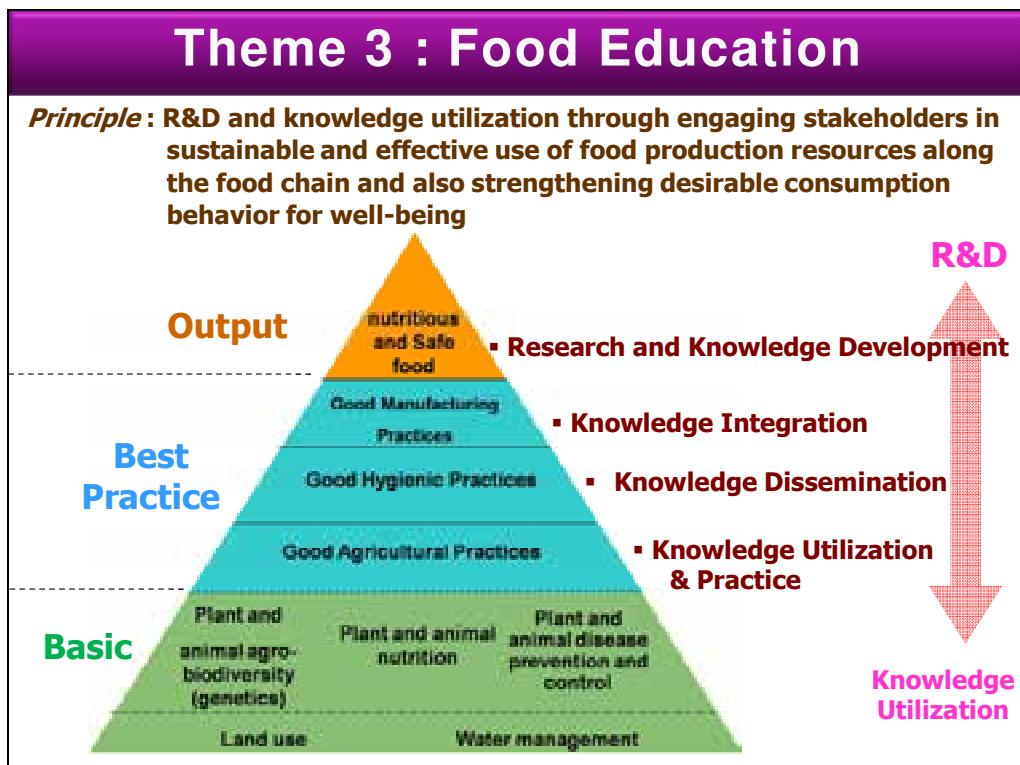


Figure 13 Strategic Theme 3: Food Education

Source: Thai National Food Committee (2011)

- ***Theme 4: Food management***

The fourth strategy aims at systematic improvement in the nation’s food-chain during normal times and crisis situations. Key areas under this strategy are shown in Figure 14.

1. Improve and strengthen the structure of involved organizations (5 measures)
2. Develop and improve laws related to the food production chain (3 measures)
3. Improve database and management (4 measures)

Food management can be achieved by: (i) strengthening the organizational structures of involved sectors and developing networks and cooperation among them, (ii) improving relevant laws and regulations and their enforcement within the food production chain, as well as (iii) improving database management and reducing gaps in national management. In addition, capacity development and decentralization of authoritative, monitoring and evaluation systems are required. However, a major challenge in managing the food system at a national level is that many issues need political decisions before they can be addressed. To facilitate decision-making,

the SFFM emphasizes harmonization, coordination and facilitation among key sectors with participation from academia, the private sector and NGOs to achieve the Framework's objectives.

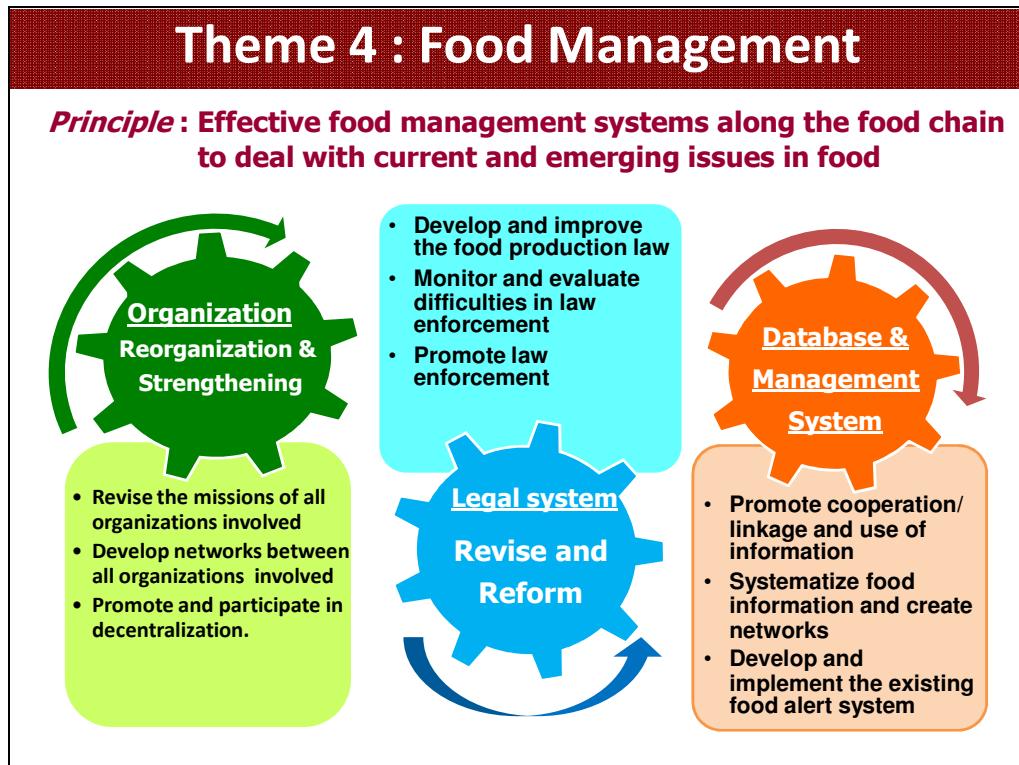


Figure 14 Strategic Theme 4: Food Management

Source: Thai National Food Committee (2011)

Expected outcomes of the SFFM

1. Thailand has resources for efficient and sustainable food production and supply.
2. The agricultural community has strong food production capabilities, as well as a sound economic foundation and justified management system that can create income within local and national markets.
3. Consumers have access to good quality and safe foods of high in nutritional value in terms of both domestic and imported products.
4. Thailand has a good and effective food management system that can respond to any situation, both in normal and in crisis circumstances.
5. Consumers have confidence in Thai food products, which can facilitate their promotion based on the prevailing culture and their nutritional value, as well as broaden the market opportunities for such products.

Implementation of the SFFM

Three committees are implementing the SFFM, namely, a committee on food security throughout the food-chain, a committee on food quality and safety, and a committee on linking food, nutrition and health. Each committee implements key SFFM issues; for example, zoning and smart farmers; research and services in the food production system; management and

control systems for chemical substances used in agriculture; strengthening inspection and certification throughout the food-chain; integrating a food safety control system at national, provincial and community levels; and nutrition education and communication to increase fruit and vegetable consumption, together with decreasing the intake of sugary, salty and fatty foods. Nutrition indicators related to undernutrition, overnutrition and related NCDs will be used in community-based programmes, in workplaces and schools to prevent DBM and NCDs.

5.1.2.2 Ministerial level

Relevant Ministries have integrated the NESDP and the National SFFM into their action plans and operational guidelines to cover food security, food quality and safety, as well as linking food, nutrition and health. This section focuses on policies of the MOAC and the MOPH, which are the two main agencies overseeing the food-chain and consumer protection.

The Ministry of Agriculture and Cooperatives

The strategic policy and frameworks related to nutrition-sensitive agriculture and food systems under this Ministry are:

- I) The eleventh agricultural development plan, 2012-2016
- II) Strategic framework for food security, 2013-2016
- III) Agricultural commodity and food safety standards strategy, 2010-2013

The purposes of these policies are to increase agricultural productivity to meet domestic and international food demands, to ensure national food security, to develop quality and safety standards for agriculture and food products for consumer protection, to sustain natural resources, and to improve the quality of life of farmers.

I) The eleventh agricultural development plan, 2012-2016

This plan is aligned with the eleventh NESDP and the SFFM. The Ministry has several visions, namely, farmers experiencing a good quality of life, the Thai people achieving food security, and agriculture being a source of the country's income. The plan consists of three main strategies.

Strategy 1: Promote the quality of life of farmers

The approaches under this strategy include stabilizing jobs, income and welfare security for farmers; rehabilitating severe damage caused by natural disasters; encouraging farmers to be self-reliant and to be smart farmers; encouraging a new generation to be farmers; as well as supporting agricultural institutes and networks in policy development so the ministerial plan's actions can be implemented at the community level.

One of the highlights of this strategy is strengthening farmers to become "Smart farmers". The concept is that smart farmers should be proficient in all aspects of agriculture and competent in their work. They require support in terms of knowledge and information on what they are producing. It also entails persuading them about the importance of consumer safety as well as social and environmental friendliness (Box 1). Towards this end, they are supported by smart officers who have a wide knowledge of agriculture and related aspects, who are able to apply know-how and new technology to farming, and who can lead farmers towards a green economy or zero waste agricultural initiatives. In addition, initiatives exist that focus on strengthening

household food security by encouraging farmers to undertake sustainable agriculture and family farming and utilizing food waste as biogas material.

Box 1: Policies to develop “Smart farmers”

The Ministry has a policy to develop smart farmers, who are defined as those who have knowledge on what they produce in terms of both supply and demand. They have sufficient information for planning and decision-making. They also are concerned about consumer safety as well as showing social and environmental responsibility. They have skills for product and market management, as well as being proud to be farmers.

Some smart farmers already exist locally, such as those with local wisdom and senior farmers. However, the policy still needs to develop more new smart farmers, such as those from the young generation who have little information or experience.

Policy movement mechanisms entail: establishing a working committee, promoting communication and understanding among related agencies, recruiting smart farmers, undertaking an agricultural development plan, building partnerships between all sectors, developing smart farmers along a farmer life path, conducting monitoring and evaluation on smart farmers, and awarding distinguished smart farmers as good models. There is also a need for information centres that link data from all related sectors in order to conduct provincial production zoning and the application of information technology to develop and upgrade the entire supply chain (from farm to market). After all, smart farmers will produce high quality agricultural products that are environmentally friendly and will, in turn, earn sufficient incomes.

Strategy 2: Increase efficiency in production, management and food security

The purposes of this strategy are to strengthen the agricultural structure, develop and improve the quality of agricultural products and food, and promote agricultural research for development to enhance food security. The important initiatives are:

- Promote food and energy security by balancing production between food crops and energy crops. Policies involve determining agricultural zoning for suitable commodities as well as promoting agricultural research and development.
- Promote green production, green technology for agriculture, recycle and reduce agricultural waste, implement GAPs, as well as organic farming and chemical reduction. In addition, there are policies to disseminate knowledge and information related to the impact of climate change in order to reduce carbon emission.
- Research and development for value-added agricultural products, i.e. crops, fisheries and livestock, with diversification and quality improvement along the entire food-chain.
- Enhance good quality and safe production; policies need to reduce food loss and waste, promote food safety and standards throughout the supply chain, and encourage farmers to produce in compliance with the standards, as well as appropriate food utilisation and value creation.
- Develop agricultural trade and logistical systems to support economic growth.

Strategy 3: Efficiently develop and balance agricultural resources for sustainability

This strategy focuses on the efficient use and management of sustainable production resources and infrastructure (i.e. soil, forest, water and bio-diversity). The initiatives involve developing water resources, increasing water reservoirs and irrigation areas, rehabilitating fishery resources, and improving land use and soil quality for agriculture, as well as conducting risk assessments and preparing to tackle areas at risk of flooding and drought due to climate change and natural disasters.

The eleventh agricultural development plan thus provides a wide range of agricultural development directions that can be used to guide the actions of departments within the Ministry.

II) Strategic framework for food security, 2013-2016

In order to achieve the vision of “Thailand can produce safe and high quality food and have sustainable food security for all”, this framework’s strategic theme was developed based on the concept of food security as defined by FAO (2009), i.e. food availability, food access, food utilization and food stability. Consequently, the main strategies are as follows.

Strategy 1: Produce adequate food for sustainable domestic demand

With the aim of having adequate, safe and nutritious food, in terms of both domestic and/or imported products, this strategy involves increasing productivity, developing production infrastructure, minimizing the effects of climate change, enhancing the role of farmers’ organizations in food production, and encouraging investment in the agricultural sector.

Strategy 2: Encourage all Thai people at all times to access good quality, nutritious food

Achieving the target of food access requires facilitating local production and self-sufficiency, restoring the food reserve culture at the household level, facilitating food logistics within the country, promoting a social safety net for vulnerable groups, and supporting preventive measures so as to be prepared for crisis situations.

Strategy 3: Enhance good quality and safe food production, reduce food waste and promote appropriate food utilization

The major areas under this strategy are: promoting food safety and food standards throughout the food-chain, enhancing consumer access to nutritious foods, reducing food loss and waste in the supply chain, and developing an agricultural database system with access channels to sources of information.

Strategy 4: Promote sustainable use of natural resources for food production

This strategy focuses on the importance of supporting sustainable resource management through participatory approaches and allocating land for farmer ownership including land tenure rights for sustainable use.

III) Agricultural commodity and food safety standards strategy, 2010-2013

This strategy has the vision of “Establishing agricultural commodity and food standards and safety for all”. It emphasizes developing standards for the safety of agricultural products and

food, aiming for consumer protection, market and trade competition, and enhancement of demand-driven initiatives, including integration of operations. The main strategies are as follows.

Strategy 1: Develop quality agricultural products, e.g. crops, fisheries and livestock

The initiatives in carrying out the plan are: (i) select target products using an area approach to develop quality standards within an agricultural safety zone for both pre- and post-harvest; (ii) create a network model that connects farmers, manufacturers and distributors to ensure quality standards and prices; and (iii) develop and establish a production structure pattern focusing on enhancing the potential of Small and Medium Enterprises (SMEs).

Strategy 2: Encourage entrepreneurs to implement safety standards and compliance

The initiatives under this strategy entail: (i) promoting opportunities for small farmers to abide by the standards through advocacy and group certification; (ii) supporting farmers who are prompt to implement and to comply with the standards; (iii) promoting GAPs implementation and encourage GAPs volunteers in agricultural areas through capacity building, such as training and an internal group control system; and (iv) establishing a certified body and farm auditors supported by the government.

Strategy 3: Research and development for high quality food products and their markets

This strategy's initiatives focus on research and development to increase the value of target products along the supply chain, from farm to market. In addition, agricultural and food products that are certified as Q products, or quality products, are promoted together and linked to markets, such as green markets and modern trade markets.

Strategy 4: Create a food education system and standards to support information, promote education and improve communication methods

This strategy highlights the importance of food education and a knowledge management system. The initiatives involve providing knowledge to all relevant people in the food-chain, strengthening their understanding of and commitment to implementing food safety standards, as well as upgrading the quality of food.

Strategy 5: Ensure confidence in Thai agricultural commodities and food product standards

This strategy's initiatives emphasize: (i) developing a food system monitoring mechanism; (ii) improving the certification of laboratories; (iii) creating a rapid alert system for unsafe agricultural products, food and feed products; and (iv) encouraging SMEs to implement a traceability system, including promotion of closer cooperation amongst relevant agencies.

The Ministry of Public Health

The MOPH is directly responsible for nutrition and health related issues. It determines nutrition and health policies and strategies, develops health service and health management systems, promotes nutrition and health, controls and prevents diet-related NCDs, and strengthens food safety and quality control systems. Under the MOPH, the government's public health policies aim to invest in healthcare services and enhance capacity building; to provide health promotion measures aimed at reducing the morbidity, mortality and impact of NCDs; to strengthen public health volunteers' potential; and to improve the quality of life of all age groups, including

vulnerable groups and the disadvantaged. Moreover, a national health information monitoring system exists that assesses the situation of target groups in order to formulate evidence-based development guidelines.

The MOPH's major strategic policies and frameworks related to nutrition and food systems are:

- I) The eleventh Health Development Plan, 2012-2016
- II) Thailand Healthy Lifestyle Strategic Plan, 2011-2020
- III) National Nutrition Plan, 2010-2013
- IV) Food Safety Strategy, 2012-2016

I) The eleventh health development plan, 2012-2016

Thailand's health partners have adopted the eleventh Health Development Plan as a national guideline, which is aligned with the eleventh NESDP. It has a vision of "all people being in good health and together building a fair and sufficient health system, leading to a healthy society". Its principle is to develop plans under HM the king's Sufficiency Economy Philosophy with good governance and the participation of all sectors. The Ministry's main policies are: to strengthen health partners and self-reliance in health based on Thai wisdom; to develop a monitoring and response system, especially for disaster management and major health risks; to encourage health promotion, disease control and prevention, as well as consumer protection; to strengthen and standardize the health service system to respond to the needs of all target groups; and to strengthen a national mechanism to regulate health services and develop a resource management system.

II) Thailand healthy lifestyle strategic plan, 2011-2020

The Ministry's 'Thailand Healthy Lifestyle Strategic Plan', launched in 2012, provides overall guidance for achieving a healthy Thai life based on HM the king's Sufficiency Economy Philosophy and a moderate life path. The project emphasizes the risks of today's changing lifestyles and unhealthy eating habits that contribute to overweight, obesity and NCDs (modern life-style diseases). It promotes a sufficiency lifestyle, balanced diet, physical exercise and suitable emotional management. There are strategies to develop Thai healthy lifestyle communities, prevention of NCDs, alliance building for public policy, etc.

III) National nutrition plan, 2010-2013

Thailand's national nutrition plan promotes a healthy diet for all age groups and consists of three main areas: (i) obesity prevention, (ii) iodine deficiency prevention and control, and (iii) the optimal growth and development of Thai children.

The first strategy responds to the nation's rising rates of overweight and obesity. Policies focus on a balanced diet for each age group. Work plans receive support and the cooperation of other health agencies, such as provincial health offices and local government organizations (LGOs) that conduct behaviour change campaigns. The national mechanism for the second strategy is the National Committee for IDD Prevention, which contains four sub-committees that work to eliminate IDD. The third strategy includes measures to facilitate healthy child growth and development, such as promoting breastfeeding; providing supplementary food for pregnant women, complementary food for infants and young children; and the implementation of FBDGs

together with encouraging greater consumption of vegetables and reduced consumption of foods high in sugar, fat and salt.

In responding to NCDs, the Ministry has strengthened cooperation for public policies on “less sweet, fat and salty diets to prolong life.” In addition, it promotes health and nutrition in all hospitals under the Ministry through, for example, healthy menus and encouraging consumers to purchase agricultural products that are certified as Q-products from organic farms. Moreover, a project on ‘nutrition suitable for all ages’ was launched for infants, preschool and school-aged children so they have sufficient nutrition for their growth and development as well as creating a suitable environment in day care centres and schools.

Most nutrition initiatives within the MOPH are under the Bureau of Nutrition, Department of Health (DOH), which is currently considering not only stressing sufficient nutrition, but also food quality and safety.

IV) Food safety strategy

One of the Ministry’s missions is food safety and quality control. The main policies entail defining food standards, as well as regulating and monitoring national food safety for consumer protection. Its operations include: law enforcement, system development to control and standardize food products in line with relevant laws, monitor and examine product standards, conduct research to gain new knowledge for consumer protection, and encourage related agencies to fully participate in consumer protection.

According to the food safety strategic plan (2012-2016) framed by the Thai FDA, policies operate under a vision of “safe and nutritious food”. Systematic monitoring and enforcement as well as database development are strengthened. The four main strategies are: i) law development and standardization, ii) monitoring and enforcement based on risk inspection, risk communication and risk assessment systems, iii) database development with an efficient Management Information System (MIS), and iv) knowledge management and development to raise awareness among all involved sectors/groups along the food-chain.

Two main departments oversee food safety: the Thai FDA and DOH. The Thai FDA regulates processed foods before and after delivery to the market. It is charged with developing appropriate, up-to-date guidelines and regulations that meet international standards. Moreover, the Thai FDA must study and implement action plans for developing the nation’s food safety system and for using information technology to network with food related agencies at central and provincial levels. In addition, mobile food safety units provide rapid responses and are able to access all areas. These units play an important role in consumer protection by inspecting product safety and updating rapid surveys and in consumer education by disseminating and communicating knowledge and information through activities and campaigns.

The DOH is in charge of food services and supporting programmes for food safety and quality; for example, promoting sanitation, clean food with good taste, and clean markets concerned with environmental health. The DOH also promotes safe, quality drinking water, especially tap water, and also plans to develop a standardized system for sanitary management for LAOs.

With regard to iodine deficiency disorder, the Universal Salt Iodization (USI) policy was enacted in 2010. It is a compulsory regulation aimed to alleviate the country's persistent IDD situation that has existed for over the past 10 years. Pregnant women and infants are especially at risk. The USI is implemented under a National Master Plan. Its approaches entail:

1) providing iodine supplementation (pills) to pregnant women, screening for the thyroid-stimulating hormone among newborns and providing immediate care, if needed, and ensuring that young children and adults receive enough iodine based on their age level; and

2) law enforcement for iodine fortification in salt that is used for human consumption and salt used in producing food products. The legal status of salt was changed so as to be a highly controlled food product. This change allows the Thai FDA to control products at production premises. By the new notification, all salt for human consumption is required to be fortified with iodine at 20-40 ppm (formerly ≥ 30 ppm without upper limit), except for salt used for making fish sauce, soy sauce, chemically-hydrolyzed soy sauce and brine for cooking (imitated fish sauce). These sauces are allowed to be fortified with iodine in the final product, not in salt before fermentation or the production process, in order to avoid iodine loss during production, transportation and warehousing. Consequently, the fortified products are of better quality, which makes them more acceptable to major key players and food industries. Thailand's approach to the USI is quite unique. However, quality assurance and monitoring of the iodized food products remain as major challenges for the Thai government and industries.

Apart from these initiatives, other voluntary approaches that help reduce and prevent micronutrient deficiencies are implemented as well. For example, iron, iodine and vitamin A have been fortified in instant noodles.

In addition to these major policies and strategies there have been several activities in nutrition education, information and communication as well as activities to support community capacity buildings.

Nutrition Information, Education and Communication (IEC) plays a vital role in consumer protection in Thailand. Policies related to knowledge management as well as holistic food and nutrition promotion involve all parties at all levels (organizational, local, national, international). Policies also exist to apply information technology to monitor the nutrition situation of the entire nation. The aim is to create a knowledge centre on agriculture, food systems and nutrition in order to promote good agricultural and manufacturing practices, along with dietary behaviours and healthy consumption practices. The development of indicators and standard systems for monitoring and operations must have the support of all stakeholders, such as communities, LAOs, and public and private networks. The main aim is to encourage people to realize the important role of food and nutrition in health. An important part of this is capacity building for LAOs, schools, child care centres and communities, including all networks, in developing positive nutrition behaviours. The policy aims to promote FBDGs in child care centres, kindergartens and schools. Children are monitored in terms of their nutrition status, such as weight and height. Moreover, various IEC measures are also implemented such as nutrition programmes to raise public awareness. For instance, nutrition labelling for processed foods and energy value declaration in food services help raise public awareness on the importance of energy and nutrient intake. Currently, certain foods for children and food products that make nutrition claims are mandated for nutrition labelling. The guideline daily amount (GDA) is

currently the nutrient profile mandated for snack foods in Thailand. The recommendation statement “consume small amounts and exercise more” is required to be displayed on labels. Education for food safety programmes includes a school-based programme on “Young Food and Drug Administration” for consumer protection in all secondary schools under the Ministry of Education (MOE) and Bangkok Metropolitan Administration (BMA). The programme was later expanded to private schools and networks as well as being promoted through community and local government participation to raise awareness on food safety and food quality.

In addition, policies exist on undertaking research and development through academic institutions as well as training entrepreneurs in technology and quality control of production and distribution of healthy food. Nutrition campaigns for all ages emphasize eating the right diet, such as eating more than 400 g of fruit and vegetables at each meal, and eating less sweet, fatty and salty foods. Other policies encourage the public to learn about good nutrition for healthy living.

Government-supported area-based approaches are supporting a health volunteer network in food safety and nutrition in order to reach the unreached. PHC promotion policies continue to be the main focus as well as supporting in solving animal diseases to human, especially in emergency case such as bird flu, since Thailand contains approximately one million village health workers who also serve as community health educators. The role of women in the community health worker network has also increased as the ratio of women to men increased from 1.5:1 in 1987 to 74:26 or 3:1 in 2009 (Sukkumnuerd 2010). The Department of Health Service Support promotes health at the community level using the PHC strategy and links with local networks. Nutrition and health supports include: i) village health volunteers who provide basic knowledge and health care and who monitor the health situation, ii) a sub-district health plan that covers 24 issues related to food and nutrition, such as food safety and diet-related diseases (i.e. diabetes and high blood pressure) as well as campaigns for behavioural change, and iii) health management villages that have community health plans and are allocated budgets for health promotion and related activities in the community. On-going policies aim for villagers to continue taking care of their health and to make positive behaviour changes. One aim is to draw on the lessons learned from villages that have successfully made behaviour changes aimed at reducing nutrition-related diseases (i.e. cancer, high blood pressure, cardiovascular), as well as to promote knowledge management and raise public awareness.

Other Ministries

In addition to the MOAC and MOPH, other ministries also play a role in supporting food and nutrition in line with their organizational guidelines, work plans and strategies. Some of these works may link vertically within their respective Ministries, while others require cooperation with other Ministries.

One objective of the Ministry of Industry’s (MOI’s) master plan (2010-2014) is to promote Thai food in terms of its quality and nutritive value. This Ministry is also working to standardize Thai food internationally, with the expectation that over half of food production factories in the country will be guaranteed by international standards. The Ministry’s vision is for Thailand to be a world leader in the food industry. The Ministry’s strategies also include value creation in the food

industry through research and development; upgrading agriculture and food production standards for quality and safety; raising consumer awareness on food safety and standards; and increasing competitiveness within the food industry.

The Ministry of Commerce (MOC) plays a role in terms of food prices and distribution. It monitors the fluctuation in food prices so as to ensure that low-income or disadvantaged groups are not adversely affected. The MOC also monitors the behaviours of entrepreneurs so that they do not take advantage of or harm consumers. The Ministry is involved in regulations and law enforcement in the trade and distribution process to ensure fair trade and food accessibility, especially among low-income households. In addition, the MOC designs consumer protection measures and works to raise public awareness. Along with the MOI, the MOC also takes part in the national policy on “Thailand: Kitchen of the World”.

The Ministry of Social Development and Human Security (MSDHS) supports the nation's welfare system to disadvantaged groups, helping them to full their basic needs, including food. Food can be provided to vulnerable groups, especially during crisis situations. This Ministry thus supports human security at all levels, including ensuring food security to needy people, especially disadvantaged and vulnerable groups.

The MOE provides basic nutrition education and promotes a healthy diet among students by integrating relevant knowledge into regular courses and subjects. In particular, the Department of Elementary Education is in charge of the SLP and SMP that provide nutritious food and milk to students. School teachers, as well as parents, are encouraged to monitor the growth of students and participate in nutrition and growth promotion activities. Moreover, some food and nutrition projects are being transferred from the MOE to LAOs.

5.1.3 Secondary policies

Apart from primary policies, Thailand also has secondary policies implemented by other partners that indirectly support food and nutrition. Many of these secondary policies aim at community development and income generation and may provide resources for supporting household food security and the health of family members. Examples include the Village and Urban Community Fund Act (2004), the Women's Development Fund (2011) and specific social protection policies, such as universal health care coverage.

National research organizations have also created an alliance for food research and development, which is an integral part of the SFFM. The term “*food education*” used in the SFFM means researching, developing and promoting appropriate knowledge, awareness and behaviours associated with the food production chain and consumption. Key strategies in food education include support for applied food research, creating knowledge management on food and facilitating continual knowledge dissemination, promoting appropriate food education among agriculturalists and communities, encouraging appropriate individual and consumer behaviours, and promoting collaboration and integration of all agencies involved in food education. In addition to the four thematic areas under the SFFM (food security, food quality and safety, food education and food management), research into expanding opportunities for food production, supply and marketing in the ASEAN Economic Community (AEC) is emphasized.

The National Research Council and other research funding agencies, which have been working together to promote and support national research agendas, have agreed to provide five million USD to support the food research issues noted below as research priorities in 2013-2014. The Agricultural Research Development Agency (ARDA) is charged with managing these issues. The research findings will be disseminated and used to support the implementation of the SFFM. Specific research issues with nutrition objectives have been identified under the food education theme, which includes strengthening desirable eating behaviours in both rural and urban settings.

The priority food research issues are as follows.

1. Opportunities and linkages with AEC in the food production and supply chain

- Food marketing research in the AEC
- Food production and supply, investment and logistics in Thailand and other ASEAN countries
- Business models for each major food product
- Efficient/effective approaches for food distribution/marketing in the AEC
- Policies, measures and regulations to strengthen investment and trade in the food sector
- Information technologies (IT) for improving food trade logistics

2. Food security

- Management and innovative technologies for increasing food productivity in small-scale farming
- Early warning and surveillance systems for specific food issues and food insecurity
- Adoption of the sufficiency economy (SE) principle for strengthening farmer job security
- Potential food products to meet Geographical Indicators (GI) criteria
- Mechanizations for food production and supply
- Strengthening agricultural communities, cooperatives and SMEs for sustainable growth in food production and supply
- Good Agricultural Practices (GAPs) for high quality and safe food production employing environmentally-friendly agricultural technology
- Life cycle assessment of food crops/animals and carbon/forest/water footprints and clean technologies at farm and industrial levels
- By-product management at farm and industrial scales
- IT and innovative management for improving logistics in the food value chain

3. Food quality and safety

- Utilization of herbs in controlling diseases in plants, livestock and fish
- Rapid and practical tests for additives and chemicals in foods
- Strengthening quality assurance and food safety surveillance at local and national levels
- Risk assessment of certain foods for consumer protection and trade
- Functional ingredients in herbs, fruits and vegetables and mechanisms of physiological actions
- Development of herbal drinks for health promotion
- Strengthening high quality and safe food production in the food production and supply chain

4. Food education

- Food and food products for different age groups and patients
- Mechanisms and functions of specific food components
- Conservation and utilization of local plants and animal foods for biodiversity and food culture
- Strengthening desirable eating behaviours at household and community levels in rural and urban settings

5. Food Management

- Early warning system and National Single Window in the food-chain
- Capacity development needed in food and agro-food industry
- Government and academic support in providing regulations and technologies to business sectors for domestic and international food trade

5.2 Analysis of the nutrition-sensitivity of agriculture and food policies and frameworks, including budgets and outcomes

Policy analysis can be undertaken in terms of content and process. Policy content must respond to the national situation and challenges at particular periods of time. Thailand's current situation is more complex as nutrition challenges have changed from undernutrition to DBM with rising rates of overnutrition and NCDs. Food management has become a critical issue for the country and its aim to improve the production of high quality and safe food, and to link agriculture, food, nutrition and health for food security and nutritional well being. The NFC and the SFFM act as umbrellas to further integrate multisectoral efforts from the national level to local level implementation. These changes have impacted the country's entire food management system in terms of policy content and working processes. Moreover, many more aspects of nutrition are being addressed under current policies compared to previous ones, which also requires strengthening collaboration between the government, academia, the private sector and NGOs.

Thailand has undertaken many agriculture and food policies and programmes that are nutrition-sensitive as well as impacting on diet and nutrition outcomes. Policies start from the production side of the food-chain as shown in Figure 10 and continue to cover the consumption side as shown in Figure 15 to ensure that consumers receive safe and nutritious foods that can lead to optimal nutrition and health. Figure 10 and 15 show the pathway of linking agriculture, food systems, nutrition and health. The key elements show a line from policy implementation in promoting and regulating food from the supply chain to service or market places, to consumption by people, and to measurement of the outcomes and impacts on nutrition and health.

In agricultural production, policies promoting smart farmers and smart officers cover the issues of land use and resource management, as well as good practices for producing nutritious and safe food. From supply to consumer demand, food distribution channels involve many sectors in charge of food quality and safety at service points and market places. Regulatory mechanisms enforce food standards and laws and provide knowledge to the public for consumer protection.

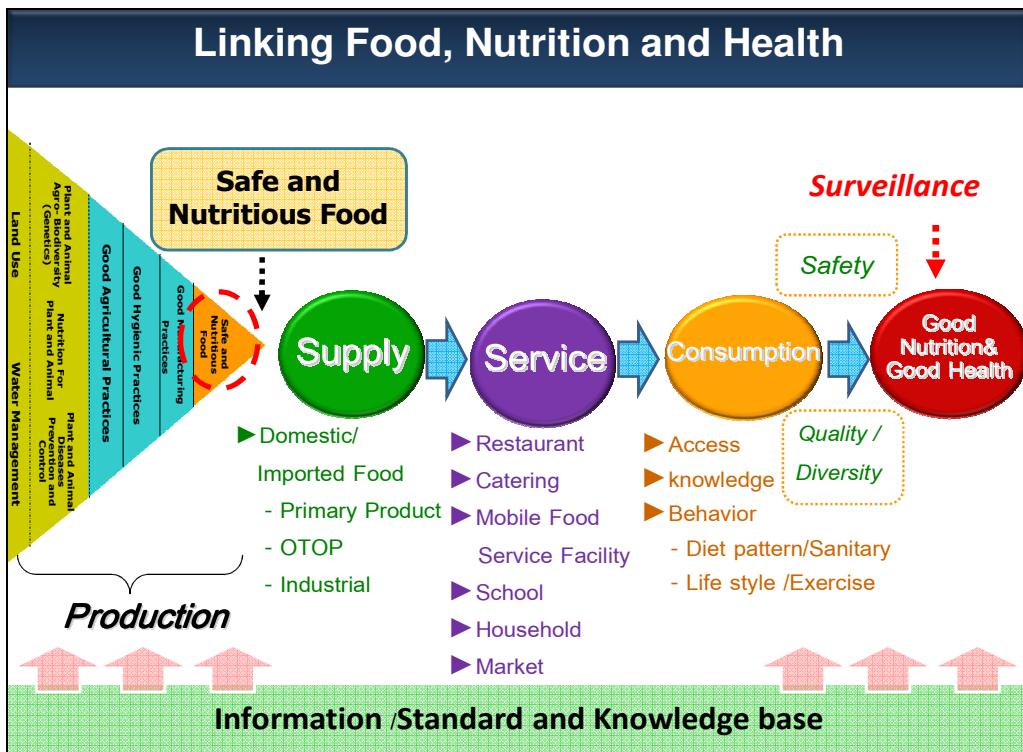


Figure 15 Linking Food, Nutrition and Health

Source: Thai National Food Committee (2011)

Agricultural production for food security relates to land allocation and ownership. It also involves motivating farmers to develop their own lands and increase production in an environmentally-friendly manner. The current agricultural policy to allocate more land to farmers has the potential to increase food security and good agricultural practices and to improve the country's nutrition situation. In addition, the current government policy on agricultural land zoning can improve productivity and the management of specific agricultural products. Furthermore, there is a policy to increase irrigated areas for agriculture, which can help to ensure an adequate water supply for agriculture and to prevent flooding. In addition to information technology, policies exist that facilitate research to develop proper genetic resources for plants and animals to increase productivity and to respond to changing climate conditions.

Since Thailand is currently facing DBM, diet-related NCDs and overnutrition, several policies under the MOPH provide services in prevention and control as well as in the treatment of these conditions. However, the health sector cannot work in isolation to achieve its mission of preventing and controlling these nutritional challenges. Hence, the NFC is a platform for multisectoral agencies to work together with academia, the private sector and NGOs using the SFFM as the guideline for food and nutrition security and for socioeconomic development.

5.2.1 Policy-supported programmes to enhance food and nutrition security

Policies mean nothing unless they are turned into effective programmes that improve nutrition and health. In addition to the above policies and programmes, the Thai government and allied organizations have implemented many other policy-based programmes to enhance food and

nutrition security. Each of these is tied to specific public health, nutrition and national development policies and frameworks of the Thai government, especially in terms of the NESDP and SFFM, and its Ministries as noted above.

Mobilization of village health volunteers

Under the MOPH and the country's PHC system, Thailand's village health volunteer strategy continues to be an important mechanism for connecting local people with health services. During the 1980s, this strategy was instrumental in alleviating maternal and child malnutrition. Health care personnel and community leaders selected each volunteer based on a sociogram, with one volunteer being assigned approximately 10 households. The volunteers were trained for 2-3 weeks on basic health issues, nutrition, care practices, basic sanitation, etc. Their main roles included: health communication, including nutrition; encouraging mothers to attend ANC and young children to take part in GMP and immunization; and interacting with and assisting local health service providers to deal with emerging health challenges. Several other success stories in public health in Thailand have involved these volunteers, such as family planning, the control of HIV/AIDs and the elimination of Avian Flu. Currently, they are being mobilized to prevent and control obesity and NCDs.

Local health staff supervise community health volunteers on a 1- to 2-month basis, or more often if an emergency arises. This supervision builds capacity in problem-solving, legitimates the roles of volunteers and is a forum for providing continuing education and information on health and nutrition. Outstanding volunteers have been recognized and have received awards at district, provincial and national levels depending upon the competition criteria. All volunteers receive certification after training. They and their families receive free medical services. Since 2009, the government has provided a monthly payment of 20 USD to each volunteer. Currently, there are one million volunteers working in Thailand's communities. They can easily reach out to women who have the main role in caring for their families, in preparing food and in bringing about positive nutrition outcomes. Although these volunteers are general health educators for all community members, women and children can receive special support, along with other related health programmes. They can also follow-up on vulnerable groups, such as pregnant mothers, infants and young children, as well as patients with NCDs.

Food-based dietary guidelines (FBDGs) and the nutrition flag

The Thai government, in collaboration with academic and private sectors, developed the nation's FBDGs and a nutrition flag in 1996 and 1998, respectively. They were designed in an easy-to-understand communication format for consumers, similar to other countries' efforts, such as the MyPyramid developed by USDA and the Eatwell Plate of UK FSA. The FBDGs recommend maintaining proper weight and eating a variety of foods from each of the main five food groups, while the flag is considered as a quantitative part of FBDGs and provides a food guide model as described in Annex 2. The guidelines and the flag have been used as nutrition education tools for disseminating accurate food and nutrition information and for promoting desirable eating behaviours among the Thai people at national to community levels and across multiple channels (Sirichakwal *et al.* 2011). In addition, the private sector has displayed the FBDGs or nutrition flag on some food labels.

Nutrition labelling

In 1998, the Ministry of Public Health implemented nutrition labelling on a voluntary basis, except for food products that make nutrition claims. The nutrition labels clearly aim to inform consumers about the nutritional value of specific foods in order to prevent under- and overnutrition and related NCDs. The format of Thailand's "nutrition fact" is similar to that of the US Food and Drug Administration, which is rather complicated for Thai consumers. While consumers are aware of nutrition labelling, its outcomes and impacts in changing their purchasing and consumption behaviours are still to be evaluated.

Food fortification

Food fortification and its policies aim to prevent micronutrient deficiency and to restore or add nutritional value to food products. Thailand has both voluntary and compulsory programmes for food industries to implement. However, there is still a need for collaboration among academia, food industries, food regulators and other sectors to work together to explore the benefit of food fortification to correct micronutrient deficiencies. For IDD especially, the country's situation still lags behind the targets set by MOPH, though the IDD control programme has been placed as a high priority policy. Universal Salt Iodization has been implemented vigorously and with good outcomes under the National IDD Control Committee, which uses regulatory measures along with monitoring iodized salt quality, conducting IDD surveillance by measuring UIC in pregnant mothers and children, as well as conducting research and public communication and education campaigns. Inter-sectoral collaboration among agencies (health, agriculture and cooperatives, industry, commerce and local administration) and the private sector has been constructive.

"Thai people have no big belly" campaign

The objective of this campaign is to raise awareness on rising trends in overweight and obesity and their consequences (NCDs), as well as to encourage the public to monitor their health by checking their WCs. This campaign was well-received by the public. The cut-off values for healthy WCs for males and females are less than 36 and 32 in, or 96 and 90 cm, respectively. The promotion of desirable eating practices and increased daily physical activity are also a part of the campaign. Funding for this on-going campaign comes from the Health Promotion Foundation.

Sweet enough network

The sweet enough network was established by a group of dentists, paediatricians and public health workers in the Ministry of Public Health's Dental Health Division. Its aims are to raise awareness on the harmful health consequences of rising sugar consumption and to lobby for regulations to reduce added sugar in food products and to control of the availability of sugary beverages. This network has been successful in banning sugary carbonated beverages in schools and in ensuring that infant and follow-up formulas are free from added sugar.

Campaign for regular exercise and physical activity

Since 2009, the MOPH has conducted various national campaigns that promote regular exercise or physical activity. Several public and private organizations have also adopted this concept. Public areas for exercise have been arranged in many workplaces and communities.

Most local authorities have allocated budgets for these activities, especially for the elderly. This campaign seems to be quite successful, especially at the community level and in workplaces.

The above examples are policies, programmes and projects that aim to improve Thailand's nutrition situation. Main sources of funding come from responsible government agencies, such as the MOPH (i.e. DOH and the Thai FDA) with additional support coming from other organizations, such as the Thai Health Promotion Foundation, the National Health Commission, and research organizations. The National Research Council and research funding agencies in agriculture and health have as their priority to allocate budgets for food research as specified in the SFFM. In addition, FAO has provided funding to the Office of Agricultural Economics, in cooperation with the National Statistical Office, to conduct a project on "Analysis of Food Security Statistics in Thailand" in order to update the country's food security situation.

Based on responses to this study's questionnaire and interviews, many other agencies are conducting programmes or projects on food security, food safety and nutrition within their strategies and responsibilities. Although some may not focus directly on nutrition, they relate indirectly through food security, food quality and safety, control measures and health promotion. Officials from these agencies are aware of multisectoral initiatives and are willing to cooperate under the umbrella of the NFC in implementing the SFFM. Some officials indicated the need for additional budgets apart from their regularly fiscal budgets in order to ensure adequate coverage of their programmes.

The following three sections present school-based nutrition-sensitive programmes aimed at preventing undernutrition and at improving the nutritional status of school children in kindergartens and primary and secondary schools. These programmes are in line with Thailand's public health policies and the National Nutrition Plan in terms of ensuring optimal child growth and development.

5.2.2 Agriculture for school lunch project of HRH Princess Maha Chakri Sirindhorn

Since poor children living in remote areas had limited access to general government services, and were experiencing undernutrition, Her Royal Highness Princess Maha Chakri Sirindhorn initiated the "*Agriculture for School Lunch Project*" in 1980 (Box 2). This project originally aimed to address student undernutrition and to improve child education in rural remote schools, such as those along border areas under the authority of Border Patrol Police Bureau, Royal Thai Police and later in a number of schools under the Ministry of Education. Rather than provide students with ready-to-eat meals, Her Royal Highness introduced a small-scale integrated farm to schools and nutritious school lunches were prepared using agricultural products from the school farm. Each year the project reaches over 100,000 children both in primary and secondary schools in different geographical areas.

The national policy for SLP has adopted HRH's school lunch model and the Fund for School Lunches in Primary Schools Act was enacted in 1992 with the aim to provide financial support per student for nutritious lunch. Consequently, all students have currently received lunch on a daily basis.

Since this project was successful in preventing and controlling undernutrition in the remote schools, the BMA subsequently adopted it to promote nutrition and control and prevent DBM among its schools and students. In rural schools, the project's objectives also expanded to include life skills learning and holistic community development, as well as encouraging stronger school-community partnerships. The project also broadened its scope to cover the care of mothers and young children under three years, as well as the elderly.

The model of food and nutrition management in schools under HRH's guidance is an example of holistic development for schools in relation to their communities. The project started in border areas where regular public services were not able to reach marginalized communities. Thus, this project filled an important service gap. This project also serves vulnerable groups outside schools, such as pregnant women, infants and preschool age children. These persons can also receive nutritious lunches from community schools so they have sufficient nutrition suitable for each age level of development.

Outcomes

Appropriate nutrition and health indicators and tools for systematic monitoring are applied in this project. School teachers are trained to monitor the nutrition status of their students based on weight and height two times a year, at the beginning and at the end of each academic year. A manual was also developed as a quality control to help school teachers perform properly. Each student has a record and receives proper care; for example, underweight or stunted students receive extra eggs or 200 ml of milk daily. Through this project, the average prevalence of undernutrition in remote areas has steadily declined from around 40-50% 30 years ago to a current level of below 10% (Office of HRH Princess Maha Chakri Sirindhorn's Projects, 2010).

This school-based model of development, which links food, nutrition and health, can be applied in both rural and urban schools to facilitate learning and contribute to school kitchens. The schools can also serve as learning centres for communities regarding agriculture, post-harvest food processing, as well as food services. During the major flooding in Bangkok in 2011, some schools under the BMA undertaken the Agriculture for School Lunch project of Her Royal Highness were able to provide flood victims with shelter and food from school gardens.

In summary, HRH's project is a best practice that is geared towards sustainable food security and holistic human development with cooperation from all sectors at national and local levels. It is a good example of a nutrition-sensitive agriculture and food programme for schools. This project can narrow prevailing nutrition gaps, as it can reach disadvantaged groups along border areas as well as vulnerable groups in urban areas. It can also greatly lessen the problem of inequity, since it can reach vulnerable people in remote areas and needy communities.

Box 2: Her Royal Highness's Agriculture for School Lunch: A good practice for community holistic development

HRH Princess Maha Chakri Sirindhorn believes that adequate nutrition is essential for maintaining good quality of life, as stated below in her words:

"To me, nutrition is my special interest. Following Their Majesties the King and Queen throughout the Kingdom, I have seen undernourished children on many occasions, and I agree with nutrition experts that improving the nutritional status of our children is an important task which needs urgent attention from everyone. I believe we all agree that food is one of the most significant of our basic needs, and increased access to food, household food security and proper diets need to be given a very high developmental priority"

HRH Princess Maha Chakri Sirindhorn

FAO Regional Office for Asia and the Pacific, Bangkok, Thailand

October 20, 1992.

As most children living in remote and isolated areas often face food shortages and have no means to access other food sources, they are often trapped in a vicious cycle of hunger, malnutrition, illness and absence from school, thus preventing them from achieving their full growth and development. To help these children, Her Royal Highness initiated the Agriculture for School Lunch Project in 1980 to promote better nutrition and better health among children attending schools in remote areas where the problems of food and nutrition were severe. Her Royal Highness introduced a small-scale integrated farm to each remote school instead of providing children with ready-to-eat meals.

The initiative began as a school-based programme encompassing an area-based integrated approach. It later focused on holistic development, involving many other aspects of development, such as health, hygiene, education, vocational training, environmental conservation and cultural preservation. It also expanded its target group from school children to mothers and children as early as the beginning of life. It has reached the most vulnerable and marginalized children and has addressed not only hunger and malnutrition but also the issue of educational opportunity. The project ensures that children become well-nourished and healthy enough to learn and are fully equipped with the knowledge and skills needed for self-reliance.

Apart from disadvantaged children, the project's benefits have extended from schools to families and communities. Through school farms, children are encouraged to participate in food production for their own needs. Children are taught about techniques of vegetable and fruit production, with an emphasis on traditional vegetables and fruits; animal raising; harvesting, processing and preservation; techniques for water and farm management; etc. These activities provide an opportunity for children, teachers, community members and local officers, such as agricultural extension officers, agricultural home economists and health officers, to work together closely.

Agricultural diversity in farming is based on suitable local resources, product management, and the principle of cooperatives. Various types of food that are available all year round, can be sold through school cooperative shops to school kitchens as nourishing and safe ingredients for school lunches. Surplus products are also sold to communities. The income generated from these products goes into an agricultural revolving fund for use in the next production cycle. Children also learn how to keep accounts and how to run small businesses according to the cooperative principle. They also learn other life skills and gain positive attitudes towards producing safe and nutritious foods through sustainable agriculture using appropriate technologies and environmental management, which can be the basis for self-reliance in the future. Moreover, this initiative also strengthens relationships among schools, communities and local organizations.

A guideline for school lunch standards has been developed based on the value of essential nutrients and on one-third of the Dietary Reference Intake for Thais 2003 (DRI). In practice, the amount of recommended nutrients was simplified into types and amounts of food from the five food groups and then used in food-based menu planning. In addition, to prevent food-borne illnesses, the guideline also includes suggestions on how to prepare safe lunches and how to create a hygienic environment based on food sanitation standards. Personal hygiene practices are also emphasized. The school lunch services is a tool for children, parents, community members and school teachers to learn, practice and develop healthy eating habits in the long-run.

In addition, to increase the children's daily nutrient intakes, Her Royal Highness initiated a 'School Snacks' Project in the schools participating in her 'Agriculture for School Lunch' Project. With the assistance of local agricultural extension officers and communities, dry beans, such as soybean and mung bean, as well as fast growing fruit trees, like banana and papaya, have been planted in school farms and communities. Healthy snacks can be prepared in various ways from these plant products to serve the children at least one snack a day in mid-afternoon.

As a result of Her Royal Highness's work and dedication, schools are becoming effective settings for young people to access adequate and good nutrition, as well as to acquire knowledge and skills for healthy eating practices.

(Ref. *Building Good Nutrition: Foundation for Development, Thirty Years of Work by Her Royal Highness Princess Maha Chakri Sirindhorn*. First edition)

5.2.3 The school lunch programme (SLP)

Thailand's SLP was initiated several decades ago, but on a small-scale and with little impact on nutrition. The current nationwide SLP was implemented by law in 1992 with the aim of alleviating undernourishment among pre-primary and primary school students whose weight and height did not meet the MOPH's growth reference. In addition, it also is intended for students to begin learning about nutrition, so that eventually they will adopt desirable eating behaviours for good nutrition and health.

Funding and Support

In 1992, the Fund for School Lunches in Primary Schools Act was enacted with an initial budget of 6,000 million Baht. Since that time, the SLP has been actively implemented starting from kindergarten and gradually increasing in coverage using Fund resources and an additional regular government budget. The additional budget rose steadily as the numbers of students under the SLP increased. The SLP is operated under the "Fund for School Lunch in Primary School" Committee chaired by the Permanent Secretary of Ministry of Education. In 1998, the MOE and the MOAC worked together to provide sufficient lunches with support from the MOPH and Ministry of Interior. During 2003-2007, the MOE had a policy of cooperation between the Office of Elementary Education and Vocational Education to allow Agriculture and Technology Colleges to support school lunches in 1,200 elementary schools through agricultural education and practices in schools, using a budget from the Fund's interests and dividends of 37.3 million Baht. The SLP budget in 2010 was about 13,030 million Baht and covered about six million primary school students (Figure 16).

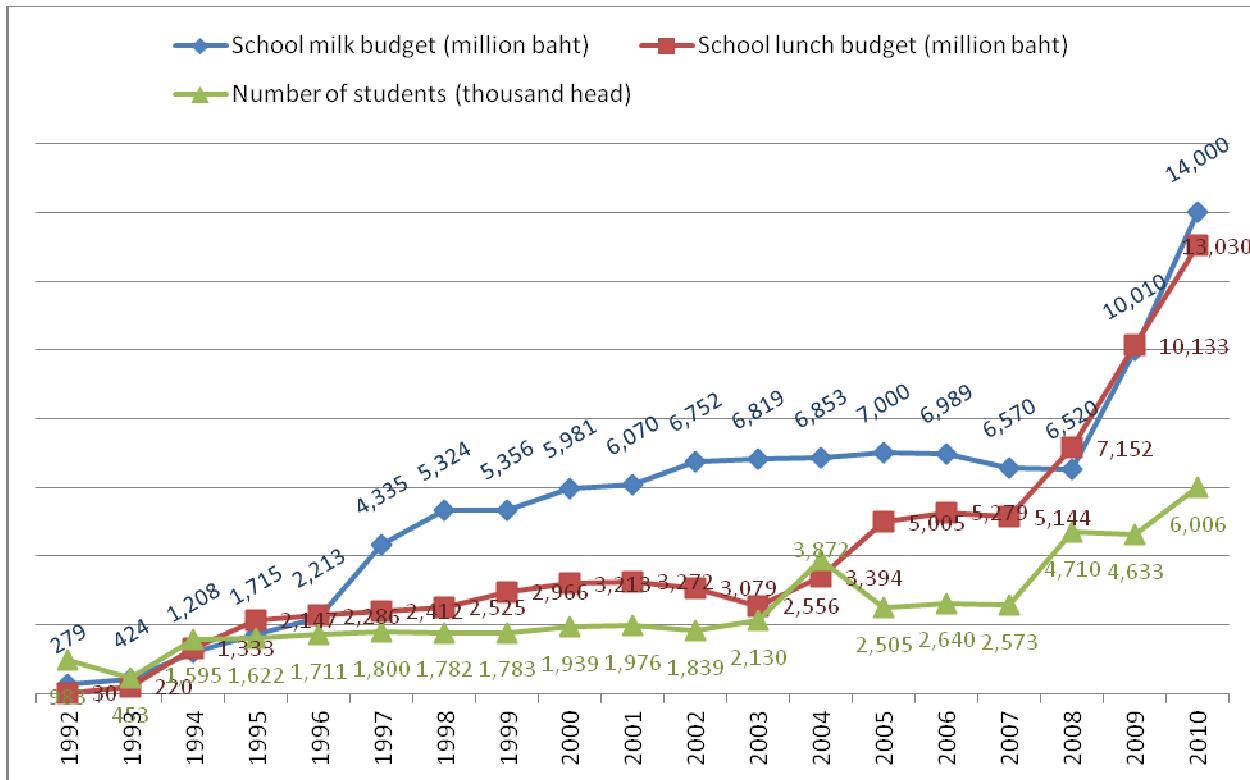


Figure 16 Budget for school lunch and school milk

Source: School lunch fund, Office of Basic Education Commission

In 2001, SLP administration was transferred to LAOs. The LAOs could add their own budget together with the allocated budget from the 'Fund for School Lunch' in order to bring the highest benefit to children in their local areas. There is also a monitoring and evaluation system, including indicators on nutrition and health benefits for students. The current annual budget is calculated at a cost of 13 Baht per student per day, which may be insufficient if meal costs increase overtime. The estimated cost to provide a quality lunch may be 20 Baht per child per day. LAOs have been asked to provide additional, incremental budgetary support for the SLP.

Outcomes

This project, along with other related projects, has had good outcomes in terms of reducing undernutrition among students and providing them with important life and livelihood skills, such as school gardening, basic personal hygiene and food hygiene. Currently, the SLP has expanded its objective. It focuses not only on alleviating undernutrition and promoting growth and development. It also centres on integrated development for life, wherein students learn how to raise both plant and animal foods using sound agricultural, food and nutrition knowledge, as well as a holistic learning process. The lunch menu is subject to quality control in terms of nutrition and food safety. School personnel have been trained in nutrition, dietetics and food services. Weekly school lunch menus, or in some cases monthly menus, are planned using locally available, seasonal foods as well as foods produced from school gardens. Schools have sufficient lunches of good nutritional value for their students throughout academic year, in line with MOPH's growth criteria and policies. As a result, the percentage of undernourished students reduced significantly from 15% in 1995 to 8% in 2009 (Mo-Suwan 2011).

However, some challenges remain with regard to the SLP, such as adequate human resources in nutrition and dietetic education, food services management, systemic monitoring and evaluation, and the active participation of parents and communities.

5.2.4 The school milk programme (SMP)

The Thai government launched the national school milk programme in 1992 with full budget support. The programme's original objective was to provide 200 ml of milk to improve the nutritional status of primary school students, as well as to create milk demand for the local dairy industry. It also aimed to develop a milk drinking habit among children and youth to improve their physical and intellectual development, since milk is a good source of energy, protein, calcium, vitamin B2 and other essential micronutrients.

The SMP is literally called the supplementary school milk programme and supports the SLP. At the beginning, the SMP covered kindergarten children and then gradually expanded in coverage to Grade 6 in 2009. The programme currently covers all kindergarten children and primary school students. Thailand's FBDGs support the SMP, since these guidelines recommend that the Thai people drink milk of appropriate quality and quantity for one's age. Pregnant women, school children, adults and the elderly should drink one to two glasses of milk daily.

A National School Milk Committee was established to manage the SMP, with the Dairy Farming Promotion Organization (DFPO) serving as the secretariat. The DFPO is responsible for managing the supply of milk and ensuring milk distribution to schools. From 1992 to 2000, the Office of National Primary Education purchased milk for the school programme. Since 2001, in line with general school fund allocation, this programme's administration was transferred to LAOs. These organizations now receive a budget from the Ministry of Interior for schools. There has been regional zoning for the production and supply of milk to schools under a tripartite agreement between LAOs, schools and milk suppliers. Currently, UHT milk is also provided to students at home during the school holiday seasons (FAO 2011).

The SMP is an example of the inter-sectoral linkage between education, agriculture, industry, local administration and health. Dairy farm and processing industries have grown significantly after this programme due to the increased demand for milk. Initially, school milk was produced from imported milk powder which supplied mainly by private dairy industries. But over time, a large number of dairy cooperatives with processing facilities became the main suppliers of school milk; more than 80% of raw milk outputs are from cooperatives (FAO 2011). Moreover, numbers of milk cows and milk production have increased significantly and steadily since 1990s (FAOSTAT 2011). The MOPH has been involved in setting milk standards and the quality control of milk, as well as in developing and establishing nutrition indicators for monitoring the nutrition and health of school students.

Coverage and Budget

The SMP is now an integral part of the Thai dairy industry, accounting for almost 37% of domestic raw milk production. In 2010, the programme covered about 8.4 million students, who had a milk supply for 260 days, with a total budget of 14,000 million Baht (DFPO n.d.). Figure 16 shows the SMP budget covering increasing numbers of student overtime.

Outcomes

FAO statistical (FAOSTAT) data show an increase in annual milk consumption per capita by school children from 24 litres per year in 1992 to 52 litres per year in 2009. Although there are not many systematic studies on this programme's impact on nutrition, a study by the Institute of Nutrition, Mahidol University, noted a reduction in child malnutrition in schools from 18% in 1992 to 5% in 2006 along with increases in average height (Jabbar and Ahuja 2011). These changes result from several nutrition-related programmes, particularly the SLP and SMP. In addition, Inthivorn (1998) conducted a study among kindergarten students attending primary schools under the administration of the border patrol police general headquarters. These schools were also implementing the SLP and SMP. The study's results revealed that these children had a significant increase in weight and height at a level of 2.9 kg and 3.9 cm per year. Moreover, data reported in the Thai Children's Health Survey Report in 2008-2009 noted that from 1996 to 2009, the average height per year of children aged 2-12 years increased approximately 4 cm annually (Mo-Suwan 2011). These findings indicate that increases in height among kindergarten children aged 3-5 years rose to an optimum level of around 4 cm annually due to the SLP and SMP. Increases in height of older aged students were fairly adequate, since they were more self-reliant in eating. In addition, a series of nationwide data from health and nutrition surveys in children indicate clearly a marked reduction in stunting, from 9.7% to 6.3%, and underweight, from 12.9% to 4.8%, among children under five years of age during 1995-2009. However, the prevalence of overweight and obesity rose from 5.8% to 8.5%, as shown in Figure 17 (Mo-Suwan 2011). This Figure also reflects a continuum in Thailand's successful reduction of maternal and early childhood malnutrition since 1982. The SLP along with the SMP has thus contributed to reducing child malnutrition in kindergartens and primary school students.

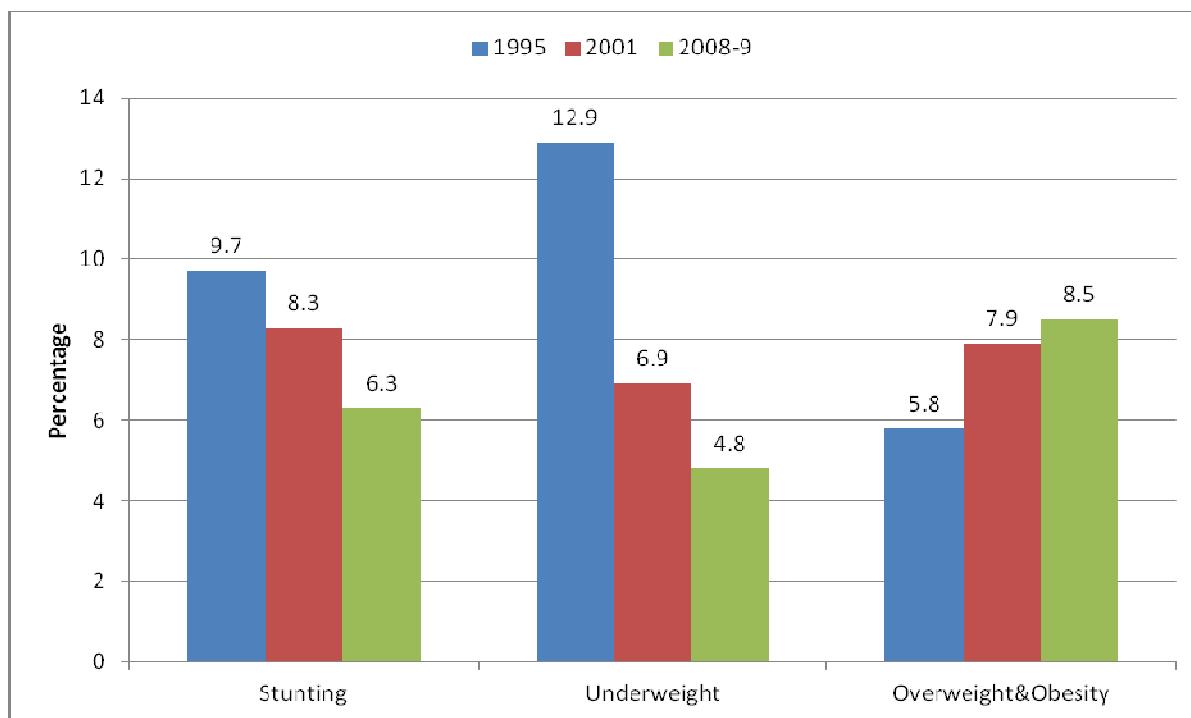


Figure 17 Nutrition status trends of children aged 1-5 years

Source: Mo-Suwan (2011)

5.3 Current policy processes and alignments

To successfully translate policies into actions, relevant parties must work in concert towards achieving common goals under agreed principles and frameworks. Integrated and harmonious actions with innovations are needed at all levels from national to regional, provincial and local/community. Each level has different roles, functions and strengths to deal with different types of tasks as shown in Figure 18 and Thailand's experience. At the national level, the main tasks include policy formulation, setting goals and indicators, strategy identification, institutional arrangements, training and support systems, monitoring and evaluation. At the local or community level, the tasks include participation and social mobilization, adapting action plans, implementing actions, and monitoring using an agreed upon set of indicators, such as nutrition indicators or other indicators relevant to the context of the community. The leading sector at all levels must also show individual and collective leadership in initiating and implementing tasks until the situation has improved. All of the above principles and guidelines have been applied successfully in alleviating undernutrition, and they will be applied once again to combat overnutrition and NCDs under the SFFM and the policies of relevant sectors of agriculture, health, education and local administration, as well as academia, the private sector and NGOs.

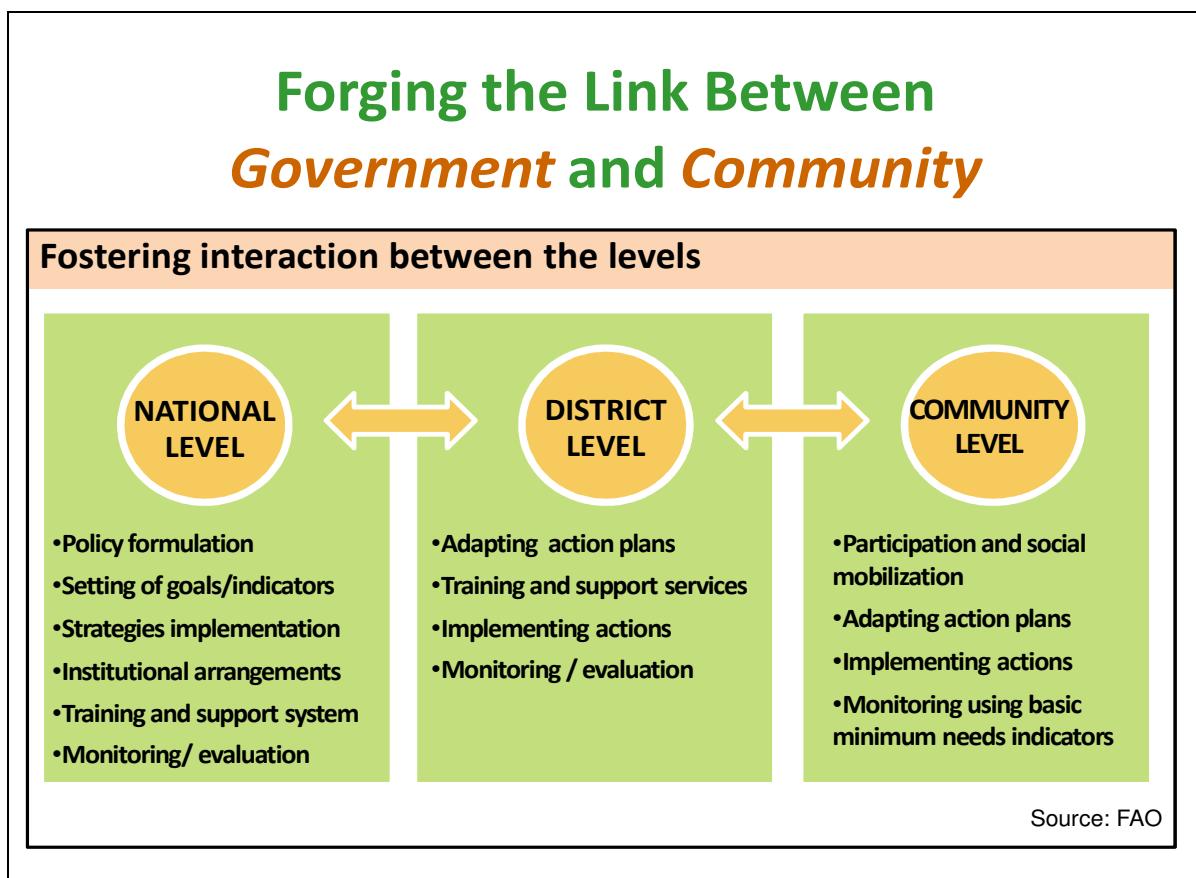


Figure 18 Fostering interaction between the levels

Source: FAO (2000)

5.3.1 Working process and alignment under national organizations

Before the NFC was established and the SFFM received approval by the Cabinet, many policies, programmes and projects existed to deal with nutrition and NCDs, food quality and safety existed. Various sectors worked in isolation to undertake these initiatives, but with little, often ineffective, inter-sectoral collaboration. These activities achieved certain agency goals, but not the goals of alleviating undernutrition, overnutrition, DBM and NCDs, which are very complex problems and beyond the ability of the health sector alone to control and prevent. Hence, the SFFM is now the policy framework under which all concerned parties work together under the NFC to harmonise their tasks and work towards the common goals of food and nutrition security.

The policy process towards implementation at national and local levels requires both vertical and horizontal linkages. There has been multisectoral and stakeholder participation in policy formulation and implementation, and eventually in monitoring and evaluating the SFFM.

Guided by the SFFM, the NFC has set up three implementing committees to facilitate and oversee three main areas: (i) food security throughout the food-chain; (ii) food quality and safety; and (iii) linking food, nutrition and health. These committees are translating the SFFM into work plans and promote corresponding actions and innovations. The SFFM has also been publicised and promoted among research and academic institutions, funding agencies, the private sector and NGOs that will incorporate part or all of the SFFM into their activities.

All tasks of these three thematic committees have been harmonized to create momentum from agriculture to food, nutrition and health. The ultimate goal is to achieve food security through sustainable food production and the supply of high quality and safe foods for the nutrition and health of consumers, as well as for food trade. The work of the third committee will lead to sectoral national programmes that will eventually be implemented within communities, schools and workplaces. In addition, HRH Princess Maha Chakri Sirindhorn's project of agriculture in schools will be promoted nationwide along with the SLP and SMP, since schools can play a valuable role in national food security and school children should enjoy good nutrition for education and learning achievement.

It is expected that implementation of the SFFM at national and community levels will lead to positive outcomes and impacts for agriculture and food systems in terms of nutrition, while health systems will continue their function of providing universal health care, including health promotion, prevention, treatment and rehabilitation.

5.3.2 Community-based approaches

In addition to national policies and organizations, effective implementation is carried out at the community level. Thailand already has experience in operating community-based programmes to reduce maternal and child malnutrition under the PAP (Tontisirin and Gillespie 1999). Currently, under the NFC and with the guidance of the SFFM, the community-based approach will be an integrated programme implemented at the local level (district level and below) with national commitment and clear nutrition improvement strategies and goals. Community actions include basic services in health, education, agriculture and other social services, mass mobilization using the volunteer system of one volunteer per 10 households, and mutual actions

to reach all people to prevent and control of DBM and NCDs. LAOs will participate actively and eventually will be responsible for integrating actions in the community.

Community holistic development requires several supportive factors, namely, basic public services; work plans and indicators for goal setting, monitoring and evaluation; and training and remedial actions to improve the situation. Basic public services cover health, agriculture, education and communication. Health services throughout the human life cycle need to be emphasized, for example, ANC for pregnant mothers, GMP for children to monitor and promote proper nutrition, growth and development, as well as care for the elderly and people with NCDs. VHV help to increase universal health care to reach the unreached and to reinforce community nutrition and health messages, particularly on maternal and child health and nutrition. Agricultural and health services include providing knowledge at all stages of the food-chain, especially food quality and safety in households, communities and schools. Local district and sub-district hospitals have personnel to provide knowledge on food and nutrition as well as healthy eating practices. Key indicators are needed to monitor the “normal” nutrition situation of all ages. After assessing and analyzing the nutrition situation, follow-up actions must be carried out until major challenges have been improved or alleviated. Awareness raising and systematic training for community workers and health volunteers, along with adequate supervision, are also needed for sustainable and efficient community operations. In addition, it is necessary to regularly monitor and evaluate the outcomes and impacts of community programmes involving health workers and volunteers so that data can be used to improve future actions.

Successful community-based approach and programmes are presented in Figure 19. The key components for success in such programmes include the following.

- 1) Basic or minimum services in health, education and agriculture, etc. are supplied by local service providers, who also serve a supportive role in facilitating community leaders in planning and implementing community action plans.
- 2) Mass mobilization and collaboration with community leaders to select, train and supervise volunteers to increase service coverage and to convey health and nutrition messages to the public. Volunteers are selected based on sociogram of one volunteer per 10 households.
- 3) Basic minimum needs indicators include nutrition indicators for problem identification, goal setting and the monitoring and evaluation of outcomes and impacts.
- 4) Remedial actions, or menus of best practices, promote healthy nutrition and healthy people and solve major nutritional problems and related NCDs. Such menus should include community food production and healthy behaviours, such as recreation and physical activity and the control of tobacco and alcoholic consumption.

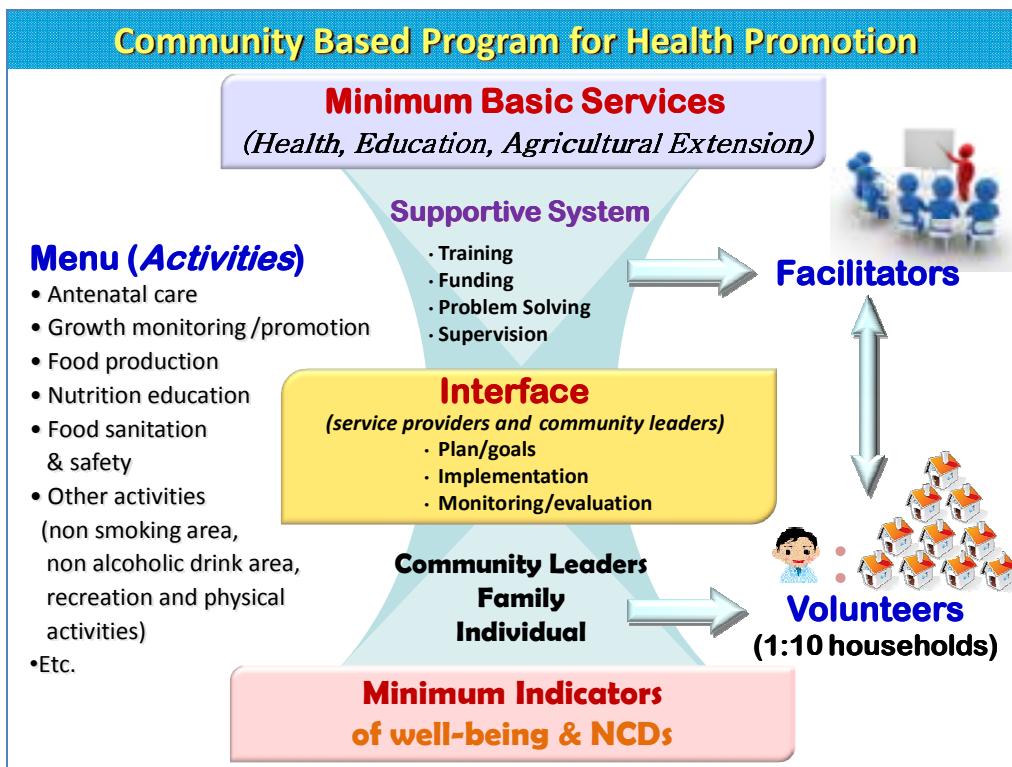


Figure 19 Community-based programme for health promotion

Source: Thai National Food Committee (2011)

Each menu must fit local situations based on sound evidence. For example, the nutrition components in ANC for pregnant mothers, which aim at reducing anaemia and preventing low birthweight through iron and folate supplementation, may not be effective if poor mothers are suffering from macro- and micronutrient deficiencies. They need additional food, multivitamins and key minerals. In Thailand in the 1980s, all pregnant mothers attending ANC services received multivitamin tablets along with daily iron tablets, while at the same time receiving nutrition counselling so they would eat additional food from local snacks to provide protein, energy and micronutrients.

The GMP menu included anthropometric measurement for weight and height followed by remedial actions if growth faltering was detected. Breastfeeding was promoted and supported during services, along with other health service packages, such as immunization, health and nutrition education, and treatment of simple illnesses. Complementary foods and feeding were crucial for continuation of normal growth. Thailand encouraged families to make use of household foods and community-based complementary foods based on a rice, legume and sesame mixture for infants and young children. Underweight children received a complementary food mix, along with close follow-up until that child was free from moderate and severe malnutrition.

Thailand also has a special cultural context in the role of important social organizations for nutrition security. For example, temples are centres for people to gather in communities. People respectfully provide food to monks who can allocate any leftover food to lay people or distribute

it to disadvantaged groups and school children in their communities. This informal social system, therefore, is a way to provide food to needy people.

In addition to line Ministries' and social organizations, LAOs facilitate Thailand's local public service works and programmes. After 1997, and based on the Thai Constitution, authority and budgeting were decentralized from the central government to locally elected LAOs, in particular, municipalities and Provincial and Tambon (Sub-district) government organizations. These organizations were allowed to manage their own policies and administration, including finance, within their areas. Some public services that were managed by central government agencies (i.e. school lunch and school milk programmes) were transferred to LAOs for administration. Thus far, there have been 180 duties decentralized from the central government, with 65 duties yet to be decentralized. These LAOs also provide their own public services and utilities that serve their constituents, such as local health care units, sanitation and schools. They also manage local food resources and their distribution. LAOs have been quite effective in identifying and providing integrated services to the disadvantaged and needy their respective areas, especially in times of crisis.

As a result of these policies, strategies, mechanisms and actions, Thailand's maternal and child health and nutrition situation significantly improved from 1980 to 2006; for example, antenatal care coverage increased from 35% to 95%; low birthweight reduced from 16% to less than 10%; undernutrition among underfives was virtually eliminated; and anaemia in pregnant mothers declined to approximately 10%.

In short, Thailand's community-based approach shows that six main aspects are important for promoting nutrition and health in communities: i) basic public services are provided, ii) local governments and village health volunteers implement operations in their respective areas, iii) nutrition indicators are applied to promote a "normal" situation for all age groups with follow-up actions to solve any persistent problems, iv) community-based operational plans are implemented in collaboration with and supported by local health centres, v) systematic training and awareness raising, and vi) monitoring, evaluation and analysis using suitable indicators.

5.4 Analysis of monitoring and evaluation approaches in the strategies and relevant indicators

Monitoring and surveillance of the Thai population's nutritional status have been key functions that the Thai government has been using to solving nutrition problems since the beginning. The data might not be ideal or complete, but they have been enough for planning and actions at community and national levels. Anthropometric measurements, clinical and biochemical assessments are used as indicators in national nutrition surveys. The MOPH is the main responsible organization for these nutrition surveys. The first national nutrition survey in 1960 included indicators on weight, height and age, as well as certain vitamins (e.g. vitamin B1, B2 and A) and minerals (e.g. iron, iodine). The information from this survey was used to develop realistic and practical plans implemented by the MOPH. Results of subsequent nutrition surveys were used for food and nutrition planning. During the fifth NESDP (1982-1987), the food and nutrition plan was integrated under the PAP. Data and information with regard to nutrition were integrated into the BMN indicators. Data were collected and analyzed at the community level and effectively used for follow-up actions.

The National Health Examination Survey Office, Health System Research Institute, conducted nutrition and health surveys in 1995, 2001 and 2008-9 (Table 10). Data and information have been quite informative in highlighting Thailand's DBM situation and rising trends in overnutrition and NCDs.

In 2006, the National Food Consumption Survey, supported by National Bureau of Agricultural Commodity and Food Standards, MOAC, was conducted with the main purpose of assessing exposure to chemical risks in food products. The survey was not planned to be cyclical on a five-year basis. It did not focus on nutrition; however, its information could be used for evaluating food sources and the nutrients consumed in Thai population. This information was useful in dealing with the complexity of overnutrition and NCDs that must be solved by several stakeholders, especially food regulators, the food industry, and nutrition and dietetic educators.

In 2012, the NFC proposed a mechanism for a limited annual or periodic nutrition survey. The proposed mechanism allows local public health academic institutions, in collaboration with the health sector, to conduct the survey based on current nutritional challenges. With this concept, each survey does not need many indicators, as was done before; however, they must be clearly identified for required targets.

The MOAC conducts annual national surveys for food agricultural products. The purposes of these surveys are to assess food production for local consumption and exportation, as well as food prices. A nutrition aspect is not included. In addition, the National Statistical Office and the National Economic and Social Development Board conduct annual surveys of household incomes and expenses on foods in order to evaluate the accessibility and affordability of foods. These surveys also do not contain a nutrition component.

In addition, there is a specific national survey from the project "Food Security and Nutrition Status in Thailand: 2005-2011", funded by FAO and conducted by the Office of Agriculture Economics and the National Statistical Office. This survey revealed that overall Thais consume a diverse supply of food and have balanced diets (National Statistical Office and the Office of Agriculture Economics 2012). Control of undernutrition has been achieved based on the MDGs and the World Food Summit goals. Thailand has a fairly good database on agriculture and food systems, which can be used to monitor and evaluate policies on food security at national and provincial levels. Presently, Thailand conducts the tables of Supply and Utilization Account and Food Balance Sheet annually. These can be used to monitor the quantity of food production and consumption in the country, as well as to calculate the number of undernourished people, and to evaluate agricultural policies.

Table 10 National and community health surveys that have been performed during the period from 2009 to the present

Surveying issues	Frequency	Data collectors	Use of information
National: overweight, obesity, diabetes, hypertension, blood triglycerides, atherosclerosis, anaemia - Food consumption - Healthy behaviour	Every 4-6 years	National Health Examination Survey Office	Planning and Campaigns
Community: growth monitoring - Children 0-5 years - Children 6-18 years	3 m or 6 m 6 m or 1 y	Sub-district hospital	Monitoring
Community: obesity - Children < 15 years - Adults > 15 years	1 y 6 m or 1 y	Sub-district hospital and local authorities	Monitoring and evaluation
Community: iodine deficiency - Triferidine coverage in pregnant, breastfeeding mother of 0-6 m baby - Urine iodine in pregnant women - Coverage of iodized salt in household	3 m 1 y 6 m or 1 y	Sub-district hospital Provincial health office Provincial health office	Monitoring and evaluation
Community: NCDs - Screen adults > 35 y o diabetes mellitus o hypertension o atherosclerosis - Prevalence of high risk o diabetes mellitus o hypertension o atherosclerosis	3 m 3 m 6 m 3 m 3 m 6 m	Bureau of Policy and Strategy National Health Security Office/ Bureau of Policy and Strategy	Planning for behaviour change

5.5 Pathway analysis of policies and strategies on agriculture and food systems that impact on nutrition

Agriculture and food systems are fundamental elements for good nutrition and well being. However, a challenging issue exists on how to increase the potential impact of agriculture on nutrition, even though there are several tools to promote the visibility of nutrition within agriculture, such as building nutrition into agricultural impact assessments, measuring commitment to undernutrition reduction, and helping to prioritize nutrition-relevant actions within agriculture (Haddad 2013). Conceptual linkages on how agriculture interventions contribute to improving nutrition and health and achieving the MDGs in least developed countries can be classified into three main pathways: development, own-production and market pathways (Dorward 2013). Evidence on the efficacy of these pathways is varied, reflecting both the importance of nutrition-sensitive agriculture and the conditionality of that importance on contextual factors. To achieve nutrition outcomes, there are various challenges in implementing agricultural interventions; for example, coordinated action by applying value chain approaches, nutrition-sensitive agriculture, and the promotion of linkages of health and nutrition with agriculture. In addition, effective collaboration among multiple stakeholders, policy and political commitment, greater gender empowerment in agriculture forum, and efficiency of food security systems are also crucially important (Dorward 2013). Gillespie (2013) has shown that the impact of agriculture and food systems on nutrition could be illustrated in several pathways:

- 1) Food production/consumption pathway
- 2) Income-food expenditure pathway
- 3) Income-non-food expenditure pathway
- 4) Food price-food expenditure/purchasing power pathway
- 5) Women employment-time-care
- 6) Women's employment-status, intra-household (IHH) decision-making pathway
- 7) Women's nutrition/health pathway

In Thailand, agriculture has been always considered a key component in poverty reduction and rural development. Under the PAP since 1982, agriculture production for subsistence economy has been promoted and supported, particularly plant and animal foods for home consumption, such as cereals, fruits and vegetables, poultry and fish. Surplus food and non-food agricultural products go to market for income generation. Earned income can be spent on other foods obtained from the market.

An analysis of pathways impacting on nutrition and health is very difficult in pinpointing only one specific pathway. However, it is clearly evidenced that pathways 1, 2 and 3 proposed by Gillespie have always operated in rural areas with different degrees of importance due to contextual situations. In Thailand, pathway 1 is crucial and has been a major agriculture policy in rural development as people have to produce food mainly for consumption, followed by pathway 2 to buy additional food if they earn sufficient income from food or non-food sources. HM the King's Sufficiency Economy Philosophy and a model of land use in rural areas are currently a major government policy in agriculture for household food security and sustainable rural development (Annex 1). Pathway 3 can be critical if health and education services are not available or accessible in rural area. Poor people must spend money or borrow money for medical treatment during illness and also for child education. Under the PAP, basic health,

education and agriculture services were made available everywhere in rural areas to help rural people to save money on food and other expenditures, such as housing and clothing. Subsequently, during approximately the last 10 years, the government has implemented policies on universal education and universal health care with free or minimum fee for services for the public sector. The government has strengthened the basic health services through the 30 Baht (one USD) per visit health service programme. This programme has been very helpful for all Thais and at all class levels, particularly poor people who do not have adequate money to spend on health care. For the urban population or office workers, the pathway of food price and food purchasing power is important, as evidenced by the financial crisis in 1997 when these groups of people suffered most. Luckily, Thailand still maintained food availability with reasonable prices and a social safety net also helped rural people to return home temporarily during the crisis. No evidence of increasing prevalence of malnutrition arose (i.e. underweight of underfives) during that period (Tontisirin and Bhattacharjee 2000).

With regard to pathways related to gender, Thailand has not considered gender as an issue in development, particularly in agriculture, nutrition, health, education and job opportunity. The ratio of women to men as village health volunteers is currently three times, which indicates women's critical role in rural health development.

Nutrition and health education have always been key components of all pathways in order to create demand for a healthy diet through basic services and supportive activities from agriculture, education and volunteers. As described in previous sections, improvements in maternal and child nutrition were carried out at the community level by promoting the production and consumption of healthy foods, such as healthy snacks as supplementary foods for pregnant mothers and community-based complementary foods for infants and young children. The school lunch and school milk programmes benefited both children as well as local farmers in a win-win situation that required effective and efficient management systems. These mutual efforts among multisectoral agencies, communities and volunteers show clearly their impact on nutrition. The BMN and nutrition indicators remarkably improved. For example, anaemia in pregnancy and the prevalence of underweight of underfives were reduced drastically in a few years; subsequently, stunting in preschool children has also declined steadily. This achievement clearly illustrates the role of community-based food production as well as the development of simple processed food for improving maternal and child nutrition and health. Income from agricultural or non-agricultural activities also increases the purchasing power of rural people in acquiring a greater variety of food from markets for household members. Hence, the linkage of impact pathways for agriculture, food, and nutrition has been a mix of development, own production and market pathways in accordance with Dorward's demonstration (2013). Nutrition and health education create increasing demand for healthy diets for vulnerable groups and the general population, which have to be carried out by multi-media and multi-channels along with supportive activities, as well as monitoring and evaluating outcomes and impacts based on nutrition indicators.

With regard to the linkage between agriculture and food policies, and food and nutrition security, Table 11 illustrates the attempt to indicate these linkages among various issues under each heading. Obviously more analysis is needed to show clearly these relationships.

Table 11 Linkage between related agriculture and food policies and food and nutrition security

Current challenges

Currently, Thailand is still facing major challenges, especially in terms of DBM and the coexistence of undernutrition and overnutrition along with NCDs, together with the complexity of agriculture and food systems. Modern agricultural technologies have been used increasingly, such as insecticides and pesticides, mechanization and food processing technologies. Food production is not only for local consumption but also for domestic and international markets as a mass production. Contract farming has been also rising. In addition, traditional food markets have been rapidly replaced by modern food trade or supermarket chain stores selling more processed food, many of which are high in sugar, fat or sodium.

Under the SFFM, the food chain approach illustrated in Figure 9 shows the linkage of agricultural productive resources and food production systems in ensuring a sustainable nutritious and safe food supply. Figure 15 shows the linkage of agriculture, food, nutrition, and health. The food supply may come from domestic production, such as fresh food products, simple processed food at the community level by small and medium enterprises, and industrial processed foods. Similarly, these three categories of food could be imported food products. The food supply will be transformed through food services, such as market places, restaurants, schools, and workplace cafeterias. If adequate, balanced, safe and nutritious food is consumed under basic sanitation and hygiene conditions, the human body will utilize energy, protein and micronutrients to achieve good nutrition and good health, while being free of food borne diseases.

Currently, the SFFM under the NFC is the platform for coordination, harmonization and facilitation in planning, implementing and evaluating integrated actions at national and community levels as well as among schools and workplaces. Nutrition and related indicators have been expanded to address not just undernutrition but also overnutrition and NCDs. The existing health volunteer system will need to be strengthened and fine-tuned towards managing these new challenges. The roles of key partners, especially academia, food business sectors and industries, should be more active and more responsible to ensure the availability, affordability and accessibility of healthy diets among consumers and trade. The food industry should produce healthier diets by reducing sugar, fat and sodium in processed food. They could engage more actively in consumer information and education through nutrition labelling and in research and capacity development. Effective IEC by all stakeholders, and based on scientific evidence, will create greater demand for healthy diets, which could be reinforced by food regulations for food safety and nutritional quality.

It is envisaged that this management model under the NFC implementing the SFFM will ensure food security, nutrition and sustainable agriculture aiming to ultimately eliminate both under- and overnutrition.

VI. Final Appraisal of Nutritional Value of Analyzed Actions

6.1 Lessons learned

Thailand faced both macronutrient and micronutrient deficiencies during the 1960s and 1970s. Its situation was characterized by: a high prevalence of anaemia in pregnancy (over 50%), high prevalence of underweight among underfives (over 50%), high IDD based on the goitre rate in school children, sporadic cases of blindness due to vitamin A deficiency, and clinical signs of vitamin B1 and B2 deficiencies. These nutritional problems were dramatically reduced during the 1980s under the PAP when nutrition-sensitive interventions were undertaken nationwide by multisectoral agencies, which streamlined implementation to the community level and maximised people's participation to reduce malnutrition. Agriculture and food systems contributed significantly to these achievements. Some important lessons learned from Thailand's success story include the following.

1. Raising local and national awareness of malnutrition as a major obstacle to health, social and economic development, using actual data on malnutrition including ecological factors, is critically important. Understanding the main causes of malnutrition among mothers and children, the most vulnerable groups, will lead to best practices in reducing malnutrition rates. At the macro-level, the main causes of malnutrition include poverty, food insecurity, illiteracy especially among women, and inaccessibility to basic health services, poor sanitation and lack of clean drinking water. The PAP recognized that poverty was a deeply-rooted cause of malnutrition that was, in turn, a symptom of poverty. At the micro-level (individuals), the main causes of maternal and child malnutrition that require corrective actions include: maternal malnutrition (undernutrition among pre-pregnant women, inadequate food intake during pregnancy and lactation, due to poverty, food restrictions, and lack of care) that results in low birthweight among newborns and inadequate quality and quantity of breastmilk; decline in breastfeeding practices; inadequate and inappropriate complementary feeding of infants and young children; unhygienic feeding practices and care; and recurrent infections, particularly diarrhoeal disease and acute respiratory tract infections. Medical and public health personnel from the MOPH and universities played significant roles in raising awareness of malnutrition and means of resolution by conducting research and disseminating findings to the public.
2. Incorporate explicit nutrition objectives and indicators into policies, strategies and action plans. The MOPH was the lead agency in identifying nutrition-sensitive indicators and interventions. However, its effectiveness was limited, since it requires more than the health sector to solve nutritional problems. The PAP provided a platform for multisectoral agencies to develop and implement plans together at national and community levels. Nutrition-sensitive agriculture and food systems included household and community food production for consumption under a subsistence economy; support for the production and consumption of local, nutritious snacks as supplementary foods for pregnant mothers; and the production and distribution of community-based complementary foods for infants and young children, especially for malnourished children. These interventions required the mutual efforts of agriculture and health workers, community leaders and women. Agriculture could also be promoted in schools to benefit child learning and contribute to the SLP. The SMP is another good example of

nutrition-sensitive agriculture to improve the nutritional status of kindergarten and primary school students and to generate income for local dairy farmers and industries.

3. Nutrition indicators are vitally important for assessing the nutrition situation of individuals, communities and the country, as well as for goal setting, the identification of remedial actions, and for monitoring the outcomes and impacts of the programmes and actions. In Thailand, simple and practical nutrition indicators were used in the past, such as anaemia in pregnant mothers, the birthweight of newborns, underweight of underfives, and goitre rate. Current indicators include the stunting rate, maternal UIC, prevalence of overweight and obesity, and NCDs (i.e. blood pressure and blood sugars in high risk persons). Under the PAP, nutrition indicators were a part of BMN indicators, which were collected and analyzed at the community level by multisectoral team and VHV. The findings were shared within the community and used for raising awareness and follow-up actions until the problems were solved. Recently information technology has been tested at the community level wherein sub-district hospital and health promotion personnel collect and analyze data based on nutrition indicators with the aid of a laptop computer. Using a human life cycle approach, the nutrition and health of pregnant mothers to the elderly will be monitored and mapped to assist in identifying and implementing remedial actions and follow-up.

4. Community actions through the mutual efforts of government service providers and the participation of community leaders and volunteers can effectively reach all vulnerable people including the unreached. In Thailand, the health volunteer system, entailing the selection, training, supervision and recognition of volunteers, has become a key part of the nation's success story in malnutrition reduction and overall health development. Currently, Thailand has over one million volunteers or approximately one per 10 households. The ratio of women to men is currently about three times, which highlights the high and visible role of women in health development. Hence, they can easily reach out to other women in their communities who are already engaged in caring for their families, preparing food and bringing about positive nutrition outcomes. The adoption of a volunteer system to complement basic minimum services, along with using nutrition indicators in community-based programmes, is highly recommended in countries experiencing a high burden of malnutrition.

5. Institutional mechanisms need to streamline efforts from the national level to the local (community) level. Under the PAP, the administrative structure for rural development integrated vertical programmes and projects as much as possible at central and local levels. Principles, goals, indicators and action plans were harmonized, coordinated and facilitated among relevant agencies (i.e. agriculture, health, education, local administration). Integrated actions were implemented initially for two years only in poverty concentration areas. Thereafter, they were scaled-up to cover the entire country. Community-based approaches entailed increasing the availability of integrated basic social services in all areas, mass mobilization through the health volunteer system, as well as the use of nutrition and other BMN indicators to identify problems and remedial actions, menus or lists of activities to alleviate poverty and malnutrition. LAOs are now playing an important role in managing key areas of local development, including public services in health, education and natural conservation. It is anticipated that in the near future, LAOs will manage important health promotion activities to improve nutrition, to increase physical

activity, as well as to control and prevent NCDs. They will work in collaboration with, and be supported by, multisectoral agencies.

6. Incorporate nutrition promotion and education in policies, programmes and actions at central and community levels, particularly concerning services through health, education and agriculture. FBDGs and nutrition labelling have been used as major nutrition education tools to promote healthy nutrition through desirable eating behaviours. Specific food and dietetic education information and messages also have been used in counselling to improve maternal and child nutrition. Periodic campaigns through the mass media and local activities are very helpful in reminding people to maintain healthy behaviours.

7. To conserve and improve the natural resource base, the NFC Act and the SFFM stress the need to maintain agriculturally productive resources and the ecosystem for food security. Since deforestation and destruction of mangroves are a major problem, current agricultural policy strongly stresses improving and expanding forest and mangrove areas. In addition, the land use zoning policy is meant to strike a balance between the production of food and energy crops. Among farmers, the smart farmer policy will increase knowledge, skills, the production of high quality and safe food, and conserve the ecosystem, as well as improve knowledge and practices in healthy consumption to achieve nutritional well being.

8. The Thai government has adopted HM the King's Sufficiency Economy Philosophy and Land Use Practices as the country's developmental principles. They aim at promoting nutrition-sensitive agriculture and food systems and at increasing household food security, especially in rural areas. These initiatives will be fundamental for sustainable and resilient development. The "Agriculture for School Lunch" initiative conducted by HRH Princess Maha Chakri Sirindhorn also is a best practice. It is a means to alleviate maternal and child malnutrition among people living in remote, difficult to reach areas. This project supports nutrition-sensitive interventions in schools by integrating agriculture and food systems with health and education. HM the King and HRH Princess' initiatives reduce inequities in development for rural people, while also serving as guiding principles and models for nutrition and food security development in Thailand.

9. Some developing countries are still facing severe nutritional deficiency challenges, especially among mothers and young children. In view of Thailand's experience, supplementary foods for pregnant mothers and complementary foods for infants and young children, along with ANC and GMP, have been essential, contributing factors in tackling maternal and child malnutrition. Consequently, food systems need to be directed at ensuring the availability and affordability of a nutritious and safe food supply specifically for these vulnerable groups. To achieve maximum benefit, these foods should be prepared from locally available foods, or foods that can be produced in communities using people's participation, in order to maximize their acceptability, affordability and sustainability. In addition, the promotion and use of commercial, industrial food products for mothers and children should be considered and could become a basis for a cooperative nutrition policy between government and the private sector.

6.2 Identified needs and knowledge gaps

While Thailand's overall nutrition situation has improved, some remnants of undernutrition still exist, alongside rising rates of overnutrition and NCDs. Moreover, Thailand will become ageing society, hence the need for special care for the elderly. The community-based approach used under the PAP needs to be revitalized in order to prevent and control these challenges. It also needs to be scaled-up based on the magnitude of problems, assessed using nutrition-sensitive indicators, with remedial actions being undertaken through a partnership between local service providers, community leaders and community health volunteers.

In rural remote areas where malnutrition and food insecurity are common, HM the King and HRH Princess Maha Chakri Sirindhorn's initiatives have dramatically alleviated these problems and serve as guiding principles for further actions to eliminate the inequality of rural people in development, particularly in terms of food and nutrition security. However, data gaps may exist, since some remote peoples, especially those belonging to ethnic minority groups, may still not be receiving the services and assistance they deserve. Consequently, additional development programmes are needed to target these people and build capacity to assess and monitor food and nutrition in these areas, followed by appropriate remedial actions that fit community cultures.

Regarding the SLP and SMP, a need exists to strengthen local agriculture and agro-industry to supply food and milk to schools to support those programmes. Both programmes have greatly stimulated food demand. The SMP provides 37% of milk supplies to schools, which could be increased further. As a result, local dairy farms and the dairy industry will gain greater benefits and become more self-reliant and sustainable. The SLP could also do the same by purchasing local foods for school kitchens to a greater extent. This will stimulate local farmers to produce fresh food of high quality and safety for students, while local food systems will be strengthened.

Campaigns to increase fruit and vegetable consumption have not been successful because of consumer concerns about the safety of these foods and their potential contamination by insecticide and pesticide residues. Multisectoral efforts on the part of government agencies, academia and the private sector are required to provide safe foods and to gain public confidence. Suitable actions include promoting GAPs, revising the registration system for chemical substances used in agriculture, strengthening the inspection and certification system in the food-chain, and creating a consumer protection network to monitor food safety. These measures can help increase fruit and vegetable consumption regarding food quality and safety related to nutrition. Nonetheless, demand-driven supply focusing on customer demand is a crucial factor in driving the entire food supply chain, hence the importance of raising public awareness and creating public knowledge.

Interventions to reduce the consumption of sugary, fatty and salty foods are also facing similar challenges, as those processed foods high in sugar, fat and salt are abundant in the market. Greater cooperation is needed among food regulators, the private sector and academia to work together and develop ways to reduce sugar, fat and salt in processed foods. Research is also required to formulate or reformulate those foods with less of these nutrients. This approach could be applied to local level small and medium food industries, as well as to the food service sector through restaurants and cafeterias in schools.

In the near future, LAOs will play a greater role in providing public services and welfare to local people. They should be able to identify vulnerable groups in their areas and provide remedial actions quickly and effectively. Since the central government has been gradually transferring some funds and duties to LAOs, they need capacity building in organizational management, personnel development, budgetary planning and allocation, a database system for monitoring and evaluation, and programmes designed to fit their local situations. Increased institutional capacity is essential. All central government agencies currently in charge of food, nutrition and health programmes must provide ongoing training and must work in collaboration with these LAOs to prepare them adequately for their future responsibilities.

VII. Conclusions and Recommendations

Conclusion

Agriculture and food systems play an important role in promoting nutrition, health, economic as well as livelihood development, since they are the basic foundations linking nutrition and health to food and nutrition security. To increase efficiency in food management, the NFC was established by law as an authorized national institutional mechanism to link agriculture, food, nutrition and health using a multisectoral approach. The NFC functions as a facilitator and coordinator of the country's food management system. The SFFM provides a policy framework, strategies and measures for the NFC to facilitate achieving the mandates of three thematic committees and around 20 sub-committees and task forces that deal with various food system dimensions. The NFC and the SFFM aim at a sustainable supply of high quality and safe foods and food products to achieve nutritional well being and consumer health protection, while also facilitating domestic and international food trade and the protection of food resources and the ecosystem. Some conclusions that can be reached based on Thailand's case study are as follows.

1. Raising public awareness on persistent and emerging nutritional challenges and related NCDs is essential to trigger policy development and subsequent remedial actions. In the past, undernutrition was the major concern. Currently, however, professional organizations and the health sector are conducting national and local nutrition education programmes and public campaigns focusing on rising trends in overnutrition and NCDs. These programmes and campaigns are encouraging greater consumption of fruit and vegetables, a decline in the consumption of sugar, fat and salt, while also promoting increased physical activity. Schools and workplaces have been targeted especially.

However, food and nutrition information made through the various communication channels, such as social media, should be carefully considered regarding a popular misconception. Today's people can reach all the messages even inaccurate data due to the advancement of information and communications technology. Thus, the appropriate ways to prevent and correct public misconceptions are to provide the public with effective education programme as well as counselling services. Moreover, knowledge management can also be integrated with capacity building into governmental and local communities in order to strengthen the effective education and communication which cover most of population including the unreached.

2. A national mechanism or forum is needed to formulate, develop, implement and monitor a multisectoral approach to address difficult issues, such as under- and overnutrition. In the past, the National Rural Development Committee and its PAP served this function. It acted as an umbrella to integrate agriculture, health, education and local administration for poverty alleviation and nutrition improvement. BMN indicators, including nutrition indicators, and the VHV system were important elements in Thailand's success story. Presently, the NFC is functioning as the national umbrella and is integrating all sectors and actors in the food-chain from supply to consumption, guided by the SFFM. The linking of food, nutrition and health using nutrition indicators to achieve nutrition objectives has been formulated and carried out harmoniously with the intention of scaling-up nationwide in a near future.

3. The active participation of key stakeholders is essential in all working processes and programmes, since nutritional challenges are complex and no single sector acting alone can completely solve them. Consequently, a multisectoral approach with participation and involvement of related parties from academia, the private sector and NGOs are crucial. Equally important for a multisectoral community-based approach is cooperation between local service providers, community leaders and community health volunteers in working together to alleviate malnutrition in rural poor areas.
4. Nutrition considerations, objectives and indicators must be incorporated in the policies, strategies and action plans of related sectors. The PAP and the SFFM have included these elements in their planning and implementation processes, which are carried out through multisectoral efforts and with full people's participation.
5. Guiding principles and best practices at the highest level are vital in laying the foundation for and guiding holistic development, for alleviating major food and nutrition challenges, for achieving food and nutrition security, and for reducing social inequities. On-going initiatives by HM the King on Sufficiency Economy Philosophy and land uses for household food security serve as guiding principles for development, particularly in agriculture and food sectors. HRH Princess Maha Chakri Sirindhorn's initiative on agriculture for school lunch has led to positive food and nutrition impacts in rural and urban schools and communities, while also promoting environmental conservation and greater social equity and equality.
6. Research, capacity development, monitoring and evaluation are crucial to support the development and implementation of plans. But frequently, they do not receive adequate attention by the sectors involved. Nevertheless, in implementing Thailand's SFFM, these issues are priorities, focusing especially on research and monitoring the plan.

Recommendations

It is necessary to further strengthen mechanisms for multisectoral efforts to be implemented harmoniously at the local level through LAOs, which require capacity development in managing all rural development issues. Success in linking of food, nutrition and health will depend to a great extent on this decentralized structure. Once LAOs have been fully strengthened, the work process should be more bottom-up rather than top-down.

It is important to increase organizational capacity at all levels, from national to community, particularly in terms of knowledge, database development, operations and management skills, as well as the design of programmes and projects. Continued capacity building and the promoting of organizational linkages among agencies for multisectoral cooperation is needed. For example, the building of common databases and their management will involve many agencies and will require linkages between local and national levels. These systems will require the development and management of effective data collection strategies, as well as monitoring and evaluation systems. All of these actions will necessitate cooperation between the central government, academic or research institutions, and local officials.

All working processes must involve relevant stakeholders and create alliances for collaboration and cooperation at all developmental steps, as well as for raising public awareness. Since the linkage between food, nutrition and health is critical in combating DBM, it requires social

participation involving the public, not just government agencies, in alleviating this problem effectively.

Programme targeting can go beyond area-based to organization-based approaches to help alleviate DBM, such as in schools, colleges, universities and workplaces to reach specific population groups. In all cases, promotion of desirable eating habits should be stressed through food services, nutrition education and communication, social media and mass communication.

Policy directions and content must fit with a country's pace of development. Currently, with the increasing complexity of globalization, urbanization and changes in food systems and marketing, along with the changes in eating habits and lifestyles, the demand for certain types of foods and food products, as well as food services, has drastically changed. This demand has led to the competitive advertising of unhealthy food products and unnecessary food supplements. Consequently, consumers must have adequate, proper knowledge and good behavioural practices on food and nutrition in order to select healthy foods and adopt healthy diets.

To build on success, greater efforts should be directed towards ensuring equity in food and nutrition security. Reaching the unreached, who often live in very distant and remote areas, requires innovative ideas and programmes, such as distance education. Food, nutrition and dietetic education and communication should aim at reaching all population groups in rural and urban areas. Information for public awareness can be promoted via many communication channels, such as through mass media campaigns and interpersonal communication involving such change agents as teachers, health staff, village volunteers and community leaders.

For all countries, a critical national development priority should be achieving sustainable food and nutrition security in an environment that ensures maintaining food production resources, preserving the ecological system, improving people's lives and livelihoods and, above all, allowing each citizen to adopt, and have, a healthy quality of life and nutritional well being. For this goal to be achieved, a multisectoral working culture at national and local levels must be nurtured, one that is based on a common understanding of the linkage between agriculture, food, nutrition and health.

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Table 1 Nutrients that the Thai people received from food consumption (1960-2009)

Table 2 Amounts of domestic agricultural supply and food utilisation of the Thai population (2009)

Table 3 Availabilities of different food commodities in Thailand (excluding foods for export and non-food uses) during 2005-2010

Table 4 Estimation of nutrient adequacies (per person per day) for available local food supplies in Thailand during 2005-2010

Table 5 Energy and nutrient adequacies of the Thai population in different parts of the country (in 2009) as referred to the Thai RDI (from national nutrition survey on nutrient consumption)

Table 6 List of activities included in the National Nutrition Plan developed by the Bureau of Nutrition, Ministry of Public Health (2010-2013)

Table 7 Examples of activities performed by the committee on linking food, nutrition and health under the National Food Committee

Table 8 Selected policies and strategic frameworks for Thailand

Table 9 Number of hunger and malnutrition during the period from 1990 to 2012

Table 10 National and community health surveys that have been performed during the period from 2009 to the present

Table 11 Linkage between related agriculture and food policies and food and nutrition security

XI. Annexes

Annex 1: Sufficiency Economy Philosophy

HM the King's Initiative on the 'Philosophy of Sufficiency Economy'

"I may add that full sufficiency is impossible. If a family or even a village wants to employ a full sufficiency economy, it would be like returning to the Stone Age... This sufficiency means to have enough to live on. Sufficiency means to lead a reasonably comfortable life, without excess, or overindulgence in luxury, but enough. Some things may seem to be extravagant, but if it brings happiness, it is permissible as long as it is within the means of the individual..."

His Majesty's birthday speech on 4 December, 1998

Thailand has gained much from Royal projects and ideas. In particular, the present King Bhumipol Adulayadej has expounded the principle of "New Theory Agriculture" or the "model of practical land use for household food security" under his holistic development framework of a "sufficiency economy." HM gave this principle to his people in 1997 when the country was hit by a severe economic crisis. HM the King emphasized the importance of building a solid foundation by stabilizing the basic economy and ensuring individual and household subsistence before moving onward to a higher level of development. The new theory centres on household food security with land and water management conducted on small plots of land. The theory suggests that 30% of land be allocated for water for feeding animals and plants, 30% for planting rice for the household, 30% for fruit and vegetables, and 10% for housing and barns for animals. The King's philosophy originally aimed at self-reliance with food diversification to ensure adequate food consumption and nutrition, while surplus plants and animals can be sold to generate household income. The main principle of this theory is that each household attain food security. They can subsist on their agriculture and food production and reduce expenses from buying necessary foods. Household agriculture does not aim for commercial gain, but for household security first, since a large single plantation aiming only for commercial gain is at risk of incurring debt or loss due to the uncertain world market. Consequently, such farmers will experience food insecurity. The King's guidance under this theory is for living in moderation with a "middle path" lifestyle (not too extreme, not too little) with knowledge and morality as foundations. This middle path lifestyle based on knowledge and ethics, reasonability, moderation and self-immunization is known as the "Sufficiency Economy Philosophy". This philosophy can be applied among all sectors at all levels and all occupations. Moreover, the philosophy can be the foundation for food security; happiness with moderation, mind and wisdom; healthy life and sustainable, holistic development.

The three pillars of "Sufficiency Economy Philosophy"

Moderation: Achieving sufficiency in practice, for example producing and consuming moderately.

Reasonableness: A rational decision on the level of sufficiency must be made by considering all factors involved and carefully taking into account expected outcomes.

Self-immunization or Risk management: Preparing for likely impacts and changes by considering the probability of possible future scenarios.

Decisions and actions under these three pillars should be based on two factors.

Knowledge: This includes academic qualifications in various aspects and having knowledge linkage.

Virtue: It comprises awareness of moral honesty, patience, perseverance and intelligence in undertaking one's way of life.

A model of land use for household food security under the Sufficiency Economy Philosophy

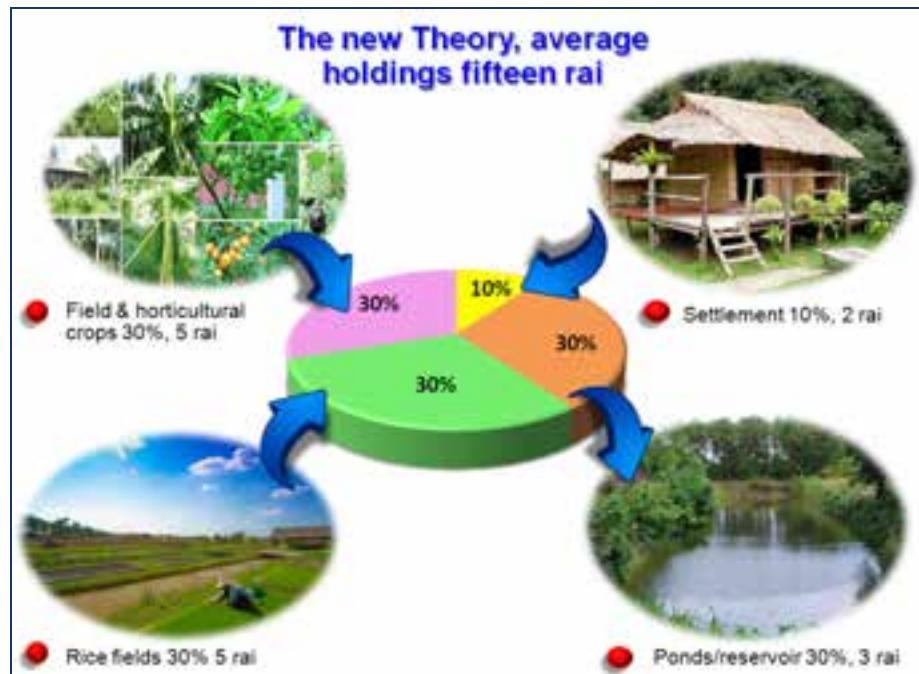
The risks and impacts of farming, such as fluctuations in agricultural prices, climate change, natural disasters, etc. are considered crucial factors affecting food productivity and food security. Consequently, the principles and model of land use under the "Sufficiency Economy Philosophy" has been applied to farming. As a result, farmers are shielded against globalization and manage sustainable agricultural systems.

The land use theory is an agricultural system based on HM the King's Sufficiency Economy Philosophy whereby farmers can subsist at an economical level. Since rice is the staple food, it is recommended that each family should grow rice and other crops with raising animals, contributing to having enough food for year-round consumption and being self-reliant. Furthermore, each community has cultural tradition of mutual helping each other. This can help reduce labour costs.

Key Success factors

The key success factors comprise three phases: (a) optimizing land use, (b) encouraging working in groups or cooperatives, and (c) gaining mutual benefits from coordination between related sectors.

(a) Optimizing land use



Modified from: The Chaipattana Foundation

An apportionment of land is in the proportion 30:30:30:10. The theory suggests that 30% of land should be allocated for pond to collect rainwater for year-round farming. In addition, aquaculture and aquatic animals can be raised in/on/or near the pond. The second 30% is for growing rice during the rainy season for the household consumption throughout the year. The third 30% is for planting other crops, fruit and vegetables, and the last 10% is for accommodation, barns for animals, and other purposes (e.g. area for mushroom culture, animal pens, and a home garden).

The above ratio can be improved or adjusted to be appropriate for geographical features, environment and climate in each area.

(b) Encouraging working in groups or cooperatives

The farmers are encouraged to work in groups or cooperatives as communal agriculture in the following areas:

- Production

Farmers must collaborate on cultivation, starting from soil preparation, seed planting preparation, fertilizers, water supply, etc.

- Marketing

In order to obtain the highest profits from agricultural production, farmers must prepare everything ready for harvest as well as cooperate in selling agricultural products.

- Living conditions

Farmers should live at least at the level of subsistence level. The fundamentals of living should be adequate such as food and clothes.

- Welfare

Each community should provide the basic services and necessary welfare, such as health centres and loans.

- Education

The community should play an important role in promoting education. For example, there should have education fund for children in the community.

- Society and religion

The community should be a social platform for all people participation regarding social and mental development using religion as the binding factor.

(c) Gaining mutual benefits from coordination between related sectors

The mutual benefits from coordination between farmers and related sectors, such as banks and private companies, should be promoted. Some banks have the project of providing loans with low interest rates for farmers, for example. Consequently, the farmers' quality of life can be improved.

The benefits of coordination include:

- Farmers can sell their rice at a high price.

• Farmers can afford consumer products at a low cost since they buy them in large quantities through cooperatives.

Benefits of the Land Use Theory

- People can live moderately at an economical level and can be self-reliant.
- People can grow some crops in the dry season by using the water stored in the pond and relying less on the irrigation system.
- People can generate income from their agricultural products particularly when water can be available all year round.
- People can be self-reliant and do not much rely on the governmental assistance much.

Source: The Chaipattana Foundation
(http://www.chaipat.or.th/chaipat_english/)

Annex 2: Food-Based Dietary Guidelines and the Nutrition Flag

Food-Based Dietary Guidelines for good health and the nutrition flag were developed for the Thai people to provide them with practical knowledge about nutritionally balanced diets and a healthy lifestyle that can lead to desirable eating habits and behaviours. The guidelines comprise nine rules, while the flag is used as a food guide model. The details are as follows.

Rule No.	Description
1	Eat a variety of foods from each of the five food groups and maintain proper weight
2	Eat an adequate amount of rice or alternative carbohydrate source
3	Eat plenty of fruit and vegetables regularly
4	Eat fish, lean meats, eggs, legumes and pulses regularly
5	Drink milk in appropriate quality and quantity for one's age
6	Eat a diet containing appropriate amounts of fat
7	Avoid sweet and salty foods
8	Eat clean and safe food
9	Avoid or reduce the consumption of alcoholic beverages



Source: <http://www.bch.cuhk.edu.hk/fns/fun-in-seven/english/images/HealthyDietPyramid/secondary/p3.html>

Annex 3: List of Persons Interviewed and Responding to the Questionnaire

List of Persons Interviewed

No.	Name	Position	Organization
Ministry of Agriculture and Cooperatives			
1	Mr.Apichart Jongskul	Secretary General	Office of Agricultural Economics
2	Mr.Chairit Dumrongkiat	Director General	Rice Department
3	Mr.Damrong Chirasuthat	Director General	Department of Agriculture
4	Mr.Kriangsak Hongto	Director General	Land Development Department
5	Mr.Lertviroj Kowattana	Director General	Royal Irrigation Department
6	Mrs.Narumol Sanguanvong	Director of Foreign Agricultural Relations Division	Bureau of Foreign Agricultural Affairs
7	Mr.Sakchai Sriboonsue	Secretary General	National Bureau of Agricultural Commodity and Food Standards
8	Dr.Werachai Narkwiboonwong	Secretary General	Agricultural Land Reform Office
9	Dr.Wimol Jantrarotai	Director General	Department of Fisheries
10	Mr.Winai Kasirax	Deputy Director General	Cooperative Promotion Department
11	Mr.Withaya Athipanan	Deputy Director General	Department of Agricultural Extension

No.	Name	Position	Organization
Ministry of Commerce			
12	Mrs.Srirat Rastapana	Director General	Department of International Trade Promotion
13	Ms.Wiboonlasana Ruamraksa	Director General	Department of Internal Trade
Ministry of Education			
14	Ms. Panita Kambhu Na Ayutthaya	Permanent Secretary	Ministry of Education
15	Ms.Sanit Yamkesorn	Director of Bureau of Student Activity Development	Office of the Basic Education Commission
Ministry of Public Health			
16	Sqn. Ldr. Boonruang Triruangworawat	Director General	Department of Health Service Support
17	Dr. Jedsada Chokdamrongsuk	Director General	Department of Health
18	Dr. Pornthep Siriwana-rangsan	Director General	Department of Disease Control
19	Mrs. Srinuan Korrakochakorn	Deputy Secretary General	Food and drug administration
Ministry of Science and Technology			
20	Dr. Taveesak Koanantakool	President	National Science and Technology Development Agency

No.	Name	Position	Organization
Ministry of Social Development and Human Security			
21	Ms. Manida Limnijisorakoon	Director of Women and Children's Welfare Protection	Department of Social Development and Welfare
22	Mr. Vitat Tachaboon	Deputy Secretary General	Department of Social Development and Welfare
Other Relevant Organizations			
23	Assoc. Prof. Chancharat Reodecha	Program Director on Agriculture	The Thailand Research Fund
24	Mrs. Orapan Srisukwattana	Deputy Secretary General	National Health Commission
25	Mr. Peeradet Tongumpai	Director	Agricultural Research Development Agency (Public Organization)
26	Dr. Pichet Itkor	Vice Chairman, Food Processing Industry Club	The Federation of Thai Industries
27	Mr. Suchart Jariyalertsak	Deputy Director-General	Dairy Farming Promotion Organization of Thailand
28	Dr. Sutthiporn Jitmitrapap	Secretary General	National Research Council of Thailand (NRCT)
29	Assoc. Prof. Wilasinee Adulyanon	Section Director of Food for Health Plan	Thai Health Promotion Foundation
30	Mr. Witoon Lianchamroon	Director	BioThai Foundation

List of Person's responding to the questionnaire

No.	Name	Position	Organization
Ministry of Agriculture and Cooperatives			
1	Ms.Chutinart Maliwan	Plan and Policy Analyst (Senior Specialist)	Royal Irrigation Department
2	Mr.Pisan Pongsapitch	Director of the Office of Standards	National Bureau of Agricultural Commodity and Food Standards
3	Ms.Chintana Wisartpong	Chief Home Economic Section	Department of Agricultural Extension
4	Mr.Thitipong Srisombat	Bureau of International Agriculture Economics	Office of Agricultural Economics
5	Ms.Chaveewan Pattanapong	Planning Division	Land Development Department
Ministry of Education			
6	Ms.Sanit Yamkesorn	Director, Bureau of Student Activity Development	Office of the Basic Education Commission
Ministry of Public Health			
7	Ms.Benjamass Suramitmaitree	Director, Division of Health Education	Department of Health Service Support
8	Ms.Nitaya Bhantuwave	Bureau of Non-Communicable Diseases	Department of Disease Control
9	Mrs.Sujit Saleepan	Bureau of Nutrition	Department of Health

No.	Name	Position	Organization
10	Ms.Sutatip Chantaraksa	Primary Health Care Division	Department of Health Service Support
11	Dr.Wanna Hanshauworakul	Bureau of Knowledge Management	Department of Disease Control
Ministry of Science and Technology			
12	Ms.Bussarin Samarnphanchai	Analyst	National Science and Technology Development Agency
13	Ms.Kitima Leerahavanichakul	Analyst	National Science and Technology Development Agency
14	Dr.Wonnop Visessanguan	National Centre for Genetic Engineering and Biotechnology (BIOTEC)	National Science and Technology Development Agency
Other Relevant Organizations			
15	Mr.Anek Bamrungkit	Plan and Policy Analyst (Senior Specialist)	National Research Council of Thailand (NRCT)
16	Mr.Teeratat Kantamara	Policy and Planning Division	Health System Research Institute

Annex 4: Questionnaire and Interview questions

Questionnaire

1. Organization name
2. Department
3. Roles, responsibilities and mission
4. What are your organization's policies related to nutrition-sensitive agriculture and food systems? How?
5. If any,
 - 5.1 What are the major goals / specific outcomes of the policies? Probe for the major purposes of the policies (e.g. an increase in agricultural productivity, trade and investment, national food security, reduction in malnutrition, etc.)
 - 5.2 To what extent are those policies related to nutrition?
 - 5.3 Do the policies specify target populations, such as school children, elderly or vulnerable groups
 - 5.4 Do the policies lead to improvement in nutrition and health?
 - 5.5 Do the policies link with other policies, both internally and with external organizations? How?
 - 5.6 Are the policies consistent with national or international policy? Please specify.
6. What strategies have the policies led to in terms of implementation? In what ways?
7. Is there any collaboration or cooperation with other relevant sectors regarding policy implementation? How?
8. Does this collaboration contribute to developing or strengthening nutrition-sensitive agriculture and the food system? How?
9. In terms of operational budget, from where does it derive? What percentage of the budget is allocated for nutrition?
10. Is there any monitoring and evaluation system for following-up on operational progress?
11. Has the monitoring and evaluation system incorporated any nutrition indicators?
12. How effective is policy implementation? To what extent?
13. Are there any gaps or difficulties in achieving set goals, e.g., organizational structure, budget, resources, capacity building? (Please specify)
14. Does your organization have the capacity to develop the potential of operations or personnel in order to raise awareness of the importance of nutrition-sensitive agriculture and the food system? (Probe for capacity development required to support the development of nutrition-sensitive agriculture) How?
15. What are the challenges or limitations in integrating nutrition-sensitive agriculture into your organization's policies?
16. Do you have any comments on re-orienting the policies towards nutrition-sensitive agriculture and food systems? How could your organization contribute?
17. Additional feedback

Interview Questions

1. What are the roles and policies of your agency?
2. How do you define and establish policies, strategies, objectives, processes and action plans that relate to agricultural or food systems, leading to food security, good nutrition and health?
3. What are the implementation processes used for actions, especially those related to nutrition-sensitive agriculture and food systems?
4. Does this implementation coordinate with other government agencies? How do you collaborate with them?
5. Which source(s) of budget is/are used for operating actions? Is it sufficient? If not, what are the main reason(s) and needs?
6. What are the challenges or limitations to implementation?
7. What are some results or successes from implementation?
8. Is there a monitoring and evaluation system to follow-up on the progress of operation?
9. What are your suggestions for implementation relating to food security?
10. What will be the future policies of your organization? How do they relate to improving the country's food security and nutrition situation in the future?
11. Do you have any comments on re-orienting the policies towards nutrition-sensitive agriculture and food systems?
12. Additional comments

Annex 5: Terms of Reference

Background

The agriculture and food systems are best placed to influence food production and the consumption patterns of nutritious foods necessary for a healthy and active life. The present agricultural and foodsystems have evolved to become more complex and global with longer supply chains from farm to fork. Nutrition-sensitive agriculture aims to maximize the impact of the food and agricultural sector on nutrition outcomes while minimizing any unintended negative nutritional consequences of agricultural policies and interventions on the consumer. It is placing a nutrition lens on the food and agricultural sector, without detracting from the sector's own goals which include production, productivity and income.

There is increasing attention to addressing the multiple forms of malnutrition (undernutrition, micronutrient deficiencies, and overweight and obesity) through agriculture and the food system. Important initiatives include the Scaling Up Nutrition (SUN) Movement, with attention to multi-sectoral development action, the Zero Hunger Challenge launched by the UN Secretary General to end hunger and malnutrition within our lifetimes, the development of country CAADP plans (Comprehensive African Agriculture Development Programme) that include nutrition in Pillar 3 (Food Supply and Hunger), the CGIAR research program (CRP-4) on Agriculture for Improved Nutrition and Health (A4NH), and the mainstreaming of nutrition as an FAO corporate priority. In addition, several development partners are developing agriculture-nutrition guidance and tools.

Applying a nutrition lens to agriculture and food systems should include a consistent focus on nutritional outcomes and indicators within national food and agricultural policies and programmes, and the broader macroeconomic policies and development strategies. The aim should be to improve food and nutrition security and combat the multiple burden of malnutrition through food and agriculture, and other relevant sectors. Although there is wide agreement on the great potential for agriculture and the food system to improve nutrition, at present there are limited experiences with this approach at scale and insufficient existence of rigorously supported evidence-based technical recommendations to inform policy makers.

Therefore, there is a need to better understand how agricultural and food systems impact nutrition outcomes. There is need to identify whether and how these systems can be modified to better meet nutrition goals in a sustainable way and reduce the risk of the multiple burden of malnutrition, including diet-related non communicable diseases (NCDs). There is an urgent need to provide practical answers and guidance for countries on the "what to do?" and "how to do it?" questions.

A number of countries have started to link their national agriculture or food and nutrition security policies to nutrition related outcomes and the multiple burden of malnutrition. These countries refer to the multiple underlying causes of malnutrition in broad areas such as agriculture, food security, food supply as well as varies stages along the value chain. Some country strategies take account of the multisectoral nature of nutrition. Eight countries¹ have been selected for in-depth review of specific ways how food and agricultural policies are having or are intended to have an impact on nutrition in that country.

These eight countries reflect different stages of the nutrition transition. In view of the multiple burden of malnutrition - hunger and undernutrition are common, especially among children,

¹ Brazil, Thailand, Nepal, Mozambique, South Africa, Malawi, Sierra Leone and Senegal

while the incidence of overweight, obesity and nutrition-related NCDs are increasingly occurring among adults- the case studies are looking at both sides of the malnutrition problem.

Specific thematic areas will be assigned to each of the country's study, such as related to the food supply chain as well as to food and agricultural and trade policies, and their potential link to nutrition and health outcomes in the country. For these the more detailed specifications and analysis frameworks were elaborated with a group of experts during the Meeting of the Minds in Geneva, 25-28 March 2013.

These TORs refer to the country case study in Thailand

Objective

The descriptive review of food and agricultural policies in Thailand will contribute to advance the discussion on nutrition-sensitive agriculture. The study will provide answers to some of the emerging questions on:

- the specific nature and range of policies and other actions to improve nutrition through food and agriculture (for various populations and geographies), including the characteristics of the system, at what point these policies and other actions engage with the food and agricultural system, and how; through what actors and institutions; and with what known or potential effects;
- the potential process and impact indicators related to actions that enhance the impact of food and agriculture on nutrition and methods of measuring both;
- key knowledge gaps in the relationship between the shape and operation of food and agricultural system and nutrition.

Description of the assignment

- i) The service provider is responsible for conducting an in-depth review of specific aspects of the agriculture and food system and its potential impact on nutrition in the assigned country/countries.
- ii) The service provider will document all relevant information and analysis in a country report according to the provided template. One country report per assigned country will be delivered.
- iii) The service provider will contribute to the synthesis report.

For activities and timeline see below.

The in-depth review of specific aspects of the agriculture and food system and its potential impact on nutrition includes the following study components:

- Identify and describe actions (strategies, policies, programmes and investments) in agriculture and the food system that may have an impact on diet and nutrition.
- Describe the envisaged impact pathways for these actions and explain how they may affect nutrition (undernutrition, micronutrient deficiencies, obesity and overweight) in particular population groups.
- Document (identify, collect and describe) the available information and evidence to substantiate the impact of such actions on diet/nutrition outcome variables or on logically related intermediate variables.

- Describe policy processes and alignment, including alignment around common results frameworks and stakeholder participation.
- Identify factors contributing or impeding collaboration between relevant ministries.
- Identify applied language and terminology with regard to food and nutrition security and describe whether and how this reflects/or not reflects attention paid to nutrition when designing, planning and monitoring food security policies and programmes.
- Highlight good practices and lessons learned from the implemented actions, including considerations on the design of the actions as well as issues relating to institutional capacity, policy processes and alignment, and stakeholder participation.
- Identify information and knowledge needs and gaps that should be addressed through further study and suggest potential processes for monitoring and evaluation.

Method

The country analysis includes a secondary data analysis, a literature review, snowballing interview approach, and a country visit to the assigned country/countries.

The consultant will review the information from relevant country policy and programme documents to seek out relevant information on strategies, policies and investments in food and agriculture, their impact pathways on various nutritional outcome, direct and indirect ones, institutional capacities, stakeholder participation, alignment, cross-sectoral collaboration processes, and others.

The literature review will provide further insights and background information. The consultant will refer to and build on country papers developed in preparation for the International Conference on Nutrition (ICN2) as well as use data in existing databases or country profiles (e.g. the NLIS (WHO) or FAO country profiles, World Bank, UNDP).

The consultant will consult with national government focal points and experts in the specific sector areas using a predefined and country adapted policy checklist and interview guide.

These and the common methodological approach for the country study will have been elaborated and agreed upon during the preparatory Meeting of the Minds in Geneva 25-28 March 2013. This meeting will provide the detailed template for the studies, including a framework of analysis, list of research questions to be answered, and the agreed common methodological approach.

Country visit: The country visit will give opportunity for more in-depth interviews with national partners and experts. Potential partners to interview include: The government focal point, representatives from the Ministry of Planning, Ministry of Agriculture, Ministry of Health, national level SUN movement stakeholders, REACH facilitators and UN country teams (if applicable), international and local NGOs and CSOs, and donors in country including the donor convener (if applicable). According to the context this list is not exclusive.

The information and its analysis will be included in a final country report. For this report the agreed template will be used. The report will include the description of the methodology, of the relevant policy areas, an analysis of their sensitivity to nutrition, lessons learned and good practices, and recommendations for 'how to do nutrition-sensitive agriculture' and potentially 'how not to do it'. It will also include the timetable of the consultancy, the country visit and a list of people that were contacted and/or interviewed, a list of references and relevant policy documents.

Content of the final country report

- Description of the stage of dietary transition.
- Description of relevant actions (strategies, policies, programmes and investments) in agriculture and the food system that may have an impact on diet and nutrition.
- Analysis how they may affect nutrition (undernutrition, micronutrient deficiencies, obesity and overweight) and/or health (infections, other communicable diseases, non-communicable diseases) of different population groups.
- Documentation of the impact of such actions on diet/nutrition outcome variables or on logically related intermediate variables.
- Description of policy processes, stakeholder participation, stakeholder coordination mechanisms and model for collaboration between Ministries, like Ministry of Agriculture and Ministry of Health etc.
- Final appraisal of nutritional value of analyzed action. Lessons learned on 'what to do' and 'how to do' nutrition-sensitive agriculture, including technical considerations as well as issues relating to institutional capacity, policy processes and alignment, and stakeholder participation.
- Description of the identified need for more information and knowledge gaps that should be addressed through further study.
- Executive summary.
- Conclusions and recommendations.
- Annexes (will be specified, including :)
 - List of persons met and interviewed
 - List of references
 - Timeline of the consultancy

Activities and Timeline

The service provider's tasks include:

37 working days within the period from 20 May until 31 July 2013

Carry out country study: 20 May – 12 July 2013

First draft of report: 12 July 2013

Comments received: 22 July 2013

Final report submitted: 29 July 2013

Qualifications

Great value is placed on the technical qualification and independence of the expert. Candidates should have the following basic and essential qualifications:

- Advanced University degree and relevant experience in nutrition; food security and agricultural sciences; food policy; or related fields
- Scientific publications in peer reviewed journals or relevant publications within the last ten years
- At least five years of country level experience (including in Africa) in linking nutrition to food and agriculture at policy, strategy, programme level
- Participation in national or international scientific bodies, committees, and other expert advisory bodies pertinent to the scope of this study is an asset
- Applicants must have excellent working knowledge of English; additionally knowledge of French or Portuguese is an asset.

Working language

The working language for this assignment is English.

Planning

The consultant will participate in the preparatory planning meeting from 25-28 March 2013 in Geneva.

Location of assignment

The place of the assignment is the residence country of the consultant. In addition a country visit will be conducted, if the assigned country is different from the country of residence. The study is conducted in the country of residence of the consultant; in-country visits might be conducted.

Reporting

All documents will be written in English and references well documented.

The final report will be delivered in English, and compiled following the agreed template.

Annex 6: Acronyms

AEC	ASEAN economic community
ANCs	Antenatal cares
ARDA	Agricultural Research Development Agency
B.E.	Buddhist Era
BMA	Bangkok Metropolitan Administration
BMNs	Basic minimum needs
DBM	Double-burden of malnutrition
DFPO	Dairy Farming Promotion Organization
DOH	Department of Health
DRI	Dietary reference intake
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	FAO statistic
FBDGs	Food-based dietary guidelines
FBS	Food balance sheet
FNP	Food and nutrition plan
GAPs	Good agricultural practices
GDA	Guideline daily amounts
GHPs	Good hygienic practices
GI	Geographical indicators
GMP	Growth monitoring and promotion
GMPs	Good manufacturing practices
HACCP	Hazard analysis critical control points
Hct	Haematocrit
HM	His Majesty the king
HRH	Her Royal Highness
IDA	Iron deficiency anaemia
IDD	Iodine deficiency disorder
LAOs	Local Administrative Organizations
MDGs	Millennium development goals
MOAC	Ministry of Agriculture and Cooperatives
MOC	Ministry of Commerce
MOE	Ministry of Education
MOI	Ministry of Industry
MOPH	Ministry of Public Health
MSDHS	Ministry of Social Development and Human Security
NCDs	Non-communicable diseases
NEDP	National economic development plan
NESDB	National Economic and Social Development Board
NESDP	National economic and social development plan
NFC	National Food Committee
NGOs	Non-Governmental organization
NRC	National Research Council
NSO	National Statistical Office
NSW	National single window
OAE	Office of Agricultural Economics
ONPE	Office of the National Primary Education
PAP	Poverty alleviation plan
PEM	Protein energy malnutrition
PHC	Primary health care
Ppm	Part per million
RDI	Recommended dairy intakes
SFFM	Strategic framework for food management
SMEs	Small and medium enterprises

SLP	School lunch programme
SMP	School milk programme
Thai FDA	Thai Food and Drug Administration
UIC	Urine iodine concentration
USI	Universal salt iodization
VHVs	Village health volunteers
WCs	Waist circumferences
WFS	World Food Summit
WHO	World Health Organization

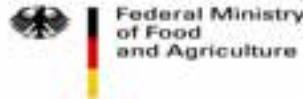
UNITED NATIONS SYSTEM
STANDING COMMITTEE
ON NUTRITION

The United Nations System Standing Committee on Nutrition (UNSCN) is the food and nutrition policy harmonization forum of the United Nations. Its vision is a world free from hunger and malnutrition, where there are no longer impediments to human development.

UNSCN

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