

NUTRITION RESEARCH IN THE EIGHTIES : INSTITUTE FOR MEDICAL RESEARCH

TEE E SIONG

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INTRODUCTION

Nutrition research in the Institute for Medical Research (IMR) dates back to 1900, when the Institute was founded. The earliest nutrition studies were in fact carried out by the first four directors of the IMR, who investigated actively into the etiology and pathology of beri-beri. This pioneering work on beri-beri, subsequently proven to be due to vitamin B1 deficiency, stimulated interest on other disorders arising from vitamin deficiencies in the diet such as xerophthalmia, rickets, pellagra, and angular stomatitis. With the setting up of a Division of Nutrition after the war in 1946, nutrition research in the IMR was extended to cover various other nutritional problems including protein-energy malnutrition anaemia, and certain aspects of nutritional toxicology.

Nutrition research in the Institute has thus had a long history. A variety of food and nutritional problems have been studied, as is evident from the research reports and publications regularly documented in the annual reports of the Institute. The various applied research projects are carried out with the general objective of constantly updating our knowledge on food and nutrition in the country. Data and information collected serve as inputs to the relevant authorities for the implementation of suitable intervention programmes to overcome the food and nutritional problems faced by the communities.

This report describes briefly various nutrition research studies completed recently (in the 80's), as well as those that are being carried out in the Institute. As in previous years, research themes cover a variety of topics, and are geared towards food and nutritional problems that are of relevance to the country. Most of the studies have been carried out by the Division of Human Nutrition. It will however be noted that in many of the studies, there has been collaboration with other Divisions in the Institute, as well as with other Institutions in the country. Findings of studies are not reported, although references to published reports are given.

NUTRITIONAL STATUS OF COMMUNITIES

Over the years, the Institute has carried out numerous studies to identify the nutritional problems faced by various communities in the country, to understand the etiology, and estimate the magnitude of these problems. Studies carried out in the early 80's include those reported by George *et al* (1981) on a group of children with severe protein-energy malnutrition in Kuala Lumpur, Chong and Hanis (1982) on birthweight distribution and trends in Kuala Lumpur, and that of Chong *et al* (1982b) on the nutritional status of the armed forces. Three more recent studies reported by the IMR are outlined below.

In addition, the Institute has issued various reports pertaining to the overall nutritional status of communities (Chong 1982, 1983, 1984; Kandiah, 1982; Tee and Khor 1986), as well as some dealing with the nutritional assessment methodologies (Chong 1980; Ng 1984; Tee 1985a).

Status of Community Nutrition of Rural Villages, Peninsular Malaysia

The Division of Human Nutrition recently reported findings from a series of relatively large nutrition surveys conducted at approximately yearly intervals between September 1979 and September 1983 (Chong *et al*, 1984). The studies involved the clinical examination and anthropometric measurement of about 3600 persons. These subjects

were from 14 villages in the states of Kelantan, Johore, Kedah and Perak and included various agricultural communities, viz padi-growing, rubber-tapping and fishing. Blood specimens were obtained from about 3000 individuals, and urine from half that number for the determination of various nutritional biochemical parameters. Another 1500 persons provided stool samples for parasite examination. Visits were made to 548 houses for collection of data on socio-economic characteristics, food consumption and pattern, food beliefs and practices.

Malnutrition in Malaria Endemic Villages of Bengkoka Peninsular, Sabah

In a smaller study in Sabah, carried out by the Division of Human Nutrition and the Sabah Medical Services, the nutritional status of 96 pre-school children and 61 women of child-bearing age in three poor and remote villages in the Bengkoka Peninsula was studied (Kandiah *et al*, 1984). The subjects were examined by a combination of anthropometric, biochemical and food consumption techniques. The majority of the inhabitants of the main village of Pantai were the Rungus, who practised the slash and burn type of subsistence farming. In the peripheral village of Taradas, the inhabitants were also mostly Rungus. Delima, another peripheral village studied, consisted mostly of the Bajaus who were mostly engaged in fishing. The interaction of malaria infection and helminthic infestation with nutrition was examined.

Kampung Bongkol Settlement Centre (Pitas District), Sabah

In another study carried by the Division of Human Nutrition in collaboration with Sabah Health Services, a total of 170 children (0-72 months of age) were examined clinically, their weight and height measured, and blood collected for Hb and plasma albumin determination (Jai Mohan *et al*, 1984). Stool of 118 children was also examined for intestinal helminths. 62 households in the settlement were also studied for their socio-economic characteristics and food consumption and pattern of the community.

FOOD CONSUMPTION AND PATTERN

Various studies on food consumption and pattern of communities have revealed a host of factors that could contribute towards the poor nutritional status of the children, as well as the nutritional well-being of the women. The low prevalence of breast-feeding, poor child feeding practices, and poor dietary pattern of households have been pointed out in various studies. These form important components of nutrition surveys carried out by the Institute described above. In addition, two specific studies in this area were recently completed.

Infant feeding study : knowledge and attitudes of selected pregnant women

The Division of Human Nutrition, in collaboration with the Ministry of Health, recently reported findings of a study on mothers' knowledge and attitudes towards infant feeding practices prior to delivery, conducted on a group of antenatal women attending clinics at two semi-urban health centres near Kuala Lumpur (Kandiah and Ooi, 1984). A total of 74 mothers in their third trimester of pregnancy were interviewed. Information collected included knowledge and attitude of the mothers towards breast feeding and supplementary feeding of their young children.

Comparative Food Consumption and Pattern in Selected Children New Villages, Malay Kampung and Indian Estates

The Division of Community Health of the Institute recently concluded a comparative health status survey among rural population living in kampungs, new villages and estates. A food consumption and food habits study was also carried out by the Division of Human Nutrition as part of this survey. Six communities in two districts, namely Ijok in

Kuala Selangor, and Kinta in Perak were studied. The food consumption study was conducted by interviews on selected households with the aid of a predesigned questionnaire that sought information on food pattern and consumption of households, infant and young child feeding practices, and food habits and beliefs of the communities. A total of 348 households were studied, representing 40% of the total households sampled for the overall health survey. Data collected are being analysed.

SPECIFIC NUTRIENT DEFICIENCIES

Aside from the general surveys into the nutritional status of communities described above, other studies have dealt with specific nutrient deficiencies in greater detail. Anaemia has been the most frequently studied problem in the country, and many studies deal with the problem as encountered among pregnant women. A review on the subject was recently published (Tee, 1985b). Iodine deficiency goitre is the other problem studied by the Institute. Although it is not a major nutritional problem in the country, high prevalence rates have been reported in certain endemic areas of Sarawak, Sabah and the northern part of Peninsular Malaysia.

Nutritional Anaemia in Pregnancy : A Study at the Maternity Hospital, Kuala Lumpur

A study recently concluded by the Divisions of Human Nutrition and Hematology reported on the prevalence and pattern of nutritional anaemia in the Maternity Hospital, Kuala Lumpur (Tee *et al*, 1984). A total of 309 pregnant women in their third trimester, of Malay, Chinese and Indian origin from the lower socio-economic strata were randomly selected for the study. Haematological indices (including Hb, PVC, MCHC, and TRBC), serum iron, transferrin saturation and ferritin, serum folate as well as protein and albumin were determined. Prevalence of anaemia amongst the three ethnic groups was studied in relation to birthweight of the infants and parity.

Endemic Goitre in Kedah

In an on-going study by the Division of Human Nutrition, the prevalence and aetiology of endemic goitre in seven villages in Kedah is being examined. The study is also aimed at monitoring the effects of regular distribution of iodised salt to selected families in the community. Four of the villages studied were in the remote areas, two of them near town areas, and one by the coast. A total of 982 people, representing 77% of the total population between ages 5 to 85 were examined. Thyroid glands were assessed clinically and graded. Blood was collected for estimations of T4, T3 and TSH by radioimmuno assay methods. Early morning urine samples were collected for iodine and thiocyanate estimations. Samples of soil and water were taken for iodine analysis. Enquiries were made for familial incidence and dietary habits to ascertain intake of iodine and for possible goitrogens. HLA (Human Leucocyte Antigen) studies were done on selected families in order to examine the genetic or familial occurrence of the disease. Iodised salt were given to several subjects and their iodine status closely monitored to determine the effectiveness of the treatment.

NUTRITION AND PARASITIC INFESTATION

Ascariasis, Trichuriasis and Malnutrition

This on-going study aims to : (a) examine the role of *Ascaris* and *Trichuris* in the 'causation' of growth retardation in children; (b) study the role of these helminths in protein deficiency. Carried out by the Divisions of Parasitology and Human Nutrition of IMR, the study has commenced in 1985. Second grade primary school children attending Tamil schools in Kuala Lumpur and Petaling Jaya have been selected for the study. The subjects have been blocked according to the intensity of worm infestations. This is

followed by random assignment of an equal number of subjects from each block to each of the treatments, i.e. anti-helminthic or placebo. The levels of intensities are then treated as distinct categories which will enable both between and within group comparisons. Anthelmintics will be administered three times, at the beginning of the study and at four-monthly intervals after that. The study is to end four months after the third and last anthelmintic or placebo administration. Various biochemical and anthropometric variables are measured before and at the appropriate time after initiation of the study.

EVALUATION OF NUTRITION INTERVENTION PROGRAMMES

Nutritional Impact of the School Supplementary Feeding Programme

Scheduled to be carried out over a two-year period, the study is aimed at evaluating the impact of the school feeding programme on the nutritional status of participating children. The Division of Human Nutrition of IMR and the Ministry of Education initiated the project in 1985, and have selected schools in two separate districts in Peninsular Malaysia for the study, namely Sepang in Selangor and Temerloh in Pahang. A group of 400 primary one school children receiving the food supplement, a cooked meal chosen from standardized menu, have been selected as the experimental group. As controls, another group of 200 children from comparable rural backgrounds in schools that are not participating in this feeding programme have been chosen. Nutritional status of the children are being monitored using clinical examination, anthropometric measurements, various nutritional biochemical parameters and dietary intake determinations. Other student characteristics that will be studied are scholarstic achievements of each child through assessment of school performance records and special mental function tests.

OVERNUTRITION

Coronary Heart Disease Risk Factor Survey

Studies into the ill-effects of overnutrition are increasing in prominence in the country. An area that has received greater attention by researchers is diet and cardiovascular disease. The Institute has been involved in studies in this field for some years. The recent publications of Chong (1981), Chong *et al* (1982a), Foo and Chong (1982), Chong and Ng (1985) and Chong (1986) are of relevance. A recent study initiated by the Division of Human Nutrition in 1982 is aimed at determining the prevalence of coronary risk factors such as hyperlipidemia, glucose intolerance, hyperuricaemia, obesity, undesirable lifestyles and hypertension amongst middle-aged executives in the city. Over 400 male volunteers in apparent good health, between 30–50 years, and holding executive positions in large firms and factories as well as Government Departments around Kuala Lumpur and Petaling Jaya have been studied. Interviews were conducted on the subjects for information on medical history and lifestyle. Weight, height and blood pressure were recorded. A fasting blood sample was collected for determination of serum lipids, glucose and uric acid. The study is scheduled for completion in 1986.

STUDIES ON FOOD COMPOSITION

Studies into the nutrient composition of Malaysian foods have been carried out for many years in the IMR. These activities took on a more systematic approach in the 80's with the initiation of a programme by the Division of Human Nutrition to arrive at a comprehensive, up-to-date food composition table for use in the country. This laboratory participated in the inaugural meeting for the formation of ASIAFOODS (Tee, 1985c) and was appointed the national focal point for this newly formed regional organization for cooperative acquisition and exchange of food composition data. Other studies of food composition include some food toxicants, and a major study into the nutritional properties of processed palm oil.

Compilation of a Malaysian Food Composition Table

The first phase of the project was to review all available reports on the composition of local foods to assess the situation regarding studies into nutrient composition of Malaysian foods (Tee, 1981). Data were also selected from these reports and compiled into a Preliminary Malaysian Food Composition Table, released for interim use in 1982 (Tee, 1982). Using this preliminary table as a guide and reference, systematic chemical analyses on local foods were carried out to fill in the gaps in this table, to update published values using improved methodologies, as well as to increase the types of foods analysed. The analysis programme has been carried out as a joint effort between the Division of Human Nutrition of this Institute, the Food Technology Division of MARDI, and the Faculty of Food Science and Technology of UPM. Results obtained from this programme, have been compiled and an up-dated version of the Preliminary Table published (Tee, 1985b).

The analysis programme is continuing, and the Department of Food Science and Nutrition of UKM has joined in this collaborative programme. Aside from raw foodstuffs, the programme has now taken on the analysis of cooked foods as well.

Nutrient Composition of Malaysian Fishes

As part of the overall project of compiling a Malaysian food table, a detailed study of the nutrient composition of locally available fishes was carried out. Duplicate samples of 50 species of marine fishes, from 31 families, commonly available in the local markets were studied for their nutrient composition. Moisture, protein, fat and ash were determined, from which carbohydrate and energy content were calculated. Five minerals, viz calcium, phosphorus, iron, sodium and potassium were analysed. The vitamins assayed were retinol and carotene, thiamine, riboflavin, niacin and ascorbic acid. Results of the study have been submitted for publication (Tee *et al.* in press).

As an extension to the study of marine fishes, nutrient composition of some fresh-water fishes are also being determined. Thus far, 14 species of the fishes have been analysed. The nutrients studied are the same as those reported for the marine fishes.

Nutritional Studies on Malaysian Processed Palm Oil

Processed palm oil is widely used locally for cooking and frying purposes and thus forms an important component of the Malaysian diet. It would thus be important to both manufacturers and consumers to understand fully the nutritional value of this oil. A number of studies of Malaysian processed palm oil have been initiated by the Division of Human Nutrition, in collaboration with PORIM in 1984. These studies, using rats, an experimental model, aim to : (a) evaluate the nutritive quality (digestibility, rate of absorption, feed efficiency and caloric availability) of refined palm oil and its fractionation products, palm olein and palm stearin; (b) study the effects of the feeding of palm olein and palm stearin which have been subjected to frying operations; (c) investigate the effects of a prolonged feeding of processed palm oil on blood biochemistry, platelet function and atherogenesis.

Studies on the nutritive quality of refined palm oil, palm olein, palm stearin and soybean oil in the white rat model have been completed. Evaluation of the safety of heated fats which contain 25% of polar compounds is currently underway.

Lead Content of Some Malaysian Foodstuffs

The Institute has, in recent years, placed greater emphasis on studies into food safety. Two recent reviews on some relevant toxicants have been published on the subject (Mat Isa Awang and Tee, 1984; Tee and Siti M. Shahid, 1984). A study on lead contamination in local foods was recently concluded.

Considerable amount of attention has been directed towards determining the levels of lead in foods and beverages, since these are important sources of lead exposure. However, there have been few studies into the extent of lead contamination of Malaysian

foods. The Division of Human Nutrition, IMR has recently completed a study of lead level in a variety of local foodstuffs. A total of 80 food items from 11 food groups were studied. Samples were analysed using the organic extraction and spectrophotometric procedure. Findings of the study have been submitted for publication (Siti M. Shahid *et al*, in press).

NUTRITION IN CHRONIC RENAL FAILURE

Nutritional and Immunological Assessment of Patients in Chronic Renal Failure

This study is a longitudinal assessment of the nutritional and immunological status of patients in chronic renal failure on continuous ambulatory peritoneal dialysis (CAPD). Started in 1984, this is a joint project between the Division of Human Nutrition of the Institute and the Institute of Nephrology of the General Hospital, Kuala Lumpur. Fifteen adult patients with end stage renal failure have been selected for the study and various baseline information collected, including : (a) medical evaluation and investigation with particular reference to determining residual renal function; (b) assessment of nutritional status by measurement of weight/height² ratio, arm muscle circumference, triceps skin-fold thickness, serum proteins, serum lipids and dietary intake; (c) measurement of immunological status by determining immunoglobulins and complement levels. The patients were then put on the CAPD programme and monitored longitudinally. Examinations were carried out at 1, 2 and 6 months after starting CAPD.

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