

Nutrition and Health in Thailand: Trends and action (UNSSCN, 1992, 124 p.)



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FOREWORD

Viewing improved nutrition as an outcome of development processes expands the area of concern for policy-makers and practitioners who seek to combat malnutrition. These processes operate at different levels in society, from the individual through to the whole arena of governmental policy and indeed international relationships. The SCN, in deciding on initiating a series of country-wide reviews of nutrition-relevant actions in 1990, aimed to provide a rich base of documented experiences of why and how such actions were undertaken and what was their effect on nutrition.

This country-wide approach built on the progress made at the 1989 workshop on "Managing Successful Nutrition Programmes" held at the 14th IUNS Congress in Seoul. The focus here had been on nutrition programmes, and the essential factors determining their success, and the synthesis of findings and individual case studies were later published as ACC/SCN Nutrition Policy Discussion Paper No. 8.

Two other influential documents were the SCN's "Nutrition-Relevant Actions" that emerged from the 1990 workshop on nutrition policy held in London, and UNICEF's 1991 Nutrition Strategy document. Together these provided both a common analytical framework for organising the reviews and a common language for discussing the various actions that impinge on nutrition. The value of such a framework has been demonstrated by the ease with which it lends itself to analyses of both the nutrition problem and its potential solutions. The food - health - care triad of underlying causes of malnutrition, in particular, proved to be a very useful framework for orienting the inputs and subsequent discussions at the 1992 International Conference on Nutrition, co-sponsored by FAO and WHO. Communication and thus advocacy are facilitated when people share such a conceptual understanding.

UNICEF had originally proposed that a series of country-wide reviews be undertaken and the results presented at the 15th IUNS Congress in September 1993. At the time of writing, preparations for the workshop are well underway - in fact, the richness of documented material has necessitated the organisation of an additional two-day satellite meeting in Adelaide. We are extremely grateful to UNICEF for their financial support throughout this exercise. The series editor for these country reviews was Stuart Gillespie, and the SCN Advisory Group on Nutrition (AGN) also technically examined the drafts as these emerged. In addition, I would like to express gratitude to the external technical reviewers, selected for their in-depth knowledge of particular countries, who provided the authors with comments and suggestions on initial drafts.

The essential value of these country case studies lies in their ability to describe the dynamics involved when a national government attempts to combat malnutrition. Questions such as the role of the political economy in determining policy options, obstacles met in implementation, how programmes are modified or expanded, and how they are targeted, are all addressed. The need for actions to be sustainable to achieve results over the long-term, and the importance of both measurable objectives and a system of surveillance to monitor progress, are examples of important conclusions. These reviews thus provide valuable insights into the questions of "how", as well as "what", in terms of nutrition policy.

The country reviews are intended for a wide audience including those directly concerned with nutrition in developing countries, development economists, and planners and policy makers. Along with the output of the Adelaide meeting, they will be valuable for advocacy in underscoring that effective actions *will* improve nutrition. It is hoped that these reviews and the proceeding of Adelaide will provide guidance for a strengthening and expansion of future actions for reducing nutritional deprivation.

Dr. A. Horwitz
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PREFACE AND ACKNOWLEDGEMENTS

As a result of the ACC/SCN-organized workshop on "Managing Successful Nutrition Programmes" at the 14th IUNS Congress in Seoul in 1989, it was decided, following a proposal by UNICEF, to conduct a series of studies on country-wide actions aimed at improving nutrition. These case studies could then be presented at the 1993 IUNS Congress in Australia. In keeping with this recommendation, this document provides a country review as to Thailand's food and nutrition situation, its trends, and the policies and programs which have been formulated and implemented in the 1980s.

Thailand's achievements in health and social development, since its First National Economic Development Plan (1961) and those of its National Food and Nutrition Plans beginning in the Fourth National Economic and Social Development Plan (1977), have received worldwide acclaim. During the last decade, the nation has dramatically reduced protein-energy malnutrition (PEM), including the virtual eradication of severe PEM. Children and adults, alike, have better access to health care services, preventive and curative, during the past decade as Thailand's poverty alleviation, primary health care and quality of life approaches have reached out into even the remotest of rural villages. The nation is also self-reliant in terms of food and is a major exporter of food. Nonetheless, Thailand's food and nutrition picture is not totally bright. As in other nations, the major micronutrient deficiencies persist, though these are being tackled through innovative technologies, communication techniques, and the hard work of government officials, non-government organizations, academics and community members as partners in development. New food and nutrition challenges are also emerging as Thailand enters the industrialized world and transitions into the final phase of the epidemiological transition.

The objective of this case study is to draw important conclusions as to which programs are effective in combatting and preventing malnutrition, why, and how they are best managed. The scope goes beyond "nutrition" programs per se, however. In addition to the analysis of changes in nutritional status, the study investigates the scope of indirect actions and trends in socio-economic factors (agriculture, food, industry, education and health) that have a bearing on the nutritional status of the Thai population. This review also intends to draw out important policy conclusions on what actions have worked or not worked in the context of Thailand and the principles underlying successful efforts which may be transferable for other situations.

In preparing this review, we are indebted to many persons and organizations. Most significantly, we extend our deepest gratitude to Drs. Marito Garcia and Stuart Gillespie of the ACC/SCN Secretariat who assisted in initiating this work and editing

the report. Sincerest appreciation also goes to UNICEF New York and the ACC/SCN for their support for the preparation of the reviews, and UNICEF Thailand for their generous agreement to support for publication.

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LIST OF ACRONYMS

ACC/SCN	Sub-Committee on Nutrition
ANP	Applied Nutrition Programme
BMN	Basic Minimum Needs
DHS	Thailand Demographic and Health Survey
EPI	Expanded Programme for Immunization
FAO	United Nations Food and Agriculture Organization
GDP	Gross Domestic Products
GNP	Gross National Products
H/A	Height for Age
HFA	Health For All by the Year 2000
IDD	Iodine Deficiency Disorders
IFPRD	Institute of Food Research and Product Development
IMR	Infant Mortality Rate
INMU	The Institute of Nutrition, Mahidol University
IUNS	International Unions of Nutritional Sciences
LBW	Low Birth Weight
MOPH	The Ministry of Public Health, Thailand
MCH	Maternal and Child Health
NCHS	National Center for Health Statistics
NESDB	The National Economic and Social Development Board
NESDP	The National Economic and Social Development Plan
NFNP	National Food and Nutrition Policy
NGO	Non Government Organization
PAP	Poverty Alleviation Policy
PEM	Protein-Energy Malnutrition
PHC	Primary Health Care
RDA	Recommended Daily Allowance
SD	Standard Deviation
TFR	Total Fertility Rate
UNICEF	United Nations Children's Fund
UNDP	United Nations Development Program
VHC	Village Health Communicator

VHV	Village Health Volunteer
W/A	Weight for Age
W/H	Weight for Height
WHO	World Health Organization

I. INTRODUCTION

Among the most difficult problems confronting the world community throughout the history of mankind has been the problem of food shortage and diet deficits. However, there seems to be little dispute that remarkable increases in food production have been achieved in providing for the nutritional needs of all human beings over the past decades by both developing and developed countries. Yet the number of hungry people has increased due to rapid population growth and more importantly, the lack of effective food distribution and political will to solve the problem.

Never before have food chains and food webs been more vulnerable to disruption. Human beings have unrelentingly manipulated the eco-system of this biosphere for short-run benefit without thinking about the long term adverse impact. Utilization of food to sustain life is the end point of the complex and interlocking processes of transferring energy from the sun, through food production, distribution, household food entitlement, and individual consumption, to cells in the body. There are threats along the way i.e. ecological degradation (greenhouse effect, acid rain, drought etc); inefficient distribution or unequal access to foods due to adverse economic and political situation; ignorance, lack of education or nutritionally adverse food taboos or habits; and diseases and illnesses that have harmful effects on ingestion, absorption and utilization of food inside the human body. In response to these threats, human beings have attempted to improve the production process by means of science and technology, the distribution process by social and economic systems, consumption by modifying culture and food habits, and diseases through medical and health care. However, interventions are usually confined within disciplinary boundaries and are not always concerned with the improvement of the community being targeted. For example, economists usually deal with it by lifting people above the poverty line or dealing with equity questions of income distribution, since the problem is related mainly to low income class and an increased purchasing power will command a fairer share of food. But these do not necessarily guarantee good nutrition or food intake, especially without a proper nutrition education. Agricultural research and recent advances in biotechnology have increased crop and animal yields dramatically, but applications of these technologies lag far behind in reality.

Thailand experienced one of the highest economic growth rates in the world in the late 1980's, and concurrently made significant progress in improving the social welfare conditions of its people. At the same time Thailand also achieved a dramatic reduction of malnutrition in pre-school children. But considering that Thailand is a food surplus country with a good economic development record, malnutrition in considerable magnitude still exists amongst the population. There is still plenty of room for improvement. There also seems to be a policy vacuum whereby changes in problems and situations in the long-run are not addressed. Experience has shown that ample food production in itself is not enough to cope with the mounting challenge of feeding people. Other elements, both economic and social, can also indirectly influence nutritional status. Agriculture production, food prices, purchasing power, marketing systems and food habits are examples of important socio-

economic factors¹. Millions of people lack the income or purchasing power with which to command their fair share of food, due to economic and political factors. Government policies, like the premium on export rice in the past, would reward the urban population or better-off classes who had more political voice, by depressing domestic prices at the expense of the less-politicized poor who engaged in rice farming. However, even sizeable improvements in household income do not always lead to improved nutrition, because additional funds may be spent on prestige foods of lower nutritional value or on consumer goods. These rapid changes in dietary, food acquisition and food expenditure patterns have created concern among scholars and policy makers alike. In the rural areas, because of the pressure on land and its resources due to population growth and rapid rural development, household food acquisition and food security rely more on market systems rather than domestic cultivation and a partial hunting and gathering way of life. These rather primitive food entitlements, although leading to food variety and nutritional balance, suffer from intermittent periods of scarcity. In some cases, development in terms of electrification, communication and transportation is also conducive to poor nutrition especially among the poor and under-educated. Commercial bombardments and the invasion of processed food in rural areas may result in an adverse situation when people sell more nutritious food in favour of buying less nutritious but more prestigious food. In the urban areas, there is an accelerated shift from home-based food preparation to processed or pre-cooked food. National and international agribusiness are also clearly visible in the present and will certainly claim an increasing share in people's daily life. Consumer behaviour, as never before, is being modified by intensive advertising and quite often by unfounded claims for the health benefits of special foods. Some hazardous food habits that may lead to parasitic infestation and other medical problems have also been quite difficult to modify. In these circumstances, although nutrition education may contribute to improve food choice and the better utilization of available food supplies, it needs good communication strategies to change people's values and perceptions.

¹. Rabidhadana A. The Role of Social Science in Nutrition Research. A paper presented at the Workshop on Integrated of Food Crops, Fisheries and Nutrition Research in Northeast Thailand. Khon Kaen, December 7-9, 1988.

Objectives of the Review

As a result of the ACC/SCN-organized workshop on "Managing Successful Nutrition Programmes" at the 14th IUNS Congress in Seoul in 1989, it was decided, following a proposal by UNICEF, to conduct a series of studies on country-wide actions aimed at improving nutrition. These case studies could be presented at the 1993 IUNS Congress in Australia.

Thus, the overall objective of this country review is to describe the food and nutrition situation and its trends, and the large-scale nutrition relevant actions, that were formulated and implemented in the 1980s. The goal is to draw important conclusions as to which programmes are effective in combatting and preventing malnutrition, why, and how they are best managed. The scope goes beyond "nutrition" programmes per se. In addition to the analysis of changes in nutritional status, the study shall investigate the scope of indirect actions and trends in socio-economic factors (agriculture, food, industry, education and health) that have a bearing on the nutritional status of the population. The review aims to draw important policy conclusions on what actions worked/or did not work in the context of Thailand.

II. OVERVIEW OF THAILAND AND ECONOMIC PERFORMANCE

General Overview

Thailand is primarily an agrarian society with approximately three-quarters of her 54 million population residing in rural areas. The total geographic size is approximately 513,000 square kilometres, of which five regions are recognizable by their characteristic land forms: the Northern ranges and valleys, the Central fertile plain, the Southeast coastal sea board, the arid North-east plateau and the southern humid peninsula. The tributaries draining water from mountain ranges in the North merge to form major rivers which feed the rice-producing area of the Central plains. The climate of Thailand is tropical, and much influenced by the powerful South and Southeast Asia monsoons resulting from the seasonal differences in temperatures between the land mass and oceanic body. The rainy season is usually during June to October and summer lasts from March until May with a cool-dry period in between.

The Thai race is generally considered to be one of the oldest in Asia. Their emergence as a nation began during the 13th and 14th centuries when the Thais rejected the authority of Khom (presently Khmer or Cambodia) and created the first independent Thai Kingdom of Sukhothai. Since then the Thai nation and her successive monarchs have existed without interruption for more than 700 years and have never been conquered by any major colonial power. In 1350, King Ramathibodi established a new dynasty and Ayutthaya, a new capital, which was the capital of Thailand for the next 417 years before it was burnt down by the Burmese in 1767. King Taksin, who liberated the Thai from the brief Burmese conquest moved the capital to Thonburi, the west bank of present Bangkok. King Phuttayodpha (Rama I), who succeeded King Taksin and established the present Chakri Dynasty, moved the capital across the river to Bangkok for strategic reasons in 1782. Since the last of a series of battles with the Burmese during his reign, Thailand has enjoyed a relatively peaceful political and economic development. It is interesting to note that during the past two centuries, Thailand has been the only country in Asia where people have not suffered greatly from internal turmoil, raging wars, and natural disasters, though there have been many bloodless *coups d'etat*. The absolute monarchy came to an end in 1932 with a bloodless revolution and King Rama VII accepted a constitutional monarchical status with a democratic government. The present King, His Majesty King Bhumiphol (Rama IX) acceded to the throne in 1946.

Thailand is relatively homogeneous with respect to ethnicity and religion. More than 80% of the population are ethnic Thai, with about 10% of the population of Chinese descent. Malay ethnic groups inhabit the southern peninsula, and a number of hill tribes dwell in the northern mountain ranges. Buddhism is the most common religion; over 90% of Thais identify themselves as Buddhist. The Islamic religion is the second most common (6%) followed by Christianity and others.

The government administrative body consists of thirteen ministries and the office of the prime minister. The country itself is divided into Bangkok Metropolis as the capital and 72 additional provinces which are further divided into 704 districts, 7871 tambons or sub-districts and 62,373 villages. Governors and chief district officers are appointed by the central Government, apart from the Governor of Bangkok who is elected by popular vote. Village headpersons (*pu-yai-ban*) are elected directly by the public while tambon chiefs (*kam-nan*) are elected by village headpersons residing in their respective administrative areas. Neither village headpersons nor tambon chiefs

are civil servants. The chief district officers are directly responsible to their provincial governors. Since governors are career civil servants appointed by the King on the recommendation of the Interior Ministry and cabinet approval, the Ministry of the Interior holds the overall administrative power, but at present the governors are very powerful decentralized decision makers at the provincial level. However, the governor must ensure that central government policies are carried out by supervising the operations of personnel from all ministries, departments and agencies within his jurisdiction. Thus, overall government policies are channelled through the Interior Ministry while other line Ministries are responsible for implementing sectoral policies and plans.

Economic Overview

Thailand is, at present, no longer an agricultural economy. In less than thirty years, Thailand has been transformed from a subsistence agrarian society into a rapidly industrializing free-market country. Due to an industrial and export-oriented agricultural development policy, the economy has undergone rapid and sustainable growth and has been cited as one of the most successful countries in the developing world over the past two decades. Under the six Economic and Social Development Plans (NESDP) put into operation over the past 30 years, the economic level of the country and the standard of living of the population have clearly risen. The GNP has increased 18 times in real terms from about 58.9 billion baht in 1961 to 1,047.5 billion baht in 1985, while at the same time per capita income rose almost 10 times from 2,150 baht per person in 1961 to 20,420 baht per person in 1985².

². Summary, the Sixth National Economic and Social Development Plan (1987-1991). The National Economic and Social Development Board, Bangkok, Thailand, 1991.

Recent trends of some major economic indicators are presented in Table 1. During the 1980's, Thailand's economic performance has been impressive especially during the last quarter of the decade. The GDP kept rising in real terms at 1972 levels from 299.5 billion baht in 1980 to 574.2 billion baht in 1989. Gross national saving has shown a healthy trend from approximately one fifth at beginning to one-quarter of the GDP at the end of the decade. Thailand devalued her baht twice, by 8% in 1981 and 14.8% in 1984 to boost exports. Since the second devaluation and floating of the Thai baht in 1985, the exchange rates against major currencies have been quite stable and Thai exports have dramatically increased. The value of Thai exports in 1989 was three times that of 1980. It is also fair to say that Thailand has not had any foreign debt and borrowing problems either in the private or public sector. The amount of foreign debt and the debt service ratio have been relatively low compared to other developing countries. The rapidly diversifying economy, low budget deficits and later surplus at the end of the decade, and a good borrowing rating for foreign capital have helped Thailand's economy to adjust to internal and external shocks and maintain solid growth throughout the decade.

In the past two decades household income has steadily increased in real terms and there is no doubt that continuous economic growth has "trickled down" some benefits to the poor. The prevalence of poverty i.e. the proportion of population living below the poverty line has substantially declined from 57% in 1962-63 to 39% in 1968-69, to about 31% in 1975-76 and to 24% in 1981. The decline occurred in all regions and in both rural and urban areas but the very large urban/rural income differential diminished only minimally and gradually³. However, Thailand's income

distribution and poverty profiles are of major concern. The Gini Coefficient, i.e. an index indicating disparity of wealth, has widened from 0.414 in 1962/63 to 0.426 in 1976, to 0.473 in 1981 to 0.500 in 1986 and the percentage of the population below the poverty line showed no sign of improvement in the early half of the 1980's⁴.

³. Meesook OA. Income, Consumption and Poverty in Thailand, 1962/63 to 1975/76. World Bank Staff Working Paper No. 364. Washington DC: The World Bank. 1979.

⁴. Hutaserani S and Jitsuchon S. Thailand's income distribution and poverty profile and their current situations. Thailand Development Research Institute, 1988.

Furthermore, the agricultural sector especially rice farming which is still the nation's cultural and economic foundation has been increasingly falling behind. The 62% of the Thai population who engaged in agriculture contributed only 15.1% of the GDP whereas the non-agricultural sector (38%) contributed 84.9% in 1990 (Table 2). During the six NESDPs, the ratio of average annual income between those who were in the non-agricultural and the agricultural sectors has kept on widening from 5.8 in 1962 to 9.2 in 1990. Gross regional product differential has been a major concern. The North and North-eastern regions where approximately 20% and 35% of Thai's reside shared only 12% and 14% of the GDP respectively during 1977-1987. On the other hand, Bangkok and vicinities, which had approximately 15% of the population, controlled 43% of the GDP in 1977 which further increased to 48% in 1987. More and more people have moved from the agricultural sector to other sectors for better economic opportunities. The expeditious introduction of predominantly capital intensive, large scale technology has failed to benefit those semi-subsistence farmers who are the majority, and also those urban poor who have moved from rural areas hoping for a better life. The future economic outlook is also more likely to benefit the already better-off households which contain people with non-agricultural occupations. This is mostly due to foreign capital inflows which largely finance development in non-agricultural activities. Moreover, since world agricultural production is expected to be as high as usual, lower international prices and demand will limit Thailand's agriculture exports⁵, and thus negatively affect those who are already worse-off agricultural households. The recent recession in 1990-91 in the USA which has already spawned the protectionism mood will certainly have a negative impact on Thailand's export-oriented economy if the US government decides to pursue this course. Likewise, as Thailand is an oil-importing country with limited natural energy resources, she may face difficulty in reducing trade deficits, taming inflation and sustaining economic expansion in the decade to come. This causes some anxiety amongst health experts since it has become clearer that health and nutrition go hand in hand with economic and social development.

⁵. Macroeconomic Policy Program. The Outlook for the Thai Economy. The 1989 TDR Year-End Conference "Thailand in the International Economic Community", December 1989.

III. DEMOGRAPHIC AND HEALTH TRANSITION

Demographic Transition

It is fair to say that, at present, Thailand is approaching the post-demographic transitional period. The birth rate has been declining steadily but this has started to show signs of some slow down since 1988 probably due to the sheer size of the baby

boom cohort reaching reproductive age. It is also quite certain that birth rate will decline further when the baby boom cohort reaches reproductive age, probably at the turn of the century. Crude death rates may be at the lowest during this period and are likely to start climbing slowly as a result of changes in the older population age structure⁶. Overall, during the past two decades, the population growth rate has declined considerably from 3.2% in 1970 to an estimated 1.5% in 1990. Life expectancy, according to the World Bank Series, has risen from 57.7 to 62.2 for male and 61.1 to 66.2 for females during the period of 1970-1990 and should reach 66.75 for males and 70.75 for females by the year 2,000 (Table 3). Cumulatively, these demographic transitions have created a changed picture in terms of Thailand's population age-structure from that of a broad base, pyramid-like shape in 1970 to a columnar base, pagoda-like form in 1990. A summary of population characteristics from 1960 and future trends in Table 4 indicate that Thailand will have more people in the active age group and that the dependency ratio will be less of a burden in the next decade. Compared with other countries at the same level of income, urbanization has been low but is accelerating. The low rate of urbanization probably reflects a high share of the labour force in agriculture. Inter-regional migration will become more important. The promise of higher wages in a particular location and educational attainment strongly influence a decision to migrate, and distance usually is not a strong deterrent. If the average years of schooling were to increase from 6 to 16 years, the overall migration rate in this group would increase by more than double⁷.

⁶. Birth rates during 1986-1990 were 18.0, 16.5, 16.0, 16.3 and 17.0 per 1,000 live births. Crude death rates were 4.1 (record lowest), 4.3, 4.2, 4.4 and 4.5 during the same period according the Public Health Statistics, Division of Health Statistics, MOPH.

⁷. Ashakul T. Migration: Trends and Determinants. Thailand Development Research Institute, 1988

Some of the major factors responsible for this demographic transition and its nutrition implication are reviewed as follows.

Fertility Decline

Thailand has made considerable progress with regard to her population policy through family planning programmes. Family planning programmes both public and private went into full swing under the policy direction of the Third NESDP (1972-1976). Easy access to all kinds of contraceptive measures even in remote areas without social and religious stigma, and a "pull strategy" under the successful slogan "Having Many Children Will Make You Poor" have created a virtual reproductive revolution over the last two decades.

The nation's total fertility rate (TFR) for women aged 15-44 was 2.66 in 1981-1983 and 2.23 in the 1984-1987 period. In the 1987 Demographic and Health Surveys (DHS), the highest TFR was found in the south (3.43) where a considerable proportion of the population was muslim. Although fertility has been distinctly lower for urban than for rural women, the extent of decline was greater among rural than urban women suggesting that the urban-rural differential in fertility is narrowing⁸. Contraceptive prevalence among currently married women aged 15-44 according to the MOPH has been over 70% since 1987 (Table 5). It was confirmed in the 1987

DHS that contraceptive prevalence reached 67.5%, increasing from 64.6% found by the third round of the Contraceptive Prevalence Survey conducted in 1984. At present, very few couples fail to initiate contraception prior to the end of their reproductive span and Thailand is rapidly approaching a stage of full fertility control where most couples will deliberately choose the timing of births and limit the number of children according to their preferable family size⁹.

⁸. Chayovan N, Kamnuansilpa P and Knodel J. Thailand Demographic and Health Survey, 1987. Institute of Population Studies, Chulalongkorn University, Bangkok, Thailand 1988.

⁹. Knodel J and Chayovan N. Contraceptive Initiation Patterns in Thailand. Health and Population Studied Based on the 1987 Thailand Demographic and Health Survey. Institute of Population Studies, Chulalongkorn University, Bangkok, Thailand 1988.

Without the burden of pregnancies in quick succession, both the pregnant mother and the new born infant can benefit from improved nutritional status. In addition, the infant and weaning toddler have less competition for food, and the fewer the number of children in a family, the more likely each child is to benefit during intrafamilial food distribution.

Mortality Decline

The crude death rate also declined from 13.5 per 1,000 in 1960¹⁰ to 4.5 per 1,000 in 1990 (Table 6). The adjusted rates in the table indicate that the coverage of death registration was incomplete. However, the coverage has been improving from 65.2% in males and 60.0% in females in 1964-1965 to 75.0% and 76.5% respectively in 1985-1986¹¹.

¹⁰. Economic Commission for Asia and the Far East. Comparative study of Mortality Trends in ESCAP countries. Asian Population Series No 14, Bangkok 1973.

¹¹. Kiranandana T, Chunharas S, and Kiranandana S, et al. Sickness and Death Profile in the Thai Population. MPN-001 WHO-MOPH Research Report, Chulalongkorn University Press, Bangkok, 1989. (in Thai).

Thailand's infant mortality rates (IMR) have been estimated directly and indirectly by many studies. All studies have revealed that infant mortality rates calculated from government vital statistics have been obvious underestimates. In 1971, using Trussell's indirect method on several sets of data, the IMR was found to range from 56 to 66 per 1,000 live birth compared to only 22.5 from vital registration¹². Recent IMRs from vital registration and adjusted rates are shown in Table 7. The figures indicate that the IMR in Thailand has substantially declined and is approaching that of developed countries, probably as a result of better access to health and medical care, successful EPI and general improvement in the standard of living. However, an obvious disparity exists between urban (27 per 1,000) and rural (41 per 1,000) areas¹³.

¹². Chamratrithirong A and Pejaranonda C. Level, Trends and Differentials of Mortality in Thailand. In: Hansluwka and others, eds., New Development in the Analysis of Mortality and Cause of Death, Mahidol University, Bangkok 1986.

¹³. Thailand Demographic and Health Survey 1988, Institute of Population Study, Chulalongkorn University, Bangkok, Thailand.

Child mortality has also been declining as shown in Table 8. There was no evidence of sex discrimination since mortality among boys was higher than that of girls as biologically expected. The major causes of death among infants and children aged 1-4 are shown in Table 9. Infectious and respiratory related mortality has been reduced, probably by better medical care and nutrition, but congenital anomalies have been on the rise. Whether this rising trend was due to better diagnosis or increasing exposure to teratogenic substances in the increasingly polluted environment are not known and should be investigated.

Maternal mortality has reduced gradually from 1.0 per 1,000 live births in 1980 to 0.2 in 1990. Better antenatal care and increases in the number of infants delivered by medical personnel are part of the reason for the improvement.

Infant and child mortality will continue to decline as shown by the projected trends in Table 10. Infectious diseases will further decline, while neoplasm and diseases of the circulatory system attributed to inadequate food and nutrition will increase in magnitude and importance.

Epidemiological Transition

Looking at the types of illness with which the Thai are faced, the country is undergoing an epidemiological transition, that is, from pre-transition health problems-infectious and parasitic disease and nutritional deficiencies - to those most characteristic of a post-transition phase: chronic and degenerative diseases of adult life such as heart disease, cancer, strokes and accidents, especially from traffic.

For infectious diseases, the Expanded Programme for Immunization (EPI) - one component of Thailand's Primary Health Care system - has successfully led to the decreasing incidence of Diphtheria and Tetanus Neonatorum, namely from 2009 and 753 cases with 162 and 200 deaths in 1979-85 and 292 cases with 12 and 58 deaths in 1989.¹⁴ The coverage of EPI during the 1980's reported by the MOPH is shown in Table 11. Evaluation by an EPI Coverage Survey in 1990¹⁵ indicated that high coverage with individual vaccines correlated with a high percentage of fully immunized children (F.I.C.) receiving three doses of DPT and OPV, one dose of BCG and one dose of measles vaccine. Surprisingly, the proportion of fully immunized children in rural areas which ranged from 69.5% to 90.0% was significantly higher than that in urban areas which ranged from 68.1% to 86.7%. With the knowledge that approximately 80% of Thai people reside in rural areas, the achieved level of fully immunized children was impressively estimated at 80.5%. The proportion of the population with safe drinking water and hygiene has been much improved from 32.7% and 41.9% in 1982 to 78.3% and 69.6% in 1989 but with marked regional differences (Table 12). Diarrhoeal morbidity rates are still quite high but fatality rates have been reduced (Table 13). From the 1987 DHS, the percentage on diarrhoea cases for which health professionals were consulted was 46.2%, and 46.3% of all diarrhoea cases received ORS whether they consulted health professionals or not.¹⁶ Increases in morbidity rates might be due to better access to medical facilities, since reported diarrhoea cases are usually only the tip of the iceberg. Because of the bi-directional relationship between infection and nutritional status, the achievements will certainly have a positive impact on Thai children.

¹⁴. Weekly Epidemiology Surveillance Report, Summary 1989. Division of Epidemiology, Ministry of Public Health, Thailand.

¹⁵. EPI Coverage Survey Thailand, 1990. The ASEAN Institute for Health Development, Mahidol University, Bangkok Thailand, 1990.

¹⁶. Bunnag A, et al. Occurrence and Correlates of Diarrhea among Thai Children. In: Health and Population Studies Based on the 1987 Thailand Demographic and Health Survey. Institute of Population Studies, Chulalongkorn University, Bangkok, 1989.

Malaria and tuberculosis are no longer major health threats in terms of morbidity and mortality, but the leading causes of illnesses which bring people to health centers and hospitals are still infections such as acute diarrhoea (1,248 per 100,000 in 1989), parasitic infestation (54.6% of all Thai harbour at least one kind of parasite in 1981) and upper respiratory tract infections, all of which still dominate as common ailments within the population. Other persistent health problems include viral hepatitis (7-11% of the Thai are hepatitis B carriers) and dengue hemorrhagic fever, a rampant viral infection transmitted by mosquitoes which adversely affects the human immune system (more than 300 per 100,000 in the latest epidemic in 1987). Furthermore, the recent deadly global threat of the AIDS epidemic is also being reflected in Thailand. According to a report update on 15 October 1991, the total numbers of confirmed AIDS and AIDS related cases were 177 and 487 respectively, which appear to be only the tip of the iceberg. The estimated number of HIV+ cases in 1991 is placed around 200,000 to 300,000 cases. The most alarming thing is that it is increasing rapidly among the young heterosexual group. The HIV prevalences among male sexually-transmitted disease patients and pregnant women were 5% and 0.79% respectively in a June 1991 sentinel sero-surveillance, rising respectively from 2% and 0% in December 1989.

For post-transitional problems, Thailand is now not only facing a growing burden of non-communicable, chronic and degenerative diseases, but also the emergence of new health threats, such as the propagation of addictive substances, injury from accidents, occupational hazards, and environmental pollution. Infectious diseases like malaria, tuberculosis and diarrhoeal diseases have ceased to be the major causes of death while cardio-pulmonary vascular diseases, accidents and poisonings, and neoplasm have taken over as the 3 leading causes of death as shown in Table 14. Prevalence of diabetes mellitus increased from 2.5% in all age groups in a 1971 national survey¹⁷ to 3.4-4% in urban settings and amongst the 20-80 year old age group as of 1987, and this is an increasing trend. Prevalence of hypertension is also alarming and is as high as 17% in the Bangkok slum area¹⁸ and 16.9% in urban areas found in Thailand's north-east region¹⁹. Changing food habits in urban settings to more calorie composition from fat will further increase the prevalence of nutritional related degenerative diseases. The incidence rate of cancer was 31 per 100,000 population with a mortality rate of 13.4 per 100,000 in 1981 as compared to 12.6 and 4.2 per 100,000 in 1971²⁰. Cancer morbidity and mortality trends during the past ten years have also increased gradually. This might be partly due to an improvement in cancer registration as well as from a real increase in the incidence rate due to various environmental hazards associated with present living conditions especially toxic and carcinogenic contamination in the food system.

- ¹⁷. Tandhanand S, Nitiyanant W, Makarasara C, Vannasaeng S, Vichayanrat A. Chapter 6: Epidemiology of Diabetes Mellitus in Southeast Asia. In: Bajaj JS (ed), Diabetes Mellitus in Developing Countries. New Delhi: Interprint, 1984:51-54.
- ¹⁸. Sithi-amorn C, et al. The prevalence and risk factors of hypertension in Klong Toey Slum and Klong Toey government apartment houses. *Int J Epi* 1989;18(1):89-94.
- ¹⁹. Suriyawongpaisal P. An investigation of hypertension in Nakorn Ratchasima. A master dissertation. University of Western Australia. January 1990.
- ²⁰. Cancer Statistic, National Cancer Institute, Ministry of Public Health 1981.

Other health problems resulting from the stressful socio-economic transition have also risen such as mental illnesses, drug addiction and other substance abuse. The number of patients attending the out-patient department in twelve neuro-psychiatric hospitals around the country has tripled from approximately 200,000 in 1977 to 606,144 in 1986. The number of drug addicts seeking medical care increased from 53.7 per 100,000 in 1981 to 102.4 per 100,000 in 1985. The real magnitude of these two problems, which here are based on community-derived rather than hospital-derived figures, is likely to be much greater. For smoking, it was estimated that in the late 1980s, there were more than 10 million smokers who inhaled more than 30 billion cigarettes annually. As of 1985, Thais also consumed 103.1, 0.2 and 300.2 million litres of beer, wine and whisky respectively.²¹

²¹. Proceedings of the First Thailand National Health Assembly, 12-15 September, 1988, organized by the Government of Thailand.

IV. FOURTH INFRASTRUCTURE AND HEALTH POLICY DEVELOPMENT

The health situation and nutritional status of a given population are interrelated. The bi-directional relationship of infection and nutritional status has been thoroughly investigated and scientifically established.²² Thus, it is quite important to review health development in order to clearly understand other factors that have an impact on nutrition in addition to those attributable to nutrition interventions alone.

²². Scrimshaw N, Taylor CE, Gordon JE. Interactions of Nutrition and Infection. Monograph Series No. 57. Geneva: World Health Organization. 1968.

Health Sector: A Brief History Overview

Although the Thais have had contact with westerners since the sixteenth century, the medical system in Thailand was distinctively, traditionally Thai until the mid-eighteenth century. For political reasons and due to the limited overall western impact on Thailand, there was little transfer of western medicine until the American Presbyterian Mission vigorously introduced it into the Kingdom following their arrival in 1828. The desire to combat epidemic diseases such as cholera, smallpox and malaria which for centuries had inflicted a heavy toll on lives was the first incentive for Thailand to adopt the more effective western public health measures.

The first western medical school was established at Siriraj Hospital in 1889, an important milestone in Thailand's medical history. More than a century later, the school remains the largest and most important institution of modern medical education in Thailand. Among the first functions of Siriraj Hospital was to carry out vaccinations against smallpox.

Since then, the Thais have been gradually adopting western medicine and public health measures to cope with individual and public health threats. Patterns of health service utilization have been in transition from self prescribed or traditional, to institutional and more cosmopolitan (Table 15). Health and medical services, mostly western style, are provided by both private and public sectors. More than two-thirds of total health expenditure is paid for by the private sector and individuals (Table 16). Furthermore, Ministry of Public Health is not the sole public organization to use public resources for health since approximately only 60% of the total government health expenditure comes from this ministry as shown in Table 16. Health expenditure from individuals, the private sector and other ministries is almost entirely for curative purposes.

National Health Policy Development and Objectives

The most important step in national health policy development has been the formulation of the National Health Development Plan as a part of the National Economic and Social Development Plan starting in 1961. The summary of six National Health Development Plans²³ follows:

²³. Ministry of Public Health. Chapter 2, General Programme Development and Management. In: Thailand Health Profile 1990. Ministry of Public Health, Bangkok, Thailand, 1990.

The First, Second and Third Five-Year National Health Development Plans (1960-1976)

The first five-year national health plan came into operation in 1961 with the emphasis on the construction and expansion of health facilities especially at the provincial level. The second and third plans shifted emphasis towards optimization of resource utilization. Thus, coordination between planning at national, regional and provincial level was improved, resulting in an increase in the resources available for public health facilities. There was also a strengthening of new programmes which were in line with national socio-economic development goals such as:

- maternal and child health care, and family planning
- nutrition
- development and environmental health
- communicable diseases control and eradication

Another major facet of these plans, especially towards the end of the third five-year plan, was the increasing emphasis on both the supply and training of qualified personnel. This increasing emphasis was prompted by the need to simply expand the range of existing health facilities in an attempt to improve their availability. The perceived maldistribution of health personnel in the rural areas as compared to urban areas as a result of the problem of "brain drain", in which people bitterly

resented professionally-qualified Thai medical personnel migrate overseas, was the justification for emphasis on better co-ordination between the suppliers of health personnel - i.e. universities and training institutes - and the Ministry of Public Health who was the principal user. The Third Plan also marked the inauguration of the National Family Planning Programme which had been cited as one of the most successful population control programmes in the world (currently, the contraceptive prevalence among married couples achieved is more than 70%, see Table 5).

The Fourth Five-Year National Health Development Plan (1977-1981)

This was the first time that full attention was given to the formulation of a national health development plan which took into consideration a crucial problem - the inadequate health services provided by the government to people in rural areas. The target of increasing health personnel in various areas was set up together with field works in rural areas because of the fact that during this plan a number of district hospitals were constructed. However, the need for major expansion to obtain full coverage of general and specialized hospitals at the provincial level, community hospitals at the district level and health centres at the sub-district level will not be met until the next plan is put into action.

The Expanded Programme for Immunization commenced during this plan in 1977. Since then, immunization coverage has improved to a great extent and most recently, hepatitis A and Japanese B Encephalitis vaccines have been added to the protocol (see also Table 11). The National Food and Nutrition Plan, for the first time, was incorporated into the Fourth National Economic and Social Development Plan during this period.

The Fifth Five-Year National Health Development Plan (1982-1986)

The main policy of this plan was aimed at people participation. In line with this and to use primary health care as a solution to health problems, nation-wide training of village health volunteers and village health communicators was organized. The primary Health Care and Basic Minimum Needs and Quality of Life Movement will be presented in more detail later. Regarding the development of the health infrastructure, the top priority was given to the district community downwards. At least one hospital was made available in the district areas which resulted in a remarkably increased number of health facilities, particularly community hospitals and health centres. Furthermore, innovative health development projects for achieving 'Health For All' by the year 2000 (HFA) were implemented; for example, the health card project, the campaign on the quality of life, and village self-managed primary health centres. The nationwide growth monitoring activities began and were in full force during this plan.

The Sixth Five-Year National Health Development Plan (1987-1991)

In this plan, health development has been incorporated into a human resources social and cultural development plan and a rural development plan with the objective of improving people's quality of life both physically and mentally so as to attain the long-term goal of 'Health for All'. From the results of projects implemented or tested during the fifth plan, much was learned about ways of meeting existing fundamental needs and about future trends. This knowledge has been incorporated into the plan.

To ensure that the optimal quality of life of the population as regards physical and mental health is attained through the basic minimum needs (BMN) approach and under the principle of social justice and self-reliance of the individual, family and community, the national policy of health development in the sixth Five-Year Plan was formulated as follows:

- To promote and increase the opportunity of the people to participate in the development of the quality of life with particular emphasis on basic minimum needs through effective community preparation, public information and communication and development of appropriate approaches and technology.

- To support the efforts of the communities both in the rural and urban areas in initiating or extending primary health care activities in order to solve the existing health problems based on local conditions, and to maximize the potential of the individuals and households within each particular community.

- To promote the concept of decentralization of health administration through increasing the role of the people in decision-making particularly in reference to problem identification, need assessment, strategy formulation and resources management.

- To strengthen intra-sectoral collaboration for health development through organization development, development of effective co-ordination and community systems, exchange of knowledge and experience among agencies involved in health services delivery as well as training, research and development of medical and health technologies which are responsive to the concept of primary health care and HFA/2000.

- To strengthen inter-sectoral collaboration and continuing co-operation between the public and private sectors through organization development, the establishment of effective co-ordination, communication systems and changes in the attitude and behaviour of the administrators and the staff so that they are more responsive to the national intent for increasing the quality of life of the population.

- To increase the efficiency of the public health administration particularly in view of the pricing policy of the health system and the drug and health policy development, planning and health manpower development, resources management, strengthening of management information systems and decentralization of authority from the central to the peripheral levels.

- To upgrade the health service delivery system of the public and private sectors in terms of the infra-structure, the referral system and the technical support system with a view to expanding and increasing the quality of health services to meet the needs of the people in a more integrated manner and to provide all the communities essential services particularly at the Tambon and village levels.

- To strengthen health manpower development by means of effective linkages between manpower planning and production as well as personal management with specific reference to a long-term health development plan through mobilizing the resources and potential of the government and private sectors for increasing efficiency and effectiveness of health manpower development both in technical and managerial respects.

- To revise existing laws and regulations to conform with the current situation in public health, environmental conservation, drug addition and consumer protection in the area of food, drugs and cosmetics through appropriate measures in upgrading collaborative mechanisms, law enforcement, public information and communication, provision of outlets for complaints and strengthening the process of data collection and analysis in an effort to develop appropriate strategies for prevention and suppression.
- To promote the effective transfer of health technologies between and among communities, as well as to develop and test new models and technologies which could be utilized in generating community leadership and technical co-operation among developing villages and among institutions both within and outside the country under technical and financial support from the government.
- To strengthen research and development for innovating new models and approaches in the application of technologies for health development, particularly in increasing the quality of preventive, promotive, curative and rehabilitative services; laboratory analysis; industrial health; sanitation and environmental health; invention and development of medical supplies and equipment as well as drugs, traditional medicine and essential chemical substances, under technical, financial and legal support from the government.
- To develop new alternative systems of health financing which respond to the concept of people participation and result in reducing expenditure in order to make use of the mobilized resources for health insurance or provision of essential services for the poor and the aged.

Health Services Infra-structures

Health services infra-structures in Thailand can be categorized as governmental, non-governmental, non-profit health organizations (NGOs), and profit-making clinics and medical institutions. During the Fourth and Fifth National Health Development Plans (1977-1986), the disparity between Bangkok and the rural provinces of health resources, in terms of health facilities and manpower, was narrowed as shown in Table 17. Although the number of population per health worker has improved impressively during the decade - approximately two fold for doctor and five fold for nurse - there is still much to be done to close the gap. However, Thailand has also witnessed the establishment of community hospitals in almost every district and health centre in every sub-district during the last decade. It was quite fortunate that the policy commitment was so strong that Thailand did not cut its health budget in the early 1980's when global recession forced many countries to scale down national budgets for social causes (Table 18). Actually the Ministry of Public Health's budget increased 14-15% in real terms during 1981-1983 while the Gross National Product expanded 4-5% in the preceding years. As a result of that spending, more than 200 general or specialized hospitals and approximately 240 community hospitals at the district level, and 3,000 additional health centres at sub-district level sprang up 2 to 4 years later all over the country.

In 1989, approximately 70% of the general and specialized hospitals and 85% of the total beds were in the public sector, namely the Ministry of Public Health, other ministries, public enterprises and local governments. Of out-patient clinics (excluding those within the hospitals), profit-making private clinics made up more than 95%.

More than 80% of all categories of health personnel except pharmacists and dentists are in the public sector. However, most of them also work regular hours in the profit-making institutions.

Ministry of Public Health

The Ministry of Public Health is responsible for the organization, management, and administration of public health services and most of the medical services of the government, especially in the rural areas. Since 1977, the government budget for the Ministry of Public Health (MOPH) surpassed 5% only twice in 1977 and 1991, was usually between 4-5% and accounted for less than 1% (0.69%-0.89%) of the annual GNP (Table 19). During the period, the MOPH budget was less than 20% of total health expenditure (see Table 16). The budget analysis indicates that the proportion of the total national budget allocated to the MOPH has been quite stable, but the rate of increase may be subject to the country's economic performance. It is also evident that MOPH has not been the prime target for budget cuts during times of economic hardship.

Although primary health care has been promoted in line with this policy for more than a decade, budget appropriation for primary health care remains only approximately one-quarter of the total MOPH budget with minimal increase, while secondary and tertiary medical care slightly dropped around 5 percentage points during the past decade (Table 20). However, it is fair to say that the budget share of primary health care, which involves mainly promotive and preventive measures, is relatively high compared to that of other countries. Furthermore, the relatively rapid economic growth has also resulted in significant budget increases in current prices and in real terms (Table 19, 20).

There are six major organizations in the MOPH at central level. The Office of the Permanent Secretary is the biggest organization. This office is responsible for policy and planning (e.g. Health Planning, Epidemiology, and Health Statistics Divisions, etc), manpower development (e.g. Health Education, Health Training, and Nursing College Divisions, etc), and health administration (e.g. Personnel, Finance, and Legal Affairs Divisions, etc). It also supports general or regional hospitals at the provincial level and community hospitals at the district level through its Provincial Hospital Division and its Rural Health Division respectively. In addition, the office directly supervises and controls the Provincial Health Offices which are headed by the Provincial Chief Medical Officer, who is in charge of the medical and health services in the provinces.

Other departments are the Department of Communicable Disease Control which is responsible for the technical support of general communicable disease control as well as the prevention and control of some specific communicable diseases such as AIDS, malaria etc; the Department of Medical Sciences which conducts medical research and supports laboratory services for preventive and curative care and consumer protection; the Department of Medical Services which is the technical support department in the field of non-communicable diseases and controls some large general and specialized medical institutions especially those located in Bangkok; and the Food and Drug Administration.

Nutrition activities are the responsibility of the Nutrition Division in the Department of Health. The Department of Health has the mandate to support the provision of

preventive and promotive health care through the Provincial Health Office. It comprises several programme areas such as sanitation and water supply, occupational health, nutrition, family health including maternal and child health and family planning etc. Nutrition activities are carried out by health personnel at the sub-district level and Village Health Volunteers/Communicators at the village level under the direct control of the Provincial Health Office. The support from the Nutrition Division is technical, logistic, and supervisory. It co-ordinates information systems and carries out operational research. The budget allocations for the Department of Health and the Nutrition Division and their trends in the past decade are shown in Table 21. The nutrition budget has increased more than 3 times during the past decade. On average, the Department of Health received about 7% of the MOPH budget and the share has recently increased slightly. The figures also reflect the greater share and higher rate of increase in the budget of the Nutrition Division in the early 1980's when a nation-wide growth monitoring and nutrition campaign to combat protein energy malnutrition was launched and in full gear. The Nutrition Division budget increase of more than 45% in 1990 was mainly due to the Iodine Deficiency Disorders Control Programme.

V. FOOD AVAILABILITY SITUATION AND TRENDS

Thailand is one of those countries that are not only food self-sufficient but are also big food exporters on the world market. Thailand is the biggest tapioca exporter (usually over 75% of world market share) and competed fiercely with the USA to be the number one rice exporter in the 1980's. Food self-sufficiency attainment, the threat of famine and the vulnerability of food imports are not central to Thailand's food policy formulation. Food commodities, both basic and value-added processed products *are the major* source of export earnings rather than a drain on foreign exchange earnings. Yet a considerable number of Thai children are malnourished. This section will look at this contradictory phenomenon in more detail.

Food Production Potential

To address the food and nutrition situation and trends needs an impartial assessment of food production potential which is the first link in the food and nutrition system. Major resources on which food production rely on in Thailand are:

Land Resources

Thailand is well endowed with cultivable land, which represents some 65% of its total area (51.3 million hectares) - a theoretical maximum²⁴. Land utilization in 1988 indicated that forest land is shrinking rapidly and down to only 28% of the total area whereas farm holding land constitutes 46% and the rest is unclassified land. Of the total farm holding land, 50.2% is paddy land, 24.2% is for upland crops, 13.2% is for fruit tree and tree crops and the rest (12.4%) are livestock farm areas, vegetable and flower farms, idle land and housing areas²⁵. Due to recent economic development primarily concentrated in the central plain and eastern sea board, the most fertile arable land is rapidly being converted into industrial sites and suburban settlements. Under mounting pressure from an increasing population and export earnings from cash crops, increases in production have come from the expansion of cultivated areas to marginal land frontiers or encroachment upon forest areas rather than increases in yield per unit area. Increases in farmland have been largely at the expense of forest land. Furthermore, FAO has reported that crop yields in Thailand

are showing a decreasing trend both in irrigated and rainfed areas partly due to unsuitable farming systems, physical, chemical and biological degradation of soils, and poor management²⁶. About 46% of farm holding land is classified as special problem soil, i.e., saline and sodic soils, acid sulphate soils etc²⁷.

²⁴. Overview and Perspective. In: Arbhahirama A, Phantumvanit D, Elkington J and Ingkasuwan P eds. Thailand Natural Resources Profile. Bangkok: Thailand Development Research Institute, 1987:3.

²⁵. Agricultural Statistics of Thailand, Crop Year 1988/1989 (No. 414). Office of Agricultural Economics, Ministry of Agriculture & Co-operatives, Bangkok, Thailand 1989.

²⁶. FAO. Investigation of Lands with Stagnating and Declining Productivity. (OCP/INS/107/JPN), Interim Report, Bangkok 1984.

²⁷. Panichapong S. Distribution, Characteristic and Utilization of Problem Soils in Thailand. 1982 Tropical Agriculture Research Series No 15, Ibaraki, Japan.

However, as Thailand may have a stable population of 85-90 million in the next 3 or 4 decades, present food production levels and land resources should be able to sustain food security in Thailand provided that the right policies and management systems are being adopted. Land use planning and zoning to increase land productivity will become increasingly critical to future efforts to secure food for the Thai people and to maintain food exporter status.

Water Resources

Thailand receives a generous rainfall - on average 1,550 millimetres per year (800 billion cubic metres) - suggesting that water is unlikely to be in short supply.²⁸ The rainy season usually begins in mid-May and ends in mid-October, when the southwest monsoon brings moisture from the Indian Ocean and contributes approximately 80% of the annual rainfall. However, it is quite uneven and inequitable both in spatial and temporal distribution. Flooding may alternate with drought especially in the north-east where annual rainfall has a somewhat unreliable pattern. Water resources development in terms of irrigation covered only 25.76 million rai or 19.70% of the total farm holding land excluding housing area and idle land in 1988. The north-east which is the most populated and poorest region has the smallest percentage of farm holding land with irrigation (7.08%) compared to the highest in the central plain (39.5%); thus the majority of paddies and up-land crop farms are rainfed. Furthermore, only 30% of the irrigable area even in the central plain has adequate irrigation in the dry season. Lack of adequate maintenance and inefficient use of water resulting from incomplete systems, unregulated flows, and inadequate or outdated control structures are some important problems of the Royal Irrigation Department. Groundwater utilization for domestic consumption and for supplementary irrigation in the dry season is also of concern. The 1977 Groundwater Act, an attempt to ensure the safe yield of the aquifer and to prevent land subsidence and saltwater encroachment, unfortunately, is enforced only around the Bangkok metropolitan area.

²⁸. Water Resources. In: Arbhahirama A, Phantumvanit D, Elkington J and Ingkasuwan P eds. Thailand Natural Resources Profile. Bangkok: Thailand Development Research Institute, 1987:47-55.

Although Thailand has made increasing use of its water resources, water demand is increasing rapidly, not only for agriculture but also for industry, hydroelectric power, domestic consumption and inland water way transportation. Inevitably, there will also be growing competition for water resources, both within and between regions and increasing friction among users from various sectors. Clearly, Thailand needs to adopt a more co-ordinated approach to water resources management from the food security point of view.

Fishery Resource

Thailand's fishery resources are harvested from the 2,615 kilometre coastline of the Gulf of Thailand and the Andaman Sea, and the 3,750 square kilometres of inland water area (20 rivers, 4 natural and more than 11,010 large and small man-made reservoirs). For marine fish, the estimated maximum sustainable yield - which is the guide to a safe level of exploitation of fishery resources - indicates safe levels of exploitation in the Andaman Sea, but over-exploitation in the Gulf²⁹. There is no potential for future development of trawl fisheries which exploit mainly the demersal (bottom dwelling) fishery resources rather than the pelagic (surface dwelling) fishery resources. Another potential problem is that the small-scale coastal fishermen continue to use outdated technology and these poor fishermen are in constant conflict with the large scale trawlers³⁰.

²⁹. Fishery Resources. In: Arbhahirama A, Phantumvanit D, Elkington J and Ingkasuwan P eds. Thailand Natural Resources Profile. Bangkok: Thailand Development Research Institute, 1987:165-190.

³⁰. Phantumvanit T, et al. A Report on the Status of Coastal and Marine Resources of Thailand. Thailand Development Research Institute, August, 1986.

Aquaculture i.e., freshwater culture, brackish water culture and mariculture, has a long term potential for increasing fishery production either to provide cheap protein sources for local consumption or export earnings. But however successful these efforts may be, the evidence suggests that water pollution and the rapid destruction of the country's mangroves could emerge as real threats to the long-term success. Other major constraints of aquaculture development that must be overcome are seed and fingerling production, aquaculture feed production, genetic improvement and disease problems. Moreover, the proclamation of the Exclusive Economic Zone, which extends national jurisdiction over fisheries out to 200 miles seaward of the baseline of territorial seas, has greatly diminished the Thai fisherman's fishing ground. While Thailand has increased the sea under her jurisdiction by 50%, Thai fishermen have lost about 300,000 square miles of the sea that they once utilized.

Food Production

The present interplay of the country's natural resources, the application of technology, government policies and the Thai people who engage in the agricultural sector has propelled Thailand's food production to a level that consistently exceeds annual domestic consumption. Throughout its history, Thailand's exports of

agricultural commodities and food products have far exceeded its food imports in terms of cash value. In 1988, Thailand had a positive agricultural balance of 116 billion baht by exporting 194.2 billion baht and importing 78.2 billion baht. In 1981, Thailand earned 74.161 billion baht from food exports, constituting 48.6% of total earnings, while importing only 5.963 billion baht of food products (2.7% of total imports).³¹ These mainly economic transactions should not be interpreted as meaning that Thailand can meet her nutrient requirements and achieve firm food security. It merely reflects that Thailand produces food in excess of her population's ability or willingness to acquire and consume, directly or indirectly. The details of some major food products are as follows:

³¹. Department of Business Economics. International Trade and Important Economic Information B.E. 2524. Ministry of Commerce 1981.

Rice

Thailand is not only self-sufficient in terms of rice production, the country's main staple, but is also one of the world's largest exporters (34.6% of world market in terms of quantity, and ranked first in 1986). Rice is not only the main staple food of the Thai people, but it is the major subsistence and cash crop for the majority of farmers as well. In the 1988/1989 cropping season, rice output was 21.1 million tons. Rice production, domestic consumption and export have increased very little in the 1980's and the proportion has been approximately two-thirds domestic consumption, one-third export. Based on the aggregate figure, per capita domestic consumption ranges between 150-170 kilograms per year which should provide approximately 1,500-1,700 kilocalories and 30 grams of vegetable protein per day, about half of the recommended daily allowance in terms of both calories and protein (Table 22). However, rice production productivity has been among the lowest with average yields per rai of 320-330 kilograms during 1983-1987 due to very low input usages in terms of machinery, fertilizer and other factors. Gradual growth has been maintained through the expansion of low yield marginal land which has been brought into agricultural use. Thus, Thailand still has tremendous potential to produce more either for domestic consumption or export provided that farmers get the right incentives, with special emphasis on alleviating marketing and pricing constraints.

Other Food Crops

In 1986, Thailand was not only the world largest exporter of rice, but also cassava (34.6% and 89.2% of the world market respectively), along with several other agriculture and livestock commodities³². Other major food crops whose estimated value exceeded 10 billion baht (400 million US\$) during 1984-1988 included maize, sugar cane, and combined oil seeds i.e. soybean, coconut, ground nut etc. Most of these agricultural products are for export and indirect consumption as animal feed.

³². FAO Production Yearbook 1986 and FAO Trade Yearbook 1986.

One crop which has experienced significant changes in its production pattern is the soybean. Demand for soybean oil and soybean cake for animal feed has increased sharply during the past decade. Soybean production has tripled as a result of import substitute policy from 113,000 tons in production year 1982/1983 to 517,000 tons in 1988/1989 but it is still inadequate to meet domestic demand. Government pricing and tariff policies for soybean products have been quite complicated and

governments have been careful to balance out conflicting interests among concerned parties (i.e. farmers, the poultry industry as regards export and local consumers). Changing food habits to more bread consumption, especially among urbanites, has also accelerated the demand for wheat products. Thailand tries to produce her own wheat but the amount produced is minimal compared to imports that have increased exponentially during this past decade.

Fish

The Thai fishing industry is one of the ten largest in the world. Fishery output, more than 90% marine fish, grew steadily from 1.95 to 2.78 million tons during 1979-1987. Domestic consumption, approximately two thirds of its direct, and one third indirect, accounted for 70-80% of the total catch. From these figures fish, then, is the major animal protein source for Thai people and provides on average 10-14 gm. of protein per capita per day. However, according to the National Dietary Survey by the Nutrition Division, MOPH and the Faculty of Public Health, Mahidol University, the average daily fish consumption was 26.45 gm (5.5 gm of protein).

Livestock and Dairy Products

Thailand's livestock production has increased very slowly during the decade. Less than 10% of cattle and buffalo are commercially produced. Buffalo and cattle are raised primarily as draft animals for paddy fields with meat production as a by-product. Farmers raise a small number of animals using traditional method based on open-access resources, agricultural residues and family labour with no specific food provision. On the other hand, commercial pig-raising farms have gradually been developed mainly due to rapid increase in urban demand for pork. From Table 23, actual legal slaughter for consumption has been approximately only half of the demand. Although villagers sometimes illegally slaughter their own animals for household consumption and communal feasts, the numbers are unknown but are considered to be quite significant. However, this would provide only 20-30 gm of an edible portion or 3-5 gm of protein from pork and beef (buffalo and cow meat) per person per day. In the recent past, rural Thai people used to supplement animal food sources from small wild animals, e.g. birds, frogs and reptiles. These activities are rapidly disappearing at present due to deforestation and ecological degradation.

Thailand produced only 152,888 tons of milk in 1990 (or approximately 3 litres of milk per person per year), an increase from less than 50,000 tons in the early 1980s. Although the majority of the Thai are lactose intolerant, the demand has kept on rising at the rate 25-30% in the past couple of years. Between 1984 to 1988, the value of milk product imports steadily rose from 54.84 to 79.45 billion baht³³.

³³. Agricultural Statistics of Thailand, Crop Year 1988/1989. Center for Agricultural Statistics, Office of Agricultural Economics, Ministry of Agriculture & Cooperatives. Bangkok, Thailand 1989.

Poultry and Broiler Industry

The broiler industry has undergone significant structural changes during the past two decade. Most of the chickens that supply the domestic market and the frozen chicken industry for export are from large commercial farms as well as contract farms.

Currently, Thailand produces more broilers than required for domestic demand but domestic consumption, according to the figures in Table 24, is not as high as it should be (approximately 6-8 chickens per person per year). On the other hand the export amount and revenue of frozen boneless chicken or duck rose to 97,420 tons and 4.999 billion baht in 1988. However, rural farmers usually raise their own backyard chickens for mainly household consumption (10-15 chickens per household per year can be expected).

Whether a country has the ability to produce enough food for her population can also be looked at from the food availability aspect. Daily per caput availability of nutrients and dietary score during 3 periods in the past decade (Table 25) have indicated that approximately 80% of the total calories came from carbohydrate. Fat availability has been quite low (10-13% of the total calories) mainly coming from vegetable sources but has gradually increased. Dietary protein also came predominantly from vegetable sources and constituted less than 10% of the total calories available. Thus, the dietary scores for Thai population may still need some improvement. It is quite obvious that while Thai people still consume relatively low amounts of animal protein food, Thailand exports enormous amount of protein food sources i.e. frozen boneless chicken or ducks, and approximately 0.6 million ton of fishery products valued at more than 41 billion baht in 1988. However, the requirement in terms of total calories has been met (Table 26).

VI. FOOD CONSUMPTION PATTERNS

The linkages between food production and the nutritional status of the individual consumer are very complicated. Bounty food production does not always guarantee adequate consumption. Food production must flow from production locations to reach ultimate consumers in the market through various marketing channels and outlets. Various marketing activities are involved in the flow of food such as harvesting, transportation, processing, wholesaling and retailing, etc. Furthermore, household food acquisition and individual consumption are influenced by food prices, family income, food habits and cultural taboos, nutrition knowledge and advertisement, tastes and preferences.

Food Expenditure Patterns

Engel's relationship and the high proportion of total expenditure allocated for food in Bangkok slums and in the north-eastern households was observed in Table 27 in the early 1980's. Later in the decade in 1988, the proportion of total expenditure allocated for food lowered and accounted for 32-40% of all household expenditure in a bigger survey in five regions (Table 28). Three-quarters of the food expenditure (77.3%) was on raw food items to be cooked at home rather than eat out expenditures and ready-to-eat or take-home food, except for Bangkok where almost half of the food expenditure were not home-based. Most of the food acquired for household consumption (71.9%) was bought rather than home produced except in households in the North-east where purchased food constituted about half (51.1%). Average monthly household income, expenditures on food and the proportion of food expenditure by socio-economic class in the same year are shown in Table 29. Actual food expenditure was higher, and the proportion of food expenditure to total expenditure was lower in the better-off professional classes. The reverse trend was observed in poorer socio-economic classes. It is quite clear that the rural Thai or farmers can no longer subsist on their farm land since half of their food has to be

acquired by purchasing. Thus, household income, food price and access to the food market are important factors of household food security even among the food producer household.

However, the food expenditure trend has indicated that during the decade the country total food expenditure has increased in real terms (Table 30). Since the rate of change of food expenditure has been greater than the population growth rate, individual food expenditure should have increased in real terms also. There were no significant changes associated with expenditure changes for cereal staple and animal protein. This indicates that either the increase in food expenditure is quite minimal, or that the proportion of food expenditure on cereal staples is dropping, while the proportion spent on animal products is increasing.

Dietary Patterns

Typical Thai dietary patterns rely heavily on rice as the main source of calories and protein. Studies on daily dietary intake in various age groups in Thailand in the 1980's were shown in Table 31. The National Nutrition Survey in 1986 revealed that dietary consumption was 1,766 calories per capita (92% of the Thai RDA standard) and decreased from 94% in 1960 (ICNND's Nutrition Survey). The data also indicated that protein consumption increased slightly from 10.9% of the total calories to 11.5% (equivalent to 50.8 grams, 125% of the Thai RDA). The proportion of animal protein to total protein was 45.1% compared to 30% in 1960. Fat consumption also increased from 9% of the total calories in 1960 to 21.8% in 1986. Average intakes of micronutrients were generally adequate; 126% of RDA for iron, 231% for Vitamin A, 313% for Vitamin C, but inadequate for calcium at 61%³⁴.

³⁴. Nutrition Division, Department of Health, MOPH and Department of Nutrition, Faculty of Public Health, Mahidol University. National Nutrition Survey, 1986. (Unpublished data).

The data demonstrate that average calorie intakes among the studied subjects were mostly less than the Recommended Daily Allowance (RDA). Caloric distribution shows that more than 60% of total calories come from carbohydrate, and fat consumption is low. Thus, the dietary intake data confirm the food availability data presented earlier. It clearly demonstrates that the existence of food surpluses for export does not imply that all food related problems have been solved.

Food Habits

The poor intake cannot be blamed entirely on poor distribution and poverty. The results of the Food Habits Research Phase I (1985-1986) pointed to several food practices and associated aspects affecting general nutrition among target populations³⁵. For example, food taboos were frequently observed, especially in the rural north-eastern region. The rationale behind food restriction was often fear of having a large foetus, thus leading to a difficult and high risk delivery. During the two week postpartum period, lactating mothers usually consumed only rice and salt without animal protein. Mothers also tended to start feeding supplementary foods (i.e. pre-masticated glutinous rice or rice mashed with ripe banana) as early as the first week of life. On the other hand, animal protein food such as fish, egg, and meat were fed very late after 6 to 9 months of age. Premature feeding of meat was the perceived cause of parasitic infestation.

³⁵. Institute of Nutrition, Mahidol University. Thailand Food Habits Project. Thailand, 1989.

Information obtained was used to formulate strategies and design messages for behavioural modification of undesirable food habits as well as strengthening desirable habits amongst the target population during the second phase of the research project and nationwide nutrition education.

VII. NUTRITION SITUATION AND TRENDS

Despite the overall economic thriving conditions and the bounty of food during the 1980s, there are still considerable nutritional problems. However, during the decade, Thailand has reduced the magnitude and severity of the problems, especially protein energy malnutrition (PEM). Current nutrition problems and their trends can be summarized as follows:

Low Birth Weight (LBW)

There has been a slight improvement of low birth weight prevalence in Thailand during 1980s. In 1989 and 1991 the overall prevalence of LBW (under 2,500 gm.) were 9.5% and 9.0% respectively for the whole country. In 1982, the regional prevalences were 8.2%, 9.3%, 10.4%, and 12.8% in the Southern, the Central, the North-eastern, and the Northern regions respectively while in 1991 the figures were 9.5%, 9.2%, 9.4%, and 10.2% respectively as shown in Table 32. For the Bangkok area, the prevalence of LBW in 4 major hospitals in 1982 ranged from 4.6% in an elite teaching hospital to 9.2% in a general hospital and showed relatively no changes over time (4.6% in 1988³⁶ and 9.7% in 1991³⁷ respectively). Among the hypotheses why the North has the highest LBW prevalence is the high percentage of minority hill-tribes, the fact that it is an IDD endemic area and the high smoker prevalence among women.

³⁶. Unpublished data from the Department of Obstetric and Gynecology, Ramathibodi Hospital. Bangkok, Thailand 1988.

³⁷. Department of Health. Report of the incidence of low birth weight in the Bangkok metropolitan area, 1991. Bangkok Metropolitan Administration, Thailand 1991.

Protein Energy Malnutrition (PEM)

The prevalence of protein energy malnutrition (PEM) by weight-for-age in children under five who reflect macro-nutrients deficiency was 53% between 1979-1982. Since the growth monitoring activities were institutionalized by the Division of Nutrition, MOPH at the beginning of the fourth NESDP in 1981, Thailand has achieved a dramatic reduction in PEM according to the National Growth Monitoring Quarterly Report by the MOPH with a coverage of more than 2.6 million pre-school children. Using the Thai growth standard the combined mild, moderate and severe malnutrition by weight-for-age as shown in Table 33 declined consistently from 50.8% in 1982 to 18.6% in 1990 (for moderate and severe combined from 15.1% to 0.8% in the same period). The north-east has consistently been the worse-off region. The combined malnutrition rate in 1990 in this region was 24.6% compared to less than 10% in the east and central region (Table 34).

A recent study in 24 north-east villages in 1990 has indicated that PEM in this worse-off region also has seasonal variations³⁸. The combined malnutrition in the dry season (March-May) was higher (48.3%) than the same group of pre-school children (37.5%) in the cold-dry and post-harvest seasons. This might reflect the seasonal food shortage in this region. Using the NCHS standard, the percentage of the children who fell below -2 SD cut-off points in the hot-dry season were 34.7%, 28.1% and 9.9% by weight-for-age, height-for-age and weight-for-height respectively (Table 35). This can be considered as the worst case scenario, since the north-east is the poorest region and food in the hot-dry season is scarce. For comparison, the 1987 Demographic Health Survey showed the prevalence of pre-school children falling below -2 SD. of the NCHS Standard by W/A, H/A and W/H at 25.8%, 5.7% and 22.4% respectively. The figures indicate that children in the north-east are more chronically malnourished (H/A) than Thai children (overall) in 1987. The improved W/H indicator observed in 1990 compared with that in 1987 should be viewed with caution since they already suffer stunting.

³⁸. Kachondham, Y. et al. Report on IDRC's Integrated Nutrition Project in North-east Thailand, Phase 1. Institute of Nutrition, Mahidol University, 1992.

It is quite difficult to make any international comparison since the nationwide growth monitoring activities collect only weight-for-age data using the Thai Standard instead of the NCHS Standard. However, using the database of a recent study in the north-east to create a set of adjusted factors, the PEM prevalence using W/A indicators and the -2 SD NCHS Standard cut-off point might be 33.9%-36.4% in 1982 and 12.4%-13.3% in 1990 (Table 36). Furthermore, another interesting point regarding the nationwide growth monitoring report is that the coverage percentage might be overestimated since according to the population age structure, children under 6 should be approximately 5 to 6 million during the period. To say that the growth monitoring had 89% coverage (in Table 33) when only 2.6 million children participated is improbable even subtracting all children in the urban areas who were usually not counted in the nationwide growth monitoring activities. Thus, the achievement might be overestimated since those who were left out were mostly temporary migrants or the economically deprived. Nevertheless, there is no doubt that tremendous improvements in the nutritional status among Thai children did happen in the 1980s.

Iron Deficiency Anaemia

Iron deficiency anaemia was first described as a public health problem in a 1962 nutrition survey by a joint Thai-US group of scientists of the Interdepartmental Committee on Nutrition for National Defence³⁹. Studies in the south from 1980-1988 indicated prevalence rates as high as 30-43.3%^{40 41 42}. Iron-deficiency anaemia using hematocrit classified by WHO criteria among pregnant women in 1986 were widespread, at its highest in the Eastern region (35.9%) and lowest in the North (20.4%)⁴³. For children aged 0-5, 29.2% of them were anemic in the 1988 national nutrition survey, reduced to 15% in 1991. The prevalence of anaemia in school-age children and pregnant women from the hospital-based data has been reduced from 27.3% and 27.3% in 1988 to 18.6% and 18.8% in 1990 respectively (Table 37). People in the South seem to have the highest prevalence of anaemia. It may be the climatic, occupational and life style conditions (i.e. tropical forest and not wearing shoes while working in rubber plantations) that may be conducive to higher hookworm infestation among people in the South. Since Thalassemia and

Thalassemia trait are inherent problems among the Thai in the North and the North-east, iron deficiency anaemia prevalence may be overestimated due to the inclusion of those who are thalassemic.

³⁹. ICNND (U.S. Interdepartmental Committee on Nutrition for National Defense). Kingdom of Thailand Nutrition Survey Oct-Dec, 1960. Washington DC: Department of Defense, 1962.

⁴⁰. Nutcharas U, et al. Anemia in Muslim villages of Thailand. *Health and Environment* 1987; May-Aug: 5-11.

⁴¹. Surapruerk P, et al. Anemia in South Thailand: A Preliminary Study, Songkla, Thailand. *Songkla Med J* 1980; 2(1):38-50.

⁴². Tintara H, Kor-anantakul O, and Pornpatkul M. Causes of Anemia in Pregnant Women in Hat Yai, Songkla. *Songkla Med J* 1988; 6(3):268-76.

⁴³. Thaineur V. Direction and Nutritional Activities in the 6th National Economic and Social Development Plan. Nutrition Division, Ministry of Public Health, 1987.

Most pregnant women currently have access to antenatal care and usually get iron supplementation in the first visit. Iron supplementation for at least 3 months is recommended and compliance is doubtful since only half of pregnant women have 4 antenatal visits or more (Table 32). Poor compliance issues include (i) lack of good communication to warn pregnant women in advance against black stools and dyspepsia that may follow iron tablet ingestion; and (ii) "Nurturing tablets", a collective term often used by health providers for vitamin and iron tablets, may be wrongly perceived by pregnant women for fear of having a big foetus and painful labour. To improve iron supplementation compliance these issues certainly have to be addressed.

Iodine Deficiency Disorder (IDD)

The Northern region and some provinces in the north-east are categorized as goitre endemic. A national iodine deficiency disorders (IDD) control programme has been underway since 1989. The prevalence of IDD at present has been determined on the basis of physical examination of children in rural primary schools where teachers have been trained to screen for goitre. The prevalence of goitre in these 15 provinces declined from 19% in 1989 to 16.8% in 1990 and the goitre rates in each affected province are shown in Table 38. Moreover, the Nutrition Division Report in 1991 indicated that prevalence of goitre in school children might be as high as 37.9% in 10 upper north-east provinces and 26.5% in 11 central provinces. Since interrater agreement on goitre is not always reliable, these data are subject to verification by better methods i.e. urinary iodine, cord blood Thyroid Stimulating Hormone (TSH) and other tests. According to the Nutrition Division, these techniques will be used in random samples to verify and improve the quality of screen data reported by school teachers.

Current control measures include the distribution of iodized salt, iodate concentrated stock solution drops in community wells, drinking water tanks at school and at home in villages where goitre rates exceed 5%. Iodized oil capsules (200 mg) are also

provided for women of child-bearing age and pregnant women in those villages where goitre rates are greater than 20% or those villages that have cretins of less than 5 years of age.

Vitamin A Deficiency

The existence of vitamin A deficiency as a public health problem is not clear. Information on vitamin A deficiency's magnitude and geographical distribution is obtainable through accumulated small scale surveys and research studies. Nonetheless, studies have shown the decline of vitamin A deficiency prevalence over the last two decades as follows. A 1977 survey in Ubon Ratchathani province in the North-east demonstrated that 17% of 146 preschool children showed deficient serum retinol levels (less than 10 mcg/dl) and as much as 70% of the children studied had marginal serum vitamin A (10-20 mcg/dl). Results in school children were 22% for deficient and 51% for marginal levels⁴⁴. In 1987 the prevalence of deficiency levels and marginal levels in school children in the same areas reduced to 1.3% and 16.8% respectively⁴⁵. In the 1990 survey in the North and the North-east, marginal serum retinol between 10-20 mcg/dl were found in 14% and 7% of the pre-school children in the dry and the rainy seasons, respectively, due largely to an increase in vitamin A-rich foods during the latter period⁴⁶. Thus, it may be concluded that, although xerophthalmia and deficient serum levels existed during the 1960's⁴⁷ to mid 1970's, the problem declined to marginal levels, rather than severe ones, during the mid-1980's. Nevertheless, sporadic cases of clinical manifestations and deficient serum retinol levels in pre-school children can still be found in some specific areas in rural north and north-eastern Thailand⁴⁸.

⁴⁴. Dhanamitta S, Stoecker B and Vallyasevi A. Community Approaches to the Prevention of Vitamin A Deficiency. Paper presented at the IVACG Meeting, Jarkarta, Indonesia, 11-13 October 1980.

⁴⁵. Dhanamitta S, Viriyapanich T and Kachonpadunkitti Y. Vitamin A deficiency in Thailand. In: Proceedings of the Fifth Asian Congress of Nutrition. Yasumoto K et al., eds. Center for Academic Publications. Tokyo, 1987.

⁴⁶. Nutrition Division and the Institute of Nutrition at Mahidol University. Report on Prevalence of Inadequate Vitamin A Nutriture in Pre-school Children of the North and Northeast Thailand. Department of Health, Ministry of Public Health. Bangkok, 1991.

⁴⁷. Interdepartmental Committee on Nutrition for National Defence (ICNND). The Kingdom of Thailand Nutrition Survey (October-December 1960). Department of Defence. Washington, D.C. 1962.

⁴⁸. Bloem M, et al. The Prevalence Study of Vitamin A Deficiency and Xerophthalmia in Northeastern Thailand. *Am J Epidemiol* 1989; 129:1095-1103.

Other Micro-Nutrient Deficiencies

Other micro-nutrient deficiencies are also quite common and prevail in certain vulnerable groups. Despite the general impression that riboflavin deficiency was common among rural dwellers, there is little knowledge about its epidemiological nature. A study was conducted in 32 villages in two north-eastern provinces (Khon

Kaen and Nakorn Rajsima), covering 430 under-fives⁴⁹. The overall prevalence of riboflavin deficiency, measured by erythrocyte glutathione oxidoreductase activity, was 16%. The highest prevalence was in the first year age group (21%). A similar survey was done in Bangkok children from a well baby clinic, and found a prevalence of only 2%.

⁴⁹. Vudhivai N, et al. Riboflavin status in preschool children in northeast Thailand: A community survey. *J Med Assoc Thai* 1986; 69:543-8.

Since the problem is not fatal, nor does it cause serious injuries, it has received very little attention. Angular stomatitis was very obvious during certain times of the year. At least half of school children in the north-east might have had various stages of angular stomatitis during the peak period. Thereafter, it is cured by itself without treatment.

Urinary Bladder Stone Disease

Urinary bladder stone disease has been listed in the past as one of the major nutritional problems in Thailand. Its striking characteristics were the high prevalence in young children and the stone composition. Phosphorus deficiency was identified as the causal factor, and was related to infant feeding practices in the north and north-east where the prevalence was high⁵⁰. In the studied population in 1963, 3.8% of them, at one time in their life, may have had active bladder stone disease⁵¹. There have been no reports on the present trend. The only evidence was the decline in the number of patients admitted for urinary stone operation. A follow-up from hospital records in Chiang-mai (north) between 1962 and 1984 showed a marked decline in the proportion of children under 10 years old admitted for stone operations (64% of lower urinary tract and bladder stone patients in 1962, 26% in 1974 and 3.8% in 1984). There have been no epidemiological studies to support the trend.

⁵⁰. Van Reen R, Valyasevi A, Dhanamitta S. Studies of Bladder Stone Disease in Thailand, VIII. Sulfate Excretion by Newborn and Infants: Possible Relationship of Protein Malnutrition to Bladder Stone Disease. *Am J Clin Nutr* 1967; 20:1378-1386.

⁵¹. Halstead SB, Valyasevi A. Studies of Bladder Stone Disease in Thailand, III. Epidemiologic Studies in Ubol Province. *Am J Clin Nutr* 1967; 20:1329-1339.

Nutrition Related Health Problems

The burden of specific nutritional deficiency diseases co-exists with many complex nutritional problems, which put a tremendous strain on the current research organization and its resources. Due to uneven prosperity in society, inadequate consumer protection and unmitigated environmental dangers, Thailand is now enduring a new chapter of nutrition-related health threats in rapid transition, with malnutrition and other deficiency diseases co-existing with the diseases of affluence.

The Nutrition Division reported that the prevalence of overnutrition (W/H > 120% standard weight) in Bangkok school children aged 6-12 (N = 267) was 22.3% in male and 16.45 in female students. A nutrition survey of 3,494 officers of the Electricity Generating Authority of Thailand in the mid 1980s indicated that 23.3% of male and 18.8% of female officers were obese⁵². Heart disease, the number one

killer (30 deaths per 100,000 persons per year) in recent mortality statistics since 1980, and hypertension are known to be associated with overnutrition especially among the well-to-do class (see also in section 3.2). The dreadful Sudden Nocturnal Death Syndrome, a disease causing untimely deaths among workers working outside Thailand is believed to have nutritional etiology due to thiamine (B1) deficiency and low potassium intake in the diet. Certain kinds of cancer are related to over-consumption of fat and contamination with toxic substances in the food chain as the price of uncontrolled environmental hazards and rapid industrial development.

⁵². Pakpeankitvatana R, Tanphaichitr V, Lochaya S, et al. Clinical and epidemiological studies on hyperlipidemia in urban Thais. In: Yasumoto K, et al, eds. Proceedings of the Fifth Asian Congress of Nutrition. Center for Academic Publications, Tokyo 1988:430-3.

VIII. NUTRITION POLICIES, INTERVENTIONS AND NUTRITION-RELATED HEALTH DEVELOPMENT IN THAILAND

History Perspectives

Early Period (before 1960)

Thailand has been blessed as "the land of bounty", and famine or hunger has rarely been mentioned throughout her history. This was vividly reflected in a famous inscription stone during the Sukhotai period (1200-1400): "In the water we have fish; in the paddies we have rice." Abundant food from the fertile rice-growing central river delta was accompanied by low population growth. The population of Thailand and its growth remained quite low even during the first half of this century: 8.2 million in 1910, 9.2 million in 1919, and 11.5 million in 1929. However, despite the low population density and relative abundance of food, there is reason to believe that the quality of the average Thai diet must have been low over a long period of time, in particular with regards to protein consumption. The height-for-age of Thai children, when compared with North American references shows that Thai children lag behind their counterparts⁵³. This may be due to the food habits and traditional diet of the Thai people: predominantly rice with very little consumption of other higher quality foods such as animal proteins. It was not until after the Second World War (late 1940s) that Thailand started her demographic transition through the impact of public health measures and socio-economic development. The population began to increase rapidly as anticipated during the first phase of the transition. The population reached 26.2 million by 1960 and 34.4 million by 1970⁵⁴ and began to slow down in the 1980's. This increase gave rise to social and economic pressures, including deforestation, ecological degradation, urban migration, and the emergence of mass poverty and malnutrition.

⁵³. Khanjanasthiti P, et al. Growth of Infants and Preschool Children. J Med Assoc Thai 1973;56(2):88-100.

⁵⁴. Porapaktham Y. Mortality and Health Issues: Levels and Trends of Mortality in Thailand. Asian Population Studies Series No. 77. ESCAP, United Nations, Bangkok, 1986.

It can be said that nutrition activities began in 1926 when the Ministry of Interior at the Department of Public Health established a Nutrition Section chaired by Dr. Yong Chutima. The section was re-organized many times during the following 40 years. First, it was joined with the Division of Food and Medicine, Ministry of Public Health (MOPH) during 1942-1953. Later on, this division was divided into the Division of Food Promotion and the Division of Medicine. Since 1963, the Division of Food Promotion has been renamed the Division of Nutrition in the Department of Health.

From the inception of the Nutrition Section until the 1950s, this division took the leading role in nutrition activities for both clinical and public health purposes. During the long tenure of Dr. Yong Chutima, the first director of the Nutrition Section and later the Food Promotion Division (1926-1960), a variety of food and nutrition activities - such as the use of high protein food supplementation for patients in the Central Hospital and the Siriraj's Hospital School of Medicine in Bangkok - were initiated⁵⁵. A nationwide nutrition education campaign was also launched by Prime-Minister General Piboonsongkram in 1937 which advised Thai people to eat nutritionally balanced foods based on the 5 food groups. A promotional song was composed to help deliver the messages. Information was also given on appropriate combinations of foods, and there was promotion of soybean milk, desserts and other products⁵⁶.

⁵⁵. Ministry of Public Health. Nutrition in Primary Health Care. Bangkok: The Royal Thai Government: Ministry of Public Health, 1984.

⁵⁶. Valyasevi A. Nutrition in Thailand: Past, Present and Future. In: Wichaidit S, Thanpaichitr W, and Srianujata S, eds. Applied Nutrition. Bangkok: Brayoonwong Press. 1986. (Thai).

During the same period, nutrition managed to find its niche in medical education at the University of the Medical Science (now Mahidol University) pioneered by Professor Dr. Choedchalong Naetsiri who integrated nutrition topics such as infant feeding, infant and child nutrition, and clinical nutrition into the medical and nursing curriculum. She also modified local foods for use as supplementary food for infants, and played an important part in encouraging medical students to become more interested in nutrition. Professor Dr. Amara Chantarapanon who was responsible for creating the Department of Nutrition within the Faculty of Public Health, was also wrote the first book on nutritional sciences in the Thai language. Nutrition was later included in other colleges, especially as part of home economics training.

Dietary surveys were conducted as early as 1931 with the assistance of foreign nutritional experts. Zimmerman found that although there were no serious dietary deficiencies, diets were mostly rice and fish with very little meat, dairy products and fat. In 1934-1935, the Siam Second Rural Economic Survey was carried out by Andrews. He found that the impact of the 1932 economic depression on food expenditure was obvious but there was little evidence of actual dietary deficiency except the lack of variety in the North and the North-east⁵⁷.

⁵⁷. Zimmerman (1931) and Andrews (1935). Cited in Konjing K, Veerakitpanich M. Food Consumption and Nutrition in Thailand. In: Panayotou T, ed. Food Policy Analysis in Thailand. New York: Agricultural Development Council, 1985:157-187.

Gathering Momentum: Pre-National Food and Nutrition Plans Period (1961-1976)

Rapid economic growth and infrastructure build-up in Thailand commenced in the 1960s propelled by the First National Economic and Social Development Plan (NESDP) initiated in 1961. Between the years 1960 and 1970, development programmes in Thailand led to a rapid annual rate of growth in the GNP, averaging 8.4% which is well above the average 5.8% for other middle-income countries during this period reported by the World Bank. This increase in national wealth, together with the development of better defined and organized government interventions due to central planning, may have enabled the later expansion of interest into public welfare programmes, including nutrition and health. But during the period of the First NESDP (1961-1965) and the Second NESDP (1966-1971), there was less inclination towards social development. Concepts of social development and know how were somewhat vague in the minds of not only economists and planners but health professionals as well. Nutrition problems were considered the responsibility of the health sector, and were dealt with primarily by curative health treatment. Thus, the First, Second and Third NESDPs (1961-1976) followed the health approach stressing remedial actions in the medical institutions⁵⁸. However, there was increasing concern for such problems among researchers and public health workers as reflected in some publications from the late 1950s and early 1960s. Descriptive statistics on nutrient deficiency conditions such as beri-beri and anaemia collected from hospital-based records showed that the problems were quite widespread, but the magnitude was unknown.

⁵⁸. Unakul S. An Economic Planner's View of the Nutrition Problem in Thailand. In: Panayotou T, ed. Food Policy Analysis in Thailand. New York: Agricultural Development Council, 1985:157-187.

To get nutrition recognized as a major national problem needing concerted efforts to find a solution took years, before policy direction was obtained from the National Economic and Social Development Plans. There were certain developmental processes that helped in gaining momentum.

First, there was a carefully planned national nutrition survey conducted in 1960 by a team of Thai and United States experts³⁶. The report of the survey was published by the U.S. Interdepartmental Committee on Nutrition for National Defence which had been involved in the conduct of similar surveys in 15 other countries. This survey has been a landmark in the development of public and government awareness of the nutrition problem in Thailand. The survey not only revealed that undernutrition and nutritional deficiencies were serious and widespread public health problems but also inspired a number of nutrition scientists to shift from pure academic interest in nutrition research to work with other professions and people to solve the country's nutrition problems. Some of the major findings in this survey were as follows:

- Protein-energy malnutrition was the most severe problem, especially among pregnant and lactating women, infants, and preschool children in poor urban or rural areas.
- Vitamin A, thiamin, and riboflavin deficiencies and iodine-deficiency goitre were found in the northern and north-eastern regions.

- Anaemia was also high, but the aetiology was not clear. Dietary intake of iron was high (but the issue of bio-availability was not known at the time).

- A high prevalence of urinary bladder stone disease, a disease whose cause was then unknown, was found in the northern and north-eastern regions.

Among the specific recommendations included in the report was the better co-ordination of (i) the different activities related to nutrition such as those of the Nutrition Division of the Ministry of Public Health; (ii) the teaching and research activities of the School of Public Health and the medical schools; (iii) the food and beverage laboratories of the Ministry of Industries; and (iv) the development activities of the Processed Food Organization and the Army Quartermaster Subsistence Division.

Second, there was the Expanded Nutrition Project, a pilot project initiated in March 1961 in 10 villages in the north-eastern province of Ubon Ratchathani. This project was later called an ANP and was conducted by several co-operating ministries, with support from WHO, FAO, and UNICEF. In fact, the project was influenced by Applied Nutrition Programme jointly developed by WHO and FAO to increase the impact of programme activities in nutrition, recognizing the failure of the implementation of supplementary feeding programmes based on donated supplies. The key aims were to encourage and mobilize rural communities to grow and use local food more to improve their diets, and the co-operation and co-ordination between various disciplines including health, agriculture, education and community development. However, it was still based on the rather restricted view that malnutrition was fundamentally a food problem, and thus emphasized the development of high protein foods. Community participation in the decision making process was quite limited.

The Thai ANP experience included the development by the Division of Nutrition, MOPH of nutritious family dishes based on high-protein foods like soybeans and other legume derivatives. Local schools also participated in the project including screening for malnourished children, vitamin A supplementation, and combined nutrition and health education. Nutrition promotion slogans were also designed, for example, "Human milk for the human baby", and "One egg a day makes a physically strong body"⁵⁹. The project received international publicity for its success, but there were no data about its impact on the nutritional status of the target group. However, the project has been regarded as one of the antecedent movements that led to collaboration among various ministries in the development of the national food and nutrition policy later on.

⁵⁹. Ministry of Public Health. Nutrition in Primary Health Care. Bangkok: The Royal Thai Government: Ministry of Public Health, 1984.

Third, the National Economic and Social Development Board recognized the multi-facetted causality of nutrition problem during the Third NESDP (1972-1976) and created venues and forums for the interchange of ideas among officers from various ministries. Many food and nutrition seminars and meetings were organized and supported by the government and international agencies i.e. UNICEF, WHO and FAO. One of the most important meetings was an Interministerial Workshop held during 14-21 February 1973 supported by UNICEF and USAID in co-operation with the MOPH⁶⁰. The objectives of this meeting were to review information on existing or proposed nutrition programmes within the Third NESDP (1972-1976); and to prepare

guidelines for the development of a National Nutrition Policy which was to be submitted to the National Economic and Social Development Board (NESDB). The outcome of the meeting also made it clear that the improvement of nutritional status of the population should be viewed as an investment, not an expense, and that the stock of future manpower was at stake. Malnutrition is not a health problem, but an outcome of social disparity. The problem must be addressed beyond the health sector. The most important point made was that the national planning authority should take responsibility for planning and coordinating the food and nutrition policy in line with national development policy. These recommendations were sent to the NESDB as the "Report for the Development of National Food and Policy Guidelines for Thailand". These recommendations were accepted and thus contributed to the creation of the First National Food and Nutrition Plan.

⁶⁰. Subcommittee on Food and Nutrition Planning. National Food and Nutrition Policy. Bangkok: The Royal Thai Government; Office of the National Economic and Social Development Board, 1975.

During this developmental process, a critical mass of experts from various ministries and universities were identified and organized into a task force under the auspices of the NESDB. The responsibility was to formulate the First National Food and Nutrition Plan to be incorporated in the Fourth NESDP⁶¹. In order to train the next generation and to strengthen the existing personnel for future tasks, many short and long term scholarships were awarded to study on food and nutrition planning abroad under the sponsorship of MOPH, UNICEF and WHO etc.

⁶¹. Nondasuta A. Thailand Food and Nutrition Planning and Programme. Proceedings of the Special Nutrition Study Seminar for Policy Makers and High level Officers in Nutrition Programmes, 25-30 November 1991. Institute of Nutrition, Mahidol University, Thailand, 1991.

Fourth, there was strong support from multi-lateral and bi-lateral agencies as mentioned earlier. The United States Agency for International Development through its Nutrition Division also made available to the Thai government a technical advisor, Dr. Nevin Scrimshaw. In close co-operation with USAID, a working group was appointed by the Sub-committee on Food and Nutrition. Planning by the NESDB produced a document entitled "Technical Information and Base-line Data for the Formulation of a National Plan on Food and Nutrition Development". The document analyzed and addressed the seriousness of the food and nutrition problems in Thailand. Multiple causes of malnutrition were outlined, including health, nutrition, demographic, and socio-economic factors. The document was very influential as it helped to communicate the information to policy makers and was used as a basis for the first Food and Nutrition Plan.

In summary, during this preparatory phase before the First National Food and Nutrition Plan, nutrition problems and target groups were identified and prioritized, pilot projects were tested, a critical mass in terms of manpower in various ministries was formed, and tremendous international support obtained.

The National Food and Nutrition Policies and Programmes

Figure 1 laid out the time frame of the National Food and Nutrition Policy (NFNP) in Thailand along with other policies related to NFNP. The first two NESDP in fact

concentrated their efforts on building the country's infrastructure, including transportation, communication systems, schools, and basic public services such as electricity, piped water, etc., with the aim of providing the basic physical infrastructure. The social aspect was not included until the third NESDP, in which family planning was the main social entity.

Although the Third NESDP did not address malnutrition, it did acknowledge that the nutritional status of the population was important to the country's development and deserved attention. In response to that concern, the MOPH submitted a health plan that included the first proposal for a food and nutrition plan. The plan was targeted primarily on infants and preschool children and, to a lesser extent, on school-aged children. The major activity was providing high-protein foods to the younger groups at risk. Activities directed at infants and preschool children were carried out at child nutrition centres newly created by MOPH, while primary schools handled programmes for school-age children.

Evaluation of programmes during the third NESDP showed that the nutrition programmes reached only 0.6% of children estimated to be malnourished. This scant coverage was attributed to limited funds and to lack of co-ordination among agencies⁶². However, evaluation of the third NESDP did provide a summary of technical and baseline data used to develop the first National Food and Nutrition Plan for the fourth NESDP.

⁶². National Economic and Social Development Board. The Fourth National Economic and Social Development Plan (1977-1981). Bangkok, Thailand: Office of the Prime Minister, Government of Thailand. 1977.

The First NFNP during the Fourth NESDP: Multi-sectoral Approach

Historically, Thailand's nutrition programmes have been components of health plans. Until 1977, the First National Food and Nutrition Plan (NFNP) was included as part of the Fourth National Economic and Social Development Plan (NESDP) (1977-1981). Since it was clear that malnutrition was a multifaceted problem, the multi-sectoral approach was devised. Thus, a National Food and Nutrition Committee was appointed, consisting of members representing various ministries, especially the four major ministries, namely agriculture, education, interior (community development) and health. A committee at provincial level with a similar composition was also appointed.

The first NFNP listed seven major nutrition problems: protein-energy malnutrition, iron-deficiency anaemia, vitamin A deficiency, beri-beri from thiamin deficiency, goitre caused by iodine deficiency, angular stomatitis induced by riboflavin deficiency, and urinary bladder stone disease resulting from phosphorous deficiency. Protein-energy malnutrition was considered the most significant and a priority problem because of its high prevalence, especially among pregnant and lactating women and preschool and school-aged children. Possible causes were identified as inadequate food production for household consumption; inefficient and inequitable food market systems; poverty and high population growth; improper food habits and lack of nutrition education; and inadequate health services.

The first NFNP set out ambitious and comprehensive goals to improve the nutritional status of the population by tackling the problem from many angles, i.e., improvement of health care and hygiene; increasing food availability; nutrition

education; and improving socio-economic conditions of the vulnerable groups. The plan targeted rural infants, preschool children (children under five), pregnant and lactating women, and, to a lesser extent, school children. (See Annex 1 for the details).

Although both short and long term strategies and activities were formulated, short-term action to remedy severe and moderate malnutrition was the priority, by feeding children high-protein supplements at Child Nutrition Centres (approximately 1,200 were constructed)⁶³. These foods were centrally produced and supplied through the health system to the periphery. Home delivery of supplementary foods was provided for children with severe malnutrition.

⁶³. Tantiwong P, Santikitrungruang C, Withyametha B. National Nutrition Policy and Nutrition Programme in Thailand (1982-1986). Proceeding of the Fifth Food and Nutrition Planning Workshop, April 21-25, 1986, University of the Philippines at Los Banos, Philippines. 1986:103-118.

In reality, the nutrition programme was not fully implemented due to lack of inter and intra sectoral collaboration. Although some action plans were well defined, planning was entirely a top down approach. The planning, authorization and budget allocation were decided from the central or provincial level and vertically channeled to the grassroots, but no single agency was responsible for overall co-ordination and monitoring of programmes. *There was no change in the programme planning and budget allocation structure to support multisectoral efforts. There was very little participation by the community.* Many of the activities did not achieve the set objectives and depended totally on government-provided services, for example, the centrally produced supplementary food, and the nutrition rehabilitation in the villages.

It was not surprising that the first NFNP produced disappointing results. Malnutrition continued to be a serious problem, especially protein-energy malnutrition among infants and preschool children and iron-deficiency anaemia among children and pregnant and lactating women⁶⁴. A 1980 nationwide survey showed that 53% of preschool children suffered from protein-energy malnutrition. However, the most significant accomplishment of this plan was the creation of a strong awareness of the nutritional problems both among the public and private sectors and at all levels, and led to a strong political commitment to the country's policy.

⁶⁴. National Economic and Social Development Board. The Fifth National Economic and Social Development Plan (1982-1986). Bangkok, Thailand: The Royal Thai Government, 1981.

The Second NFNP in the Fifth NESDP: Nutrition Programmes through Primary Health Care and Poverty Alleviation Policy

The Fifth NESDP continued to include the food and nutrition plan. However, the concept and approach in planning changed. Malnutrition was recognized instead as a manifestation of poverty and ignorance. Therefore, poverty had to be eradicated. Nutrition programmes employed during the Fourth NESDP were seen as only stop-gap measures to relieve the most severe forms of malnutrition until more systematic solutions could be developed.

As in the First NFNP, the main target groups for nutrition programmes were infants and preschool children and pregnant and lactating women; however, this plan increased the attention given to school children. The goals in the Second NFNP were also more quantifiable in terms of elimination of severe malnutrition in target groups: to reduce moderate malnutrition by 50% and mild malnutrition by 25% in infants and preschool children, and to reduce protein-energy malnutrition by 50% in school-aged children. (See Annex 2 for the details)

The main thrust of the Fifth Plan's nutrition policy lay in the broader policy of poverty alleviation and development of backward areas (PAP), and the primary health care approach (PHC). The details and concepts will be presented later in sections 8.3.1 and 8.3.2. This was the important turning point in the developmental approach in the country, which had used to focus attention on overall economic growth and its trickle down effects on rural development.

The success in the implementation of the community-based nutrition programmes has been strengthened and accelerated by the long term policy to achieve health for all by the year 2000. Both PAP and PHC policies have nutrition concerns as a component. The rural poverty alleviation policy defined poverty areas as needing urgent attention instead of setting unrealistic nationwide goals. The plan targeted high-poverty rural areas as the focus of an intensive effort to meet basic human needs and to introduce simple agricultural technologies. Thus, the plan provided focal areas for all implementation agencies for the integration and co-ordination of activities in rural development both at central and rural levels. Under the PAP, all activities were directed to 288 districts in 38 provinces which were identified as the priority areas for implementation. All sectors involved had to direct their efforts to these communities. The major ministries - Health, Agriculture, Education, and Interior integrated their activities through committees at each level, serving as trainers, programme supervisors, or proposal developers. Multi-sectoral collaboration was also promoted through community-level training sessions involving personnel from each sector. Thus, village organization and planning at the community level were strengthened. These bottom-up efforts appeared to function more effectively, to promote greater integration of the efforts of the various government sectors, and to use the potential of the community - through village committees - to address needs and possible solutions. In addition, there was an organizational change for rural development by having only one national committee instead of too many sectoral developmental committees in charge of development policies, with infrastructure down to the village level. This was a striking organizational reform which combined macro- and micro-level structures to support both the top-down macro policy and bottom-up planning by the community and peripheral government resources.

The PHC concept emphasizes community self-reliance. Therefore, manpower development, management and community financing were facilitated. Village-based health volunteers called village health communicators (VHC) and village health volunteers (VHV) were trained nationwide. Growth monitoring programmes were carried out by health personnel and these volunteers in the villages. Simple and practical indicators and nutrition education for all age groups were introduced. The VHV and VHC were responsible for weighing, interpreting and communicating the results to mothers. The moderately and severely malnourished children received more attention, and their mothers were encouraged to participate in the activities. Supplementary food programmes were also financed through the MOPH, which

introduced economic incentives by establishing village nutrition funds. Under this plan, MOPH provided target villages with a fixed amount of seed money for community efforts to improve nutrition. The community also determined whether the funding would assist people with immediate needs for supplementary foods (poor families with malnourished children) or would go towards starting a local supplementary food production unit. Development of village-based supplementary food processing allowed the communities to become self-reliant. Through these strategies, the community participation improved and people took more active roles in solving the problems within their own community.

Thus, the Second NFNP integrated nutrition into the Primary Health Care Plan, focusing on areas targeted by the Rural Development Plan. Specific nutrition activities included conducting nationwide growth monitoring; promoting village-based production and consumption of supplementary foods in poverty-stricken districts; providing supplementary food to severely malnourished preschool children; subsidizing school lunches in rural primary schools; advancing nutrition education by public campaigns and home visits; and fostering nutrition-related research, training, and extension activities.

By the end of the Fifth NESDP (1982-1986), the nutrition situation of infants and preschool children had been dramatically improved, and severe PEM had practically been eliminated and only a small amount of moderate PEM remained. Weighing by simple beam balance and the use of growth charts by the village-based health volunteers (VHV and VHC, trained under the PHC strategy) and mothers were shown to be feasible and used for problem identification. Simple technology for village level processing of supplementary food was promoted to overcome the disruptive distribution of centrally produced supplementary food. Village self-financing schemes were also tried with some success.

The Third NFNP in the Sixth NESDP: Nutrition Programmes as an Integral Part of the Basic Minimum Needs and Quality of Life Movement

The third NFNP, incorporated into the sixth NESDP, continued to use Primary Health Care, with multisectoral collaboration for planning and implementation. Target groups for the Third NFNP were the same as for the previous two, except that wage labourers and the elderly were added. Nutrition activities included developing more sensitive indicators for nutrition surveillance and growth monitoring; conducting nutrition education for behavioural changes; encouraging interdisciplinary research in food and nutrition; and promoting community self-financing with the merger of various Primary Health Care funds into a multi-purpose village fund. (See Annex 3 for the details).

The concept of "having a better quality of life" was introduced to replace that of "having good health". The quality of life concept was translated into action via the "basic minimum needs" approach and was implemented as a pilot trial under the PAP scheme in 1983. Improvement in the quality of life was the central goal during this period of the NESDP. The BMN approach provided the same tools for identifying problems, monitoring progress and evaluating the steps taken towards a better quality of life. Simple and practical indicators, understood and measurable by the villagers were developed. Eight main categories of the BMN indicators were used.

The important feature of this NFNP was the basic minimum needs approach to improve community participation and integration of sectoral development activities. In the Sixth NESDP, similar strategies for nutrition continued and the basic minimum needs approach was implemented nationwide to strengthen the integration of sectoral efforts. Birth weight and weight-for-age of underfives and school-aged children were the nutritional indicators defined for measuring adequate nutrition. Thus, nutrition activities became a means to achieve the goal of quality of life. Through this iterative process, it was expected that villagers would increase their understanding and have confidence to participate. In these processes, local officers were expected to change their roles from being the agents of change to the facilitators or advisers.

By 1989, more than 500,000 village health communicators (VHC) and 50,000 village health volunteers (VHV) were trained, covering almost all the villages in the country. At the end of the Sixth NESDP, the most recent nutritional surveillance report (1991) has shown that the prevalence of severe malnutrition is almost nil, and moderate malnutrition has reduced sharply.

Nutrition-Related Policy and Health Development

Poverty Alleviation Plan (PAP)^{65,66}

⁶⁵. National Economic and Social Development Board. Rural Poverty Alleviation Programme, 1982-1986.

⁶⁶. Tontisirin K and Kiranandana T. Public Policy and Implementation Strategies for Alleviation of Malnutrition and Poverty in Thailand. A paper presented at a meeting on The Financing of Social Services during the 1980's and Policy Options for Next Decade", March 1-3, 1990. UNICEF Office, Florence, Italy.

Based on the report "Rural Development Policies" prepared by the Prime Minister's Advisory Council, the Prime Minister General Prem Tinsulanonda initiated the Poverty Alleviation Plan in 1981. Subsequently, it became a major programme of the Fifth NESDP (1982-1986).

The objective of the programme was to improve the quality of life for 7.5 million poor in the northern, north-east and southern regions. The PAP was targeted at high poverty concentration areas. Two hundred and eighty-eight districts and subdistricts in 38 provinces of the north-east, north and south were included. It was planned that population living standards would be developed to subsistence level by providing minimum basic services, introducing appropriate technology and gradually transferring responsibilities to the people. Maximum participation by the people was considered fundamental for solving their own problems.

A central co-ordinating organization, "*National Rural Development Committee*", for rural development was appointed in 1982. This committee soon replaced all other committees involved in rural development prior to 1982 and served as the sole national rural development committee. At the provincial level, there were the Provincial Employment Creation and the Provincial Development Committees. At the district, subdistrict and village level, there was only one development committee at each respective level. Four major ministries, i.e. Health, Agriculture, Education and Interior were the implementing agencies. The activities were integrated and targeted

at poor villages through the village committees. Nutrition was implemented as one of the PHC elements by the village-based health volunteers, village committee and villagers themselves. Intersectoral collaboration at the village level was strengthened by an integrated training team, consisting of extension personnel from the four main ministries to facilitate the community activities.

Four key programmes were implemented:

i) *Rural job creation programme*: Jobs were created for rural people during the dry season to boost their income. Most of the employment was given to people in the locale so that rural people would remain in their communities and participate in community development activities.

ii) *Village development projects or activities*: The activities included village fish ponds, water sources, prevention of epidemic diseases affecting poultry, cattle and buffalo bank, and other development projects focused on rural poor to improve their economic status and household food security.

iii) *Provision of basic services*: Public services for rural poor such as health facilities and health services, nutrition, clean water supplies, and illiteracy education programmes were directed to the targeted areas.

iv) *Agricultural production programme*: Important programmes included nutritious food production (especially crops used for supplementary feeding of young children), upland rice improvement projects and soil improvement projects. Income generation and household food security were the direct benefits.

A system for channelling all information was established. Central data processing was set up at Thammasart university in Bangkok. The same record forms were used in all areas and data reported to the central rural development committee.

In the Sixth NESDP, the PAP approach continued to be utilized. The plan also concentrated on self-reliance and adjustment to the changing economic conditions and environment⁶⁷. In this plan, villages were classified into 3 categories:

i) *Backward or poor areas* defined as villages where people faced 4 or 5 problems of basic needs for their livelihoods, such as poor transport facilities, no land holding for agriculture, low agricultural productivity, and poor health and environmental sanitation. 5,787 villages were in this category and required intensive governmental support as in the PAP areas.

ii) *Intermediate areas* defined as areas facing only one or two problems identified in the poor areas. 35,514 villages were included, and this group of villages required some government inputs.

iii) *Advanced areas* defined as areas with very few problems and economically better off. 11,621 villages were in this category. They did not necessarily need government inputs, and were encouraged to work with the private sector.

⁶⁷. National Economic and Social Development Board. Rural Development Plan in the Sixth NESDP 1987-1991.

The result of this plan from a food and nutrition point of view was quite promising. Rural household food security improved due to the availability of more nutritious foods such as fish, chicken, vegetables and fruit. More than 60,000 families utilized new agricultural technologies and there were 2,655 new village fish ponds at the end of the fifth NESDP. The cattle and buffalo bank was also able to lend animals to 20,000 families. In addition, health services through the primary health care approach had reached more than 80% of the targeted villages. Thus, the PAP must have contributed a certain amount to the reduction of PEM prevalence during the period.

Primary Health Care Development^{68,69}

⁶⁸. Ministry of Public Health. Nutrition in Primary Health Care. Bangkok: The Royal Thai Government: Ministry of Public Health, 1984.

⁶⁹. Kachondham Y and Chunharas S. On the precipice: transitions and challenges for Thailand's health development. Nakhonpathom, Institute of Nutrition, Mahidol University at Salaya, 1992.

Since Thailand has adopted Primary Health Care (PHC) as its major strategy for health development, it is indeed necessary to highlight its development in parallel with nutrition activities.

Thailand's Primary Health care (PHC) initiative began in the 1960's with various community-based health development programmes initiated in different parts of the country. This initiation was driven firstly by a concern about the inadequate coverage of the nation's health service infra-structure. Secondly, but equally important, was the belief in the community's potential for self reliant health care. This also entailed a need to establish an effective interface between the people's efforts and the health service system. Concepts and approaches for improving the community's participation in health and its interface with the health service system have been tested since 1970 in the Saraphi, Lampang and Sa-merng Provincial Projects in northern Thailand, and the Nakorn Rashedima (Korat) Project in the North-east, amongst others. Lessons learnt regarding appropriate health information dissemination took into account people's culture and perceptions, simple curative and preventive care provision, and mobilization of potential local resources (both financial and manpower). These were used to improve approaches to this difficult but healthy strategy⁷⁰. Riding on the momentum of the Alma-Ata Declaration and the global goal of "Health for all" (HFA) by the year 2000, these experiences were then incorporated and turned into a national PHC programme starting in 1980, which was in the middle of Thailand's 4th National Health Development Plan (1977-1981). The latter's objectives included the following:

- To increase health service coverage and to make basic health services available, accessible and acceptable to people, particularly among the under-served rural population and to help the people to help themselves.

- To utilize community resources and to encourage community participation in order to solve individual health problems and eventually to establish self-help programmes at the village level.

- To promote the dissemination of health information to the people as well as to integrate all the data which reflect the health needs of the communities.
- To promote the health status of the people who live in the rural areas and their own awareness of health problems and problem solving capabilities.

⁷⁰. Nittayarumphong S. Evolution of Primary Health Care in Thailand: What Policies Worked? *Health Policy and Planning* 1990; 5(3):246-254.

PHC in Thailand, at present, is comprised of the original 8 elements cited by the World Health Organization, including education, proper food supply and nutrition, maternal and child care and family planning, adequate and safe water supply and sanitation, immunization, prevention and control of local epidemic diseases, appropriate treatment of common diseases and injuries and availability of essential drugs⁷¹. In addition, Thailand has added two other elements, maintenance of mental health and the prevention and control of drug abuse, as well as observance of dental health. Most recently with increasing health concern about various problems which need wider community participation, an additional 4 elements have been added: consumer protection in health; environmental health; substance abuse control; and AIDS prevention.

⁷¹. Nondasuta A. *The Realization of Primary Health Care in Thailand*. Ministry of Public Health, Bangkok, Thailand 1987.

Several stages in PHC's gradual development in Thailand over the past decade are evident. There are no clear cut passages from one stage to another, but the concepts and efforts have evolved as follows:

Stage I - Manpower recruitment and community organization development (starting from 1977).

This involved the training of village health volunteers (VHV), village health communicators (VHC) and the villagers themselves to take care of various development activities and to manage the different inputs necessary for achieving improved community and individual well-being. The health personnel were also re-oriented, trained to work with people, and to be better supporters rather than just care providers. The aim was to establish a firm front line of contact with the villagers. Tremendous efforts have been made to ensure that this will develop on a long-term basis by training health centre staff in education techniques and increasing their technical knowledge in health and curative services. As for nutrition activities, VHV and VHC co-ordinated all food and nutrition activities within their villages⁷². Supervised by health personnel, they carried out growth monitoring activities in the village. Simple beam balance and growth charts, which helped mothers and caretakers to understand the nutritional status of their children were introduced. After each weighing session, the weight-for-age of all children weighed was plotted on a village growth chart. This tool allowed the community to visualize the magnitude of its nutrition problem. As the result of this development, in 1989, there were 588,555 VHCs and 62,075 VHVs in almost every village (98.4%) in the country.

⁷². Boonyoon D and Chandavimol P. *Village-Based Social Development Planning: An Experience from Korat Province Thailand*. Bangkok: Ministry of Public Health, 1986.

Stage II - Community self-financing evolution and managerial back-up (starting from 1978).

Community financing may take the form of village revolving funds, co-operatives or other types of collective financing schemes with inputs coming mainly from within the community to allow them full responsibility in planning, managing and monitoring their own development. Training and support, however, were provided by the government. Thus MOPH provided target villages with a fixed amount of seed money for community efforts to improve nutrition. The primary requirement was that money would only be dispensed if the community had developed a strategy to generate revolving funds. The community determined whether the funding would assist people with immediate needs for supplementary foods (poor families with malnourished children) or would go towards starting a local supplementary food production unit. Later on, single-purpose financing schemes usually evolved into multi-purpose co-operatives. A further incentive were the matching funds provided by the government and (up to a certain amount) which boosted even further the efforts of the community.

In 1985, the Health Card Scheme was introduced. In this scheme, villagers pay a premium and are issued health cards which entitle them to free medical services when they are in need. The first contact point will be at village level or the nearest health centre where they will be referred upwards, if necessary. Higher level health facilities, i.e. community, general and regional hospitals, allow cardholders to pass through a "green channel" once they have seen and been screened by lower level staff. Within the scheme, the health service system must organize itself in such a way that the first contact/referral point for the villagers will be effective in handling the problem. Further, referral between different levels will be well co-ordinated. In doing this, they receive financial inputs from the community's health card fund. The people themselves are motivated to utilize services according to the referral level, as they are assured that they will be referred to higher levels when they require it. Thus, the Health Card Scheme is not only a form of health insurance. It also aims to ensure that effective referral will take place at all levels and by-passing be kept to the minimum.

Stage III - Infra- and Intersectoral Approaches and Health System Interface (starting from 1983).

Though intersectoral collaboration for health had been emphasized since PHC's very beginning, it was not until the introduction of the basic minimum needs (BMN) approach that it became effective and realistically put into action. The BMN approach encourages a village to establish an information system whereby villagers can collect relevant data to identify their problems concerning their "Basic Minimum Needs" and these do not solely centre on health. Community hospitals are emphasized as an essential link between the lower echelon of health infrastructure and the upper tier i.e. general and regional hospitals (84 presently exist with at least one being located in each province). Community hospital staff including physicians have been trained to ensure that they understand the principles, concepts, planning and implementation of PHC programmes. They are responsible for supervising health centre staff, and making sure that patients are currently referred from the community. They also aid in ensuring that each patient is taken care of promptly and properly in order to foster this channel of communication and co-ordination, rather than encouraging the by-passing of lower level facilities. At the same time, they will

make timely and appropriate decisions in referring patients to higher levels of care at general or regional hospitals when necessary.

Basic Minimum Needs and Quality of Life Movement^{73,74,75}

⁷³. Nondasuta A and Piyaratn P. Basic Minimum Needs. World Health, WHO Publication. June, 1987.

⁷⁴. Ministry of Public Health. Basic Minimum Needs and Quality of Life in Development. 1986.

⁷⁵. Boonyoen D and Chandavimol P. Reorientating Administrative Organization for Village-based Social Development: An Experience from Korat Province, Thailand. Kuala Lumpur, Malaysia: Asian and Pacific Development Center, 1986.

To strengthen rural development, during the sixth NESDP, the basic minimum needs approach (BMN) was used as the principle to achieve a good quality of life for rural people. In addition, the approach has been developed as a response to problems encountered in the course of actually implementing PHC programmes and projects. Two major problems were a lack of participatory orientation and the necessary skills among local government workers in promoting and supporting community participation; and inadequate opportunities for villagers to manage their own community development process i.e. data collection, planning and decision making. To overcome these obstacles, an Intersectoral Social Development Project was launched under the auspices of the NESDB in 1981. The project's outcome was a set of Basic Minimum Needs (BMN) and their indices (Annex 4) to be used by the villagers themselves.

The BMN approach may be succinctly defined as a socially-oriented, community based, intersectoral and scientifically-sound development process. It is also a process carried out by the people and community with support from the government aimed at fulfilling basic human and community needs. Eight groups of BMN indicators (32 measurable indicators) were developed and used as the tools for problem identification and setting up goals for development in the community.

The BMN has been implemented through the rural development infrastructure. It has been implemented throughout the country, although more attention was given to the rural poor areas. The steps and process in the BMN approach are summarized in Figure 2. At the community level, village committees are responsible for the data collection and compilation of each indicator. The data are presented as village aggregates and compared to the criteria of success set out for the scheme. There are 3 BMN forms employed in the process.

BMN - 1 Form is employed to collect data on BMN indicators from each household. Village committee members are responsible for this process.

BMN - 2 Form is employed to collect general village level information by compiling the data collected in BMN-1.

BMN - 3 Form is the aggregated and summarized form for the planning, prioritization and

3 Form decision-making process. This form will also be sent up the hierarchy and put into a nation-wide, computerized database at the central level.

The results from the process are used to formulate a village proposal and submitted to the sub-district committee. The extension personnel from the government agencies serve as a supervisory committee to the sub-district committee. The proposals which have been approved by the sub-district committee are then submitted to the district and provincial levels, respectively. The provincial rural development committee makes the final decision as to which proposals in the province are to be supported. The approved proposals are sent to the central level. The proposals from all provinces are considered and the budget allocation decided.

Through this entire process of problem identification, planning, prioritization of the types of activities and support needed, implementation, and evaluation by re-survey of the BMN status of the village, villagers, by themselves, are aware of their own problems and the level of their achievement. At the same time the district and provincial administration are able to effectively carry out their supervisory and supportive tasks and closely interact with villagers in trying to respond to their needs.

At the end of the Sixth NESDP, the crucial factors that contributed to the successful application of the community based BMN approach were identified⁷⁶. These were:

- appropriate leadership styles and roles, as well as attitudes of responsible government workers at different levels and of community leaders at the village and sub-district level;
- on-going, but realistic, technical, financial and morale support from relevant ministries and the government;
- long experience of trial and error efforts in community development with a spirit of self-help and a sense of loyalties (esp. community consciousness) among villagers;
- effective management of VC in community development with mobilization and development of adequate an appropriate community resources (i.e., human, financial and technological).

⁷⁶. Piyaratn P. Quality of Life Development in Thailand. In: the Proceedings of the Special Nutrition Study Seminar for Policy Makers and High Level Officers in Nutrition Programmes, 25-30 November 1991. Institute of Nutrition at Mahidol University, Thailand, 1991.

At present, more than 95% of the total villages throughout the country are using BMN indicators to gauge their development status and achievements. There have been some modifications, especially in some rapidly improved areas. Either new indicators were added or the criteria of success were lifted to a higher level. However, long term success still needs constant and persistent government support. Quality improvement in data collection by the people themselves, enhancing local capacity in planning and management, utilizing MBM indicators and supervision by government officers are important issues for sustainable success.

Growth Monitoring, and Food and Nutrition Surveillance System (FNSS)

There are two information systems which are explicitly labelled as food and nutrition or nutrition surveillance. One is the national nutrition surveillance or growth monitoring system for the under-fives and school children compiled by the Division of Nutrition and the Division of School Health, MOPH. The other is the pilot food and nutrition surveillance system (FNSS) implemented by the NESDB in 5 selected provinces in each region of the country in 1990-1991.

Growth Monitoring for the Under Fives

Strongly committed by the Division of Nutrition of the MOPH with ongoing support from UNICEF, this system claims to cover more than 85% of the nation's rural under-fives. The indicator has been weight for age using the Thai standard (combined sex) established in 1975⁷⁷ and Gomez's classification.

⁷⁷. Tantiwong P, et al, Thai standard for the under-fives, Health and Environment 1979;2(3):95-102.

Growth monitoring started in the First NFNP (1977-1981) as a means to watch over and identify high-risk children at the earliest possible stage. The aggregate data obtained have been employed for national planning, for programme management and evaluation, and for early warning and intervention based on the concept of nutrition surveillance. At the beginning, children were weighed quarterly, almost entirely by health personnel, and the system did not become established until the early 1980s because the MOPH waited until 1982 before presenting the first nationwide report of cumulative results from January 1979 to March 1982. During the second NFNP (1982-1986), nationwide Primary Health Care offered the opportunity for widespread growth monitoring activities. The activities were carried out by the VHV/VHC and served as a tool for educating mothers about nutrition and for helping them determine the nutritional status of their own children.

Several evaluation studies at the beginning of the third NFNP (1987-1991) indicated weaknesses at various steps of the growth monitoring process.^{78,79} Important weaknesses were: the incomplete census of children under five in most communities made it impossible to calculate the percentage of children the programme covered; VHV tended to focus on getting the weighing done quickly to shorten the mothers' waiting time thus seldom interpreted results to mothers or caretakers; and worst of all, mothers of children with moderate to severe malnutrition received no advice.

⁷⁸. Teller CH. Community Nutrition Assessment and Evaluation: Towards Model Building. Thailand Trip Report Aug 15-29, 1987; International Nutrition unit Technical Report Series, U.S. Department of Health and Human Services, 1987.

⁷⁹. Suntikitruangruang C, et al. Strengthening growth monitoring/nutritional surveillance in PHC. Nutrition Division Research Report No. 1, 1987.

The Division of Nutrition have made several adjustments in response to these weaknesses. Since quarterly measurements are now being done by village health communicators and volunteers (VHC and VHV), the information on households with malnourished children is used on the spot to target them for more frequent follow-ups. In the weighing session, the VHV teaches the mother how to weigh the child and how to interpret the data. Individual level analysis of determinants of malnutrition is done for these second and third degree malnourished children who

did not recover from malnutrition within the expected time of rehabilitation (Figure 3). The chart is supposed to be kept by the mother. Since 1988, these second and third degree malnourished children have also received food coupons from local MOPH officers for three months, if and when they come to the monthly weighings (5 Baht per child per day as compared with a minimum rural wage of 50 Baht per day). In 1990, the MOPH spent about 9,000,000 Baht per year (U\$ 0.36 million) in coupons. Moreover, information from this GM is used for targetting high risk populations for intervention and for eventual visiting by provincial teams. At the central level, the Division of Nutrition, MOPH computerizes the aggregate data and disseminates the GM information to government agencies involved in food and nutrition activities.

The most recent evaluation of the growth monitoring and promotion activities (GMP) in 1991⁸⁰ indicated that although mothers appreciated the chance to monitor their children's growth, there were limits to the degree of their enthusiasm. The poorest mothers, who can least afford to offer the opportunity cost of bringing their child to weighing sessions, are the ones most likely not to show up. About half (46%) of the mothers understood how to interpret nutritional status according to the colour on the chart and 62% knew about the directional changes on the chart (Table 39). There was also a major difference in attitudes between those responsible in the good and poor GMP villages. Generally, in good GMP villages considerable efforts were made to carry out the activities according to the guidelines whereas weighing might have been done only once a year in poor GMP villages. However, one of the most promising findings was mothers' wishes to be given more responsibility for weighing their children so that it could be done at their convenience rather than at a fixed time and place. The development and application of approaches, contents, messages, communication channels and materials which take into consideration the perceived needs, 'folk' wisdom and scientific knowledge are mandatory in the process of making growth monitoring more '*mother friendly*' and '*action oriented*'. Currently, under a UNICEF funded project to strengthen GMP, 400 randomly selected villages in 27 provinces (of 73) will start measuring lengths and heights of the under fives. The project will serve as a field trial to refine the protocol, management and supervisory functions for later nationwide implementation.

⁸⁰. Evaluation of Growth Monitoring and Promotion in Thailand. An UNICEF Report. Nutrition Division, Ministry of Public Health. February 1992.

In conclusion, growth monitoring in Thailand has been institutionalized from the national level down to the village level. However, there are still some concerns that deserve attention and corrective measures. Community-based growth monitoring has not yet covered most children as discussed earlier (section 7.2) and may have distorted the actual prevalence of malnutrition. The use of the Thai reference standard instead of the international reference (NCHS) also makes it difficult for international comparison. Furthermore, there seems to be a clear need for proper causal analysis by mothers and the community and improved communication with the target households and the communities in order for corrective and preventive measures to be fully implemented.

Growth Monitoring in Primary School

This activity has been carried out twice a year by teachers in all primary schools since 1986 (60-85% coverage in 1990). The indicator is weight-for-age using the Thai standard with 10th percentile cut-off. Malnourished and/or poor children are

entitled to get exemption from payment for these lunches. The provincial primary education supervisor supposes to utilize these growth monitoring data for resource allocation for school lunch programmes. The data would also be passed to health personnel at the sub-district or the district level. The system has generally low visibility, and at central level, the data are used for targeting provinces which have more problems. However, the data from this nutrition surveillance system appears not to be regularly used to monitor changes in nutritional status nationwide.

Food and nutrition surveillance system (FNSS)^{81,82}

⁸¹. NESDB. Strengthening Food and Nutrition Surveillance for Nutrition-Oriented Development Decisions: 1991 Progress Report. UNICEF, Thailand 1992.

⁸². Winichagoon P and Schuftan C. Thailand: Food and Nutrition Surveillance System: An Inquiry into Output Data Utilization for Decision-Making. 9-15 December 1991.

This rather new system (1989), actually called "Strengthening Food and Nutrition Surveillance for Nutrition-oriented Development Decision" is co-ordinated and spearheaded by the National Economic and Social Development Board (NESDB) supported by UNICEF. The FNSS was launched with the objective of pooling together and consolidating databases which existed in many government organizations at the provincial and district levels. The multi-sectoral, food and nutrition related information system would be utilized as an early warning system and a tool for planning, decision making and management at all levels.

It has just been expanded to an additional 16 provinces in 1991 after its pilot phase had been completed in only 4 provinces. So far, the FNSS information system has covered data on weather conditions (amount of rainfall, and soil fertility); agricultural production (crops, livestock and fishery); economic indicators (household income, wage rate); local consumer price index, health conditions (respiratory tract infections, acute diarrhoea and dengue haemorrhagic incidence) and nutritional status (birth weight, pre-school and school children). Recently, two additional indicators have been added: the non-agricultural income of the household and food consumption as reported by school children on recall to teachers from consumption the previous day. Also, all agricultural production is now translated into cash to allow for comparisons.

Since the beginning, the project has been continuously adjusted and restructured and, at the same time, rapidly expanded. Beginning in 1992, data aggregation for this surveillance system will be analyzed by the sub-district and district levels. Information obtained will be used to formulate the solution and development plans and feed primarily to the province for decision making and budgeting. Therefore, quarterly FNSS data will be used to identify priority areas needing more attention by each of the implementing agencies at provincial level. Communities will also request help from these agencies at provincial level for activities that they cannot undertake by themselves. Thus, the FNSS is considered as a means of involving province-level bureaucrats in using hard data for decision-making, and for the community (village committees and sub-district councils) to use the same data to prepare proposals for funding.

This experience may prove to be an innovative one. However, there are many theoretical and operational problems that need to be addressed and solved. For example, rainfall indicators should precede agriculture production indicators by at

least 6 months. Cross-sectional analysis may be inappropriate in this case. Second, the existing data collection cycles (monthly, quarterly, annually) for each indicator are not the same. Third, analysis, interpretation, and criteria for decision-making at the district and provincial levels have not yet been so well established that the FNSS can be used effectively. However, the FNSS may be another mechanism that can empower local people to recognize their own problems and help them to formulate their own plans and mobilize their own resources. The results and experiences gained from this project are still quite preliminary and difficult to be evaluated and it may be too early to do so.

Other Important Nutrition Interventions

Supplementary Food Programmes

Supplementary feeding has been one component of nutrition activities. During the fourth NESDP, supplementary foods for infants and preschool children were centrally produced at the Institute of Food Research and Product Development (IFRPD), at Kasetsart University in Bangkok. Almost the whole budget was allocated through a request to the MOPH, based on their estimation of malnourished children. The food was distributed through the health infrastructure to the sub-district health centre to allow on-site feeding of malnourished children. There was a serious logistical problem in the distribution system: children who participated in the feeding often were not the malnourished ones.

During the fifth NESDP, the strategy changed to village-based supplementary food processing. The shift in strategy might be in part due to studies by the Institute of Nutrition, Mahidol University (INMU) where supplementary food formulas of rice, beans and groundnut or sesame were developed. Each formula of 100 g of the supplementary food provided approximately 450 Kcal and 12-14 g protein. These food mixtures could be processed in the village using simple, low-cost equipment and operated by trained villagers⁸³. The mixtures were tested for acceptability and their impact in rural villages with favourable results⁸⁴. The recipes were later modified and analyzed for nutrient composition, and the processing technique adopted by the MOPH for nationwide promotion of this supplementary food scheme.

⁸³. Tontisirin K, Moaleekoonpaibroj B, and Dhanamitta S, et al. Formulation of supplementary infant foods at the home and village level in Thailand. *Food Nutr Bull* 3(3):11-15, 1981.

⁸⁴. Dhanamitta, S., Winichagoon, P. and Valyasevi, A., Promotion and distribution of supplementary foods at community level in Thailand, In: *Health problems in Asia and in the Republic of Germany: How to solve them?*, Schelp, F.P., ed., Verlag Peter Lang, 1985.

Supplementary food activities were generally inseparable from growth monitoring activities. When the second and third degree malnourished children were identified, the community shared the responsibility in assisting these children and their families. It was possible to provide supplementary food through village level by processing a mixture of rice and legumes for on-site feeding and take home, or food could be purchased from other villages. Supplementary food programmes were financed through the MOPH, started in the fifth NESDP, which introduced economic incentives by establishing village nutrition funds. Under this plan, MOPH provided target villages

with a fixed amount of seed money for community efforts to improve nutrition. Development of village-based supplementary food processing allowed the communities to become self-reliant by taking action to alleviate their own nutrition problems. Although there was no nationwide assessment of the programme, various observations indicated that the food product was not well accepted in several rural communities. However, the strategy did serve to create both awareness of its importance and community concern and participation in solving the community's problems.

A new strategy of food coupons was then introduced in addition to the village food processing in 1988. The food coupon was given to individual children who were second and third degree malnourished. A monthly booklet of thirty coupons, each worth 3 baht in 1988 was given to the mothers of these children (5 baht in 1991). Every day, one coupon could be used at the local shop on specific items of food indicated on the coupon, such as eggs. Authorized shop owners in the village collected the coupons and were reimbursed from the sub-district health office. Since then combined second and third degree PEM has dropped from 2.3% in 1987 to less than 1% in 1991. How much of the improvement is attributable to this strategy remains unclear and debatable.

School Lunch Programme

Educational attainment in Thailand slowly improved during the 1980s (Table 40). Although only 11-16% of the Thai have secondary and higher education, more than 70% have at least lower primary education and less than 10% are considered uneducated. National and government expenditure on education increased in real terms during the decade. Since the economy expanded rapidly at the end of the 1980s, the educational share of the GDP has slightly dropped as shown in Table 40, although it has still increased in real terms.

Primary education is compulsory. Public primary schools are responsible to two major agencies:

Bangkok metropolitan

The office of education, the Bangkok metropolitan (BMA) is responsible for about 52% of school aged children in Bangkok. Most of these children are from lower socio-economic backgrounds. Therefore, this service is provided free of charge. The school lunch programme was started in these schools in 1977, and was claimed to have good coverage. Financial support for the programme is provided partially through governmental provision, and partially from donations from the private sector and individuals. The target group of the programme are children from poor families who cannot afford lunches. Out of 427 schools, 402 schools of varying sizes requested help for 40,879 children (as of 1991) and the budget per head per day was 1.85 baht (US\$ 0.076).

The school lunch programme of the BMA was administered by the school committee. Teachers were responsible for the menu and preparation of the foods. Either simple and nutritious Thai single dishes (such as rice and Thai chicken curry, chicken noodle soup, etc.) or a snack at mid-morning or afternoon breaks (such as soybean milk, boiled mung beans with sugar added, etc.) were provided. The menu was planned

with the nutritional content, and the use of low price protein sources, such as soy beans in mind.

Three offices in the BMA were responsible for the school lunch programme. The school service office assessed the problems and made the overall financial plan and budget allocation. The supervisory office was responsible for the training of teachers who would work on the programme, field supervision, and also provide the outreach programmes such as distributing soybean milk, promoting backyard gardens in schools, etc. The health office was responsible for the monitoring of school children and providing other health services, such as vaccination.

National Primary Education Authority

The school lunch programmes in primary schools in rural areas were organized through the national primary education authority. The planning division was responsible for planning and making proposals and the provincial primary education office was the implementation agency. 31,349 schools including 6.7 million school children were included in the plan (as of 1990).

For management, schools are divided into three categories:

- Schools in which students and their families can generally afford lunch without help. Usually, these schools are in towns and are big (in terms of the number of students). There is no need for financial assistance, and the setting is not appropriate for setting up agriculture and cooking activities.
- Schools in rural areas where agricultural production is readily feasible. These schools need some capital and running expenses to organize a school lunch. Activities can be organized by mobilizing students as a part of the curriculum. Lunches are sold to students at a low price, and most students can afford to buy lunches.
- Schools which are situated in rural poor communities where agricultural production is low or not feasible. Students are from poor families who cannot afford to buy lunch.

Provision of school lunches may differ from school to school. Manpower, financial availability, community support and most importantly, teacher's enthusiasm determine the extent of the programme. For example, some schools may provide school lunch every school day, whereas others may provide lunch every other day and/or soy milk during afternoon breaks as a supplementary food.

Support from the central level, including financial support is given to schools in the third category above - provision of educational materials; provision of agricultural implements for school gardens and cooking utensils; and training. Budget support from the government has been erratic and obviously inadequate. Guidelines in terms of management and technical expertise, have also been minimal and are greatly needed. On average in the 1980s, each student received only 10 baht (US\$ 0.40) per year from the school lunch programme. It is interesting to note that the disparity between primary school students in Bangkok and in rural areas regarding the budget for the school lunch programme is quite conspicuous. Therefore, despite the fact that the school lunch programme is not new, its success has been rather modest.

However, the Primary Education Authority is in the process of requesting a major increase in the budget of the school lunch programme from the government.

Area Based Programmes: The Nutrition Projects in Narathivas, Yala and Pattani

Nutrition programmes in the three provinces in the south of Thailand, where the majority of people are Muslim and Thai-Malay, have been under the patronage of the Crown Princess Mahachakri. The project was first launched in Narathivas in 1989.

The project initially followed the MOPH protocol. The financial assistance of the project, however, was from a special fund from the Crown Princess for nutrition activities. Growth monitoring had a coverage of 70% in 1988, increasing to 90% in 1989. Almost 1,800 children were identified as having second and third degree malnutrition. The nutrition coupon was the immediate measure which provided food assistance to the malnourished children. The improvement in the second and third degree malnutrition was satisfactory. However, it was realized that such protocol would not be sustainable in the long term.

In 1989, a workshop on the promotion of good nutrition for the Narathivas population was organized. Ignorance, poverty and cultural practices which differed from other ethnic groups were identified as the underlying causes of malnutrition. Aside from nutrition activities, most other complementary measures were confined to health activities, such as maternal and child care, immunization, etc.

Two principles were introduced for implementation. First, the problem solving principle. This strategy was used to identify and assess the magnitude of the problems. The holistic approach was devised, which involved setting the four major sectors to work together. Second, the preventive principle. Preventive measures were promoted with emphasis on community participation and self reliance. Personnel were hired for the project. They were expected to organize the training of village-based health volunteers.

In 1990, the project expanded to include other activities. From the agricultural sector, agricultural promotion included the introduction of appropriate technology, home economic training for women's groups, food production for consumption, animal husbandry and fishery activities. In addition, eleven child care centres were established in 4 districts by the coordinating efforts of the community development office. The budget for all the activities was partially provided from government allocation, and partially from the Crown Princess.

IX. SUMMARY OF PERTINENT FINDINGS, LESSONS FOR NUTRITION POLICY AND FUTURE PROSPECTS

Summary of Pertinent Findings

- Although Thailand has had many both progressive and regressive political developments during the past two centuries, the Thai, unlike people in other less developed countries, have not suffered much from internal turmoil, wars, natural calamities and have never been subjected to any colonial powers. Generally, Thai society always expresses relatively strong cohesion around the absolute or

constitutional monarch, Buddhism and the national pride in the "Land of the Free" as the name Thailand implies.

- The Thai economy has grown steadily since the end of the Second World War. Due to her rather conservative and prudent macro-economic policies, Thailand has performed reasonably well during the vicissitudes of the world economy in the past two decades and has enjoyed impressive economic growth from 1988 until the present. Thailand was also one of the few developing countries that did not cut social spending, i.e., the government budget for health and education during the economic period of the early 1980's. However, although continuous economic growth has "trickled down" some benefits to the poor; the very small share of agricultural products in the GDP combined with the very large share of the agricultural labour force in total population have made the rural poor increasingly fall behind. Pockets of poverty persist and are probably the principal cause of (some intractable and unacceptable) childhood undernutrition.

- Thailand is rapidly approaching the post demographic transitional period resulting from the full impact of the family planning programme. The birth rate has been declining steadily and the crude death rate may have reached a trough, while infant and child mortality are getting closer to developed countries' levels. Since the family size has been less than 5 (Table 28,29), it means that there are a smaller number of mouths for the parent to feed than before.

- Children and adults alike have had better access to health care services, both preventive and curative during the past decade through the PHC and BMN approaches. Although there have been increases in the reported incidence of diarrhoea, the true incidence may be lower due to the impact of better safe drinking water and latrine coverage. Disease patterns are shifting from acute, infectious, vaccine-preventable diseases to more chronic, behavioural-, occupational-, and environmental-related diseases. Rising medical costs will be one of the most difficult issues affecting both the individual and the government.

- Thailand has been self-reliant on food and a major food exporter in the world market. However, domestic food availability has not been as favourable as it should be. Since household food acquisition is more and more dependent on monetary terms, whether slight increases in food expenditure in real terms are enough to compensate for what people could get before from nature and domestic cultivation remains uncertain. Better household food security in the rural poverty-stricken areas from the PAP, and nutrition awareness from growth monitoring activities together with nutrition education that benefits children by changing intrafamilial food distribution might have a greater contribution to the reduction of PEM in the under-fives than direct food supplementation activities. However, dietary studies indicate that individual food intakes have been only slightly improved and there is still room for improvement in domestic and individual consumption especially of animal protein food sources and even fat in rural areas.

- There are still considerable nutritional problems in Thailand but the magnitude and severity of the problems have been reduced in the past decade, especially protein energy malnutrition (PEM). The prevalence of PEM by weight for age in children under five based on the Thai standard declined from more than half at the beginning of the 1980's to only one fifth at the end of the decade. Iodine deficiency disorders remain a public health problem especially in the Northern provinces. Prevalence of

low birth weight in the rural areas may reflect some level of malnutrition in women of reproductive age. Anaemia is also a significant risk for many women and children and the causes are multiple, i.e. inadequate iron intake, presence of absorption inhibitors in the Thai diet and high prevalence of hookworm infestation in the south. Whether vitamin A deficiency is a public health problem in Thailand is still debatable. Other micro-nutrient deficiencies and bladder stone disease are not, at present, of public health significance in Thailand.

- There have been continuous efforts to solve nutrition problems. Initially, the attempt took mainly a medical approach and was confined primarily to health personnel. It took more than a decade to gain enough momentum and receive policy blessings at the national level. It also took another decade to lay out and to make adjustments in order to establish some fundamental development at all levels. Perspectives regarding malnutrition and its solutions have been shifting from individual and medical oriented ones, to more public health and development approaches; from stop-gap measures to more comprehensive community development solutions; and from top-down and welfare styles to bottom-up styles to empower people for self determination. There is still a lot of weakness and new threats that continuously need attention and resources. The task of solving nutrition problems in Thailand is far from over.

- It is not quite clear how much nutritional improvement is attributable to nutrition programmes. This is a difficult question, as previously mentioned, because that nutrition programmes were implemented via PHC strategy and concurrently with rural development programmes. The direct impact from nutrition programmes and activities, i.e. growth monitoring, supplementary food and nutrition might not totally explain the impressive reduction in malnutrition. Nutrition awareness at all levels which brings about intrafamilial food and nutrition adjustment, improvement of health care systems, and lesser population pressure, may also have a significant impact on the nutritional status of vulnerable groups.

Lessons for Nutrition Policy and Development

- Based on Thailand's experience, the improvement of nutrition is a long term developmental process. It is a lengthy course laden with obstacles that need crusading spirits from all parties involved. It may take more than a decade to get things off the ground, another decade for continual assessments and adjustments to firmly establish the system, and another decade before the impacts can be discernable.

- Political stability, favourable economic growth and social coherence are positive prerequisites for long term solutions that nutrition problems often need. However, those who suffer from nutrition problems cannot wait and most countries cannot offer those pre-requisites.

- To win over government commitment often needs concrete information as a basis for deciding priority problems, identifying target groups and selecting possible actions. Building up a critical mass to seek this information is a preliminary task that governments and international agencies should encourage and support. If the information is not readily available, the connection between problems and possible action may require policy research.

- Experience in Thailand has indicated that the policy decisions that brought about deliberate actions often responded to political concerns, public opinion and awareness. Thus, those who would like to push forward nutrition solutions should not only communicate with the policy makers or high level officials, but also the general public. It is crucial that the messages be designed to match the interest of each target group since too technical a presentation based on nutritional sciences often proved counterproductive.

- National policy with well defined nutrition outcomes and some intermediate process and output indicators for assessment and monitoring nutrition improvement are important. It does not necessarily have to be a food and nutrition policy, but policies which contain some nutrition consideration such as the primary health care and rural poverty eradication policies are good examples. Furthermore, objectives must be identified as to their practical value and explicitly targeted to those in great need.

- It is most effective to choose a few indicators for each determinant rather than an extensive range. Indicators should be readily understood by even the least educated group. Growth monitoring activities in Thailand have so far been based on only a weight-for-age indicator.

- There is a need for effective organizational structure and managerial mechanisms for the co-ordination and integration of the multisectoral efforts at various administrative levels, as well as in the communities. A single coordinating organization with full authority and mandate at each level may be better than several with overlapping responsibilities. This organization should be above ministerial level to guard against potential conflicts of interest.

- Nutrition can no longer be perceived as a health concern, nor social welfare. Policy makers or economists must view malnutrition as a problem compromising social, economic and human capital development. Productivity lost, directly or indirectly and human capital stock are at stake. Nutrition interventions should be viewed as national investment for intermediate and long-term objectives. Parents should also consider the adequate nourishment of offspring as long term security rather than just an immediate burden. This attitude is very crucial at all levels. Therefore, increasing "nutritional literacy" should be an integral part of planning nutrition programmes.

- Community-based nutrition intervention programmes with an emphasis on community organization for planning and management, community manpower development based on appropriate technology information, and community financing schemes have a better chance of being sustainable. Special efforts should be made to empower people for self-reliance and self determination. Local government officers and non-governmental personnel can be facilitators or supervisors for the community to initiate and involve the community in developmental activities. However, these personnel must be reoriented to understand this rather new concept of development.

- Nutrition intervention programmes should not be centrally planned and ready made, but should just provide a broad guideline. It would be better if nutrition interventions and indicators were a part of the community development process. Full efforts should be made to advocate the use of nutrition indicators in planning, monitoring and evaluating development programmes. Moreover, due to the dynamism of each

country or locality, nutrition interventions should be local decisions and flexible enough to be modified to cope with area specificity and changes in society.

- It is always the case in most less-developed countries that there have been great difficulties and obstacles on the road to decentralization and encouraging community participation. The same is true in Thailand where a long history of centralized government with traditional legal roles assigned to the civil servants has been dominant in many facets of Thai society. The new so-called "Poverty Alleviation Plan" (PAP) proposed by the Rural Development Programme can be at best a quasi-decentralization adjustment. The breakthrough came along later with the adoption of the Basic Minimum Needs (BMN) approach in village-based social planning. Tactically, the process of empowering people by using BMN indicators in problem identification, prioritization and decision-making has unleashed village potential resources on community development. The BMN approach is quite similar to the "*triple-A processes*", processes of decision making in which problems are assessed, their causes analyzed and actions are taken based on the analysis and available resources, strongly advocated by the UNICEF nutrition strategy.

Future Prospects

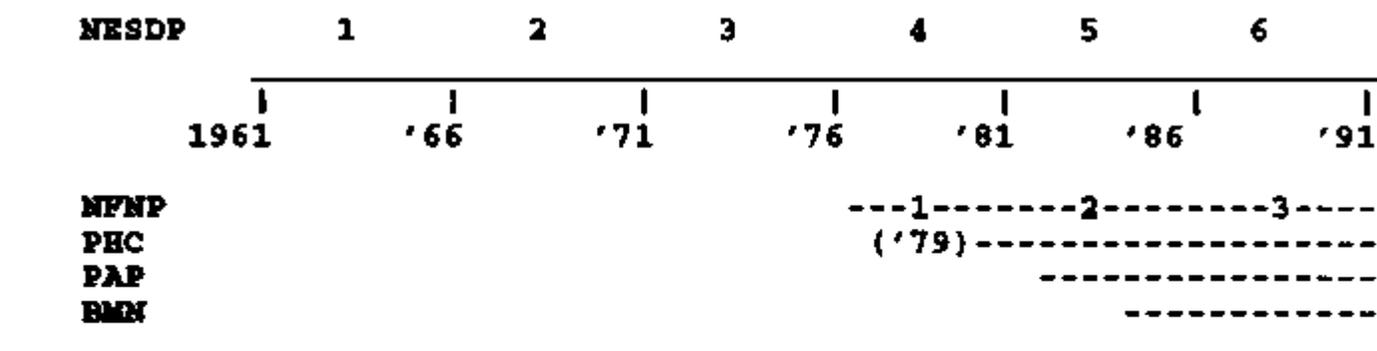
- Health services in Thailand both with respect to access and quality are improving much faster than economic growth and income levels. Direct '*child survival*' programmes such as EPI and oral rehydration salts for diarrhoea and indirect programmes such as family planning and safe drinking water coverage are in full gear. Nutrition awareness and a better chance for children to get their fair share of food in the family have become a reality. As a result, severe forms of undernutrition have been eliminated, and mild undernutrition, iodine deficiency disorders and iron deficiency anaemia are on the decline. All this would imply that Thailand must not be content with this level of achievement and should extend her '*survival strategy*' level to another level in order to ensure full potential of good health and nutrition; otherwise there will be increasing numbers of substandard survival. This is a major challenging step in the next decade that will also show the real difference between a less developed and a developed Thai society.

- Thailand has been quite successful in addressing the nutritional plight of the rural poor, but little has been done for the urban setting. Industrial development has inevitably led to massive rural-urban migration in search of better economic opportunities but not always a better quality of life. Even with the most efficient management of the urban influx, it can be expected that a large proportion of this rural-turned-urban poor will live in slums often besieged with overcrowding, insanitation and industrial pollution. Moreover, the features of urban undernutrition will be quite different from those of rural undernutrition. Since household food acquisition in the urban setting is almost totally via the market system, consumer protection both by laws and by mass campaigning for proper diets and safe foods are important issues. Government policies on income distribution, minimal wage, pricing of important food staples will be more important in the decades to come.

- Concepts of community participation through the PHC and BMN approaches have been translated into concrete actions mainly in the rural areas in Thailand. However, considering the rapidly changing situations, especially rural-to-urban migration and the economic shift from an agricultural base to a manufacturing and service economy, diversification and specificity of community participation models is another important

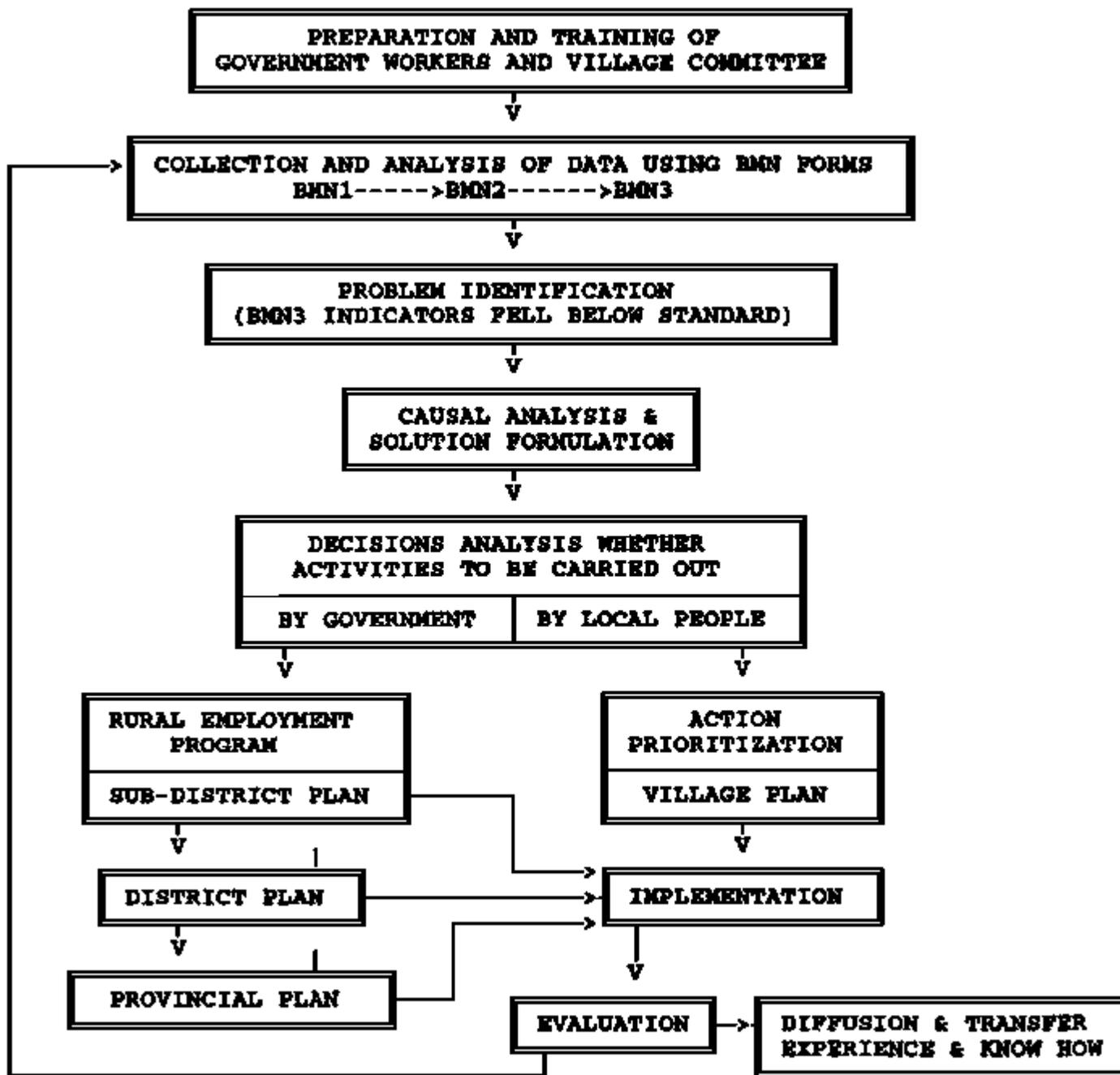
issue that planners have to deal with in the near future. Experience shows that Village Health Volunteers (VHV), Village Health Communicators (VHC) and community management schemes are differentially effective depending on the community context in which they are found. Urban communities, where time constraints are more prominent and participation on a voluntary basis is limited, require different approaches for mobilizing community participation and fostering on-going development processes and programmes.

- It is quite likely that Thailand will have to carry 'double burden' nutritional problems into the next century. The unfinished agenda of undernutrition and poverty will co-exist side by side with overnutrition and imbalances in nutrition arising from a more affluent society. Chronic, degenerative diseases largely attributable to nutrition are on the rise in Thailand. Changes in personal and family life-styles regarding food habits have been quite drastic. Prevention, which is achievable through increased awareness and behaviour modification, and the knowledge to make life more bearable once afflicted by chronic diseases are of the utmost importance. This requires a good understanding of how people behave in their daily life as regards dietary practice, work-related behaviour, and family behaviour and also how they perceive that behaviour in relation to their own health. There is also a need to develop appropriate communication techniques, channels and messages aimed at various population groups with different social contexts in the behavioural modification process. Nutrition literacy through better communication techniques should be central to nutrition interventions. It is quite certain that nutritionists without helping hands from social scientists and communication specialists will not and cannot carry on this important task effectively.



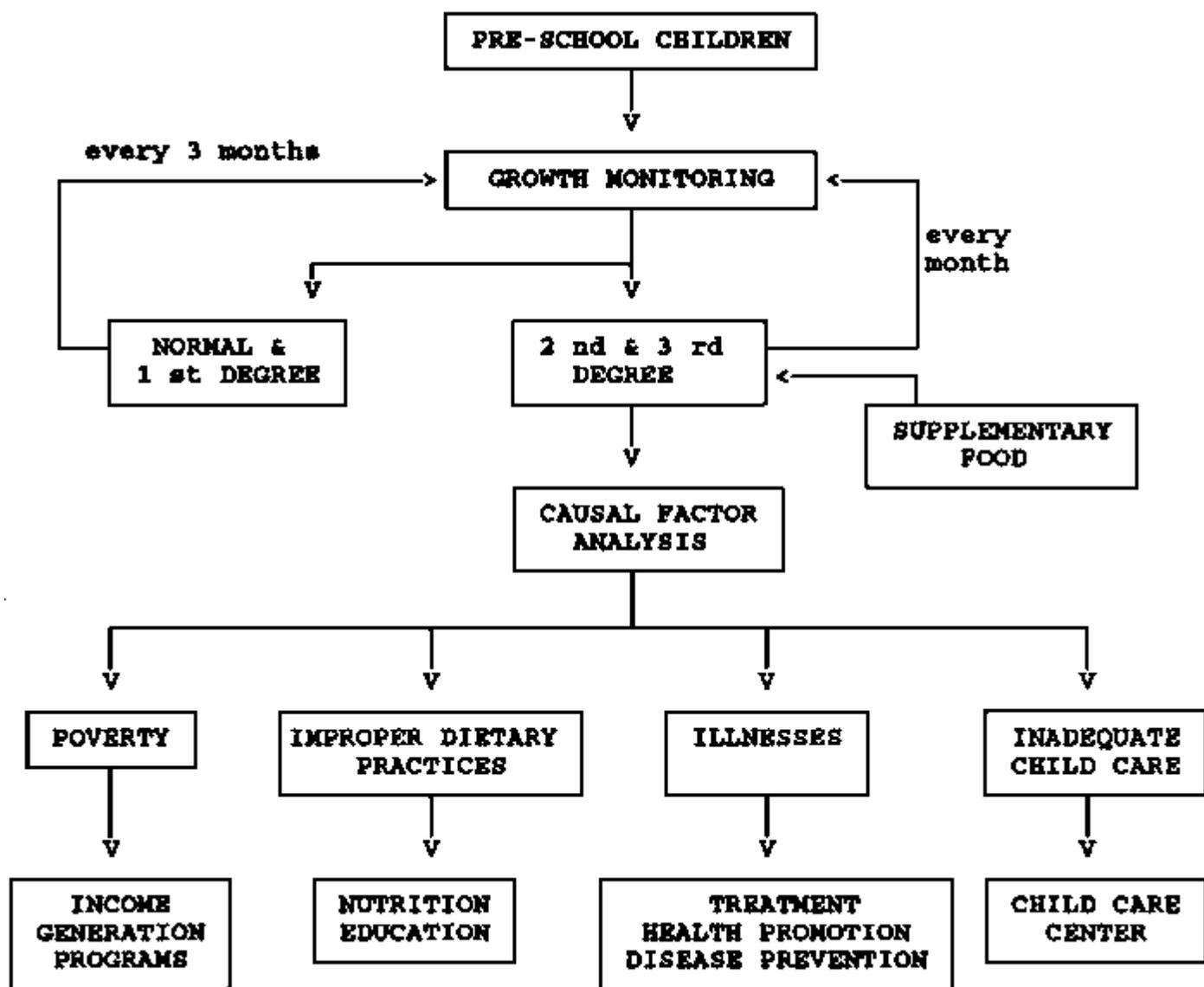
Note NESDP = National Economic and Social Development Plan
 NFNP = National Food and Nutrition Policy
 PHC = Primary Health Care
 PAP = Poverty Alleviation Policy
 BMN = Basic Minimum Needs scheme

FIGURE 1 - TIME FRAME OF THE NATIONAL FOOD AND NUTRITION PLANS AND RELATED POLICIES (1961-1990)



**FIGURE 2 - BASIC MINIMUM NEEDS (BMN) APPROACH AND PROCESS IN THAILAND
ADAPTED FROM:**

Piyaratn P. Quality of Life Development in Thailand. Paper presented in the Special Nutrition Seminar for Policy makers/High Level Officers in Nutrition Programs, Institute of Nutrition, Mahidol University, 25-30 November 1991.



**FIGURE 3 - VILLAGE GROWTH MONITORING ACTIVITIES
ADAPTED FROM:**

Suntikitrungruang C. Food and nutrition situation 1988: Thailand country report. Nutrition Division Document. Bangkok: Nutrition Division, Ministry of Public Health, 1988.

**TABLE 1 - NATIONAL ACCOUNTS, FOREIGN TRADE AND GOVERNMENT
ECONOMIC INDICATORS IN THAILAND, 1975-1989**

	1975	1980	1985	1987	1988	1989
NATIONAL ACCOUNTS						
BILLION BAHT						
GDP	303.32	658.51	1014.4	1253.15	1506.98	1775.98

GDP AT 1972 PRICE	204.43	299.47	394.11	452.64	512.47	574.20
PER CAPITA GDP (BAHT)	7220	14095	19628	23375	27631	32000
<u>AS % GDP</u>						
GROSS NATIONAL SAVING	22.69	20.01	20.05	24.51	23.83	27.84
PRIVATE INVESTMENT *	21.57	17.53	14.99	19.23	21.15	26.31
PUBLIC INVESTMENT	5.18	8.90	9.06	6.18	5.59	5.21
FOREIGN TRADE						
EXCHANGE RATE BAHT/US\$	20.38	20.48	27.16	25.72	25.29	25.71
<u>BILLION US\$</u>						
EXPORT	2.18	6.45	7.06	11.59	16.01	19.83
IMPORT #	3.17	9.28	9.33	13.28	19.81	25.31
LONG-TERM FOREIGN DEBT	1.35	5.70	12.77	15.73	15.36	16.40
<u>AS % GDP</u>						
CURRENT ACCOUNT DEFICI	-4.08	-6.44	-4.13	-0.74	-2.77	-3.67
BALANCE OF PAYMENT	-0.94	0.79	1.22	1.45	2.69	6.22
DEBT SERVICE RATIO (LONGTERM)	12.60	14.80	21.90	16.90	12.50	9.90
GOVERNMENT						
<u>AS % GDP</u>						
GOVERNMENT REVENUE	12.86	14.51	15.84	16.15	17.13	18.33
GOVERNMENT EXPENDITURE	15.33	18.37	19.72	16.85	14.74	14.68
TREASURY DEFICIT	-2.98	-3.86	-3.88	-0.71	2.39	3.65

NOTES:

* Private Investment includes change in inventories.

Excluding military aid imports.

SOURCES:

1. The National Economic and Social Development Board.
2. Bank of Thailand.
3. International Financial Statistics.

TABLE 2 - COMPARISON BETWEEN AGRICULTURAL AND NON-AGRICULTURAL SECTORS IN GROWTH, PERCENTAGE OF GDP, AVERAGE ANNUAL INCOME PER CAPUT DURING SIX NATIONAL ECONOMIC AND SOCIAL DEVELOPMENT PLANS AT CURRENT MARKET PRICE, 1962-1990

	NATIONAL ECONOMIC AND SOCIAL DEVELOPMENT PLAN					
	1ST 1962- 66	2ND 1967- 71	3RD 1972- 76	4TH 1977- 82	5TH 1983- 87	6TH* 1988- 90

AVERAGE RATE OF CHANGE							
	GDP	10.95	7.55	19.13	19.28	6.62	17.01
	AGRICULTURE	9.01	3.44	18.74	14.74	-1.95	9.79
	NON-AGRICULTURE	12.11	9.38	19.33	21.33	8.80	18.34
% GDP							
	AGRICULTURE	39.7	33.4	30.3	26.1	23.4	15.1
	NON-AGRICULTURE	60.3	66.6	69.7	73.9	76.6	84.9
AVERAGE ANNUAL INCOME AT THE ENDING YEAR							
	AGRICULTURE (BAHT)	1471	1490	3528	5773	5342	7742
	NON-AGRICULTURE (BAHT)	8505	10436	17916	36154	47237	71579
	RATIO	5.8	7.0	5.1	6.3	8.8	9.2
% POPULATION							
	AGRICULTURE	76.9	73.3	69.5	66.3	63.9	62.0
	NON-AGRICULTURE	23.1	26.7	30.5	33.7	36.1	38.0

NOTE:

* Calculated and averaged out from data in 1987-1990 only. Average annual income per caput based on data in 1989 rather than the ending year of the sixth plan and the population percentage were estimated.

SOURCES:

1. National Income of Thailand, new series 1970-1987 based on present United Nations System of National Accounting 1968. NESDB, 1988.
2. National Income of Thailand, 1990. NESDB, 1991.

TABLE 3 - LIFE EXPECTANCY AT BIRTH BY SEX, THAILAND, 1970-2005

	LIFE EXPECTANCY AT BIRTH	
	MALE	FEMALE
WORLD BANK SERIES		
1970 - 1975	57.7	61.6
1975 - 1980	59.2	63.1
1980 - 1985	60.8	64.8
1985 - 1990	62.2	66.2
UNITED NATIONS SERIES		
1971 - 1976	57.7	58.9
1976 - 1981	59.3	63.2
1981 - 1986	60.7	64.8
PROJECTION SERIES		

1980 - 1985	60.50	66.25
1985 - 1990	61.75	67.50
1990 - 1995	63.50	68.75
1995 - 2000	65.25	69.75
2000 - 2005	66.75	70.75

SOURCES:

1. World Bank. World Development Report. London: Oxford University Press, 1984. (Tables 20 & 23)
2. United Nations. World Population Prospects: Estimates and Projections as Assessed in 1984. Population Studies No. 98. Department of International Economic and Social Affairs, 1986.
3. The Report of the Working Group on Population Projections in Thailand, 1980-2015. Office of the National Economic and Social Development Board, April 1986.

TABLE 4 - POPULATION AND ITS CHARACTERISTICS, THAILAND, 1960-2000

	1960	1970	1980	1990	2000
TOTAL POPULATION (MILLION)	26.257	34.397	44.825	56.34	64.389
MALE	13.154	17.124	22.329	28.197	32.206
FEMALE	13.103	17.273	22.496	28.143	32.183
AGE GROUP (%)					
UNDER 5	16.2	16.4	12.1	11.1	8.9
5-14	27.1	28.7	26.2	22.3	18.6
15-60	52.2	49.8	56.4	60.5	65
60 AND OVER	4.5	5.1	5.3	6.1	7.5
DEPENDENCY RATIO	92	85	75	60	48
URBAN POPULATION (%)	12.5	13.2	17.0	18.7	20.5
POPULATION PER SQUARE KILOMETER	51	70	87	109	125

SOURCES:

1. The National Statistics Office.
2. Reports of the Working Group on Population Projections in Thailand, 1980-2015. NESDB, April 1986.

TABLE 5 - CONTRACEPTIVE PREVALENCE RATE AMONG WOMEN OF CHILD BEARING AGE BY RESIDENCE, THAILAND 1981, 1984 AND 1987

	YEAR		
REGION	1981	1984	1987

Bangkok	65.2	71.8	71.7
North	65.8	71.4	76.6
Northeast	54.8	64.8	68.2
Central	64.3	68.8	79.6
South	43.4	50.4	55.4
Whole country	59.0	64.6	70.6

SOURCES:

1. Family Health Division, Department of Health, Ministry of Public Health.

TABLE 6 - CRUDE DEATH RATES AND ADJUSTED CRUDE DEATH RATE BY SEX AND ITS RATE RATIO, THAILAND, 1977-1989

	CRUDE DEATH RATE PER 1,000				
	UNADJUSTED	ADJUSTED RATE *			
YEAR	TOTAL *	TOTAL	MALE	FEMALE	RATE RATIO
1977	5.4	7.21	7.58	6.84	1.11
1978	5.4	7.06	7.53	6.59	1.14
1979	5.2	6.85	7.31	6.38	1.15
1980	5.3	6.83	7.28	6.37	1.14
1981	5.0	6.39	6.91	5.86	1.18
1982	5.1	6.49	6.96	6.01	1.16
1983	5.1	6.47	6.83	6.12	1.12
1984	4.5	5.59	6.12	5.78	1.06
1985	4.4	5.54	5.58	5.24	1.06
1986	4.1	5.34	5.59	5.10	1.10
1987	4.3	n.a.	n.a.	n.a.	n.a.
1988	4.2	n.a.	n.a.	n.a.	n.a.
1989	4.4	n.a.	n.a.	n.a.	n.a.
1990	4.5	n.a.	n.a.	n.a.	n.a.

NOTES:

Public Health Statistics.

* Adjusted by adding deaths in the unknown age group proportionate to stratum weight and further adjusted by registration missing rates.

SOURCES:

1. Public Health Statistics, 1989. Division of health Statistic of the Permanent Secretary, MOPH, 1991.

2. Kiranandana T, Chunharas S, and Kiranandana S, et al. *Sickness and Death Profile in the Thai Population*. MPN-001 WHO-MOPH Research Report, Chulalongkorn University Press, Bangkok, 1989. (in Thai). Table 5.8.

TABLE 7 - INFANT MORTALITY RATE, ADJUSTED INFANT MORTALITY RATE BY SEX AND ITS RATE RATIO, THAILAND, 1977-1986

	INFANT (AGE 1-4) DEATH RATE PER 1,000				
	UNADJUSTED	ADJUSTED RATE *			
YEAR	TOTAL #	TOTAL	MALE	FEMALE	RATE RATIO
1977	13.52	30.27	33.78	26.60	1.27
1978	14.00	30.94	34.82	26.90	1.29
1979	12.05	26.40	30.29	22.36	1.35
1980	11.52	25.30	28.37	21.56	1.32
1981	11.02	23.75	27.13	20.25	1.34
1982	10.92	23.35	27.05	19.55	1.38
1983	11.11	23.55	26.88	20.20	1.33
1984	10.56	23.45	25.10	21.75	1.15
1985	10.17	21.21	23.98	18.35	1.31
1986	9.40	19.57	22.20	16.87	1.32

NOTES:

Public Health Statistics.

* Adjusted by adding deaths in the unknown age group proportionate to stratum weight and further adjusted by registration missing rates.

SOURCES:

1. Public Health Statistics, 1989. Division of Health Statistic of the Permanent Secretary, MOPH, 1991.

2. Kiranandana T, Chunharas S, and Kiranandana S, et al. *Sickness and Death Profile in the Thai Population*. MPN-001 WHO-MOPH Research Report, Chulalongkorn University Press, Bangkok, 1989. (in Thai). Tables 5.9

TABLE 8 - CHILD MORTALITY RATE AND ADJUSTED CHILD MORTALITY RATE BY SEX AND ITS RATE RATIO, THAILAND, 1977-1986

	CHILD (AGE 1-4) DEATH RATE PER 1,000				
	UNADJUSTED	ADJUSTED RATE *			
YEAR	TOTAL #	TOTAL	MALE	FEMALE	RATE RATIO
1977	3.81	3.98	3.93	4.04	0.97
1978	3.59	3.70	3.71	3.68	1.01

1979	3.35	3.42	3.39	3.45	0.98
1980	3.09	3.13	3.18	3.08	1.03
1981	2.78	2.78	2.85	2.72	1.05
1982	2.60	2.59	2.63	2.54	1.04
1983	2.52	2.48	2.55	2.41	1.06
1984	1.85	1.91	1.91	1.90	1.01
1985	1.66	1.60	1.69	1.51	1.12
1986	1.38	1.34	1.39	1.28	1.09

NOTES:

Public Health Statistics.

* Adjusted by adding deaths in the unknown age group proportionate to stratum weight and further adjusted by registration missing rates.

SOURCES:

1. Public Health Statistics, 1989. Division of Health Statistic of the Permanent Secretary, MOPH, 1991.

2. Kiranandana T, Chunharas S. and Kiranandana S, et al. Sickness and Death Profile in the Thai Population. MPN-001 WHO-MOPH Research Report, Chulalongkorn University Press, Bangkok, 1989. (in Thai). Tables 5.10, 5.11 and 5.12.

TABLE 9 - CERTAIN LEADING CAUSES OF DEATH (RATE PER 100, 000) OF CHILDREN UNDER 1 AND 1-4 YEAR OLD ACCORDING TO ICD 9TH REVISION, THAILAND, 1982-1990

CAUSE OF DEATH	RATE PER 100,000				
	1982	1984	1986	1988	1990
UNDER 1 YEAR					
1. CERTAIN CONDITION IN PERINATAL PERIOD	232.9	239.3	157.9	150.7	139.0
2. CONGENITAL ANOMALIES	32.9	43.4	58.7	82.7	112.7
3. OTHER DISEASES OF RESPIRATORY SYSTEM	102.6	64.9	62.6	59.5	26.5
4. OTHER BACTERIAL DISEASES	50.7	38.9	34.3	37.9	32.8
5. INTESTINAL INFECTIOUS DISEASES	42.1	28.1	29.9	23.5	19.9
CHILD 1-4 YEAR					
1. OTHER ACCIDENTS EXCLUDED TRANSPORT	16.2	15.3	13.4	15.3	13.1
2. PULMONARY CIRCULATION & OTHER HEART DISEASES	7.1	7.5	6.7	6.9	8.6
3. OTHER DISEASES OF RESPIRATORY	20.1	13.3	10.1	9.5	8.2
4. VIRAL DISEASES	8.6	10.1	4.4	4.1	4.1
5. DISEASES OF NERVOUS SYSTEM	7.4	5.1	4.1	3.8	3.6

NOTES:UNDER 1

1. ICD 760-779
2. ICD 740-759
3. ICD 466, 480-519
4. ICD 020-041
5. ICD 001-009

CHILDREN 1-4

1. ICD E900-E929
2. ICD 415-429
3. ICD 466, 480-519
4. ICD 045-079
5. ICD 320-359

SOURCES:

1. Division of Health Statistics, Office of the Permanent Secretary, MOPH, 1991.

TABLE 10 - PROJECTED CRUDE DEATH RATE, INFANT AND CHILD AGED 1-4 MORTALITY, AND CERTAIN CAUSE OF DEATH RATES IN THAILAND, 1990, 1995, 2000

	PROJECTION OF MORTALITY RATE PER 1,000 *					
	1990		1995		2000	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
CRUDE DEATH	4.80	4.54	4.18	3.74	3.70	3.08
MALE	5.04	4.80	4.37	3.94	3.85	3.24
FEMALE	4.57	4.33	3.99	3.58	3.55	2.95
INFANT 0-1	31.78	29.97	26.43	24.49	22.01	20.01
CHILD 1-4	1.44	1.27	1.16	0.83	0.96	0.55
CAUSE BY DISEASE GROUP						
INFECTIOUS DISEASES	3.09		2.40		1.86	
NEOPLASM ALL SITES	3.26		3.89		4.63	
CIRCULATORY SYSTEM	6.03		7.08		8.32	
DIGESTIVE SYSTEM	1.45		1.12		0.86	
COMPLICATED PREGNANCY	0.05		0.02		0.01	
CERTAIN CAUSES OF PERINATAL	0.61		0.40		0.26	

NOTES:

* Based on the econometric and arithmetic simulation models under the assumption of low fertility scenario in the Report of the Working Group on Population Projections in Thailand, 1980-2015. Office of the National Economic and Social Development Board, April 1986.

SOURCES:

1. Kiranandana T, Chunharas S, and Kiranandana S, et al. Sickness and Death Profile in the Thai Population. MPN-001 WHO-MOPH Research Report, Chulalongkorn University Press, Bangkok, 1989. (in Thai). Table 11.1, 11.3, 11.5.

TABLE 11 - REPORT IMMUNIZATION COVERAGE IN THAILAND, 1981-1990

VACCINE TARGET POPULATION	BUDGET YEAR					
	1981	1983	1985	1987	1989	1990
CHILDREN < 1 YR.						
BCG	71.40	75.71	79.50	96.24	93.32	
DTP2	52.20	64.70	67.20	79.19	79.13	
DPT3	-	48.54	62.35	75.09	74.35	85.2
OPV3	19.10	46.39	61.78	73.71	76.21	85.6
MEASLES	-	-	25.83	51.50	58.45	69.9
PREGNANT WOMEN						
T2 + BOOSTER	28.60	34.56	48.24	59.45	63.58	75.6
PRIMARY SCHOOL						
DT2 + BOOSTER	-	70.60	75.58	75.59	74.14	80.5
BCG BOOSTER	-	52.94	53.60	63.40	65.11	78.6
SCHOOL CHILDREN GR. 1-6						
TYPHOID	88.90	75.00	31.47	81.67	78.77	
SCHOOL EXIT						
RUBELLA (GIRL)	-	-	-	67.38	76.23	
T BOOSTER	-	-	-	-	67.63	

SOURCES:

1. Expanded Programme on Immunization 1989. Division of General Communicable Diseases, Department of Communicable Diseases Control, MOPH, 1990.
2. Health Statistics Summary 1989-1991. Division of Health Statistics, MOPH.

TABLE 12 - COVERAGE OF SAFE DRINKING WATER AND HYGIENIC LATRINES IN THAILAND 1982, 1986 AND 1989 AND BY REGION IN 1989

COVERAGE (%)	1982	1986	1989
SAFE DRINKING WATER	32.73	70.21	78.25

HYGIENIC LATRINE	41.91		51.16		69.57
REGIONAL COVERAGE IN 1989 (%)	REGION				
	NORTH	NORTH- EAST	CENTRAL	SOUTH	WHOLE KINGDOM
SAFE DRINKING WATER	69.59	94.12	79.1	45.22	78.25
HYGIENIC LATRINE	81.07	61.98	79.26	51.94	69.57

SOURCES:

1. Thailand Health Profile 1988, 1990. MOPH, Bangkok, Thailand.

TABLE 13 - DIARRHEAL DISEASES MORBIDITY AND MORTALITY OF CHILDREN UNDER 5 YEAR IN THAILAND 1985-1990

RATE PER 100,000

YEAR	1985	1986	1987	1988	1989	1990
MORBIDITY						
TOTAL*	3637.1	4422.3	5258.8	5937.8	5661.8	5109.9
ACUTE DIARRHEA	3168.5	3845.8	4420.8	5079.4	4869.7	4439.9
FOOD POISONING	92.8	108.3	125.3	135.1	168.7	114.5
DYSENTERY	355.8	449.7	682.6	705.9	607.1	539.4
ENTERIC FEVER	20.0	18.4	30.2	17.5	16.3	16.1
MORTALITY						
TOTAL*	11.2	7.0	14.6	9.7	7.8	6.2
ACUTE DIARRHEA	10.9	6.7	13.5	9.1	7.3	5.7
FOOD POISONING	0.1	0.1	0.2	0.1	0.1	0.2
DYSENTERY	0.1	0.1	0.7	0.3	0.3	0.1
ENTERIC FEVER	0.1	0.1	0.2	0.2	0.1	0.3

SOURCES:

1. Division of Epidemiology for morbidity and Division of Health Statistics for mortality, MOPH.

TABLE 14 - THE FIRST 10 LEADING CAUSES OF DEATH IN ORDER AND RATE PER 100,000 ACCORDING TO ICD 9TH REVISION, THAILAND, 1984-1990

CAUSE OF DEATH	RANK (O) AND RATE (R) PER 100,000							
	1984		1986		1988		1990	
	O	R	O	R	O	R	O	R
1. PULMONARY CIRCULATION & OTHER FORMS OF HEART DISEASE	1	33.3	1	35.5	1	42.1	1	49.6

2. OTHER ACCIDENTS EXCLUDED TRANSPORT ACCIDENTS	3	18.7	4	15.4	4	18.7	2	25.3
3. MALIGNANT NEOPLASM OF UNSPECIFIC SITES	4	14.9	3	16.9	3	18.7	3	22.0
4. DISEASES OF OTHER PARTS OF THE DIGESTIVE SYSTEM	2	20.1	2	18.6	2	18.8	4	18.4
5. TRANSPORT ACCIDENTS	7	11.6	10	8.4	6	10.4	5	15.2
6. OTHER DISEASES OF THE RESPIRATORY SYSTEM	6	13.5	5	11.3	5	12.6	6	13.0
7. CEREBROVASCULAR DISEASES	8	11.0	8	9.2	9	9.6	7	10.5
8. DISEASES OF THE NERVOUS SYSTEM	10	9.1	9	9.0	8	9.9	8	10.0
9. MALIGNANT NEOPLASM OF DIGESTIVE & PERITONEUM	15	5.3	13	5.8	11	8.0	9	9.7
10. HOMICIDE & INFLICTED INJURY	5	14.6	6	10.3	7	10.0	10	8.5

NOTES:

1. ICD 415-429
2. ICD E900-E929
3. ICD 190-199
4. ICD 530-579
5. ICD E800-E848
6. ICD 466, 480-519
7. ICD 430-438
8. ICD 320-359
9. ICD 150-159
10. ICD E960-E969

SOURCES:

1. Division of Health Statistics, Office of the Permanent Secretary, MOPH, 1991.

TABLE 15 - PATTERNS OF HEALTH SERVICE UTILIZATION IN THAILAND, 1970, 1979 AND 1985

SERVICES	YEAR		
	1970	1979	1985
None	2.7	4.2	-
Traditional	7.7	6.3	2.4
Self Prescribe	51.4	42.3	28.6
Health Center	4.4	16.8	14.7
Public Hospital	11.1	10.0	32.5
Private Clinic and Hospital	22.7	20.4	21.8

NOTE:

Utilization of services of illness that require more than 24 hours of rest or require medical attention.

SOURCES:

1. Institute for Population and Social Research, Mahidol University.

TABLE 16 - TOTAL HEALTH EXPENDITURE AT 1987 PRICE AND PERCENTAGE OF TOTAL EXPENDITURE BY SOURCE IN THAILAND, 1980, 1984 AND 1987

SOURCES	TOTAL HEALTH EXPENDITURE (%)		
	1980	1984	1987
GOVERNMENT SECTOR	<u>28.41</u>	<u>27.90</u>	<u>24.15</u>
MINISTRY OP PUBLIC HEALTH	17.20	17.39	14.06
OTHER MINISTRIES	8.72	6.93	5.96
CIVIL SERVANT FUND	2.50	3.58	4.13
LABOR HEALTH FUND	<u>0.38</u>	<u>0.50</u>	<u>0.39</u>
PUBLIC ENTERPRISES	<u>0.71</u>	<u>0.77</u>	<u>0.83</u>
HEALTH INSURANCE	<u>0.88</u>	<u>0.75</u>	<u>0.66</u>
INTERNATIONAL AID	<u>1.44</u>	<u>0.79</u>	<u>0.73</u>
PRIVATE SECTOR AND PEOPLE THEMSELVES	<u>68.18</u>	<u>69.30</u>	<u>73.23</u>
TOTAL HEALTH EXPENDITURE (BILLION BAHT AT 1987 PRICE)	34.263	53.033	67.771

SOURCES:

1. Adapted from Chapter 6. Health Care Financing in Thailand, Table 6.3, Page 232. In: The Proceedings of the First Thai Health Assembly. 12-15 September 1988, Bangkok, Thailand.

TABLE 17 - HEALTH RESOURCES IN THAILAND, 1977-1989

HEALTH RESOURCES	YEAR						
	1977	1979	1981	1983	1985	1987	1989
<u>Population per bed</u>							
Whole Country	881	827	810	761	748	718	725
Bangkok	353	352	361	376	336	316	358
Other Provinces	1067	989	962	888	882	855	833
<u>Population per doctor</u>							
Whole Country	7503	6868	6851	6259	5978	5595	4361
Bangkok	1289	1210	1362	1404	1453	1418	1062
Other Provinces	17117	15897	14027	11453	9706	8871	7207
<u>Population per nurse</u>							

Whole Country	2852	2641	2423	1870	1336	1190	962
Bangkok	564	520	494	517	523	460	384
Other provinces	5405	5228	4803	2849	1663	1486	1190
<u>Population per midwife</u>							
Whole Country	5842	5239	5537	5435	7003	5959	4883
Bangkok	8098	4105	7709	8018	8031	5469	10041
Other provinces	5658	5421	5345	5215	6906	6027	4584
<u>Health facilities*</u>							
General Hosp.	459	571	653	769	829	896	926
Specialized Hosp.	32	32	30	32	98	87	85
<u>Public facilities #</u>							
Regional or General	87	88	89	96	89	85	86
District Hosp.	256	322	313	409	500	545	557
Sub-district Health center	3779	4088	4828	7163	7600	8062	8170

NOTES:

* Include private and public facilities.

Only those under Ministry of Public Health. Regional or General Hospital are located in provincial cities with specialized services. District hospitals (formerly Medical Health Centers) are usually located in district towns.

SOURCES:

1. Public Health Statistics, 1983, 1986, 1989. Division of Health Statistic of the Permanent Secretary, MOPH, 1985, 1988 and 1991.

TABLE 18 - GROSS NATIONAL PRODUCT (GNP), TOTAL GOVERNMENT AND MINISTRY OF PUBLIC HEALTH (MOPH) BUDGET AND RATS OF CHANGE AT 1972 PRICE, 1978-1990

Unit: Million Baht at 1972 Price

YEAR	GNP	GOVERNMENT BUDGET		RATE OF CHANGE		
	(1)	TOTAL (2)	MOPH (3)	(1)	(2)	(3)
1978	269,611	45,065	1,894.81			
1979	283,019	47,116	2,036.68	4.97	4.55	7.49
1980	298,068	49,745	2,051.23	5.32	5.58	0.71
1981	315,086	58,961	2,346.55	5.71	18.53	14.40
1982	327,936	65,419	2,703.02	4.08	10.95	15.19
1983	354,322	69,425	3,099.56	8.05	6.12	14.67
1984	377,784	75,403	3,384.33	6.62	8.61	9.19

1985	389,148	81,593	3,530.87	3.01	8.21	4.33
1986	406,935	80,273	3,517.65	4.57	-1.62	-0.37
1987	446,249	82,487	3,453.64	9.66	2.76	-1.82
1988	505,756	83,087	3,539.29	13.33	0.73	2.48
1989	568,470	92,606	3,805.77	12.40	11.46	7.53
1990	626,970	103,462	5,010.98	10.29	11.72	31.67

SOURCES:

1. National Income of Thailand, new series 1970-1987 (based on present United Nations System of National Accounting 1968). NESDB, 1988.
2. National Income of Thailand, 1990. NESDB, 1991.
3. National Health Budget, B.E. 2520-2534. Division of Planning, Office of the Permanent Secretary, MOPH, 1991.

TABLE 19 - MINISTRY OF PUBLIC HEALTH BUDGET AS THE PERCENTAGE OF TOTAL GOVERNMENT BUDGET AND GROSS DOMESTIC PRODUCT AT CURRENT MARKET PRICE, 1977-1990

Unit: Million Baht

YEAR	GNP	GOVERNMENT TOTAL BUDGET	MINISTRY OF PUBLIC HEALTH	PERCENT	% OF GNP
1977	403,529	68,790	3,520.61	5.12	0.87
1978	488,226	81,000	3,405.77	4.20	0.70
1979	558,861	92,000	3,976.91	4.32	0.71
1980	658,509	109,000	4,494.58	4.12	0.68
1981	760,195	140,000	5,571.80	3.98	0.73
1982	820,002	161,000	6,652.32	4.13	0.81
1983	910,054	177,000	7,902.41	4.46	0.87
1984	973,412	192,000	8,617.60	4.49	0.89
1985	1,014,399	209,000	9,044.32	4.33	0.89
1986	1,095,368	211,650	9,274.70	4.38	0.85
1987	1,253,147	227,500	9,525.11	4.19	0.76
1988	1,506,977	243,500	10,372.51	4.26	0.69
1989	1,775,978	285,500	11,733.06	4.11	0.66
1990	2,051,208e	335,000	16,225.05	4.84	0.79
1991	n.a.	387,500	20,568.62	5.31	n.a.

SOURCES:

1. National Income of Thailand, new series 1970-1987 (based on present United Nations System of National Accounting 1968). NESDB, 1988.

2. National Income of Thailand, 1990. NESDB, 1991.

3. National Health Budget, B.E. 2520-2534. Division of Planning, Office of the Permanent Secretary, MOPH, 1991.

TABLE 20 - BUDGET APPROPRIATION OF MINISTRY OF PUBLIC HEALTH (MOPH) BY LEVEL OF SERVICES AS THE PERCENTAGE OF TOTAL MOPH BUDGET AND RATE OF CHANGE OF ACTUAL BUDGET AT CURRENT PRICE, 1980-1991

YEAR	BUDGET APPROPRIATION AS PERCENTAGE OF MOPH BUDGET			RATE OF CHANGE OF ACTUAL BUDGET			
	PHC	PMC	SMC&TMC	MOPH BUDGET	PHC	PMC	SMC&TMC
1977	23.11	31.55	45.34				
1978	23.38	29.52	47.10	-3.26	-3.06	-10.35	-0.45
1979	23.59	29.79	46.62	16.77	17.49	17.56	15.31
1980	21.85	30.36	47.79	13.02	4.21	14.65	15.29
1981	22.02	30.32	47.66	23.97	25.42	24.29	24.10
1982	24.64	30.84	44.52	19.39	34.15	21.93	12.00
1983	25.40	31.95	42.65	18.79	21.68	22.26	13.08
1984	27.02	31.99	40.99	9.05	15.52	8.79	4.39
1985	27.32	32.67	40.01	4.95	6.67	7.72	2.93
1986	27.29	32.99	39.72	2.55	2.64	3.74	2.05
1987	26.80	32.01	41.19	2.70	1.20	0.00	6.82
1988	26.60	32.01	41.39	8.90	8.04	8.82	9.40
1989	26.92	31.80	41.28	13.12	14.84	12.76	13.18
1990	27.08	31.37	41.55	38.28	40.08	37.38	40.20
1991	27.37	31.26	41.37	26.77	21.35	19.63	19.49

ACRONYMS:

PHC = Primary Health Care

PMC = Primary Medical Care

SMC&TMC = Secondary Medical Care and Tertiary Medical Care

SOURCES:

1. National Health Budget, B.E. 2520-2534. Division of Planning, Office of the Permanent Secretary, MOPH, 1991.

TABLE 21 - DEPARTMENT OF HEALTH AND DIVISION OF NUTRITION BUDGET, PERCENTAGE AND RATE OF CHANGE AT CURRENT PRICE, 1980-1991

Unit: Million Baht

YEAR	BUDGET		(1)*	(2)**	RATE OF CHANGE		
	Dept. of Health(1)	Div. of Nutr (2)	as percentage of		MOPH Budget	(1)	(2)
			MOPH	(1)			
1980	261.15	24.15	5.81	9.25			
1981	298.97	26.83	5.37	8.97	23.97	14.48	11.12
1982	504.94	31.24	7.59	6.19	19.39	68.89	16.45
1983	553.60	39.03	7.01	7.05	18.79	9.64	24.91
1984	675.69	57.23	7.84	8.47	9.05	22.05	46.62
1985	704.84	60.41	7.79	8.57	4.95	4.31	5.56
1986	725.94	56.37	7.83	7.77	2.55	2.99	-6.69
1987	691.98	43.25	7.26	6.25	2.70	-4.68	-23.28
1988	747.19	41.60	7.20	5.57	8.90	7.98	-3.80
1989	912.00	54.01	7.77	5.92	13.12	22.06	29.81
1990	1438.37	78.97	8.87	5.49	38.28	57.72	46.23
1991	1895.22	79.11	9.21	4.17	26.77	31.76	0.17

NOTES:

* Department of Health budget as a percentage of total MOPH budget.

** Division of Nutrition budget as a percentage of Department of Health budget.

SOURCES:

1. National Health Budget, B.E. 2520-2534. Division of Planning, Office of the Permanent Secretary, MOPH, 1991.

2. Division of Nutrition, MOPH.

TABLE 22 - RICE PRODUCTION, EXPORT, DOMESTIC CONSUMPTION IN THAILAND, 1983-1987

Year	In million tons			Consumption #		
	Production*	Export	Domestic Consumption	Rice kg/person/year	Energy calories/person/day	Protein gm/person/day
1983	11.14	3.48	7.66	154.0	1536	24.5
1984	12.90	4.62	8.28	163.3	1628	31.3

1985	13.14	4.02	9.12	176.5	1750	33.8
1986	13.37	4.52	8.85	168.1	1676	32.2
1987	12.46	4.44	8.02	149.6	1492	28.7

NOTES:

* Production in paddy converted to polished rice by conversion factor = 0.66

Calories and protein calculated from the ratio of 75% normal rice and 25% glutinous rice based on the Table of Nutrients in the 100 gram edible portion. Division of Nutrition, the Department of Health, Ministry of Public Health, July 1987.

SOURCES:

1. Agricultural Statistics of Thailand in 1987/88 and Data from Research Division, The Office of Agricultural Economics, Ministry of Agriculture and Cooperatives
2. Yearly Trade Statistics, Department of Business Economics, Ministry of Commerce, 1987.

TABLE 23 - THE ESTIMATED DEMAND OF SWINE, BUFFALO, CATTLE FOR DOMESTIC CONSUMPTION AND ACTUAL LIVESTOCK SLAUGHTERED IN 1984-1988

Year	Demand						Actual slaughtered		
	Kg/person/year			Number in thousand			Number in thousand		
	swine	buffalo	cattle	swine	buffalo	cattle	swine	buff.	cattle
1984	11.76	1.33	2.76	6920	324	850	3180	130	419
1985	12.07	1.38	2.78	7230	341	887	3470	134	412
1986	12.05	1.43	2.83	7330	359	917	3330	145	397
1987	12.03	1.48	2.88	7430	379	948	3260	153	402

NOTES:

Average live weight of a swine is 100 kg, edible part 82.4 kg.

Live weight of a buffalo is 380 kg, edible part 207.1 kg.

Live weight of a cattle is 262 kg, edible part 160.7 kg.

SOURCES:

1. Division of Agricultural Economic Research, The Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.
2. Agricultural Statistics of Thailand 1987/88

TABLE 24 - CHICKEN PRODUCTION, AND DOMESTIC CONSUMPTION IN THAILAND, 1984-1987

Year	Production	Export*	Domestic Consumption	
	(million)	(million)	(million)	(chicken/person/year)
1984	430.9	61.10	369.80	7.29
1985	488.2	67.57	420.63	8.14
1986	504.2	115.71	388.49	7.38
1987	510.2	146.26	363.94	6.79

NOTES:

* Exports, converted back from the Customs Department Statistics, Ministry of Finance 0.56 kg. Frozen Boneless Chicken = 1 chicken.

SOURCES:

1. Agricultural Statistics of Thailand in 1987/88 and Data from Research Division, The Office of Agricultural Economics, Ministry of Agriculture and Cooperatives
2. Yearly Trade Statistics, Department of Business Economics, Ministry of Commerce, 1987.

TABLE 25 - DAILY PER CAPUT AVAILABILITY OF PROTEIN, FAT, CARBOHYDRATE AND DIETARY SCORE IN THAILAND, 1979-81, 1982-84 AND 1986-1988 AVERAGES

	1979-81	1982-84	1986-88
DAILY PER CAPUT IN GRAM.			
PROTEIN	46.9	45.8	49.1
VEGETABLE	34.7	n.a.	34.3
ANIMAL	12.2	n.a.	14.8
FAT	26.0	28.3	33.4
VEGETABLE	15.6	n.a.	20.1
ANIMAL	10.4	n.a.	13.3
CARBOHYDRATE	477.0	471.0	458.3
DAILY PER CAPUT IN KILOCALORIES			
TOTAL	2330	2322	2330
PROTEIN	188	183	196
FAT	234	255	301
CARBOHYDRATE	1908	1884	1833
% TOTAL CALORIES			
PROTEIN	8.1	7.9	8.6
FAT	10.0	11.0	13.2

CARBOHYDRATE	81.9	81.1	78.2
DIETARY SCORE *	66	65	73

NOTES:

* Calculated from the nutritional rating of each food group. The rating of 0.5 given to cereals, roots and tubers, and sugar compared with that of rating one given to fat and oil is based on the consideration of caloric density. Animal products, pulse and beans, and fruit and vegetables were given the rating of 2 for providing either essential nutrients or caloric density or the necessary bulk and fiber.

SOURCES:

1. Report of the Regional Expert Consultation on the Asian Network for Food and Nutrition. RAPA Publication: 1988/7. Regional Office for Asia and the Pacific (RAPA), FAO, Bangkok, 1988.

2. Selected Indicators of Food and Agriculture Development in Asia-Pacific Region, 1979-89. RAPA Publication: 1990/15. RAPA, FAO, Bangkok, 1990.

TABLE 26 - DIETARY ENERGY AVAILABILITY AND ITS COMPOSITION IN THAILAND, 1974-1988

	DIETARY ENERGY AVAILABLE IN KCAL/CAPUT/DAY				
	1974-76	1979-81	1982-84	1983-85	1986-88
TOTAL CALORIES/REQUIREMENT					
Total Calories	2269	2330	2322	2303	2288
Calories % Requirement #	113.68	116.73	116.33	115.38	114.63
% COMPOSITION OP TOTAL CALORIES					
Total Cereals *	71.13	66.09	61.15	63.44	61.15
Roots & tubers	2.60	2.70	2.71	2.74	2.49
Pulses & beans	0.53	0.47	0.78	0.87	1.49
Nuts & oilseeds	3.00	2.79	4.22	4.65	4.94
Fruits & vegetables	4.98	5.71	6.63	6.47	5.94
Total sweeteners **	9.08	12.36	14.51	9.12	9.66
Fat & oils	1.98	2.49	2.50	2.61	2.93
Total animal products	5.64	6.01	5.86	6.95	7.82
(Meat & offals)	2.95	3.69	3.40	4.04	n.a
(Milk & milk products)	0.31	0.39	0.47	0.52	n.a
(Eggs)	0.62	0.34	0.39	0.83	n.a
(Fish & sea foods)	1.76	1.59	1.59	1.56	n.a
Others ***	1.06	0.94	0.95	1.13	1.05

NOTES:

Requirement at moderate activities. FAO Methodology, Human Energy Requirements: A Manual for Planners and Nutritionists, Oxford Press, 1990.

* Mainly rice (more than 98%).

** Mainly sugar and honey.

*** Alcoholic beverages and others.

SOURCES:

1. Availability of Dietary Calories. RAPA Publication: 1988/6. Regional Office for Asia and the Pacific (RAPA), FAO, Bangkok, 1988.

2. Selected Indicators of Food and Agriculture Development in Asia-Pacific Region, 1979-89. RAPA Publication: 1990/15. RAPA, FAO, Bangkok, 1990.

TABLE 27 - PROPORTION OF TOTAL EXPENDITURE ON FOOD BY INCOME CLASSES, THAILAND, 1982

Income class (baht)	Proportion spent on food	
	Urban slum * (%)	Northeast (%)
< 1,000	62	81
1,000-2,000	59	62
2,001-3,000	60	51
3,001-4,000	57	-
4,001-5,000	54	-
> 5,000	51	-
Average	58	-

NOTE:

* Middle-class families in Bangkok spent 33% of total expenditure on food.

SOURCES:

1. Kongjing K and Veerakitpanich M. Food Consumption and Nutrition in Thailand. In: Panayotou T, eds. Food Policy Analysis in Thailand. Agricultural Development Council. Bangkok, 1985. Table 12. page 177.

TABLE 28 - AVERAGE MONTHLY HOUSEHOLD AND PER CAPITA INCOME AND EXPENDITURES FOR FOOD AND PROPORTION OF FOOD EXPENDITURES BY REGION IN THAILAND, 1988

	WHOLE KINGDO	REGION

	M					
		GREATER BANGKOK	CENTRAL	NORTHERN	NORTHEASTERN	SOUTHERN
HOUSEHOLD						
SIZE	4	3.5	3.9	3.7	4.5	4.1
INCOME	4106	7877	4220	3400	3067	3959
% IN KIND	24.7	19.2	21	22.7	27.0	32.0
TOTAL EXPENDITURE	4161	7873	4267	3397	3105	4254
FOOD EXPENDITURE	1519	2571	1627	1220	1175	1707
% TO TOTAL EXP	36.5	32.7	38.1	35.9	37.8	40.1
FOOD EXPENDITURES						
BY TYPE (%)						
HOME PREPARED	77.3	54.5	80.7	83.5	88.6	80.5
FOOD TAKEN HOME OR EAT OUT	22.7	45.5	19.3	16.5	11.4	19.5
BY ACQUISITION						
PURCHASED	71.9	89.2	82.0	64.8	51.6	77.3
PART OF PAYMENT	1.9	3.2	0.9	1.9	1.7	1.7
HOME PRODUCED	21.3	3.2	12.7	27.1	42.1	15.7
RECEIVED FREE	4.9	4.4	4.4	6.2	4.6	5.3
PER CAPITA						
INCOME	1027	2251	1082	919	682	966
TOTAL EXPENDITURE	1040	2249	1094	918	690	1038
FOOD EXPENDITURE	380	735	417	330	261	416

SOURCES:

1. Report of the 1988 Household Socio-economic Survey. National Statistical Office, Office of the Prime Minister, Thailand.

TABLE 29 - AVERAGE MONTHLY HOUSEHOLD AND PER CAPITA INCOME, EXPENDITURES FOR FOOD, AND PROPORTION OF FOOD EXPENDITURES BY SOCIO-ECONOMIC CLASSES IN THAILAND, 1988

	FARM OPERATOR @		OWN-ACCOUNT, NON-FARM		EMPLOYEES			
	OWNING	RENT	ENTREPRENEURS*	PROFESSIONAL**	PROFESSIONAL #	GENERAL WORKERS	CLERICAL ##	PRODUCTION WORKERS
HOUSEHOLD								
SIZE	4.5	4.3	4.1	3.6	3.5	4	3.6	3.7
INCOME	2825	3056	5773	26707	9649	2050	5830	4202
% IN KIND	36.8	32.0	17.0	8.6	15.4	31.7	20.3	20.5
TOTAL EXPENDITURE	3052	3280	5600	22105	8875	2334	6003	4160
FOOD EXPENDITURE	1228	1384	1904	3844	2331	1144	2059	1655
% TO TOTAL EXP	40.2	42.2	34.0	17.4	26.3	49.0	34.3	39.8
FOOD EXPENDITURE								
BY TYPE (%)								
HOME PREPARED	92.6	90.8	69.7	74.5	64.5	87.8	57.8	68.8
FOOD TAKEN HOME OR EAT OUT	7.4	9.2	30.3	25.5	35.5	12.2	42.2	31.2
BY ACQUISITION (%)								
PURCHASED	50.6	62.6	82.4	90.8	91.2	74.0	85.6	82.3
PART	0.4	0.9	0.5	0.0	0.7	2.5	5.7	5.1

OF PAYMENT									
HOME PRODUCED	45.8	32.9	13.7	0.0	3.6	17.2	3.6	7.4	
RECEIVED FREE	3.2	3.5	3.5	9.2	4.5	6.3	5.1	5.2	
PER CAPITA									
INCOME	628	711	1408	7419	2757	513	1619	1136	
TOTAL EXPENDITURE	678	763	1366	6140	2536	584	1668	1124	
FOOD EXPENDITURE	273	322	464	1068	666	286	572	447	

NOTES:

@ Farm operators were classified into mainly owning land and mainly renting land.

* Included entrepreneurs, trade and industry.

** Included professional, technicians and administrators.

Included professional, technical and administrative workers.

Included clerical, sales and services workers.

SOURCES:

1. Report of the 1988 Household Socio-economic Survey. National Statistical Office, Office of the Prime Minister, Thailand.

TABLE 30 - FOOD EXPENDITURE AND PROPORTION BY FOOD GROUPS AND RATE OF CHANGE AT 1972 PRICE, THAILAND 1978-1990

Unit: Billion Baht

	YEAR								
	1981	1982	1983	1984	1985	1986	1987	1988	1989
FOOD EXPENDITURE	68.3	69.7	71.2	74.6	77.6	79.4	82.5	84.9	88.8
(BILLION)									
RATE OF CHANGE									
FOOD EXPEND. (%)		2.1	2.2	4.8	4.0	2.4	3.8	2.9	4.6
POP. GROWTH (%)		2.1	2.0	2.0	1.9	1.9	1.8	1.7	1.8
EXPENDITURE (%)									
RICE & CEREALS	25.5	25.2	24.9	24.0	23.1	23.2	22.7	22.3	21.5

MEAT & FISH	31.8	32.6	32.3	31.5	32.0	32.9	32.2	31.7	31.7
MILK CHEESE & EGG	5.8	5.3	5.6	5.9	5.6	5.6	6.0	6.7	6.9
OIL & FAT	2.5	2.5	2.4	2.7	2.9	3.3	3.3	3.7	3.8
FRUIT & VEGETABLE	18.6	18.0	18.6	19.7	20.0	18.9	19.2	19.1	19.6
OTHER FOOD *	15.9	16.4	16.2	16.4	16.3	16.0	16.4	16.4	16.5

SOURCES:

1. National Income of Thailand, new series 1970-1987 (based on present United Nations System of National Accounting 1968). NESDB, 1988.
2. National Income of Thailand, 1990. NESDB, 1991.
3. The national Economic and Social Development Board.

TABLE 31 - DAILY DIETARY INTAKE IN VARIOUS AGE GROUPS IN THAILAND

Dietary Studies (age group)	Sample Size	Dietary Intake		Composition (%)		
		calories	% RDA*	prot.	carbo.	fat
<u>South</u>						
Saowanit A, et al, 1981	44	1027	66	15	68	17
(children age 2-6)						
<u>Northeast</u>						
Pradipasen H, et al, 1982	78	858	72	11	67	22
(children age 1-3)						
Pradipasen M, et al, 1982	55	909	59	11	68	21
(children age 4-6)						
Pradipasen M, et al, 1982	62	1753	103	11	78	11
(mothers age 30-39)						
Thara V, et al, 1986	44	1227	79	13	79	8
(children age 4-6)						
<u>North</u>						
Prasong T, 1985	78	1903	75	13	57	30
(men age 20-24)						
Prasong T, 1985	17	1409	78	14	53	33
(women age 20-22)						
Yingyong T, 1986	?	2508	125	11	77	12
(pregnant age 20-40)						
Yingyong T, 1986	?	2508	90	12	75	13
(lactating age 20-40)						

NOTES:

* As percentage of Thai Recommended Daily Allowance.

SOURCES:

1. Saowanit Ongrungruang, et al. Nutritional status of the pre school children in rural southern region of Thailand. Journal of the Nutrition Association of Thailand. 1981; 15:5-14.
2. Pradipasen M, Charoenpong R, Temcharoen P, et al. Nangrong Dietary Survey. Institute for Population and Social Research Publication, Nakornpathorn, 1985.
3. Prasong Tienboon. Recall dietary study and nutritional status of the fourth year medical students, Chiangmai University. Journal of the Nutrition Association of Thailand. 1985; 2:84-102.

TABLE 32 - MATERNAL AND CHILD HEALTH (MCH) SERVICES COVERAGE (PERCENTAGE), THAILAND, 1989

SERVICES	NORTH	NORTHEAST	CENTRAL	SOUTH	WHOLE COUNTRY
Antenatal care 4 visits	57.0	54.9	45.1	46.7	52.0
Delivery by trained personnel	69.5	71.3	69.5	61.3	68.8
Postnatal care 4 visits	35.3	37.5	30.6	39.8	35.9
Low Birth Weight 1989	11.3	8.9	9.8	8.4	9.5
Low Birth Weight 1991	10.2	9.5	9.2	9.5	9.0

SOURCES:

1. Family Health Division, Department of Health, Ministry of Public Health, 1989.
2. Nutrition Division, Department of Health, Ministry of Public Health, 1991.

TABLE 33 - COVERAGE OF GROWTH MONITORING AND PREVALENCE OF PROTEIN ENERGY MALNUTRITION IN PRE-SCHOOL CHILDREN IN THAILAND, 1982-1990

YEAR	No. of Children (million)	Coverage		Malnutritional Status (%)			
		Village	Children	Normal	Mild	Moderate	Severe
1982	1.00	n.a.	n.a.	49.2	35.7	13.0	2.13
1983	1.58	n.a.	n.a.	52.0	34.3	11.8	1.91
1984	1.27	n.a.	n.a.	64.8	28.5	5.9	0.80
1985	1.62	65.1	31.4	71.6	24.4	3.9	0.21
1986	2.19	89.3	39.8	73.9	22.7	3.2	0.13
1987	2.31	92.9	71.3	76.5	21.0	2.4	0.06

1988	2.41	97.2	82.1	78.0	20.0	2.0	0.04
1989	2.51	99.0	87.1	79.4	19.3	1.3	0.01
1990	2.60	99.5	89.7	81.4	17.8	0.8	0.004

NOTES:

1. Based on Gomez's classification using the Thai's Standard Weight.
2. Growth monitoring in 1982-1984 were annual. Quarterly growth monitoring was institutionalized in 1985. Second quarter data were presented here.

SOURCES:

Growth Monitoring Report in Children aged 0-60 months, B.E. 2525-2533, Division of Nutrition, Department of Health, MOPH, Thailand.

TABLE 34 - PREVALENCE OF PROTEIN ENERGY MALNUTRITION IN PRE-SCHOOL CHILDREN IN THAILAND BY REGION, 1982-1990

REGION	NORMAL (%)					MILD MALNUTRITION (%)				
	1982	1984	1986	1988	1990	1982	1984	1986	1988	1990
NORTH-EAST	43.3	56.2	67.0	71.5	75.4	39.1	34.4	28.3	25.7	23.5
NORTH	49.2	70.4	76.7	79.5	81.4	34.8	24.8	20.6	18.7	17.6
EAST	63.2	76.4	85.5	88.2	91.0	27.1	20.3	12.9	10.8	8.7
SOUTH	56.4	65.4	76.1	81.0	84.6	31.3	27.7	20.8	17.2	14.8
CENTRAL	63.3	77.1	87.4	89.8	91.9	28.4	20.6	12.0	9.8	8.0
REGION	MODERATE MALNUTRITION (%)					SEVERE MALNUTRITION (%)				
	1982	1984	1986	1988	1990	1982	1984	1986	1988	1990
NORTH-EAST	15.2	8.1	4.5	2.8	1.1	2.39	1.36	0.21	0.06	0.000
NORTH	13.4	4.5	2.6	1.7	1.0	2.67	0.38	0.12	0.06	0.012
EAST	8.0	3.1	1.5	0.9	0.3	1.67	0.29	0.06	0.04	0.005
SOUTH	10.5	6.4	3.0	1.8	0.6	1.78	0.52	0.13	0.05	0.008
CENTRAL	7.2	2.2	0.7	0.4	0.1	1.04	0.11	0.02	0.01	0.001

NOTES:

1. Based on modified Gomez's classification using the Thai's Standard Weight.
2. Growth monitoring in 1982-1984 were annual. Quarterly growth monitoring was institutionalized in 1985. Second quarter data were presented here.

SOURCES:

Growth Monitoring Report in Children aged 0-60 months, B.E. 2525-2533, Division of Nutrition, Department of Health, MOPH, Thailand.

TABLE 35 - NUTRITIONAL STATUS BY THAI AND NCHS STANDARD IN THE PRE-SCHOOL CHILDREN DURING COLD-DRY AND HOT-DRY SEASON IN NORTH-EAST THAILAND, 1990-1991

SEASON	NUMBER OF CHILDREN	% MALNUTRITION			
		W/A THAI STANDARD*	NCHS (-2 SD)		
			W/A	H/A	W/H
COOL-DRY NOV90-JAN91	1,236	37.5	25.0	28.9	4.5
HOT-DRY MAR91-MAY91	1,202	48.3	34.7	28.1	9.9

NOTES:

* Mild, moderate and severe malnutrition combined or below 90% of the 50th percentile Thai Standard used by the nationwide growth monitoring activities.

SOURCES:

Kachondham, Y. et al. IDRC's Integrated Nutrition Project in North east Thailand, Phase 1. (on going).

TABLE 36 - NUTRITIONAL STATUS BY THAI AND NCHS STANDARD (ADJUSTED) IN THE PRE SCHOOL CHILDREN IN THAILAND, 1982-1990

YEAR	NUMBER OF CHILDREN (MILLION)	% MALNUTRITION			
		W/A THAI STANDARD*	NCHS (-2 SD) #		
			W/A min-max	H/A min-max	W/H min-max
1982	1.00	50.8	33.9-36.4	29.4-39.2	6.1-10.4
1983	1.58	48.0	32.0-34.3	27.8-37.0	5.8-9.8
1984	1.27	35.2	23.5-25.2	20.4-27.1	4.2-7.2
1985	1.62	28.5	19.0-20.4	16.5-22.0	3.4-5.8
1986	2.19	26.0	17.4-18.6	15.1-20.1	3.1-5.3
1987	2.31	23.5	15.6-16.8	13.6-18.1	2.8-4.8
1988	2.41	22.0	14.7-	12.8-	2.6-4.5

			15.8	17.0	
1989	2.51	20.6	13.7-14.7	11.9-15.9	2.5-4.2
1990	2.60	18.6	12.4-13.3	10.8-14.3	2.2-3.8

NOTES:

* Mild, moderate and severe malnutrition combined or below 90% of the 50th percentile Thai Standard used by the nationwide growth monitoring activities.

Recalculated by using adjusted factors for the best and worst case scenario from the data-base in Kachondham, Y. et al. IDRC's Integrated Nutrition Project in North-east Thailand, Phase 1. (on going).

TABLE 37 - PREVALENCE OF ANEMIA AMONG PREGNANT WOMEN AND SCHOOL CHILDREN IN THAILAND, 1990

REGION	PREGNANT WOMEN*		SCHOOL CHILDREN	
	NUMBER	% ANEMIA	NUMBER	% ANEMIA
EAST	37,345	19.56	17,172	16.63
NORTHEAST	107,041	17.11	60,915	18.12
CENTRAL	72,770	19.29	23,762	16.72
NORTH	51,633	16.01	25,037	18.42
SOUTH	59,633	23.04	26,047	23.15
WHOLE COUNTRY	328,415	18.77	152,933	18.61

NOTES:

* Hospital-based data from 680 hospitals in 70 provinces.

SOURCES:

1. Pregnant women and school children iron deficiency anemia surveillance report, 1990. Nutrition Division, Department of Health, Ministry of Public Health.

TABLE 38 - GOITER SURVEY IN SCHOOL CHILDREN IN 14 NORTHERN PROVINCES AND LOEI PROVINCE IN THE NORTHEAST THAILAND, 1988-1990

PROVINCE	GOITER PREVALENCE (%)		
	1988#	1989	1990
Northern Provinces			
Uttaradit	36.26	45.74	37.40
Maehognsorn	27.28	42.98	44.12
Nan	-	38.50	36.37

Lampoon	-	28.78	19.86
Chiengrai	-	27.85	23.41
Payao	-	25.30	16.26
Tak	70.51	21.30	20.25
Lampang	32.24	20.04	16.75
Sukotai	-	13.72	18.41
Chiengmai	-	12.43	15.68
Petchaboon	45.93	9.87	7.86
Pitsanuloke	59.80	9.42	10.54
Phrae	20.63	7.99	7.66
Kampangpet	54.34	3.08	6.03
Northeast Province			
Loei	40.99	13.48	11.63

NOTES:

Goiter rates include goiter grade 1a, 1b, 2 and 3.

SOURCES:

1. Goiter survey report in school children, 1990. Nutrition Division, Department of Health, Ministry of Public Health.
2. (#) Thailand Health Profile, 1990. Ministry of Public Health, Bangkok, Thailand.

TABLE 39 - MOTHER'S ABILITY TO INTERPRET GROWTH CHART COLOR AND DIRECTIONAL CHANGES OF WEIGHT (OBSERVATION OF 3 DIRECTIONAL LINES ON THE CHART) BY AREAS

INTERPRETATION	AREA *			TOTAL (%)
	GOOD (%)	POOR (%)	CENTRAL (%)	
<u>GROWTH CHART COLOR</u>	<u>N = 136</u>	<u>N = 168</u>	<u>N = 129</u>	<u>N = 433</u>
BOTH CORRECT	54.4	45.2	38.8	46.2
MIXED **	15.4	9.6	4.6	9.9
BOTH WRONG	30.2	45.2	56.6	43.9
<u>DIRECTIONAL CHANGES OP WEIGHT</u>	<u>N = 136</u>	<u>N = 168</u>	<u>N = 119</u>	<u>N = 423</u>
ALL CORRECT	64.7	71.4	47.1	62.4
TWO CORRECT	9.6	11.9	12.6	11.3
ONE CORRECT	8.8	3.0	1.7	4.5
ALL WRONG	16.9	13.7	38.6	21.8

NOTES:

* Areas are classified as good growth monitoring and promotion areas in the rural Northeast and the South (good), poor growth monitoring and promotion in the rural northeast and the south (poor), and the semi-urban central areas (central).

** One correct and one wrong.

SOURCES:

1. Evaluation of Growth Monitoring and Promotion in Thailand. An UNICEF Report. Nutrition Division, Ministry of Public Health. February 1992.

TABLE 40 - PERCENTAGE OF EDUCATIONAL LEVEL AMONG POPULATION AGED 11 YEAR AND OVER, AND GOVERNMENT CONSUMPTION EXPENDITURE ON EDUCATION AND RESEARCH AT 1972 PRICE, THAILAND 1981-1989

	1981	1982	1983	1984	1985	1986	1987	1988	1989
EDUCATION LEVEL (%)									
UNEDUCATED	9.8	9.6	9.1	8.9	9.0	8.0	8.1	7.8	
LOWER PRIMARY *	72.3	71.2	63.7	61.5	58.4	56.2	54.5	53.1	
HIGHER PRIMARY	6.9	7.5	13.1	15.3	18.0	19.7	20.5	21.4	
SECONDARY	6.1	6.2	7.4	7.6	8.1	8.8	9.3	9.7	
VOCATIONAL #	4.2	4.8	5.8	5.8	5.4	6.0	6.2	6.5	
UNIVERSITY @	0.7	0.7	0.9	0.9	1.1	1.3	1.4	1.5	
GOV. EXPENDITURE									
EDUCATION & RES. (BILLION BAHT)	11.4	13.2	14.5	15.8	16.8	18.0	18.4	19.2	19.6
RATE OF CHANGE		16.0	9.8	9.4	6.4	6.7	2.4	4.5	1.9
% GDP 1972 PRICE	3.6	4.0	4.1	4.2	4.3	4.3	4.1	3.7	3.4

NOTES:

* Lower Primary: Grade 1 to 4 or lower. Higher Primary: Grade 5 to 6.

Included Technical Vocational, Teacher Training, Short Course Vocational and others.

@ Included College (University level).

SOURCES:

1. National Income of Thailand, new series 1970-1987 (based on present United Nations System of National Accounting 1968). NESDB. 1988.

2. National Income of Thailand, 1990. NESDB, 1991.

3. Education Information Division, Office of the National Education Commission.

ANNEXES

ANNEX 1: FOOD AND NUTRITION PROGRAMMES IN THE FOURTH NESDP (1977-1981)

The goal of the First NFNP in the Fourth NESDP was to improve the nutritional status of infants and young children (0-5 years) and pregnant and lactating mothers.

The targeted populations included:

- 100% of infant 0-6 months of age (estimated total of 1 million by 1981) through their mothers (840,000 women);
- 30% of young children, 6 months to 5 years of age (estimated total of 1.4 millions by 1981);
- 30% of pregnant and lactating mothers (estimated total of 250,000 by 1981).

The operational goals were:

- To reduce death rate due to malnutrition and associated causes in 0-4 year old children by 50% (i.e. from 50 per 1,000 to 25 per 1,000);
- To reduce the prevalence of malnutrition of 0-4 year old children by 50% (from 52-80% to 26-40%);

The programmes implemented during this period included:

1. Direct intervention:

Direct services designed to achieve the goals included the followings:

1.1 Promotion of breast feeding for infants 0-6 months of age by:

- Orientation and training of authorities and personnel of various levels and disciplines, and village (community) leaders such as traditional midwives, school teachers, and village-based health volunteers;
- Nutrition education of mothers through existing health services, mothers' class, mobile units and home visit services.

1.2 Promotion of nutritional health of 6 months to 2 years old children by promoting continued breast feeding and introduction of supplementary feeding at appropriate ages by:

- Nutrition education on breast feeding and supplementary feeding;
- Provision of supplementary feeding by on-site feeding and take-home feeding through village health volunteers and housewives under supervision of the health and other extension personnel.

1.3 Promotion of nutritional health of the 3-5 years old children by:

- Establishment of day-care centers both in rural areas and Bangkok metropolitan area;
- On-site feeding at the center by day-care attendants, village health volunteers, mothers under the supervision.

1.4 Promotion of nutritional status of pregnant and lactating mothers through:

- Nutrition education in the MCH services, mass campaign, home visit and mobile units;
- Provision of high protein supplementary foods and vitamins and minerals supplements;
- Feeding programs for young children and nutrition education of the mothers via the health sector.

2. Indirect intervention:

2.1 Improvement of production, transport, distribution and storage of the supplementary food for young children by involving both the governmental agencies and private industry by:

- Increase the production capacity of the supplementary foods (produced by the Institute of Food Research and Product Development, IFRPD) to fulfill the needs of the feeding programs;
- Encourage private industry to participate in the production of supplementary foods, with the quality control by the MOPH and the IFRPD;
- Organizing effective distribution/marketing system of the supplementary foods at low cost and outreach to rural areas via two major channels:

Government channel

The distribution will be channeled directly from the processing plant in Bangkok to the provincial health office whereby the food products will be delivered to the hospital, district and subdistrict health centers and day-care centers in the village. The inventory of the food products at various levels would be monitored by the government inventory system. Stock of the supplementary foods at the feeding site at any given time would be 7-day supply. There may be additional outlets in the community shops organized by the community for children outside the feeding programs. Packaging for the food products would also be unique or carry the distinct label indicating its use for the national feeding programs.

Private channel

Private industry would participate in producing foods to complement to the production capacity of the IFRPD. The distribution and marketing would be the responsibility of the industry.

2.2 Community production and utilization of nutritious food crops by:

- Emphasis on raw materials used for producing supplementary foods and other nutritious foods, such as chicken, duck, egg, fish;
- Develop home food preservation and simple processing methods for family consumption.

2.3 Nutrition and health education for the public and housewives through various media.

2.4 Training of personnel in various sectors involved by:

- In-service training of teachers, health personnel, community development workers, agricultural extension workers;
- Training of volunteers and child-care attendants;
- Producing educational materials which can be shared among workers in various sectors/disciplines.

2.5 Provision of services in family planning, family health, environmental sanitation and health education.

2.6 Occupational promotion for income generation by:

- Promote occupations for women and youths;
- Promote vocational training;
- Promote food and cash crop production at the community level.

To carry all these interventions, each government agencies separately design their own relevant projects that formed parts of the national programmes.

Agencies participated in carrying out the programmes were:

- Division of Nutrition, Department of Health, Ministry of Public Health
- Division of Agricultural Development, Department of Agricultural Extension, Ministry of Agriculture and Cooperatives
- Division of Project Implementation, Department of Community Development; Division of Land Settlements, Department of social Welfare; Division of Public Education, Ministry of Interior
- Department of General Education and Office of the Committee of Private Education, Ministry of Education

- Division of Health Promotion, Department of Health, Bangkok Metropolis
- Institute of Food Research and Product Development, Kasetsart University; and Institute of Nutrition, Mahidol University.

The information system was available to compile the severity of malnutrition among the underfives through the MOPH infrastructure. The data is processed at the central level and report produced accordingly. However, by the end of the Fourth NESDP, the nutrition surveillance system was not well in place.

Important experiences and outcomes of the food and nutrition programs during the Fourth NESDP are as follows (Fifth NESDP, 1982-1986):

Operational problems

- The nutrition center did not reach the actual target. Malnourished and poor children did not attend the activities as planned.
- The distribution of supplementary food reached only 30% of the targeted malnourished children.
- There was no functional body which coordinated and monitored the programs. There was a lot of repetition in services by different sectors involved.

Impact

The evaluation in 1980 showed that the prevalence of malnutrition among the underfives remained at 53%, having 2.2% or 150,000 children in the severe stage. Malnutrition in all regions of the country except the central were higher than 50%, with the highest prevalence in the northeast.

ANNEX 2: FOOD AND NUTRITION PROGRAMMES IN THE FIFTH NESDP (1982-1986)

The food and nutrition policy during the Fifth NESDP still addressed malnutrition problems among the same target groups as the previous plan. However, in this plan, the operational goals for each target group were made very specific, as follows:

1. Pregnant and lactating women

- To eradicate PEM and iron deficiency.

2. Infants and preschool children (underfives)

- To eradicate third degree (severe form) malnutrition;
- To reduce second degree (moderate form) malnutrition by 50% (i.e. from 13% to 7.5%);
- To reduce first degree (mild form) malnutrition by 25% (i.e. from 38% to 28%).

3. School aged children

- To reduce malnutrition (estimated prevalence of 40-50%) by 50%;
- To eradicate iodine deficiency goiter in the endemic areas (nine provinces in the north).

The implementation strategies were specified as follows:

- Create awareness in food and nutrition among the target population;
- Promotion of production and consumption of nutritious foods;
- Improve environmental sanitation and preventive health services such as immunization via the PHC scheme and focus on highly problematic areas;
- Promotion of village-based supplementary food processing as well as mass scale production by private sector for commercialization;
- Promotion of income generating activities;
- Consumer protection enforcement;
- Having the local government (district level?) act as a coordinating body for planning and implementation at the grassroots level, and with continued efforts;
- Encourage applied research in food and nutrition;
- Focus attention on areas severely affected and the poverty stricken areas and the specified target populations.

Program implementation

1. Nutrition surveillance programs

Establish the nutrition surveillance in all provinces by covering the poverty stricken areas (286 districts) during the first two years and extend to all during the last three years. Specific programs were:

- Weight-for-age of the underfives using growth chart by village-based volunteers, and teachers for school children, both having subdistrict health personnel as supervisors;
- Identify goitrous cases in school children by the mobile units from the central and regional teams;
- Identify iron deficiency anemia using clinical sign and done by midwives for all risk groups.

2. Nutrition education

Focus attention on nutrition education of pregnant women and lactating mothers, as well as the public, with emphasis on maternal nutrition during pregnancy and

lactation, breast feeding appropriate supplementary feeding. All activities were to be conducted through PHC, home visits, mothers' group, mass and mobile unit activities.

3. Supplementary feeding

On-site feeding and take home (supplementary) food distribution for the severely malnourished children at the nutrition or child care centers, by village-based volunteers and mothers.

4. Promotion of community food production

Focus attention on low income families to produce nutritious crops for home consumptions. Promotion of village-based supplementary food processing, food preservations and processing for family consumptions, school lunch programs and on-site feeding. The agricultural extension workers were the key for these activities.

5. School lunch programs

Provision of school lunch along with nutrition education, community food production and environmental sanitation in school. The national primary education and the MOI were responsible for provision of the initial funds and training of teachers.

6. Fortification of specific nutrients

Both iodine and iron fortification of salt was tried out and distributed in endemic areas, with government subsidies on the iodine and iron compounds.

7. Training and research

Training of trainers at various levels, and promotion of applied and operational research in all sectors involved.

8. Consumer protection

Improve and enforce laws relating to foods for consumer protection. Promulgate the infant food code.

Organization and management

The national food and nutrition committee continued with some modification of the subcommittees. The structure of the committee was extended to the district and village level according to the rural development scheme. Food and nutrition programs are ones of the programs decided upon by the development committee.

At the community level, nutrition activities were organized through the PHC. The program is known as growth monitoring. Growth chart from the weight-for-age measurement was used to identify the problem. Village-based supplementary food processing was promoted as the immediate solution with the decision making by the community to assist the families of the malnourished children. Mothers of the underfives, especially of the malnourished children were encouraged to participate in weighing, food processing and on-site feeding. Foods were also distributed as a take

home for mothers of the severely malnourished children, whereas families of the less severely malnourished were asked to contribute either in cash or in kind to sustain the village supplementary food processing.

Management information system

Nutritional surveillance information system was well established in the MOPH during this period. Quarterly reports on prevalence of malnutrition of the underfives by degree of malnutrition by provinces, regions and national figures were prepared and distributed to concerned agencies. A separate information system for other information under the rural development programs was also established and fully functioned during the latter half of the plan.

ANNEX 3: FOOD AND NUTRITION PROGRAMMES IN THE SIXTH NESDP (1987-1991)

During this Third NFNP in the Sixth NESDP, there was no explicit food and nutrition policy. Nutrition became an integral part of the BMN indicators. The policy indirectly related to nutrition was the focus on the strengthening of the system to carry out several activities including nutrition. In terms of the operation, nutrition in PHC scheme continued in the same manner as during the previous NESDP.

The operational goals of the plan were:

1. Pregnant women

- To decrease iron deficiency anemia to be below 20%;
- To have 90% of birth weight above 2,500 g; and 60% above 3,000 g.

2. The underfives

- To reduce second and third degree malnutrition to <2%;
- To reduce anemia to be below 20%;
- To eliminate IDD.

3. School aged children (>5-14 years old)

- To reduce the prevalence of underweight to be <4.5%;
- To reduce anemia to be <20%;
- To eliminate IDD.

In addition to above three groups, laborers and the elderly were also included.

Program implementation, organization and management were similar to that explained for the fifth NESDP. The BMN approach was fully implemented throughout the country.

ANNEX 4: BASIC MINIMUM NEEDS

Eight groups of BMN indicators were originally developed to be used by villagers themselves as well as local government officials as tools for problem identification, analysis, goal setting and action program implementation. The indicators below were developed into checklists as a way to determine problems and their priorities as a basis for planning intervention activities as well as to monitor and evaluate their results.

I. Adequate food and nutrition

- 1) Proper nutrition surveillance from birth to five years and no moderate and severe PEM.
- 2) School children receive adequate food for nutritional requirements.
- 3) Pregnant women receive adequate and proper food, and delivery of newborn babies with birth weight not less than 3,000 g.

II. Proper housing and environment

- 4) The house will last at least five years.
- 5) Housing and the environment are hygienic and in order.
- 6) The household possesses a hygienic latrine.
- 7) Adequate clean drinking water is available all year around.

III. Adequate basic health and education services

- 8) Full vaccination with BCG, DTP, OPV and measles vaccine for infants under 1 year.
- 9) Primary education for all children.
- 10) Immunization with BCG, DTP and typhoid vaccine for primary school children.
- 11) Literacy among 14-50 year old citizens.
- 12) Monthly education and information in health care, occupation and other important areas for the family.
- 13) Adequate antenatal services.
- 14) Adequate delivery and postpartum services.

IV. Security and safety of life and properties

- 15) Security of people and properties.

V. Efficiency in food production by the family

- 16) Growing alternative crops or soil production crops.
- 17) Utilization of fertilizers to increase yields.
- 18) Pest prevention and control in plants.

- 19) Prevention and control of animal diseases
- 20) Use of proper genetic plants and animals.

VI. Family Planning

- 21) Not more than two children per family and adequate family planning services.

VII. People participation in community development

- 22) Each family is a member of self-help activities.
- 23) The village is involved in self-development activities.
- 24) Care of public properties.
- 25) Care and promotion of culture.
- 26) Preservation of natural resources.
- 27) People are active in voting.
- 28) The village committee is able to plan and implement projects.

VIII. Spiritual or ethical development

- 29) Being cooperative and helpful in the village.
- 30) Family members are involved in religious practices once per month.
- 31) Neither gambling nor addiction to alcohol or other drugs by family members.
- 32) Modest living and expenses.

BACK COVER

UNITED NATIONS
ADMINISTRATIVE COMMITTEE ON COORDINATION - SUBCOMMITTEE ON NUTRITION

(ACC/SCN)

The ACC/SCN is the focal point for harmonizing the policies and activities in nutrition of the United Nations system. The Administrative Committee on Coordination (ACC), which is comprised of the heads of the UN Agencies, recommended the establishment of the Subcommittee on Nutrition in 1977, following the World Food Conference (with particular reference to Resolution V on food and nutrition). This was approved by the Economic and Social Council of the UN (ECOSOC). The role of the SCN is to serve as a coordinating mechanism, for exchange of information and technical guidance, and to act dynamically to help the UN respond to nutritional problems.

The UN members of the SCN are FAO, IAEA, World Bank, IFAD, ILO, UN, UNDP, UNEP, UNESCO, UNFPA, UNHCR, UNICEF, UNRISD, UNU, WFC, WFP and WHO. From the outset, representatives of bilateral donor agencies have participated actively in SCN activities. The SCN is assisted by the Advisory Group on Nutrition (AGN), with six to eight experienced individuals drawn from relevant disciplines and with wide geographical representation. The Secretariat is hosted by WHO in Geneva.

The SCN undertakes a range of activities to meet its mandate. Annual meetings have representation from the concerned UN agencies, from 10 to 20 donor agencies, the AGN, as well as invitees on specific topics; these meetings begin with symposia on

topics of current importance for policy. The SCN brings certain such matters to the attention of the ACC. The SCN convenes meetings on inter-sectoral and sector-specific topics. Ten-year programmes to address two major deficiencies, vitamin A and iodine, have been launched.

The SCN compiles and disseminates information on nutrition, reflecting the shared views of the agencies concerned. Regular reports on the world nutrition situation are issued, and flows of external resources to address nutrition problems are assessed. State-of-the-Art papers are produced to summarize current knowledge on selected topics. As decided by the Subcommittee, initiatives are taken to promote coordinated activities - inter-agency programmes, meetings, publications - aimed at reducing malnutrition, primarily in developing countries.